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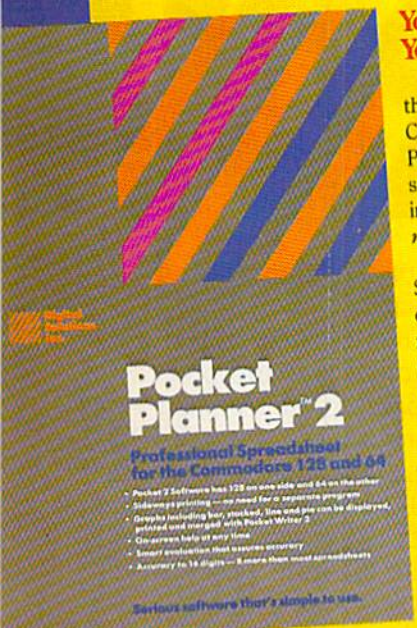
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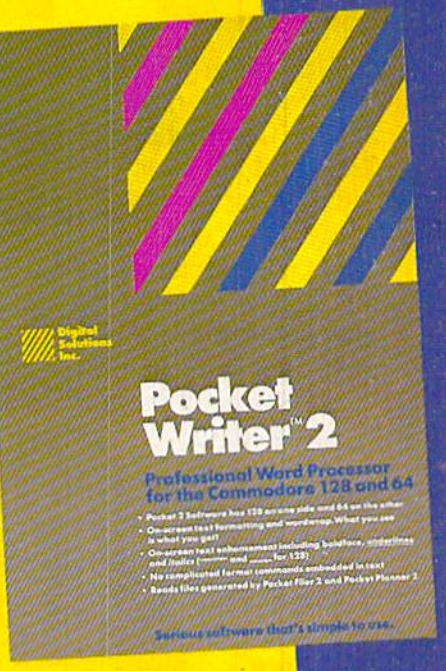
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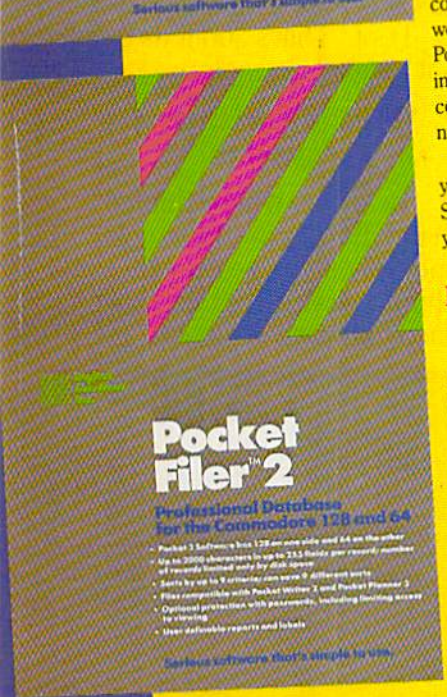
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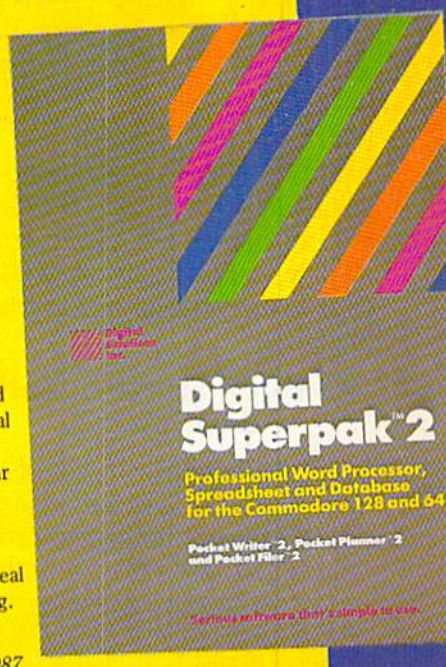
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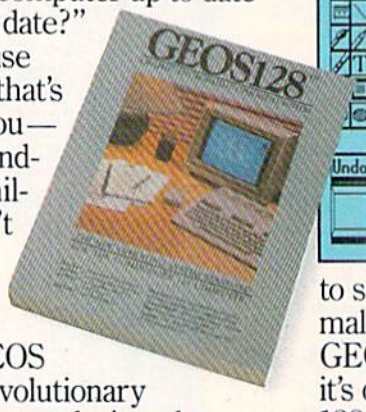
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IS YOUR 128 O
OR GROW

So there you are, furiously working away at your Commodore 128, thinking everything is just peachy, when all of a sudden, it hits you. That haunting, hollow, horrible question that every computer owner must inevitably face:

"Is my computer up to date —or out of date?"

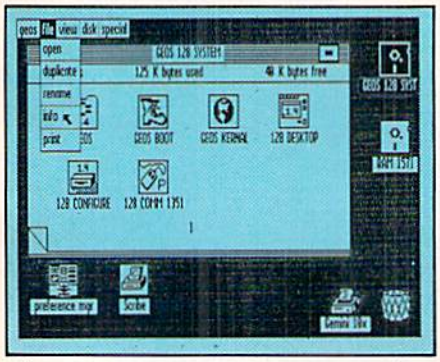
If you use GEOS 128, that's a question you—or your grandchildren's children—won't ever have to worry about.

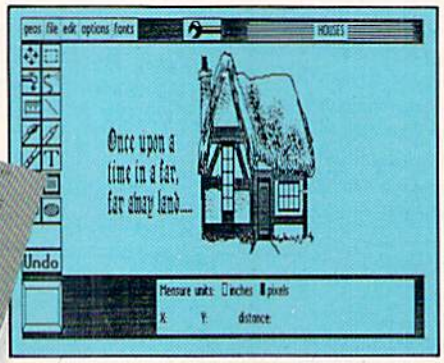


Because GEOS 128 is the revolutionary software system designed to push your hardware to new limits. Unleash its full power across a full 80 column screen. And expand its capabilities for years to come.

We should have installed disk brakes.

Loading up with GEOS turns your 128 into a mouse-driven maniac that loads, processes and saves everything up





to seven times faster than normal. Part of that's due to the GEOS diskTurbo, but most of it's due to the fact that GEOS 128 doesn't treat your 128 like a C64.

You see, by recognizing your machine as a 128, GEOS 128 operates at a full 2 MHz, instead of 1 MHz. So you get twice the speed. Twice the power. And since GEOS 128 also supports the quicker 1571 and 1581 double-sided disk drives—and the 1750 RAM expansion unit—there's no telling how much faster that puppy will fly.

Fast and slick with mouse or stick.

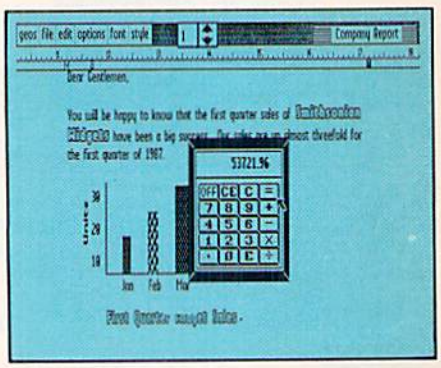
Using GEOS is ridiculously simple. All you need is a mouse or joystick, and a keen ability to point and click. Everything else is pretty much a matter of reading *menus* (a technical term for "little lists of things"), or selecting *icons* (a technical term for "little pictures of things"). It's sort of like talking in sign language.

For example, if you want a document for word-processing, you point to the icon that looks like a stack of papers. Click your mouse and bingo—you're in the file. If you want to erase the file, you drag the stack of papers over the little waste basket and click your mouse.

Poof. That's about as tough as it gets.

Working within the system.

Learning where things are in GEOS is pretty simple, especially if you've ever sat behind a desk. Because that's exactly how we designed



GEOS 128.

You keep your documents and graphics in files; everything else stays right on the desktop: the notepad, the calculator—there's even an alarm clock. In fact, the only thing our desktop

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GROWING UP ING OLD?

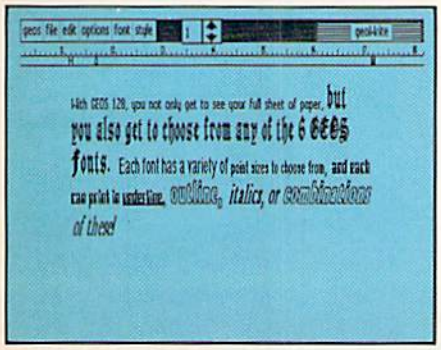
Now, we realize that's a lot to pack into one GEOS package. But as long as we're packing it in, we might as well let you know something else: There's more.

doesn't have is a place to put your feet when the boss isn't around.

But not only does GEOS give you a place to write and draw, it actually helps you write and draw better. Because unlike your basic office model, our desktop comes with geoWrite and geoPaint built right in.

With geoWrite, your way with words leaves people speechless, as they watch you effortlessly cut, paste and move entire blocks of copy anywhere on the page. And since geoWrite comes with different fonts in a variety of styles and sizes, your documents become even more dazzling.

With geoPaint, you can draw designs. Create with colors. And tantalize your tastes with tons of tones and textures. Invert, rotate or mirror images.



Then place them wherever you want: either in your geoWrite document, or in your GEOS Photo Album for later use.

But no matter what kind of masterpiece you create, you always get to view it on a beautiful, 80 column-wide screen. No more scrolling left to right. With GEOS 128, what you see really is what you get.



The more you put into your system, the more you get out of it.

Of course, when we say that GEOS 128 has far-reaching implications, we're not kidding around. Every GEOS 128 package includes free QuantumLink software, which hooks you (via modem) into a nationwide network of Commodore people just like you. There's even a service that will Laserprint your documents for you.

The older it gets the better it looks.

It's true. Because there are always new GEOS applications just waiting to jump off the shelves and into your 128. Packages like geoDex and geoFile, for keeping addresses and data straight. Fontpack and Writer's Workshop, for tweaking text with that special, extra touch. And, of course, geoCalc, a full-featured graphics spreadsheet for all you number freaks.

They're just the first in a long line of GEOS applications that are constantly being developed to keep your 128 up to date.

So if you'd rather have your 128 grow up than grow old, load up with GEOS. You owe it to yourself. You owe it to your 128.

Heck, you owe it to your grandchildren.

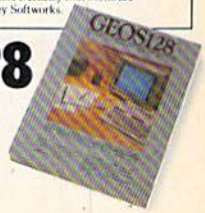
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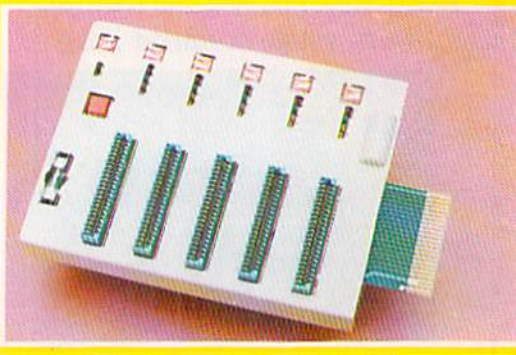
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Make sure your gifts will be well received by following a few basic shopping guidelines.

COMMODORE CLINIC *by Jim and Ellen Strasma* 26
Highlights of 1987 from Commodore Clinic, our column that answers readers' questions on hardware, software, programming and other computing problems.

MAGIC *by Jim Borden* 36
Two hundred of the best 1987 hints and tips from Magic, the original column on performing Commodore computing wizardry.

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***RUN*'S 1988 CALENDAR** 48A
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COMMODORE SERVICE CENTERS 97
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RUNning Ruminations

Whether you're a beginner or an expert, a C-64 or C-128 user, this Fourth Annual Special Issue holds a lot in store for you.

Special Issue: 1988

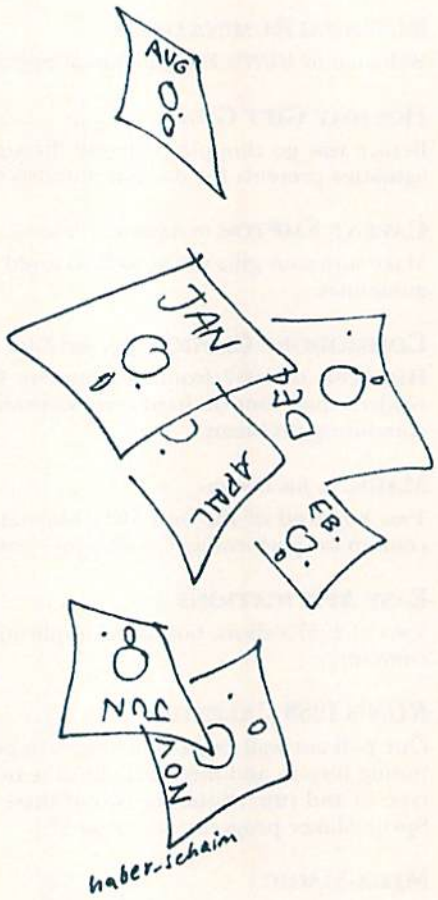
Without any hesitation at all, I can tell you that *RUN*'s Fourth Annual Special Issue is our best ever. But, as the saying goes, the proof of the pudding is in the eating. So, let's sample a taste of what this issue contains:

—Holiday Shopper's Guide. For those who are looking for a computing gift for themselves or a friend or relative, this buyer's guide—just in time for the holiday shopping season—offers many ideas. Everything from printers to programs to paperbacks—all organized by product category and including the complete addresses of the manufacturers.

While making no claims to be an all-inclusive gift guide, this section contains scores of products—along with a description of each one—for your Commodore. Inclusion of a product in this buyer's guide does not represent an endorsement of that product; rather, it's a list of what's available and noteworthy. To help you choose what's best for you, we have also included tips on how to buy products in the Commodore marketplace and guidelines on how much to spend for the kind of product you're looking for.

—The Best of Commodore Clinic. Got a computing problem that you can't seem to resolve? Chances are that the solution is here in this collection of Commodore Clinic answers to questions most troubling *RUN* readers. Computer whiz Jim Strasma offers his expert advice concerning software availability, compatibility, hardware modifications, applications, programming, new products and more.

—Magic Tricks. No *RUN* Special Issue would be complete without a collection of Magic, *RUN*'s popular column of useful tricks and tips. One of the reasons for its popularity is the immediacy of these short routines, programming techniques, keyboard entry shortcuts and general computing hints. No long program listings to type in, no lengthy documentation or instructions to read. You'll discover information on how to do things that you thought weren't possible. You'll witness the results right before your eyes. Now, that's magic.



Compiled by noted Commodore programmer, Jim Borden, the tricks are organized by subject matter. They are written by Commodore users—just like you—who want to share their practical, down-to-earth knowledge. So you can bet the tricks are useful and will help you extend the enjoyment of your Commodore computer, as well as advance your computing skills.

You'll be impressed by the skill and cleverness of the tricks, which were selected from the 1987 issues of *RUN*. With over 200 tricks in this issue, I'll wager that there'll be dozens you can use immediately and dozens more that you'll want to come back to at a later date.

—Computing Calendar. Over the years, the *RUN* pull-out programmer's wall chart has become a Special Issue trademark. This year we're bringing our readers something new—a pull-out computer calendar that features important dates in the annals of personal computing and significant milestones in the history of Commodore computing. The front and back covers of the calendar feature colorful artwork generated on a C-64 by noted Commodore artist Wayne Schmidt. In addition, the calendar features entertaining "seasonal" program listings that will help you get into the spirit of the season—Spring Scene, Summer Celebration and Fall Holidays, the last two requiring the useful Sprite Controller program included in the Special Issue.

—Utilities & Applications. This issue also contains a number of easy-to-type-in utility and application programs that you'll want to save and add to your software library.

—Guide to Service Centers. Where can you turn for help when you have a problem with your computer equipment? It's reassuring to know that you're not alone—there's someone close by who can help. This official Commodore service center listing, organized alphabetically by city within each state, will tell you where to take your ailing computer for repair.

As you can see, this year's issue will be many things to many different people, and we feel we're more than justified in calling this issue "special." This annual issue is the result of a lot of hard work by a lot of talented people. In previous years, the Special Issue has been a prized addition to the collection of Commodore computerists. And this year is no exception.

We have retained the best features of previous years and combined them with some new features that make this issue the best yet. See if you don't agree.

Dennis Brisson

Dennis Brisson
Editor-in-Chief

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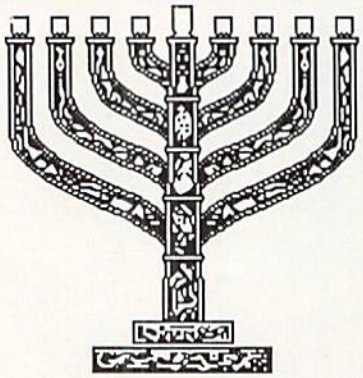
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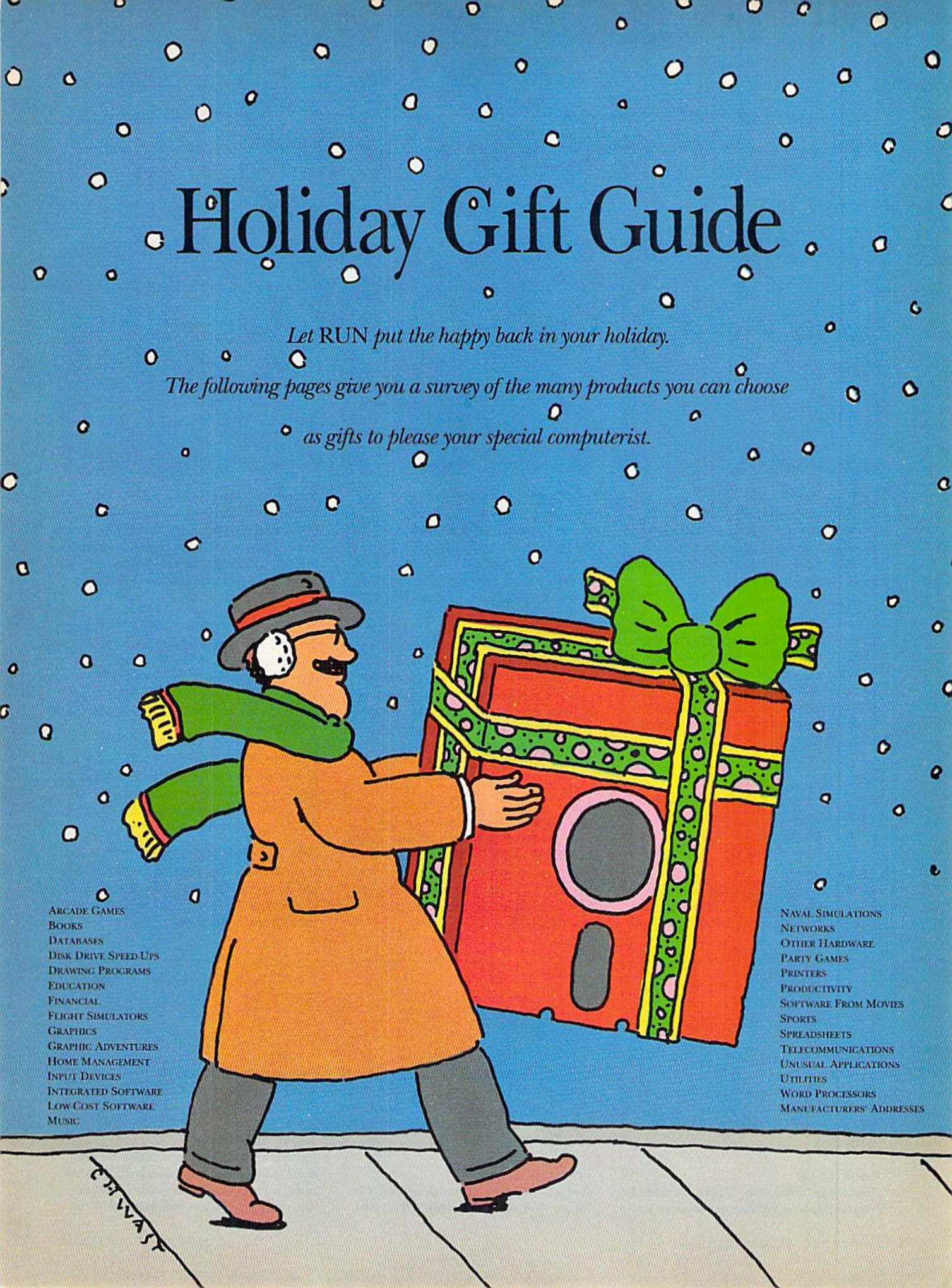
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Holiday Gift Guide

Let RUN *put the happy back in your holiday.*

The following pages give you a survey of the many products you can choose as gifts to please your special computerist.

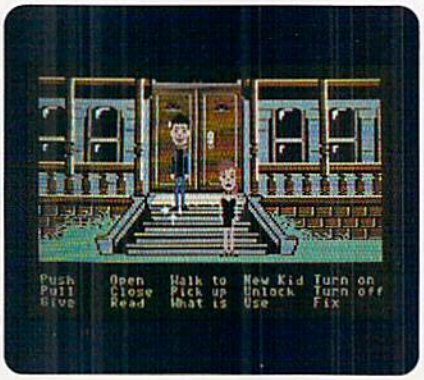


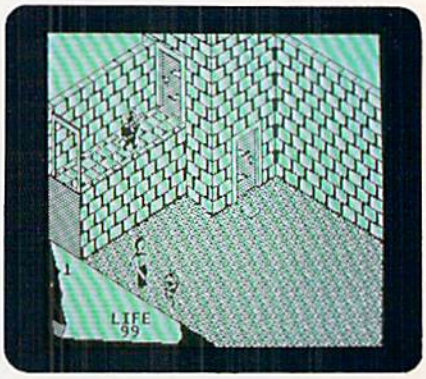
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Unusual Applications
Utilities
Word Processors
Manufacturers' Addresses



ARCADE GAMES







Control the Action

Accolade's Comics is an interactive comic book, whose direction you control yourself. The comic lets you choose between two themes and dozens of story lines that you can play in any of eight arcade games. Accolade; C-64; $39.95.

What a Prize!

Defender of the Crown is a tale of brave knights whose days are filled with daring jousts, sword fights and enemy castles in seige. To save England, your skills as swordsman and military leader will be tested. Should you succeed, you'll win the Crown of England and the love of many a beautiful damsel. Mindscape; C-64; $34.95.

Weird Game

In *Bop 'n Rumble*, your mission is to save all the grannies from the vicious elements that have gone wild in the city. Mindscape; C-64; $29.95.

Al-eeeeeeee!

You're *The Last Ninja* and the last hope to recapture the sacred scrolls that contain the secret of Ninja power. Activision; C-64; $34.95.

What's GOING on?

In Lucasfilm's *Maniac Mansion*, you *think* your goal is to rescue a friend who was kidnapped by a weird family (think of them as your neighbors; it adds to the fun) and held captive in their mansion, but as you direct a trio of teenagers to him, you discover deeper and stranger plots. Activision; C-64; $34.95.

Save Earth from the Demoids

Power, a 22nd-century galactic war game, pits you against the hostile Demoid Empire that occupies Earth's vital source of power, the Mitonium conversion plant. You must successfully complete seven levels of play before you can infiltrate the plant and disable the converter before the Demoids destroy it. Accolade; C-64; $14.95.

Burp

When things get dull around the house, take a trip to the stars in *Star Trek: The Promethean Prophecy*. You'll occupy youself with contacting an alien culture and searching their planet for a food supply for your starving crew. It's a good game to play a few hours before supper time. Simon & Schuster Software; C-64; $32.95.

Save Dan Dare's Friends

You and your friends compete against a 25-minute game clock to guide *Dan Dare: Pilot of the Future* through four areas to rescue his friends Digby and Professor Peabody, who are imprisoned on a deadly atomic asteroid hurtling toward Earth. Electronic Arts; C-64; $19.95.

Computer Board Game

The object of *Robot Rascals* is for you and up to three of your friends to maneuver your robots around the planet Laustenfownd in search of the objects matching those on the cards you hold in your hands. The winner is the first to find all the objects and return home. Electronic Arts; C-64; $39.95.

For the Kids

A series dedicated to the 10–14 year old gamer, Maxx-Out has titles like *Spy vs Spy III: Arctic Antics, Boulder Dash Construction Set* and *Rad Warrior*. Epyx; C-64; $24.95.

Someone Get the Lights

In *Fairlight*, you are Isvar the Unknown, who must penetrate the secrets of the dungeons of Fairlight to free the sorcerer trapped within and recover the lost Book of Light. Mindscape; C-64; $29.95.

BOOKS

Play 35 Games

Written in Basic 7.0, the program listings in *35 Amazing Games for Your C-128* offer everything from arcade action to educational fun. HP Books; C-128; $9.95.

Look It Up

The 656-page *Commodore 128 Reference Guide for Programmers* is for beginners and advanced programmers both, covering Basic, assembly language, 40- and 80-column text programming, the operating system, CP/M, DOS, sprite animation, input devices and memory maps. Howard W. Sams & Co.; softcover; $19.95.

Tricks and Tips

Save time and add to your computing skills with *The Big Tip Book for the C-64/64C/128*. Its 192 pages of helpful hints and useful shortcuts is for everyone, from beginners to advanced programmers. Bantam Books; $16.95.

Fix it Yourself

Someone had the good idea to publish *The Brady Guide to Microcomputer Troubleshooting & Maintenance*, a step-by-step problem-solver and maintenance manual available in trade-paperback format.

ILLUSTRATED BY SEYMOUR CHWAST



DATABASES

This guide could save you weeks—possibly months—waiting for your computer or peripherals to get back from the repair shop by showing you how to perform routine maintenance and money-saving repairs yourself. Prentice Hall Press; any computer; $17.95.

Music, Music, Music

There are enough music software packages in *Coda*, the 1987 edition, to start your own Abbey Road studio. The 160-page software music catalog includes such categories as Fun & Entertainment, Learning & Teaching, Sequencing & Recording, Music Printing, Voice Librarians, Sound Libraries and Programming Aids. Wenger Corp.; C-64 and C-128; $4.

Learn to Type

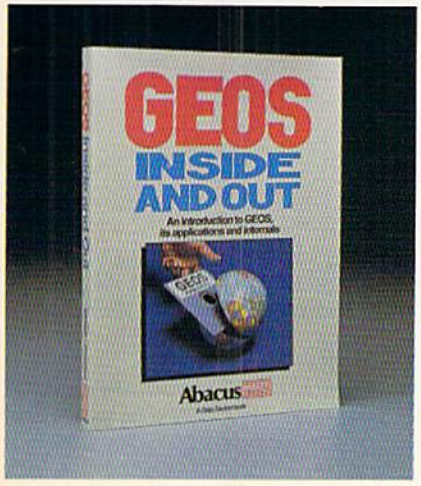
Kids Can Type, Too! contains 22 typing lessons for the 8–12-year-old in your family to help them zip through their homework assignments and type in all those program listings in *RUN*. The book has stiff covers so it can stand erect on a desk for easy viewing. Barron's; any computer; $6.95.

By the Guru Himself

Machine Language for the C-64, 128 and Other Commodore Computers, a 377-page tutorial by the Commodore guru, Jim Butterfield, helps you gain speed, versatility and an understanding of computers in general. Prentice Hall Press; $14.95.

GEOS Fantasia

GEOS Inside and Out, for beginners and seasoned computer users, not only shows you how to use GEOS, but also how to add your own applications. And it contains the listing for the FileMaster program so that you can convert your programs to GEOS format and create icons for them. Abacus; $19.95.



Fleet Systems Database

The *Fleet Filer* database is compatible with the Fleet Systems 2 and 3 word processors. The package has both an 80-column C-128 database and a C-64 database, which have identical menus, so that you can use files created by the C-64 version in the C-128 version and vice versa. Professional Software, Inc.; C-64 and C-128; $39.95.

Vizastar 128

Vizastar 128 is an 80-column spreadsheet/database combination, with the database an accessory to the spreadsheet, so that the two should really be used in conjunction. It's menu-driven and very fast. Progressive Peripherals & Software; C-128; $89.95.

Timeworks' Timesaver

Data Manager 128 is a screen-formatted, 80-column database that uses drop-down menus for quick and easy access to options and modes. Timeworks; C-128; $69.95.

Super Database

Superbase 128, with well-written documentation, lets you access full-page help screens that display anything you might need to know about performing a particular procedure. It operates in a flexible full-screen format, and once you've designed a layout, all functions are accessed from two main menus. Progressive Peripherals & Software; C-64 and C-128; $99.95.

Consult The Consulant

The Consultant has a large, 186-page guide that leads you slowly through the learning process and provides an easy explanation of the three-step procedure for writing records to disk as sequential files, so they can be read into your favorite word processor. It performs the four basic math functions and handles field tabulations at the end of numeric fields, with up to 36 tabulations per report. Electronic Arts; C-64 and C-128; $59.95.

Need More Room?

With *Pocket Filer 2*, you can activate the numeric keypad and other C-128 keys in C-64 mode and use it with the 1351 proportional mouse and with the Commodore 1700 and 1750 RAM expanders as RAM disks, providing over 500 and 2000 blocks of storage, respectively. You can enter up to 255 fields per record, containing a maximum of 2000 characters and sort up to nine fields. Digital Solutions, Inc.; C-64 and C-128; $59.95.

DISK DRIVE SPEED-UPS

For the Fast Times

Fast Load loads any software up to five times faster than normal, loads disks with two keystrokes, copies single files, sends commands to the disk drive and lists directories. Includes a full assembly language monitor. Epyx; C-64 and C-128; $39.95.

Beyond the Load-Speed Barrier

Mach 5 includes a fast-loader cartridge, which loads programs up to 500 percent faster; single-keystroke execution of many commands; and disk-directory listing without disturbing the program in memory. Access Software, Inc.; C-128; $34.95.

DRAWING PROGRAMS

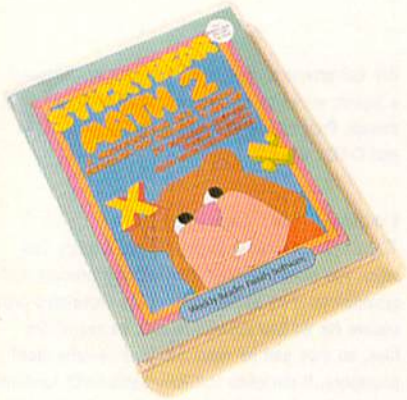


Draw Free-Hand

Using Inkwell's new light pen (purchase separately), a mouse, joystick or KoalaPad, you can use *Flexidraw* (latest version 5.5) to create graphics freehand or draft diagrams, plans, graphs; then link picture screens to form larger drawings. The package also lets you add text to your drawings. Inkwell Systems; C-64; $34.95. ►



EDUCATION



Drill and Practice

Stickybear Math 2, the sequel to Stickybear Math 1, offers drill and practice in multiplication and division and is recommended for ages seven and up. The program automatically adjusts its difficulty level based on the success the child has had with previous problems. Weekly Reader Family Software; C-64; $29.95.

Take a Trip

Where in the USA is Carmen Sandiego? is a mystery-exploring game wherein you must follow Carmen's group around the U.S. Contains a map of the United States and Fodor's travelguide. Broderbund; C-64; $39.95.

Don't Embarrass Yourself

With *RSVP* you explore a wide variety of common and uncommon social situations at home and abroad. You test and expand your knowledge of manners either through gameplay and simulation or through simple question-and-answer sessions on a choice of topics. Blue Lion Software; C-64; $29.95.

Who Besides Professors Read Term Papers?

Term Paper Writer turns your collection of facts into an organized document, with notetaking, outlining, writing and search functions to help you. Activision; C-128; $49.95.



Where's the Best School?

The Perfect College, with a database on over 1650 accredited four-year U.S. colleges and universities, lets you choose up to 26 college-selection criteria, including cost, location, majors, student/faculty ratio and overall competitiveness. Mindscape; C-64; $19.95.

FINANCIAL

Balance Your Books

Dome Accounting by Computer, closely modeled after the popular Dome Simplified Bookkeeping System, features easy-to-set-up procedures, automatic updating, desk accessories and reports. Great American Software; C-64; $39.95.

Keep Track of Your Finances

J.K. Lasser's *Your Money Manager*, a home accounting and small-business tool to organize and keep financial records, has transaction windows to record checks, deposits and payments. A calculator and graphs are also available. Simon & Schuster Software; C-64; $69.95.

Back to the Futures

Become a daring speculator in the markets of your choice in the money game, *The Financial Time Machine*. You can lose your shirt alone or play it with up to three of your friends (misery loves company), choosing any five-year period between 1930 and 1984, betting from $25,000 to $100,000. You play it like the real thing: The game even starts off with the running of a ticker tape and news events that can influence prices. Good luck. Insight; C-64; $34.95.

Your Financial Future

Sylvia Porter's *Your Personal Financial Planner* for the C-128 leads you step by step through a series of questions to help you develop comprehensive financial plans to determine the best financial moves for your career, marital status, children, savings, life insurance, investments, life-style and retirement, and to plan ahead. Timeworks; C-128; $69.95.

FLIGHT SIMULATORS

Pilot a Hellcopter

Gunship features not only the skill and action of low-level helicopter flight, but also simulates your career as a helicopter pilot. MicroProse; C-64; $34.95.

Jet Combat

Jet simulates the land-based F-16 fighting Falcon and a carrier-based F-18 Hornet. You can test your skills under different combat conditions. SubLogic; C-64; $39.95.

Be Careful!

Pilot the powerful Stealth Starfighter on a mission to destroy the Dark Tower and with it the Merciless Council of Nine. But be careful. The sky is alive with warp fighters and the landscape bristles with radar towers. Robot-controlled photon tanks and laser artillery surround you. *Stealth* has 3-D graphics effects, flight and battle sounds and five difficulty levels. Broderbund Software; C-64; $29.95.

Go to the Moon

Become an astronaut or a mission control specialist in *Apollo 18: Mission to the Moon* as you re-create any one of the moon missions of the '60s. Accolade; C-64; $29.95.



GRAPHICS

Add More Graphics

Graphics Integrator 2 converts picture formats among any of the popular graphics packages, adds pictures to your word processor and creates slide shows. Inkwell Systems; C-64; $29.95.

Pretty Pictures

With *Basic 8.0*, you can produce resolutions of 640 × 200 pixels in monochrome and 640 × 192 in color without additional hardware. The package adds over 50 new graphics commands to your C-128. An icon-based, desktop utility gives you access to your Basic 8.0 creations. Patech Software; C-128; $39.95.

Bestow Awards

AwardWare, an awards-generation program, designs and prints customized certificates, awards, announcements, stationery and memos, as well as checks, coupons and tickets. Hi-Tech Expressions; C-64; $14.95.

Comic Strip Artist

Create with Garfield—Deluxe Edition, for designing and printing original Garfield cartoons, offers over 200 pieces of artwork, different typefaces for captions and stories and the capability to print in color. Educational use in terms of encouraging writing and artistic skills. DLM; C-64; $39.95.

GRAPHIC ADVENTURES

Find a Leather Scroll

Legacy of the Ancients transports you to the world of Tarmalon, where you embark on a noble quest to retrieve the lost Wizard's Compendium, a leather scroll with evil powers. You pick your own character attributes such as intelligence, dexterity and charisma and then prove your mettle in five action games and two casino games before you go on your search. Electronic Arts; C-64; $29.95.

Escape from an Alien Planet

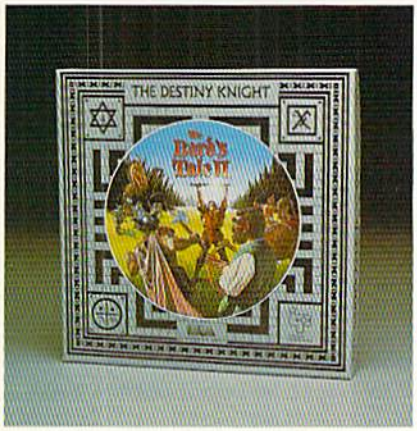
In *Mercenary*, you are an intergalactic brigand for hire, and your ship has crash-landed on the planet Targ. To get another ship and leave the planet, you'll have to ally yourself with the native Palyars against the invading Mechanoids. Datasoft; C-64; $29.95.

Having a Wonderful Time—Wish You Were Here

In *Trinity*, the last day of your vacation in London is also the first day of World War III. Only seconds remain until the city—and you—are vaporized by an H-bomb, unless you escape to a secret universe, a plane between fantasy and reality, where every atomic explosion is mysteriously connected. Infocom; C-64; $34.95.

Desert Rat

Desert Fox, a combat simulation and strategy game, contains five arcade-style combat scenarios such as aerial combat, tank battles and tactical maneuvers, which you encounter at random as you defend the allied supply depots from Rommel's firepower. Accolade; C-64; $14.95.



For D & D Fans

The Bard's Tale II: The Destiny Knight combines the elements of traditional Dungeons and Dragons role-playing games, a starter dungeon where players can quickly gain experience points and "Snare of Death" puzzle rooms that must be solved if your band of adventurers is to get out alive. Electronic Arts; C-64; $39.95.

Explore a Mythical Land

The Pawn takes place in the mythical land of Kerovnia. Have fun using the program's powerful parser, which lets you input complex instructions as you explore the kingdom. Firebird; C-64; $39.95.

How Does It Feel to be Wanted?

In *Borrowed Time*, someone wants you dead, and, as Sam Marlow, PI, you have less than a day to find out who. You control the PI's actions while the suspects move independently. Activision; C-64; $29.95.

HOME HELPER

Recipes from the Stars

The Celebrity Cookbook features gourmet recipes from such entertainers as Frank Sinatra, Bob Hope and Shirley MacLaine. You can also write your own cookbook. Merrill Ward; C-64; $29.99.

INPUT DEVICES

Smart Mouse

Commodore's true proportional *1351* mouse measures the distance it's travelled, remembers the distance and direction and passes the information along to your computer without interrupting other program tasks, and you can use it with GEOS. Commodore Business Machines; any computer; $49.95.

Reach out and Light Up!

The newest light pen available for graphics work is the *184-C*. It features tri-lobular design and two tough-surface switches. Inkwell Systems; C-64; $59.95.

Light on the Subject

The Tech Sketch *LP10* light pen includes a light-pen-driven color paint program. Tech Sketch; C-64; $49.95.

Perfect Fit

Designed to fit in the palm of your right hand, the *500XJ* joystick fire-buttons are positioned for index-finger control. Epyx; C-64 and C-128; $19.95.

Off We Go

The *MicroFlyte* joystick, for Sublogic's Flight Simulator II, controls centering on both axes, with little backlash and more precise control. The large but lightweight box includes pushbuttons to increase or decrease your engine throttle and two buttons to control the movements of your flaps. Microcube Corp.; C-64; $59.95.

Greater GEOS Icon Control

IconTroller, a joystick-type unit, manipulates the GEOS operating system's icons. It mounts onto the keyboard and has a feed-through jack to connect a joystick or mouse. Suncom; C-64 and C-128; $19.99. ►



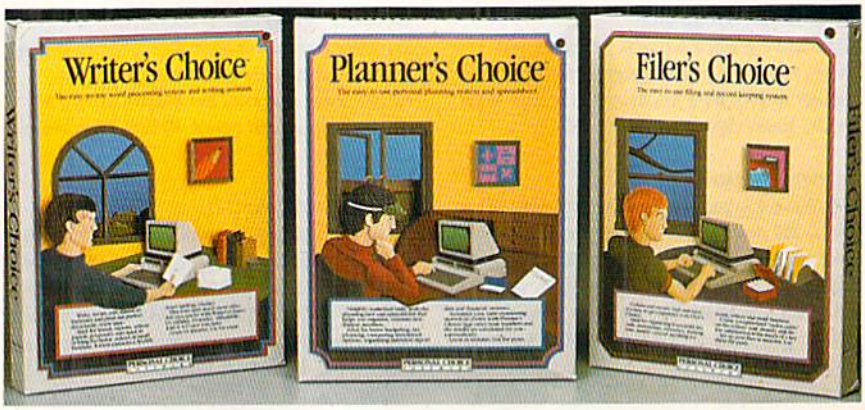
INTEGRATED SOFTWARE

Pick Pocket

Pocket Writer 2, *Pocket Filer 2* and *Pocket Planner 2*, which make up the Pocket Series, can be used independently as well as together. You can load numeric data from the database into the cells of the spreadsheet for use in calculations and what-if projections. The word processor sorts lists of words or numbers alphabetically or numerically in ascending or descending order and displays text lines in either 25 standard or 50 half-height text lines on screen at once in 80-Column mode. Digital Solutions; C-128; $59.95 each, $99.95 Digital Superpak.

Information Processor

Vizastar 128 is an information-processing system offering a spreadsheet, programmable macros, worksheet, windows and graphics to let you create bar and pie charts. Progressive Peripherals & Software; C-128; $89.95.



Collect Them All

The Personal Choice Collection is a series of productivity tools, comprising a word processor with a 50,000-word spelling checker, a filing and record-keeping system, and a personal planning and spreadsheet system. Activision; C-64 and C-128; $39.95 each/$99.95 set.

LOW-COST SOFTWARE

Stay Alive

In *Sanxion*, you and your friends battle alien foes in a high-speed aircraft. Skillful maneuvers are needed to keep you alive through 20 levels of 3-D landscapes and waves of attackers. Electronic Arts; C-64; $19.95.

Can You Survive 200 Attacks?

Delta Patrol involves you in an adventure through the Delta sector, where you'll race through more than 200 alien attack waves in over 50 environments. Electronic Arts; C-64; $19.95.

Starfighter Jet Pilot

Sigma 7, with seven levels of difficulty, each with three levels of play, features you as the pilot of a starfighter jet who must prevent the completion by evil aliens of Sigma 7, a powerful interstellar battle station. Accolade; C-64; $14.95.

Mad-Men

In *Spy vs Spy I: The Embassy Espionage Mission*, you and a friend must compete to grab the top-secret briefcase that contains four items and get away. In *Spy vs Spy II: The Island Caper*, you are in search of buried missile parts on an exotic tropical island. Accolade; C-64; $14.95 each.

Take It Easy

Easy Working Software, a series of integrated software, includes a word processor with standard editing features; a filer, which stores, selects and reports information; and a planner, which creates spreadsheets for budgeting, tax calculations, expense reports, financial statements and other applications. Spinnaker; C-64; $9.95 each.

MUSIC

At Your Fingertips

With *The Music Shop*, you can compose, edit, save, print and play music, using standard musical notation, or play and rearrange dozens of pieces included in the package. Music is displayed in a page-by-page format, so no scrolling is necessary. Whole to 32nd notes, rests, eight-time signatures, triplets, ties and octave-up features and first and second endings are at your command. You can select preset instrument sounds and print sheet music. Broderbund Software; C-64; $44.95.

NAVAL SIMULATIONS



Avast, Maties!

In *Pirates!*, you and your friends play buccaneers, plundering ports and ships throughout the Caribbean to build your reputations and seize fortunes. MicroProse; C-64; $39.95.

Down Under

As commander of a WWII fleet-class submarine that patrols the Atlantic and Pacific theatres in *Up Periscope!*, you relive 14 historical situations or hunt for enemy craft. ActionSoft; C-64; $29.95.



NETWORKS

Log On

CompuServe, the largest information network in the country, provides you with news, sports, aviation and weather reports; newsletters from manufacturers; forums and clubs for interacting with people from around the world; electronic mail; games; and even a CB simulator for live chatting with others. CompuServe; $39 to join, $12.50/hour for 1200-baud access, $6/hour for 300-baud access.

Encyclopedic

Delphi not only has its own encyclopedia, but sophisticated online research libraries as well. You can send electronic and U.S. mail, and its GlobaLink service has professionals to translate your text files to a foreign language, including German, Italian and French, and then send them anywhere in the world. General Videotex Corp.; $49 to join, $17/hour daytime, $7/hour evenings and weekends.

I Screen of GEnie

GEnie has one of the largest databases of Commodore public domain software available on any network. It claims to add over 1000 new Commodore programs to its downloading databases each month. Its Flagship Commodore RoundTable draws many experienced C-64 and C-128 users. Other offerings include a CB simulator for live chatting; electronic mail; a travel service; home shopping; the Grolier's encyclopedia; financial services; and multiplayer games. General Electric Information Services Co.; $18 to join, $5/hour non-prime-time, $35/hour prime-time.

Party Line

PlayNet is devoted to socializing and game playing. It was developed for Commodore owners, with Commodore forums for you to join. PlayNet; $19.95 to join, $12/month for up to four hours online time, beyond which you pay $2.75/hour. Open only at night and on weekends.

Real People

American PeopleLink is a text-based social and game-playing network open during prime and non-prime-time hours. American PeopleLink; $15 to join, $4.95/hour non-prime-time access, $11.95 (300 baud) and $12.95 (1200 baud) for prime-time access.

Link Up

QuantumLink, designed for Commodore users, offers dozens of programming clubs and thousands of public domain programs for downloading, news and information services, weather updates, online shopping, multiplayer games and educational services. You can also download and preview commercial software. QuantumLink Computer Services; $9.95/month, plus $3.60/hour for certain "Plus" services.

Go to The Source

The Source offers its services to businesses and professionals, with up-to-the-minute commodity prices, news and commentary; continuous updates on prices from six domestic and three overseas exchanges; and 200 news items per day, covering the weather, the White House and worldwide developments affecting commodities. Its Investext investment service provides access to 38 international investment banking firms. Subscribers can use The Source's service, MicroSearch, giving access to thousands of article abstracts from over 100 computer-industry publications. The Source also has computer clubs, including one for Commodore users. The Source; $49 to join, $8/hour (300 baud) non-prime-time access and $21/hour (300 baud) during daytime hours, $10 (1200 baud) non-prime-time access and $25 (1200 baud) during the day.

OTHER HARDWARE

The Quick Brown Box

Double Quick Brown Box has a switch to let you toggle between modes. The software included in the package lets you load the cartridge with a group of programs of your own choice. Brown Boxes, Inc.; C-64 and C-128; $69.

Programmer's Development System

The *Lt. Kernal* is a true programmer's development system, using its own interface and custom DOS. In 64 mode, it loads and saves about 65 times faster than a 1541, and in 128 mode, 135 times faster. It can be partitioned into ten logical units, with up to 15 separate user areas in each. An extended DOS provides over 40 commands, including an "oops" for saving a file you've just scratched. Xetec; C-64 and C-128; $899.95.

Tiny Drive Does a Big Job

The 3½-inch disk drive is rapidly becoming the standard in the computer industry, and Commodore has joined the club. Its *1581* drive weighs about three pounds and measures a mere 8½ by 5 by 2½ inches. It requires double-sided disks, which are completely enclosed in a rigid plastic case that protects them from some environmental damage that would ruin a 5¼-inch floppy. The drive has a whopping 808K of storage, and it can handle many more directories than either the 1541 or 1571. Commodore Business Machines; C-64 and C-128; $249.95.

Talk Back

Hearsay 1000 is a voice-recognition synthesis system that plugs into your computer so you can talk to your software and your software can talk back to you. Hearsay; compatible with most commercial software; $79.95.

More Memory

The *1764* RAM Expander boosts your C-64's available memory by 256K, to a grand total of 340K. You can leave it permanently plugged into your 64's expansion port, since it doesn't interfere with any program or hardware operations. Commodore Business Machines; C-64; $149.

PARTY GAMES

What Do You Know?

Mind Pursuit is a test of intelligence, knowledge and trivia and includes thousands of questions for both adults and children in the realms of science and nature, history and geography, sports, culture and entertainment. Your goal is to bury the opposition beneath an avalanche of points, in a race to the finish, complete with shortcuts, free-move bonus squares and tokens. Datasoft; C-64; $29.95.

For TV Game Show Junkies

Wheel of Fortune, *Family Feud* and *Jeopardy* are based on the game shows of the same names. ShareData Inc.; C-64; $9.99 each.

Trivial Trivia

If you enjoy playing trivia games, look into Interstel's *Quizam!*, because it genuinely depends on the computer to select and display questions, evaluate your answers, keep a running score for each player, display a game board and provide musical accom- ►



PRINTERS

paniment to game play. You can play on any of eight game boards at any of eight levels of difficulty, with over 2000 questions in two categories, Fun Facts and School Days. Electronic Arts; C-64; $29.95.

That's Not a Word!

As in the original game of Scrabble, players build words using letters, each with a numerical value. The wordsmith with the highest number total wins the game. Computer *Scrabble* includes a playing vocabulary of about 12,000 words and a built-in spelling checker to resolve arguments. Electronic Arts; C-64; $32.95.

Murder, Anyone?

In *Make Your Own Murder Party*, players are invited to host their own evening of dinner and amateur sleuthing. You select one of two scenarios. In one scenario, a group of friends get together to reminisce about their college days in the '60s, and you try to figure whodunit. In the other scenario, members of a rich and powerful family are the suspects. As your party unfolds, clues are revealed until the murderer is caught. Electronic Arts; C-64; $39.95.



An Improvement

Designed to interface to Commodore computers with a special Star Micronics cartridge, the *NL-10* possesses as many print features as you're likely to find on any low-end dot matrix printer. It's been improved with a cartridge ribbon instead of a spool ribbon and a detachable paper guide for single-feed forms. In addition, the removable tractor feed mechanism has been replaced by a non-removable, adjustable tractor unit, which reduces wasted paper by pushing continuous-feed paper through the printer. Star Micronics; C-64 and C-128; $379 (includes interface).

Fine Print

The *Panasonic KX-P1091*, very popular among Commodore owners, has a matrix density of 18 × 18 dots, which is about the best quality you'll find in low-end dot matrix printers. The 14½-pound printer requires a parallel interface to work with Commodore computers, and its cassette ribbon has a life expectancy of three million characters. It prints faster than most of its competing machines, with 120 cps in Draft mode and 29 cps in NLQ mode. Panasonic; C-64 and C-128; $399.

PRODUCTIVITY

Wow! Are You Using an Amiga?

GEOS, a graphic environment operating system, lets you manipulate icons, windows and pull-down menus—just as on the Amiga and Apple Macintosh. Berkeley Softworks; C-64 version, $59.95/C-128 version, $69.95.

Partners

Partner 64, a 64K, 40-column, cartridge-based desktop accessory program, gives you eight memory-resident accessories that operate as it temporarily freezes any program you're running so that you can use its appointment calendar and datebook, memo pad, phone list and autodialer, name and address list, calculator, typewriter, label maker and envelope addresser. Partner 128 contains the features of Partner 64, plus it works in 80-Column mode. Timeworks; C-64 and C-128; $59.95 and $69.95, respectively.

Six for the Price of One

Productivity Pak III contains the RUN Script Plus word processor for the C-64 and C-128, which has been upgraded with a spelling checker, label-printing and RAM-expander capabilities, and the ability to load files and issue disk commands from a disk-directory listing; RUN Calc, an electronic spreadsheet that can be used for calculations ranging from checkbook balancing to complex investment analysis; RUN File 1.0, a database designed to do all the management tasks involved in keeping records; RUN Investor; RUN Dex; and RUN Notepad, which lets you keep notes during a program run. C-64 and C-128; CW Communications/Peterborough; $19.97.

SOFTWARE FROM MOVIES

Get Them Out of There!

In *Aliens: The Computer Game*, you must do everything in your power to save not only your own life but also the lives of your crew, from the attacks of those horrible, carnivorous creatures. Activision; C-64; $34.95.

Danger Zone

Top Gun puts you in the fighter pilot's seat of an F-14 Tomcat. Use your heat-seeking missiles and 20mm rapid-fire cannon to engage the enemy in a deadly dogfight, or compete against another player. Mindscape; C-64; $9.95.

SPORTS

Arena

SuperStar Ice Hockey is three games in one. As a player, you take the ice as center or goalie; as coach, you set up and rotate your players' lines; and as manager, you trade and draft players. Mindscape; C-64; $34.95.

Fore!

World Class Leader Board features a driving range; practice putting green; trees; traps; water; top views of each hole, showing the position of balls in play; replicas of Cypress Creek, Doral Country Club and St. Andrews courses; plus the Gauntlet Country Club, designed to be the ultimate test that would give even the Golden Bear nightmares. Access Software; C-64; $39.95.

Design Your Own Course

What other game opens up with the player designated as that great comeback golfer, Jack Snicklaus, who you can customize, rename and save to disk so you can develop your own Arnie's army of golfers? And, if you can't master the EA Championship course in *World Tour Golf*, then design your own! Electronic Arts; C-64; $34.95.



SPREADSHEETS

Up and Running in 20 Minutes

Multiplan, a full-featured spreadsheet and financial modeling tool, includes templates for home or business use for financial planning, loan analysis, depreciation, family budget and income tax preparation; windows; linked worksheets; built-in financial, mathematical and statistical functions; alphabetic and numeric sorting; and flexible formatting. The package also has a Quick Start manual to get you up and running in less than 20 minutes. Epyx; C-64 and C-128; $59.

Make a 100-Yard Spreadsheet

With *Swiftcalc 128*, an 80-column spreadsheet, you can add pie charts, vertical bar charts, scatter diagrams, line graphs and three-dimensional staggered bar charts. Its Sideways option lets you print out one continuous sheet. Timeworks; C-128; $69.95.

TELECOMMUNICATIONS

Being There

If you know someone who never leaves the house, get them *SpeedTerm*, a command-driven terminal software package through which they may communicate with others via bulletin board systems and online services. Supports Xmodem and Punter file transfer protocols. Abacus; C-64 and C-128; $39.95.

Edit On-Line

BobsTerm Pro 128 offers a full-screen text editor and on-screen status display of available space in the 60K buffer. You can edit files while it reads, writes, uploads and downloads to any disk type. Progressive Peripherals & Software; C-128; $79.95.

Traditional Telegaming

Three telegames—*Trapdoor Checkers*, *Baudleships* and *Radical Chess*—incur no connect charges, since no commercial online network is needed. All three games are based on the traditional games of checkers, battleship and chess, with a twist. Bear Graphics Software; C-64; $24.95 each.

WORD PROCESSORS

Take a Letter

PaperClip 128 has fast processing speed, easy operation and automatic startup, and its document size expands to accommodate 999 lines of text. Electronic Arts; C-128; $89.95.

An Improvement

Fleet System 4 has been improved over earlier versions to include word wrap, on-screen bold and underlined text, and the ability to see how your text will look printed out. Another new feature lets you save, as default settings, your printer configuration, secondary address, linefeed option and screen colors, and then temporarily change or adjust these settings from within the program. Comes with PSI's database, Fleet Filer. Professional Software, Inc.; C-128; $79.95.

Fond of Fonts

Fontmaster 128 lets you use up to nine different fonts on a single document, and several text modifiers or embedded commands can be used to change pitch; to select micro, normal or tall characters; or to toggle bold, underlined, italic, compressed and expanded type, as well as super- and subscripts. It's compatible with over 100 printers and 20 interfaces. There are a number of foreign language fonts such as Hebrew, Russian, French and German and 52 other fonts to choose from. Xetec; C-128; $59.95.

Work in 40 or 80 Columns

Word Writer 128 works in both 40- and 80-Column modes. Features include on-screen highlighting to print out underlined, italicized and boldfaced words, sub- and superscripts and headers and footers. Timeworks; C-128; $69.95.

Control Your Documents

WordPro 128/S, with proportional printing, relies on commands you embed in the text to control the format and layout of your printed document. The flip side of the program disk has a 90,000-word dictionary, with room to add 10,000 more. It works with over 100 different printers. Spinnaker Software; C-128; $39.95.

UTILITIES

Every Which Way But Loose

Blowup makes a hard copy of your screen—even bit-mapped high-resolution pictures and sprites, prints it in normal or reversed image, rotates the picture for horizontal or vertical printout, crops the picture and enlarges and reduces it. Data Share, Inc.; C-64; $59.95.

Fix It Yourself

The *Programmer's Tool Box* has a trace function, automatic line numbering and several disk options such as listing programs off of disk and reading text files without loading them. You can use the functions as needed, without the utility getting in the way. Includes the Pal 64 macro assembler to give you machine language capability. Spinnaker Software; C-64; $19.95.

Take Work Home

If you use an IBM or compatible at work and a C-128 and 1571 disk drive at home, you might appreciate *The Big Blue Reader* program, which transfers ASCII files written with MS-DOS computers into Commodore-compatible sequential files, or vice versa. That way, you can bring work home for the holidays, weekends and vacations. S.O.G.W.A.P.; C-128; $39.95.

Finally

Highlights of *The Final Cartridge* are an enhanced Basic, providing 20 new commands; an ML monitor, which uses no computer memory; a screen freezer; the ability to print a frozen screen; and faster disk-loading. H & P Computers; C-64; $44.95.

UNUSUAL USES

My Foot!

You can never go too far with the uses you can find for computer chips. The *RS Computer Shoe* has one built into its heel, which records your run, then communicates the results to your computer for analysis. Puma; C-64; $199.95.

Trace Your Family Tree

Family Roots offers genealogy fans individual and group sheets, charts, name indices, general search and text capabilities. Adapts to most disk drives, printers and screens. Manual included. Quinsept; C-64; $185. ►



MANUFACTURERS' ADDRESSES

Abacus Software
PO Box 7211
Grand Rapids, MI 49510

Access Software, Inc.
2561 South 1560 West
Woods Cross, UT 84087

Accolade
20833 Stevens Creek Blvd.
Cupertino, CA 95014

ActionSoft
201 West Springfield Ave.
Champaign, IL 61820

Activision
2350 Bayshore Frontage Rd.
Mountain View, CA 94043

American PeopleLink
3215 N. Frontage Rd., Suite 1505
Arlington Heights, IL 60004

Bantam Books
666 5th Ave.
New York, NY 10103

Barron's
113 Crossways Park Drive
Woodbury, NY 11797

Bear Graphics Software
PO Box 12206
New Brighton, MN 55112

Berkeley Softworks
2150 Shattuck Ave.
Berkeley, CA 94704

Blue Lion Software
PO Box 650
Belmont, MA 02178

Broderbund Software
17 Paul Drive
San Rafael, CA 94903

Brown Boxes, Inc.
26 Concord Rd.
Bedford, MA 01730

CWCommunications/ Peterborough
80 Elm St.
Peterborough, NH 03458

Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380

CompuServe Information Services
5000 Arlington Centre Blvd.
Columbus, OH 43220

Data Share, Inc.
717 S. Emporia
Wichita, KS 67211

Datasoft
19808 Nordhoff Place
Chatsworth, CA 91311

Digital Solutions, Inc.
2-30 Wertheim Court
Richmond Hill, Ontario
Canada L4B 1B9

DLM
One DLM Park
Allen, TX 75002

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404

Epyx, Inc.
1043 Kiel Court
Sunnyvale, CA 94804

Firebird
PO Box 49
Ramsey, NJ 07446

General Electric Information Services Co.
401 North Washington St.
Rockville, MD 20850

General Videotex Corp.
3 Blackstone St.
Cambridge, MA 02139

Great American Software
PO Box 910
Amherst, NH 03031

H & P Computers
154 Valley St.
South Orange, NJ 07079

Hearsay, Inc.
1825 74th St.
Brooklyn, NY 11204

Hi-Tech Expressions
1700 NW 65th Ave., Suite 9
Plantation, FL 33313

Howard W. Sams & Co.
4300 W. 62nd St.
Indianapolis, IN 46268

HP Books
PO Box 5367
Tucson, AZ 85703

Infocom
125 CambridgePark Drive
Cambridge, MA 02140

Inkwell Systems
PO Box 85152 MB290
San Diego, CA 92138

Insight
2708 Arlington Ave.
Highland Park, IL 60035

Merrill Ward & Associates
255 N. El Cielo Rd., Suite 222
Palm Springs, CA 92262

Microcube Corp.
PO Box 488
Leesburg, VA 22075

MicroProse Software
120 Lakefront Drive
Hunt Valley, MD 21030

Mindscape, Inc.
3444 Dundee Rd.
Northbrook, IL 60062

Panasonic
2 Panasonic Way
Secaucus, NJ 07094

Patech Software
PO Box 5208
Somerset, NJ 08873

PlayNet, Inc.
PO Box 587
Wynantskill, NY 12198

Prentice Hall Press
One Gulf + Western Plaza
New York, NY 10023

Professional Software, Inc.
51 Fremont St.
Needham, MA 02194

Progressive Peripherals & Software
464 Kalamath St.
Denver, CO 80204

Puma U.S.A., Inc.
492 Old Connecticut Path
Framingham, MA 01701

QuantumLink Computer Services
8619 Westwood Center Drive
Vienna, VA 22180

Quinsept
PO Box 216
Lexington, MA 12173

ShareData, Inc.
7400 W. Detroit St., Suite 170
Chandler, AZ 85226

Simon & Schuster Software
One Gulf + Western Plaza
New York, NY 10023

S.O.G.W.A.P. Software
611 Boccaccio Ave.
Venice, CA 90291

The Source
1616 Anderson Rd.
McLean, VA 22102

Spinnaker Software Corp.
One Kendall Square
Cambridge, MA 02139

Star Micronics
200 Park Ave., Suite 3510
New York, NY 10166

SubLogic
713 Edgebrook Drive
Champaign, IL 61820

Suncom
260 Holbrook Drive
Wheeling, IL 60090

Tech Sketch, Inc.
40 Vreeland Ave.
Totowa, NJ 07511

Timeworks
444 Lake Cook Rd.
Deerfield, IL 60015

Weekly Reader Family Software
245 Long Hill Rd.
Middletown, CT 06457

Wenger Corp.
1401 E. 79th St.
Minneapolis, MN 55420-1590

Xetec, Inc.
2804 Arnold Rd.
Salina, KS 67401 ■

Caveat Emptor

As you peruse the RUN *Holiday Gift Guide for gift-giving ideas, keep the following guidelines in mind.*

By ANNETTE HINSHAW

You've probably heard the one about a computer that has no software or peripherals making a good doorstop. Well, a Commodore should never suffer that fate, because there are thousands of Commodore-compatible products on the market ready to entertain and assist the user. *RUN*'s Holiday Gift Guide presents a smorgasbord of such products—useful, clever, high-quality or otherwise noteworthy items that have appeared, primarily within the last year, for the C-64 and the C-128. Chances are you'll find an appropriate gift for each Commodore user on your list, and maybe even something you can't resist for yourself.

However, before you shell out your hard-earned money for any of these products, you should ask yourself a few questions:

Is It Appropriate?

Make sure you understand what the product does, and think about how it will fit your needs or those of the person you're giving it to. Don't buy a program just because it's cute or has appealing packaging. An electronic poker game is less fun than the real thing, and you can probably balance your checkbook with a hand calculator in less time than it would take on your Commodore. Unless the checkbook program is part of an effective money management tool, it has no real advantage over its noncomputer equivalent.

On the hardware side, a modem won't do much good for accessing national networks if you live in the country and can't afford the long-distance phone calls, and a mouse will be just a pest if it eats up too much space on your desk.

Which Product Is Best?

Define your goals and priorities before you buy. What product comes closest to reaching them at the price you want to pay, and is it close enough? What concessions must you make to arrive at a decision?

For instance, if you were thinking of buying accounting, recipe filer and mailing list programs—all databases—you could consider one database manager that would produce all three and cost less than the individual programs combined. Remember, though, that using programs specifically designed for a task is faster, because it circumvents development time. If time is more important to you than cost, you might better buy the three ready-to-use programs.

Also remember that there are no set right and wrong answers. Is the power of a Hayes-compatible modem worth the hassle and extra cost of getting an RS-232C interface for it? Probably not, if all you want to do is read messages on computer bulletin boards. But that answer changes when you get into serious telecommunicating.



Try to discern what features of a product you or your friend or relative will actually use. Are that spelling checker and those fancy fonts necessary in a word processor? Are you really going to print out your computer graphics or use special screen-design functions? Does your modem have to transmit at 1200 baud, or would 300 baud be just fine?

Computer-specific magazines like *RUN* often publish round-up articles that compare features of commercial products. You should study these articles, and ask other users about details you don't understand.

Never assume that the program with the most features is the best. It may lack the one thing ►

ILLUSTRATED BY MACIEK ALBRECHT

you can't live without, or it may be too complex for your abilities or needs. Keep in mind that it's said 80 percent of the work done with any application program exploits only 20 percent of the program's features.

What Does the Literature Say?

You or the recipient of your gift will be living with your choice for a long time, so don't decide what to buy until you've done your homework. Consult lists, like this Gift Guide, and make your own list of products that interest you. Then, gather all the information you can about them.

"Give prime consideration to products you have been pleased with."

Don't let glitzy packaging and high-powered ad campaigns deceive you. Carefully read product specifications in the ads and on the packages, and, if it's available, read through documentation or literature from the manufacturer.

If you're looking for a C-128 program that runs in 128 mode, make sure the ad, package or literature says so or implies it by specifying an 80-column monitor or double-sided disks.

Note what the printed matter *doesn't* say. If an ad for a modem doesn't specify that it runs at 1200 baud, that it dials automatically or that it comes with software, it probably doesn't, even if the ad seems to suggest that it does.

If you're ordering by mail, invest in a phone call. It'll be cheaper than returning a product that isn't what you wanted.

Read reviews in computer magazines, and ask friends and members of your local user's group for recommendations. You could also leave messages requesting information on computer bulletin boards, both local and national. If you don't have a modem, ask a friend to leave the messages for you. Give prime consideration to products from manufacturers you or others have been pleased with in the past.

If your local retail outlet or user's group provides program demos, take advantage of them. Running a demo won't reveal all the pitfalls in a program, nor all of its beauties, but it will give you a feel for its basic operation.

Is It Compatible?

It's too late to cry when you find out that a graphics program you bought is incompatible with your printer or that your favorite terminal program won't drive your new modem. Nothing is more frustrating than seeing your non-Commodore disk drive refuse to load a game or discovering your new C-128 spreadsheet doesn't have a 40-column mode. You're usually safe with Commodore hardware, but some programs won't work with some Commodore printer models.

Software can be incompatible with other software. Background utilities such as screen dumps and wedges won't work with other programs that use the same memory locations.

Software and hardware documentation may specify that two products work together. If it doesn't, perhaps you can borrow a copy of a program to try on your hardware or take your software to another system before you buy. You can always call the manufacturer and ask for compatibility verification.

Commercial vs. Noncommercial

If you're buying software and you're not sure what features to look for, the best bet may be a public domain or shareware program—available from user's groups and other sources—or a disk, like ReRUN, put out by a magazine. These programs are inexpensive and often easier to learn to use than their commercial counterparts, plus, by the time you master one and bump into its limitations, you'll know what you want and don't want out of a commercial product. And you may find you never need a commercial equivalent.

Generally, expect to pay $50–$100 for commercial productivity software such as word processors, databases, spreadsheets and terminal programs. The latest games are running $30–$50, while many older ones are being distributed for less than $20. Educational software meant for schools is usually pricey—in the same range as productivity software—but educational programs meant for home use are about $20–$35.

Public domain and shareware programs, whether from a user's group, the author or specialized commercial firms, go for about $5–$15



per disk, with each disk containing several different programs.

For used hardware or software, expect to pay one-half to two-thirds the original price.

Where to Buy?

An excellent place to buy a computer product is from a local dealer, especially one who'll help you learn to use the product and who has a generous return policy if it doesn't work out the way you hoped. Unfortunately, not many places like that exist for Commodore users. Barring a local dealer, you can probably be confident in buying top-rated products at discount stores. If you're very lucky, you can find used products in good condition.

Mail order offers the widest selection to choose from, and it doesn't have to be as risky as you might think. A lot of mail order firms are reputable and offer both good service and good buys. ►

Take command of your computer system

Consolidate your 64, 64C or 128 system with the Command Center:



Just look at all it includes:

- **Built-in AC Power Strip** with power surge and voltage spike protection, line noise filtering and power outlets.
- **Built-in Drive/CPU Cooling Fan** to prevent overheating.
- **Modular Telephone Plug** with its own on-line/off-line telecommunications switch. (Optional on 64 and 64C).
- **Master AC Switch** for easy system power up.
- **Single or Dual Drive Configurations** with the standard drive insert.



☐ 64..... $119.95

☐ 128.....$149.95

☐ 64C..... $129.95



COMMAND CENTER ACCESSORIES

(Specify 128, 64, or 64C when ordering)

Dust Cover $19.95 — covers entire system

Keyboard Cover $19.95 — smoked acrylic

Drive Reset $14.95 — one switch per drive

Short Serial Cable $9.95 — for chaining drives

Modem Switch $9.95 — 64/64C option

Tilt/Swivel Monitor Stand $14.95 — see below

Cartridge Port Extension Board — $24.95

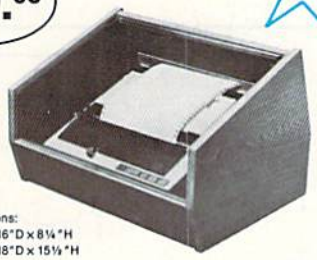
The Command Center will untangle your system.

(Call for details)

"Sound Trap" acoustic enclosure

NEW

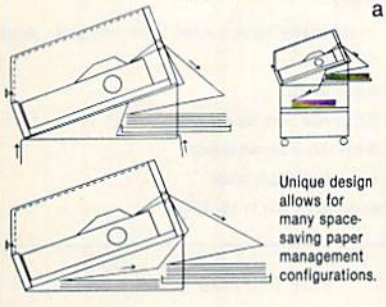
We offer the **total solution** to complete your "office at home" for the **special introductory price of only** **$99.95**



- Fits all popular 80 column printers, 132 column also available
- Sturdy wood construction
- Sound absorbing foam lining reduces printer noise up to 90%
- Tilted for easy printer viewing
- Attractive woodgrain finish compliments any surroundings
- Clear acrylic lid keeps sound in and dust out
- Unique slide-out shelf catches printout, eliminating the need for a costly catch-basket

Dimensions:
Inside 20½"W x 16"D x 8¼"H
Outside 22½"W x 18"D x 15½"H

Compare to other enclosures of similar quality and dimensions costing at least $139.95! That doesn't include "extras" like a catch-basket and a stand to raise the enclosure which are already incorporated into our design!



Unique design allows for many space-saving paper management configurations.

The "Sound Trap" is available with an optional fan to dissipate heat build-up. Integrated AC outlet and master power switch activates both printer and fan. **$49.95**



Cramped for extra space? Our optional cart is specially designed for use with the "Sound Trap". It has the same quality wood construction and casters for mobility. **$149.95**

Shipping/Handling:
Sound Trap $12.00
Cart $19.00

Cart Dimensions: 24¼"W x 18"D x 25"H

Data Director

$39.95



- Eliminates cable swapping.
- Saves wear on disk drive serial ports.
- Share two Commodore® 6-pin serial devices with one computer.
- Works with Commodore® compatible disk drives, printers, and all interfaces.
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A few simple precautions can help you make sure you're dealing with such a company. See "Mail Order Maxims," *RUN*, May 1987, for helpful suggestions on purchasing through the mail.

Buying used programs and equipment is no different than buying new. Be careful in what you choose, and always see the product in operation before you pay for it. User's groups are good places to make connections on used products.

A Look Ahead

The Holiday Gift Guide may assist you in buying 1987 products, but what lies over the horizon? This wouldn't be a year-end article without predictions.

With the largest user base in the world, Commodore owners can expect to see a continuing flood of software—some jazzier, some more specialized and some less expensive than ever before. Low-cost European imports and domestic budget lines will drive prices down, especially for games.

I hope 1988 will be the year when the C-128 comes into its own, with many powerful new programs that exploit its special features. If the RAM expanders and hard-disk drives that came out in 1987 sell well, we may see some big-memory applications for Commodores. Laser printers are coming down in price, so serious desktop publishing should be filtering into the Commodore arena, too.

Accessories for interfacing computers to VCRs or stereo systems look promising, and I expect telecommunications to expand. Prices for using information services may drop, unless the FCC rate hike takes effect.

I bought my first VIC less than six years ago, and now I'm ready to buy a 512K RAM expander or a hard-disk drive for my 128. Much of the hardware and software I now own was beyond my reach six years ago—or so I thought—and I'll probably be saying the same thing six years from now.

Those of us who've been involved with computers these few short years see a revolution coming in the way we live our daily lives. It may be a generation before we see and understand the importance of what has already happened. On that note, I wish you all a Happy Holiday Season! ■

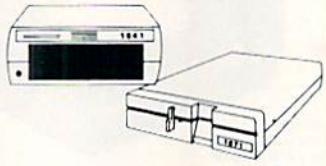
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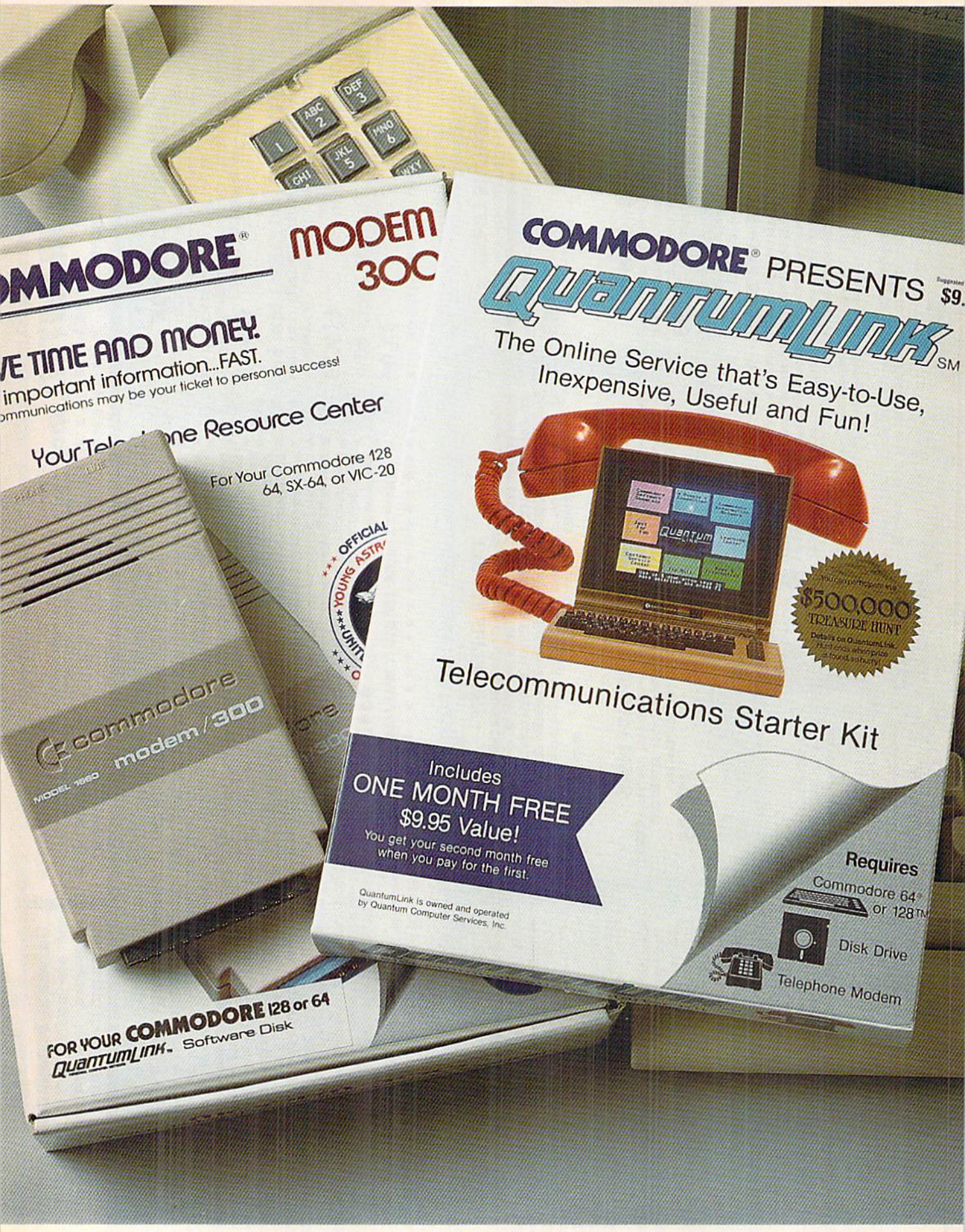
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Commodore Clinic

In this RUN *Special Issue, as in the last, we are publishing highlights from our popular Commodore Clinic column. There follows a selection of those questions and answers from 1987 Clinics that should be most helpful to you. The table of contents below directs you to the software, hardware, programming and other topics we've included.*

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MISCELLANEOUS

By JIM and ELLEN STRASMA

ILLUSTRATED BY KRIS STEVENSON

COMMERCIAL SOFTWARE

Productivity

Q *Can you recommend any good sources of information on starting a home business, such as doing word processing or maintaining mail lists?*

—DIANE HIEM
HIGHLAND, IL

A The most helpful resource I ever found along those lines was the book *The Incredible Secret Money Machine*, by Don Lancaster. Don was a true pioneer of the microcomputer revolution and has been quite successful over the years making a living working at home. This book details his methods.

A more recent resource specifically for Commodore owners with small businesses is *Money Machine*, a bi-monthly magazine from Redwood Empire, PO Box 6609, San Mateo, CA 94403.

Q *A program I wrote is about 8K long and loads in less than three seconds. However, data from one of my Swiftcalc 128 spreadsheets takes six minutes to save. Why is there such a drastic difference in speed?*

—BRIAN HARDING
CARROLLTON, TX

A Several factors make loading a program much quicker than saving spreadsheet data. First, when you load a program, there's no question about where the information will go or where the next sector in the program is located. The first two bytes of the program are its load address, and each sector includes all the information needed to find the next sector in the program.

A save, on the other hand, first needs to find space for each new sector of data in turn, without any quick way for the disk drive to know in advance how many sectors will be needed in all. Also, it has to link all the sectors together so they can be read or loaded later.

Second, you load a program, as a single operation, into a block of contiguous memory. However, when you save data, it's written from a much smaller buffer area, which means only a small part of the total file can be written at a time.

Third, if the computer has to change any string variables, it may require occasional time-outs to get rid of unneeded strings created by the file-save operation. There'll be short periods when the computer seems to go dead, then resumes as though nothing had happened.

Finally, your spreadsheets may be much larger than 8K. One spreadsheet I use allocates as data every cell to the left of or above any cell in which I have written anything, even if I erase the cell. This can dramatically increase the space taken up by a spreadsheet.

If the time delay matters a lot to you, try another spreadsheet. I can't ever recall having to wait more than a minute or so for a spreadsheet to save its data.

Q *Where can I get a replacement disk for The Manager database?*

—KAREN LANDRETH
FLORENCE, SC

A Packed with your original program disk and manual is a card telling you how to get a replacement disk directly from Commodore. Send the original disk to Customer Support at Commodore Business Machines (1200 Wilson Drive, West Chester, PA 19380), with a check for $5.

Q *I'm using Timeworks' Data Manager 128 with a 1571 disk drive. I've entered 230 four-page records, but when I enter record number 231, I get error number 52, File too Long. Why is this, when the disk directory still shows 588 blocks free?*

—STEVE BRICHTER
NEW WINDSOR, NY

A Although a single sequential file can grow indefinitely within the limits of the disk, a single relative file has a limited size—something C-64 owners didn't have to worry about because the limit is slightly larger than the capacity of a 1541 disk.

When this problem last surfaced, back in the days of the Commodore 8096 computer and 8050 disk drive, programs like Silicon Office solved it by treating two or three separate relative files as though they were part of the same one. You can do something similar by putting all your records whose keys start with the letters A–M in one file, and all those whose keys start with N–Z in a second file. This is not an ideal solution (especially when you need a zip-code-sorted report), but it may be your only solution until either programs like Silicon Office appear for the C-128 or Commodore expands the capacity of relative files, as they did for the 8250 disk drive during the last days of the PET.

Q *Does Ashton-Tate make dBase for the C-64? If not, is there a program like or better than dBase II or III for the C-64?*

—ROBERT GOYER
HUNTSVILLE, AL

A The CP/M version of dBase II has been used successfully on the C-128 in CP/M mode, but I'm not aware of any plans by Ashton-Tate to offer products for the C-64. Precision Software's Superbase 64 offers many of the same features, including multiple related files and a command language. This program has been popular with Commodore owners for several years.

Q *Is there a terminal program for the C-64 that dials numbers having a specific prefix and saves the ones that answer with a computer tone?*

—JEREMY MAPPUS
AUSTIN, TX

A Programs that do what you ask do exist. One was even featured in the movie *WarGames*, where it got its user into deep trouble. Morally and legally, however, there is almost no defense for their use, and it might even be illegal for me to help you find one.

Just because a computer answers the phone doesn't give you the right to access it. Laws regarding this are getting more strict, and properly so. If you insist on getting into a computer uninvited, limit your explorations to trying the programs Hacker and Hacker II from Activision. That way, your next letter to the Clinic won't have to be mailed from the clink.

Q *I'm interested in setting up a modem bulletin board service. I have a C-128 and 1571 disk drive. What else would I need?*

—TOM CARVALHO
SAN DIEGO, CA

A I'm partial to Steve Punter's Punter BBS, one of the first such boards available for Commodore owners and still one of the best known. The current version is 64.5. You can sample his product and arrange a purchase by calling Punter's own BBS in Mississauga, Ontario, Canada. The number I have for it is 416-624-5431.

As for a modem, the Commodore 1670 is probably an adequate and economical choice, although you may want

to get Punter's own advice on the best modem to use with his BBS program.

Q *I need a program that will list about 300 phonograph albums by 1) publisher, 2) album title, 3) song title, 4) composer, 5) orchestra and 6) conductor. Do you know of any software that can do this?*

—WADE JORDAN
MACON, GA

A If you treat each song as a separate entry in a database program, almost any commercial data manager can handle the data, but you'd run out of storage on most Commodore disks long before you'd saved all of your data.

A better solution is to use a relational data manager, such as Precision Software's Superbase (sold by Progressive Peripherals, 464 Kalamath St., Denver, CO 80204). That way you can have an entry for each album in one data file, with a separate entry in a second related file for each song on the album. And the information shared by all the songs on an album is entered only once. (Depending on the number of songs per album, you may still need to use some abbreviations to get all your data on a 1541 data disk.)

Q *When I upgraded from a C-64 to a C-128, my troubles began. When I transferred database records, first to Consultant 128 and later to Superbase 128, the programs had great difficulty sorting my 3000 records. Progressive Peripherals told me the problem is in a 1571 disk chip and that they haven't been able to program around it. I contacted Commodore on QuantumLink and was told there is nothing wrong with the chip in the 1571. Repeated attempts to speak directly with someone at Commodore have failed.*

Can you tell me anything about the 1571 chip?

—ROBERT GELISKE
PONTIAC, MI

A Since you encountered your sorting problem with two different top-flight programs, your problem is almost certainly due to a 1571 ROM bug. Since you are storing a relatively large amount of data, my guess is that the culprit is the bug a Commodore document dated last September described as follows: "With multiple files open and sectors being allocated on both sides [of the disk], the BAM swapper mechanism would trash BAM side one."

If not, perhaps it's due to one of the 13 other 1571 ROM bugs listed on the same page, or in the nine pages of other C-128 problems described in the same document. That's the bad news. The good news is that, according to the same document, these faults were corrected in an unreleased set of four Version 3 ROMs. A 1571 upgrade ROM *is* available from some user groups and *RUN* advertisers.

Education, Graphics, Entertainment

Q *I'm planning on taking a computer programming course that introduces the Pascal programming language, and I need to know what software company sells the best Pascal for the C-128.*

—JUAN PEREZ
HIALEAH, FL

A The best Commodore-specific version I've tested on the C-128 is Super Pascal, from Abacus Software (PO Box 7219, Grand Rapids, MI 49510). It's also available for the C-64. Super Pascal includes both a text editor and compiler, and seems to have all the extras anyone could want.

However, Turbo Pascal, the compiler we use in our Pascal classes here at Western Illinois University, is supported by most new textbooks. It's from Borland International (4585 Scotts Valley Drive, Scotts Valley, CA 95056), and is available in a CP/M version that should be usable in CP/M mode on the C-128, and in an MS-DOS version for the PC-10.

Q *I have been searching diligently for a golf program. The only one I know of doesn't seem to take full advantage of the graphics capabilities of the C-64. Could you suggest some others?*

—DAVID SHARP
ADDRESS UNKNOWN

A Friend Jim Oldfield has been searching for the ultimate computer golf game for years. His current favorite is Leader Board from Access Software. Others are also good, but he likes Leader Board because of the small hardware key (dongle) included with the game that allows him to make a backup copy for his own use.

You also might want to consider Electronic Arts' World Tour Golf.

Q *A few years ago I was introduced to Archon, an off-beat version of chess with a medieval setting. Since I'm getting a C-128, I'd like to buy this game, but I can't remember who makes it.*

—BRIAN T. BURNS
CORTLAND, NY

A Archon and Archon II are products of Electronic Arts (1820 Gateway Drive, San Mateo, CA 94404) and should be available through most Commodore dealers.

Q *Does GEOS or Fontmaster for the C-128 offer a solution to the problem of writing math exams that include math symbols and diagrams?*

—PHILIP ROSEN
NEW YORK, NY

A Jim Oldfield, having extensive experience using both geoWrite (from Berkeley Softworks) and Fontmaster II (from Xetec), reports that both are quite capable of integrating special math symbols into a document. Doing so will probably require fewer separate steps with Fontmaster II, but with GEOS you may also be able to make effective use of other related programs, such as geoPaint and geoPublish.

Q *The various ads I've seen for music software never indicate whether the programs can be used as background music in my own programs. Do you know of a music program that can do this?*

—E. H. MCCUAIG
SAN MATEO, CA

A Master Composer, from Access Software, does what you ask. Once you enter this program, its songs compile into executable machine language programs that load and run separately from, but concurrently with, your programs via IRQ interrupts.

Q *Are there any C-64 programs for learning or playing bridge?*

—ALEX KAISER
CATHEDRAL CITY, CA

A The shortage of bridge game programs is somewhat surprising, considering that Personal Software's version of bridge for the original Commodore PET was one of the first polished games offered for that machine. Unfortunately, Personal Software is long since gone, but Artworx Software (150 North Main St., Fairport, NY 14450) is still around and offers two newer programs for teaching and playing bridge. ►

Bridge 4.0 is a well-regarded bridge simulation, in which you and a computer partner play against two computer opponents. It includes both bidding and actual play. The computer also keeps score.

Artworx' other bridge program, Compubridge, is a tutorial and quiz program to help improve your play. Both Bridge 4.0 and Compubridge are available from mail order dealers.

Q *My copy of the F-15 flight simulator from MicroProse fails to load on my C-64. Instead, the program tells me I have "Hardware Failure." It does load properly on a friend's C-128, on a borrowed 1541 and on my 1541 with a repair shop's C-64. What do you think is the problem?*

—JOHN GRAHAM
MIAMI, FL

A A surprising number of software companies are unaware that there are several versions of the C-64 Kernal ROM in use, since Commodore doesn't publicize such information. My first guess is that your C-64 has an early Kernal ROM, and that incompatibility keeps your program from loading. If you update the chip, the problem should go away.

However, before you buy a new chip, try loading your flight simulator after disconnecting any unnecessary accessories from your system. I had a similar problem with Gunship, a MicroProse program that has captured my son's attention lately. When I unplugged my RS-232 interface, the program loaded.

Utilities

Q *I have a C-64 and 1541 disk, and I'd like your opinion of the Epyx Fast Load cartridge. It appears to load and save programs five times faster or better. I've always believed you seldom get something for nothing, so is there a trade-off somewhere?*

—JIM BODEAUX
COVINGTON, LA

A Fast Load is a reputable product that for the most part does what it claims, and it's made a lot of friends by healing the 1541's debilitating case of slowness. The trade-off is incompatibility with a small number of copy-protected programs, which refuse to run with the cartridge installed. However, chances are you'll never encounter a program that won't work with Fast Load.

If you're mechanically inclined, you can solve this problem by adding an on/off switch to the cartridge. The switch should interrupt the EPROM line on the cartridge port when off. If you aren't mechanically inclined, just turn off your computer and unplug the cartridge when you want to run programs incompatible with Fast Load.

You should also deactivate Fast Load when you're using relative files, because readers have found it unreliable.

Q *Is there a product with a push-button screen dump that prints out any screen from a C-128 and C-64?*

—JOHN KIMBALL
WASHINGTON, DC

A I haven't heard of one that will handle the C-128's 80-column screen yet, but if you can live with a C-64 mode dump, either of two products should work well for you. One is the Freeze Frame cartridge, now sold by Supra (1133 Commercial Way, Albany OR 97321) since its original maker, Cardco, folded. The other is The Final Cartridge, from H&P (154 Valley St., South Orange, NJ 07079). Since I don't like to constantly plug cartridges in and out, my own preference would be for The Final Cartridge, due to its many other features, including a program freezer, RAM dump, fast loader, machine language monitor, and more.

Q *Can you recommend a program that makes double-sided, double-density disk backups on a C-128 in 128 mode with only a single 1571?*

—JACK KARI
WHITE PIGEON, MI

A One of the best programs for the purpose is free: Multi-file Copier by Kevin Pickell. It's widely available from user groups, on CompuServe or, if you can't find it locally, from the computer bulletin board system at 217-356-8056.

PROGRAMMING

Basic

Q *What is Reverse Polish Logic?*

—KAM WONG
EDMONTON, ALBERTA, CANADA

A There are three possible ways to write a mathematical expression; 1 + 2, the one all of us use every day, is one way. When the plus operator (+) is in its usual location between the two operands (1 and 2), that is known as infix notation.

A second way is Polish notation. In this form, the operator precedes the operands, and it's expressed as + 1 2. The advantage of this version is that it speeds the programs used to evaluate them, since the parentheses usually required to describe complex expressions are no longer needed.

The third way, known as Reverse Polish notation, places operands before the operator, expressed as 1 2 +. Hewlett-Packard calculators and the Forth programming language use Reverse Polish notation because expressions can be efficiently stored and retrieved with the stack operations included in the machine language instruction sets of nearly all microprocessors.

Q *Is it possible to write a subroutine that allows the user to create Data statements that will be included in the listing after the program is run?*

—WILLIAM WORD
BELLWOOD, IL

A Yes, it's possible, and most user group libraries provide Data-maker programs to make Data statement values out of the contents of selected memory locations. This is useful in converting a machine language program into a form that's easier for nonprogrammers to enter.

However, apart from such specialized uses, what you propose is a self-modifying code, which is a nasty violation of good programming. It's also unnecessary. Rather than add Data statements to a listing, why not just open a file and dump your data into the file? That's what files are for, after all, and we'd all be better off if more programmers used them.

Q *I have a couple of questions about using FRE(X) to find the space used in RAM. What's the formula for the C-64? Also, some programs show no space used. Don't machine language programs use up space in RAM?*

—WALLACE EDSON
LOMPOC, CA

A The FRE( ) function on the C-64 finds your remaining Basic work space by subtracting the current contents of a pointer to the start of the Basic program work space from those of a pointer to the end of the current

Basic program. The difference is the remaining number of free bytes, stored as a two-byte integer.

Since two-byte integer values greater than 32767 are interpreted as negative and there are initially 38911 Basic bytes free on the C-64, if you try ? FRE(0) immediately after switching on your computer, the machine will report −26627 bytes free. When you get a negative number of bytes free, ? 65536 + FRE(0) shows the correct answer.

If you give the latter command immediately after switching on, the response will be 38909, two bytes fewer than claimed by Commodore's sign-on message. The difference is due to two zero bytes that end each Basic program and are present even before a program is written or loaded. Commodore considers them initially free, but FRE(0) counts them as used.

As for machine language programs, they do use space in RAM, but unless they emulate Basic in the way they allocate that space, FRE(0) may not even know they are in memory. Then, too, some machine language programs use portions of memory unavailable to Basic, and don't reduce its work space.

Q *Can you tell me how to put quotation marks within a Print statement on a C-64? I'm writing a story within a game, and it's difficult to read the text without them.*

—MICHAEL HALL
DESOTO, TX

A This is easier than you might expect. Simply replace the quotation marks with an equivalent character code, CHR$(34).

Thus, if you wanted a character in your story to say: "Hold it thar," said Sam, your Print statement would read as follows:

```
1000 PRINT CHR$(34);"HOLD IT
     THAR,";CHR$(34);" SAID SAM."
```

Since Commodore Basic defaults to semicolon spacing, the semicolons between the parts of the statement are not strictly necessary, but should be left in for compatibility with other Basics.

One problem is that, once a quotation mark has been printed, the system will be in Quote mode until either a second quotation mark or a carriage return is printed. In Quote mode, cursor control characters don't move the cursor, but instead show up as reversed characters.

You can switch off Quote mode on the screen, but not on a printer, by printing two quotation marks in a row, followed by a back-space character, entered as CHR$(8). This erases the unwanted second quotation mark and exits Quote mode.

You can also use CHR$( ) substitution to add other special characters, such as cursor controls to Print statements.

Q *I'm running out of array memory on my C-128. Is there a way to use idle Basic program memory for arrays?*

—JIM LYNCH
ST. THOMAS, VI

A Yes, although it isn't very convenient and works best when all the data values in the array to be stored that way are small numbers or single characters, which allows each element to fit in a single byte of memory.

The basic idea is to directly poke the data into, and peek it back out of, unneeded space in the Basic program bank of memory. You'll need to find a safe starting address within the unused space and then locate each element in the poked array relative to that address. It's also up to you to make sure nothing tampers with that memory, since Basic offers very few safeguards when using Peek and Poke.

Before going to that extreme, I would also remind you of integer arrays. If a numeric array variable name ends with a percent sign (%), each of its elements take up three fewer bytes of memory than usual. The savings in a large array are sufficient to be worth a serious effort to limit data values to integers.

Debugging

Q *In some of my programs, I poke screen display codes into locations 1024–2023 of my C-64. This should print the character to the screen location I choose, but I can see the characters only when the cursor is flashing at the same location. How can I solve this problem?*

—JOSHUA CARON
QUIMBY, ME

A When you poke a character into screen memory, you're only half done. To see your results, you also need to poke a code for the color you want the character to be in color memory. Otherwise, you'll poke the character all right, but its default color will be the same as the background color, making it invisible until the background color changes by either a flashing cursor or an appropriate additional Poke. Color memory on the C-64 begins at location 55296 and has one location for the color of each screen location, stored in the same order as character positions in the screen memory beginning at location 1024. You may poke any number in the range 0–15 into each color memory location, with each number representing one of the 16 available colors.

Q *How do I get my MPS-1000 to print out the execution of a program? I can get a listing, but not a copy of the run.*

—SHIRLEY GARDNER
VERGENNES, VT

A For programs that get all data via Read or Input statements and display all results with Print statements, first use the following sequence of commands to generate a hard copy of the listing:

```
OPEN 4,4:CMD 4:LIST
```

Then adjust the paper to the top of the next page and begin the program run with:

```
GOTO 100
```

where 100 is the first line number in your program. (Use this instead of the Run command.) Now your program should execute normally, except that all output will be redirected to the printer instead of the screen.

When your program ends, you'll need to type one more line to print the last line of output and direct output back to the screen:

```
PRINT#4:CLOSE 4
```

One other caution. Since most printers buffer a full line of output before printing it, it's best to write your program with separate Print and Input statements rather than using the version of input that includes a prompting message. The problem with the latter form is that you can't read the question on the printer until after you've already answered it. Putting questions in separate Print statements avoids this.

Disk & File Handling

Q *In the directories of some commercial disks, I see the word DEL in the file-type column. Similarly, sometimes when I download a combined file from the local BBS and separate it afterwards with a program called Lynx, one program doesn't work, and when listed also has a DEL after its name in the directory.* ►

Does DEL there mean deleted? If so, why doesn't it just not show up in the directory at all? And if that's not it's meaning, what can I do to save such programs?

—ALASTAIR BOR
ANDOVER, MA

A The delete file type does indeed seem to stand for deleted. More specifically, it stands for a file that has been scratched, but not closed. It's definitely a file type to avoid, which is presumably the precise meaning you're intended to receive when looking at the directory of a copy-protected commercial disk.

Altering a directory entry so that it will show as a delete file is a simple matter of altering the file-type byte in the directory entry to the hex value $80, using any of the readily available disk sector editors. However, if you change the file-type byte back to that of a normal file (for example, to $82 for a program, $81 for a sequential file), be aware that the associated file may still be incorrect—either intentionally as a part of a copy-protection scheme or accidentally as a result of an unsuccessful disk command.

The best thing to do with such files on a disk that's copy-protected is to leave them alone, so as not to disturb the already fragile functioning of such disks. If a delete file shows up on other disks, I'd consider that a good time to copy all the other files off it one at a time onto another disk for safe-keeping, then restore the deleted file on the new disk from the most recent backup. (You do make backups of your data disks, don't you?)

Q *What do the terms text file and binary file mean, and what is put on the disk for each?*

—TED CHIDESTER
SANTA FE, NM

A An easy way to distinguish between text and binary files is that text files are made up of printable characters that people can read, whereas binary files are made up of binary codes that only computers can easily read.

The distinction is obvious in CP/M mode on the C-128, and under MS-DOS on the PC-10 and PC-20, all of which have a type command to list the contents of a disk file. If it's a text file that ends with extensions such as .TXT, .ASM or .SRC, you'll be able to read its contents as it scrolls across your screen. On the other hand, if you try to type in a binary file, such as a machine language program, you'll get only what appears to be garbage on the screen.

To a purist, a text file should be made up only of letters, numbers, punctuation and special symbols, and not include any control codes or graphics. A binary file, however, may include any character. If it's also a program file, its first two characters will also be the absolute address in memory into which the program should be loaded to run properly.

Q *How do I put more than one program on a disk? For instance, sometimes I type a program from* RUN *one month and want to save another program on the same disk the next month. How can I do this without erasing the first program?*

—S. GALATOWITSCH
ST. PAUL, MN

A Unlike cassettes, which can easily erase an existing program when you save a new one on the same cassette, disks make it both easy to save a second program on the same disk and difficult to erase earlier programs without intending to.

Starting from a blank, formatted disk, you can save your first program with the command:

```
SAVE "0:NAMEONE",8
```

When you type in another program, save it with the command:

```
SAVE "0:NAMETWO",8
```

The only thing that changes is the program name, which must be different for each program on a disk. Even if you forget and attempt to reuse a name, the error light on the disk drive will begin flashing to tell you to try a different name.

Q *I haven't had any benefit from the programs published in* RUN *because I have a tape drive. Would you be kind enough to explain how to change Open statements so that I can use programs written for a disk.*

—JACK SCHULZ
PORT HUENEME, CA

A The Open statement is very flexible and can usually be redirected from a disk to a tape with only a few changes, so long as the program you're altering uses only sequential files. Fortunately, most files are sequential.

Here are the typical changes needed, with explanations.

Disk sequential file Open to write data to drive 0 of disk unit 8:

```
OPEN 7,8,9,"0:KEEPIT,S,W"
```

The equivalent Tape File command is:

```
OPEN 7,1,1,"KEEPIT"
```

which likewise opens file 7 to write a file named "KEEPIT", but on the cassette.

The first 1 in the Tape command is the device number of the cassette, and replaces device number 8 in the Disk command. The second 1 in the Tape command indicates that the file is open for writing, and replaces the ,W at the end of the Disk command. There are no cassette parallels for the channel number 9 in the Disk command, nor for the ,S Disk Access mode, because the cassette has only one possibility for each.

The equivalent commands when reopening an existing file to read back its data are:

```
OPEN 7,8,9,"0:KEEPIT,S,R"
```

and

```
OPEN 7,1,0,"KEEPIT"
```

Note that the only part that changes in either command is the Access mode: ,W became ,R on the disk, and the second 1 became a 0 on the cassette.

You'll also need to turn into a REM statement any lines that check for disk errors or give commands to the disk, but these are usually easily identified by their use of file 15. This is because the Disk-command channel is normally opened with the command: OPEN 15,8,15, causing all other disk commands and error checks to also use file 15, even though only the second 15 in the command is essential and the command file may occasionally use a different file number.

Q *How can I access a user file from a disk?*

—L. P. THOMASON
JACKSONVILLE, FL

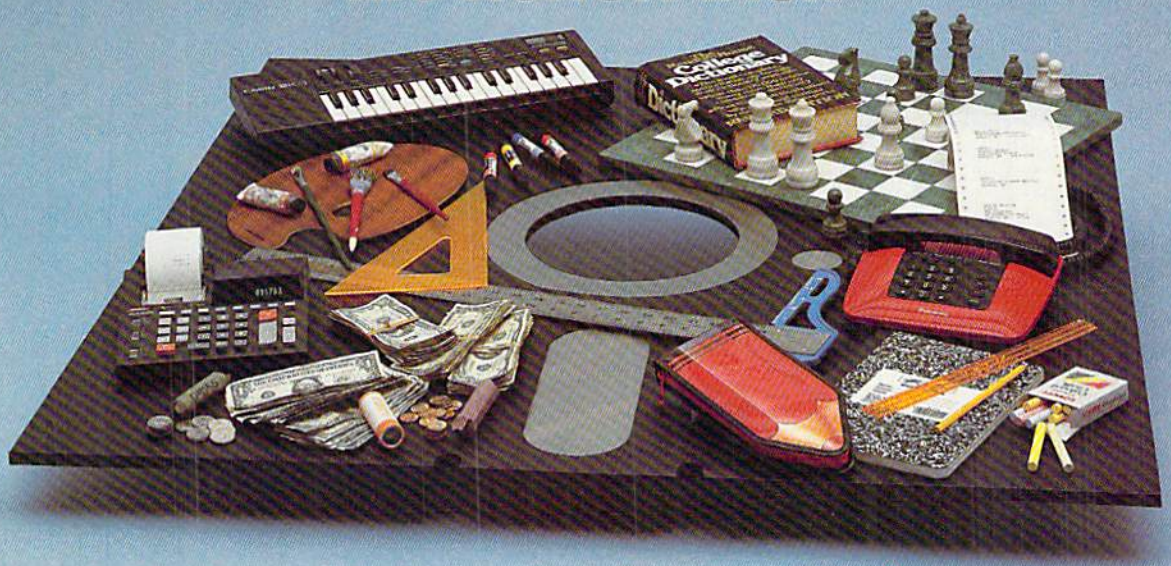
A To read a user file, just treat it as a sequential file, but replace the S for sequential in the File Open statement with a U for user. For example, to read a user file named Fido from drive 0 of device 8, you could use this Open command:

```
OPEN 1,8,3,"0:FIDO,U,R"
```

Once opened, user files can be read and written to in the same way as sequential files.

Continued on p. 60.

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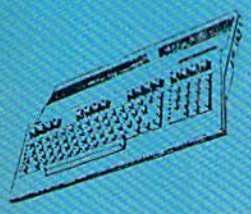
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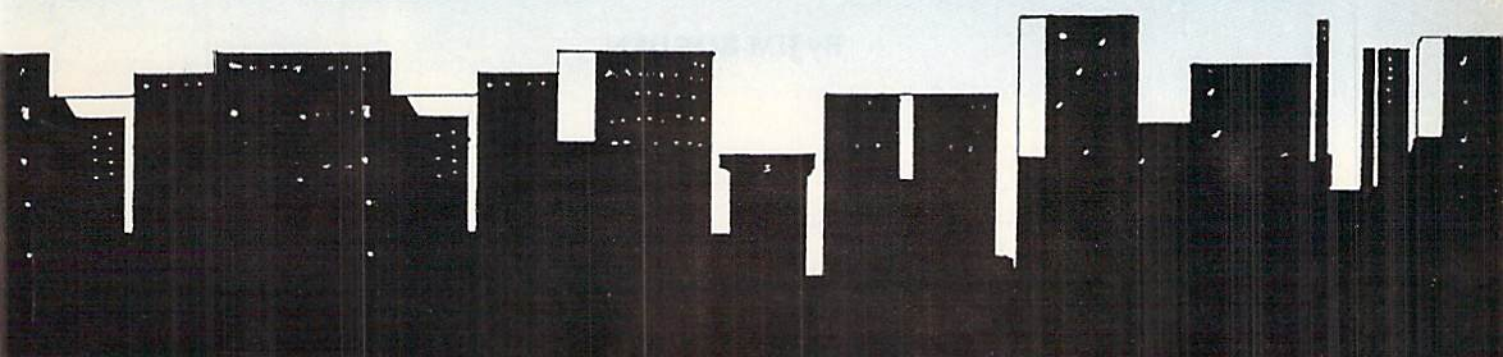
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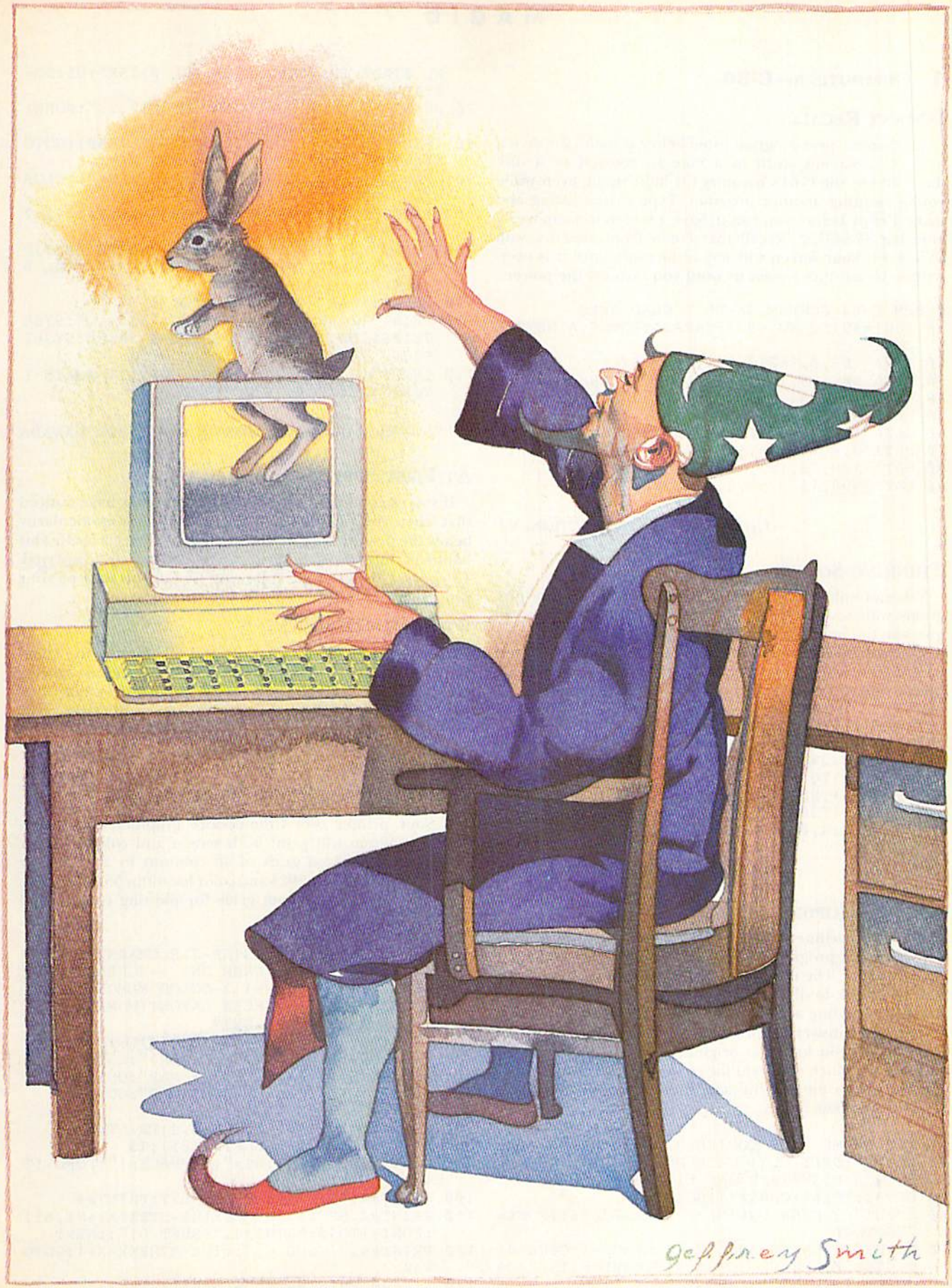
Magic

RUN's Magic column of computing tricks sent in by readers is one of the most popular features of the magazine. In this Special Issue, we're once again including a selection of the best tricks from the past year. Whether a Commodore novice or expert, hardware hacker or software aficionado, you're sure to find among these tricks some miniprograms, shortcuts and hints that will delight you and make your computing easier.

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By JIM BORDEN

ILLUSTRATED BY JEFFREY SMITH


Geoffrey Smith

1. COMPUTERS—C-64

INSTANT RECALL

The Screen Save program listed below is useful for saving lo-res text screens (such as a note to yourself or a disk directory) to the C-64's memory for later recall, even while you're running another program. Type in the listing and make a copy before you run it. Save a screen to memory by entering SYS49152. Recall the screen from memory with SYS49184. Your screen will stay in memory until it is overwritten by another screen or until you turn off the power.

```
Ø REM C-64 SCREEN SAVER - CHAD AMES
1Ø FORI=49152 TO 49215:READA:POKEI,A:NEXT:N
   EW
2Ø DATA 169,Ø,162,Ø,189,Ø,4,157
3Ø DATA 8Ø,195,189,255,4,157,79,196
4Ø DATA 189,254,5,157,78,197,189,253
5Ø DATA 6,157,77,198,232,2Ø8,229,96
6Ø DATA 169,Ø,162,Ø,189,8Ø,195,157
7Ø DATA Ø,4,189,79,196,157,255,4
8Ø DATA 189,78,197,157,254,5,189,77
9Ø DATA 198,157,253,6,232,2Ø8,229,96
```

—CHAD AMES, ESSEX JUNCTION, VT

THINKING SOUNDS

You can enhance your games and other interactive programs with sound effects. My C-64 Thinking program will give you the impression that your computer is mulling over a strategic move or working with a command you've just entered. Try it also in a program as a subroutine immediately before output to the screen or following user input.

```
49Ø REM C-64 THINKING - JOSEPH CHARNETSKI
5ØØ S=54272:POKE S+6,24Ø:POKE S+5,34
51Ø POKE S+24,15:POKE S+4,21
52Ø FOR I=1TO3Ø
53Ø POKES+1,RND(1)*18Ø:POKE S,RND(1)*2Ø
54Ø FOR J=1TO6Ø:NEXT:NEXT
55Ø POKE S+4,Ø:REM RETURN
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

ML FILE COPIER

Copying machine language files is a bit more difficult than copying Basic programs: They must be loaded with the ,8,1 or ,1,1 syntax. The utility I've developed transfers most ML files from disk to disk (or tape) without having to know the starting or ending addresses. Program operation is straightforward; just answer the prompts. The source is the medium from which you load the original, and destination is the medium on which you want the copy saved. In addition, the utility displays the starting and ending address of the ML file being copied.

```
1Ø REM 64 ML FILE COPIER-RICHARD PENN
2Ø PRINT"{SHFT CLR}{CRSR DN}{CTRL 9}INSERT
   SOURCE DISK/TAPE AND HIT RETURN"
3Ø GETA$:IFA$<>CHR$(13)GOTO3Ø
4Ø INPUT"{2 CRSR DNs}ML FILENAME";F$:IF F$=
   ""GOTO4Ø
5Ø INPUT"{CRSR DN}SOURCE:{6 SPACEs}{CTRL 9}
   T{CTRL Ø}APE OR {CTRL 9}D{CTRL Ø}ISK";D$
   :SD=8:IFD$="T"THENSD=1
6Ø INPUT"{CRSR DN}DESTINATION: {CTRL 9}T{CT
   RL Ø}APE OR {CTRL 9}D{CTRL Ø}ISK";D$:DD=
   8:IFD$="T"THENDD=1
7Ø PRINT"{2 CRSR DNs}LOADING "F$"...":POKE1
   47,Ø:SYS57812F$,SD,1:SYS62631
8Ø IFSD=1THENSL=PEEK(829):SH=PEEK(83Ø):GOTO
   1ØØ:REM TAPE
9Ø OPEN2,8,2,F$:GET#2,A$,B$:Z$=CHR$(Ø):CLOS
   E2:SL=ASC(A$+Z$):SH=ASC(B$+Z$)
1ØØ PRINT"{CRSR DN}"SL+256*SH"-"PEEK(174)+2
   56*PEEK(175)
11Ø PRINT"{2 CRSR DNs}{CTRL 9}INSERT DESTIN
   ATION DISK/TAPE AND HIT"SPC(14)"{CTRL 9
   }RETURN TO COPY"
12Ø GETA$:IFA$<>CHR$(13)GOTO12Ø
13Ø PRINT"{2 CRSR DNs}COPYING "F$"...":SYS5
   7812F$,DD,1:POKE193,SL:POKE194,SH:SYS62
   957
14Ø INPUT"{2 CRSR DNs}DONE. COPY IT AGAIN (
   Y/N)";A$:IFA$="Y"GOTO11Ø
```

—RICHARD PENN, MONTREAL, QUEBEC, CANADA

AT FIRST SPRITE

If you use sprites in your programs, you may have noticed that when you first display a sprite, it flashes momentarily below the position you have set and then corrects itself. This happens once to each sprite when it's initially displayed. To prevent this, use the following line at the start of your program:

```
10 POKE 53269,255:POKE 53269,0
```

This turns all eight sprites on and off, forcing the video chip to complete its initialization. Since the position registers point off screen initially, there is no visible effect, but when you're ready to display a sprite, it appears in the right place immediately.

—LOU GOLDSTEIN, FLUSHING, NY

SCREEN MAPPER

If your printer uses Commodore graphics, this menu-driven program will print both screen and color memory maps with numbered grids of 40 columns by 25 rows for screen locations 1024–2023 and color locations 55296–56295. It also prints screen layout grids for plotting column and row coordinates.

```
1Ø REM SCREEN MAP PRINTER-J.R.CHARNETSKI
2Ø PRINT"{SHFT CLR}{CRSR DN} 1-SCREEN MEMOR
   Y{HOME}{2 CRSR DNs} 2-COLOR MEMORY{HOME}
   {3 CRSR DNs} 3-SCREEN LAYOUT{HOME}{4 CRS
   R DNs} 4-END{CRSR DN}"
3Ø GETA$:A=VAL(A$):ON-(A<1ORA>4)GOTO3Ø:ONAG
   OTO4Ø,5Ø,6Ø:PRINT"{SHFT CLR}":END
4Ø X=1Ø24:T$="SCREEN MEMORY MAP":GOTO7Ø
5Ø X=55296:T$="COLOR MEMORY MAP":GOTO7Ø
6Ø X=Ø:T$="SCREEN LAYOUT"
7Ø PRINTA:M=25:S$=" ":OPEN4,4:PRINT#4
8Ø PRINT#4,SPC(39-(LEN(T$)/2));T$
9Ø PRINT#4,SPC(19);:B$="{4 SPACEs}":FORJ=1T
   O4
1ØØ PRINT#4,"Ø123456789";:NEXT:PRINT#4
11Ø PRINT#4,SPC(13)RIGHT$(B$+STR$(X)+S$,6);
   :FORI=1TO4Ø:PRINT#4,"{SHFT O}";:NEXT
12Ø PRINT#4,"{COMD G}";:IFX<MTHENX=X+1:GOTO
   14Ø
13Ø X=X+4Ø:PRINT#4,MID$(STR$(X-1),2);
14Ø PRINT#4,CHR$(8):C=C+1
```

```
15Ø PRINT#4,CHR$(15);:IFC<MGOTO11Ø
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

SAVING YOUR CUSTOMIZED RUN SCRIPT 64

I've enjoyed using RUN Script 64, and I've used the Params program (see "RUN Script 64," April 1986) with it many times. It's a little inconvenient, though, because it won't save the modified RUN Script file onto the same disk. Since the old version needs to be scratched before saving the new version, I added the following line:

```
895 OPEN15,8,15,"S0:RUNSCRIPT":CLOSE15
```

Now the Parameters program scratches the old file before saving the new version. Be sure to follow the instructions for the Params program. Now making changes is much easier!

—JAMES HALLMAN, OWENSBORO, KY

SYS A BORDER

Creating screen borders with the Print command can be quite a chore. Here's a machine language alternative. This routine can be appended to your program to create borders with your own character and color. The ML program that SYS a Border creates is relocatable and may be loaded wherever you have 100 bytes of free memory. Please note that locations 251 through 254 are used during the execution of the ML program.

The syntax for using SYS a Border is SYS address, screen code #,color code #. The demo at the end of the Basic loader shows how to create a border with the asterisk in the current cursor color.

```
1 REM 64 SYS A BORDER-FRANK COLARICCI
2 REM RELOCATABLE-JUST CHANGE 'BR'
3 BR=49152:REM SYS ADDRESS
4 FOR X=BR TO BR+99:READ A:POKE X,A
5 T=T+A:NEXT:IFT<>14Ø85 THEN{2 SPACEs}STOP
6 DATA Ø32,253,174,Ø32,158,173,Ø32,247
7 DATA 183,14Ø,ØØØ,ØØ4,Ø32,253,174,Ø32
8 DATA 158,173,Ø32,247,183,14Ø.ØØØ.216
9 DATA 162,Ø39,173,ØØØ,ØØ4,157,ØØØ,ØØ4
1Ø DATA 157,192,ØØ7,173,ØØØ,216,157,ØØØ
11 DATA 216,157,192,219,2Ø2,Ø16,235,169
12 DATA Ø39,133,251,133,253,169,ØØ4,133
13 DATA 252,169,216,133,254,162,Ø24,173
14 DATA ØØØ,ØØ4,16Ø,ØØØ,145,251,2ØØ,145
15 DATA 251,173,ØØØ,216,145,253,136,145
16 DATA 253,165,251,Ø24,1Ø5,Ø4Ø,144,ØØ4
17 DATA 23Ø,252,23Ø,254,133,251,133,253
18 DATA 2Ø2,2Ø8,22Ø,Ø96
1ØØ PRINT"{SHFT CLR}{3 CRSR DNs}SAMPLE"
11Ø SYS BR,42,PEEK{646)
```

—FRANK COLARICCI, WINTER PARK, FL

DISK VERIFY TIP

After saving a program to disk, I always verify it with VERIFY "*",8 to save time. This works because * accesses the last file saved or loaded. (The exception is when you initially turn on the drive; it refers only to the first file on the disk.)

—HAL VAUGHN, MOUNT AIRY, NC

INPUT PROMPT

Sometimes the standard input prompt can get in the way of elegant programming. For instance, when writing a financial program, you may want the question mark replaced with a dollar sign. My short routine rewrites Basic into RAM to let you do just that. Insert the data loader at the beginning of your program and activate the machine language routine with SYS49152. A dollar sign will appear whenever the Input statement is called.

You can restore the question mark at any time, or you can use any other character you want. Just poke the selected character code into location 43846. If you prefer that no character appear, try using a 32 (the space character) as the prompt character.

```
3Ø REM DOLLAR INPUT-KENT BRIDWELL
4Ø CK=Ø:FORI=49152 TO 49223:READ A
5Ø CK=CK+A:POKE I,A:NEXT
6Ø IFCK<>11Ø68THENPRINT"DATA ERROR!":END
7Ø SYS49152:REM >>TEST PROMPT NOW
8Ø PRINT:INPUT"ENTER PRICE: ";D
9Ø PRINT:PRINT"PRICE IS $"D
1ØØ DATA 169,ØØØ,133,251,133,253,169,16Ø
11Ø DATA 133,252,133,254,169,255,141,Ø72
12Ø DATA 192,169,191,141,Ø73,192,16Ø,ØØØ
13Ø DATA 177,251,145,253,23Ø,251,2Ø8,ØØ2
14Ø DATA 23Ø,252,165,251,2Ø5,Ø72,192,2Ø8
15Ø DATA Ø1Ø,165,252,2Ø5,Ø73,192,2Ø8,ØØ3
16Ø DATA Ø76,Ø6Ø,192,23Ø,253,2Ø8,ØØ2,23Ø
17Ø DATA 254,Ø76,Ø22,192,169,Ø36,141,Ø7Ø
18Ø DATA 171,165,ØØ1,Ø41,254,133,ØØ1,Ø96
```

—KENT M. BRIDWELL, SANTA MONICA, CA

FASTEST DATAFILE 64

Since I've discovered the usefulness of Datafile and its peripheral programs (*RUN*, November and December 1984), I've gradually increased the number of applications. One of my databases contains 438 records, and sorting it before printing it out used to take 426 seconds. I found that if I compiled Datafile with a compiler such as Blitz!, the same sort took only 90 seconds!

Searches and file loads also execute faster. A typical 500-record search was cut from 18 seconds to 6 seconds, while loading the file was reduced from 120 seconds to about 80 seconds.

The beauty of Datafile is that it can be loaded and put into use before most commercial database programs get their first screen. Compiling it makes it even more beautiful!

—PHIL HYSELL, LOUISVILLE, KY

GREAT ESCAPE

Have you ever been trapped in an input on your C-64, only to be forced to exit using the return key? Well, here's a better exit. Simply hold down the shift key, press the run-stop key and then quickly release the shift key. This is done with a sort of rolling motion. One word of caution: If you use a Datassette, make sure none of its buttons are depressed; otherwise, it could cause a program to begin loading from the Datassette and ruin the program currently in memory.

—DAVID HINK, NANTY GLO, PA

LETTER CATCHER

This game can sharpen your reflexes and typing skills, and you can have fun at the same time. ►

When you run the program, a randomly chosen letter appears at the bottom of the screen and moves slowly upward. If you press the corresponding key before the letter reaches the top, a point is added to your score and a new letter is chosen. The quicker your fingers fly, the more points you can get. The program increases speed a little after each letter. If you touch-type, you'll learn to type faster.

```
10 REM LETTER CATCHER - CHING KO
20 DT=100:S=0:CH=RND(-TI)
30 PRINTCHR$(147):CH=INT(RND(1)*26)+65
40 FORDE=1TO23:PRINT:NEXT
50 PRINT:PRINTTAB(INT(RND(1)*37)+2)CHR$(CH)
   ;:I=24
60 GETK$:IFK$<>CHR$(CH)GOTO90
70 PRINT CHR$(147):S=S+1:PRINTTAB(18);S
80 DT=DT-1:FORDE=1TO250:NEXT:GOTO30
90 FORDE=1TODT:NEXT
100 PRINT:IFI>0THENI=I-1:GOTO60
110 PRINTCHR$(147)"YOUR SCORE WAS";S:PRINT
120 PRINT"PRESS 'RETURN' TO PLAY AGAIN."
130 INPUT K$:IFK$=""GOTO20
```

—Ching Ko, McPherson, KS

C-64 Trace

Debugging a Basic program is made easier with a trace utility. These utilities trace the execution of a program and display the line numbers. Most traces display the lines on the screen while the program is running. This can cause problems if your program prints to the screen, resulting in scrambled displays. Also, when listing a program to compare it with the trace, you can accidentally scroll the trace values right off the screen.

To overcome these annoyances, C-64 Trace stores all executed lines in memory (up to 2000 of them) while your program is running, and it allows the numbers to be recalled later as often as you wish. To use C-64 Trace, type SYS820 to turn it on, and then run your program. (Turning on the trace clears all previously saved line numbers.)

To display the executed lines and shut off the trace, type SYS916. The line list can be stopped at any time with the run-stop key. Also, if there's a For-Next loop on a line, rather than display the same line many times, C-64 Trace does it just once. Lines containing only REMs are also ignored.

```
1 REM C-64 TRACE UTILITY-RICHARD PENN
10 FORU=820TO990:READQ:POKEU,Q:C=C+Q:NEXT
15 IFC<>21791THENPRINT"DATA ENTRY ERROR!":S
   TOP
20 PRINT"{SHFT CLR}SYS820 - TRACE ON":PRINT
   "SYS916 - DISPLAY LINES":POKE179,4
100 DATA 169,77,141,10,3,169,3,141,11,3,169
    ,0,133,251,141,146,3,141,147
110 DATA 3,169,192,133,252,96,72,138,72,152
    ,72,8,165,157,201,0,208,36,160
120 DATA 0,165,57,166,58,205,146,3,208,8,23
    6,147,3,208,3,76,125,3,141
130 DATA 146,3,145,251,32,134,3,142,147,3,1
    38,145,251,32,134,3,40,104,168
140 DATA 104,170,104,76,134,174,230,251,165
    ,251,201,0,240,1,96,230,252,96,4
150 DATA 0,169,0,133,253,169,192,133,254,16
    0,0,165,253,197,251,208,6,165,254
160 DATA 197,252,240,30,169,13,32,210,255,1
    77,253,170,32,211,3,177,253,32,205
170 DATA 189,32,211,3,32,234,255,32,225,255
    ,240,3,76,156,3,169,134,141,10
180 DATA 3,169,174,141,11,3,96,230,253,165,
    253,201,0,240,1,96,230,254,96
```

—Richard Penn, Montreal, Quebec, Canada

Auto Menu Booter

The Auto Menu program in the April 1986 issue of *RUN* is really great, and I use it on all my disks. However, if each program on the disk has the following lines as an Exit routine, the Auto Menu program can be loaded automatically and run.

```
10 REM AUTO MENU BOOTER-THOMAS W. O'DEA
62500 INPUT"DO YOU WANT TO RUN THE PROGRAM
      AGAIN{4 SPACEs}(Y/N){2 SPACEs}Y{3 CRS
      R LFs}";R$
62510 IF R$="Y"THEN RUN
62520 IFR$<>"N"THENPRINT"{3 CRSR UPs}":GOTO
      62500
62530 POKE53281,1:POKE646,0
62540 PRINT"{SHFT CLR}{11 CRSR DNs}"SPC(13)
      "LOADING MENU"SPC(108)"PLEASE WAIT...
      "
62550 PRINT"LOAD"CHR$(34)"AUTO MENU"CHR$(34
      )",8"
62560 PRINT"{4 CRSR UPs}":POKE631,131:POKE1
      98,1:END
```

—Thomas W. O'Dea, Randolph, MA

Blocks Free

If you'd like to know how many blocks remain free on a disk without listing the entire directory, simply enter LOAD"$$",8. Then list the "program." The result will display the blocks free on the disk but not the directory. You'll have to load a program (or a complete directory) before trying this trick again, otherwise a File Not Found error will result.

—R.V. Taylor, Little Rock, AR

On-Else

To check single-character entries for accuracy, I use a seldom-seen Basic command—On X Goto. You can use it much like If-Then-Else, which Basic 2.0 does not have. Here's a short program to show how it works.

```
10 PRINT"{SHFT CLR} TRY AGAIN? (Y/N)"
20 GET A$:IFA$=""GOTO20
30 ON-((A$="Y")+2*(A$="N"))GOTO 100,200:GOT
   O10
40 :END
100 PRINT"YES":END
200 PRINT"NO"
```

Line 30 allows the computer's logic to make the comparisons. If a comparison is true (e.g., A$ = "Y"), the computer will have a negative integer as the result (−1 in this example). If none of the comparisons matches, the result will be a zero, which the computer's logic considers to be false.

Since only one can be true, the result in this short program would be 0 (none true), −1 if A$ = "Y" or −2 if A$ = "N". The minus sign after ON will change the sign to a positive number that ON can handle. If the value is 1, then the first Goto (100) branch is taken; if the value is 2, the program goes to 200; if the value is 0, then the statement *after* all line

numbers is executed (the ELSE part), which, in this case, sends the program for another character.

—PAUL N. LACEY, PICKERINGTON, OH

64 YARD DASH

I teach computer science at a small private school. Unfortunately, we do not have as many computers as we'd like, and, until now, fighting over computer time had been a real problem. The 64-Yard Dash program is my solution. (The program should also run on the C-128.)

Type in the program and run it. You'll be asked to give the number of students and their initials (two characters). The program will randomly choose the order in which students may use the computer. Watch out for clever students who might try to alter the program in their favor (this is the voice of experience speaking).

```
10Ø PRINT"{SHFT CLR}{CTRL 2}"TAB(14)"64 YAR
    D DASH":POKE5328Ø,Ø:POKE53281,Ø
11Ø INPUT"{2 CRSR DNs}NUMBER OF PEOPLE (8 M
    AX)";N:IFN>8ORN<1THENRUN
12Ø FORA=1TON
13Ø PRINT"{HOME}{6 CRSR DNs}INITIALS OF PER
    SON #{8 SPACEs}{8 CRSR LFs}";:INPUTN$(A
    )
14Ø IFLEN(N$(A))<>2THEN13Ø
15Ø NEXT
16Ø PRINT"{SHFT CLR}{CRSR DN}"TAB(14)"64 YA
    RD DASH{3 CRSR DNs}"
17Ø PRINTSPC(38)"{COMD S}"
18Ø FORL=1TON*2:PRINTSPC(38)"{SHFT B}":NEXT
19Ø PRINTSPC(38)"{COMD X}{HOME}{5 CRSR DNs}
    "
2ØØ FORA=1TON:PRINTN$(A):PRINT:NEXT
21Ø TI$="ØØØØØØ"
22Ø R%=1+N*RND(.):PRINT"{HOME}{3 CRSR DNs}"
    :FORK=1TOR%:PRINT"{CRSR DN}":NEXT:P(R%)
    =P(R%)+1
23Ø IFP(R%)>34THEN22Ø
24Ø PRINTSPC(P(R%)+2)"{CTRL 9}{CTRL 2} {CRS
    R DN}{CRSR LF}{CTRL 6} {CRSR UP}{CTRL 9
    }{CTRL 2} {CRSR DN}{CRSR LF}{CTRL 6}{CT
    RL Ø}{SHFT LB.}"
25Ø IFP(R%)=34THEN27Ø
26Ø GOTO22Ø
27Ø W=W+1:T$=MID$(STR$(INT((TI/6Ø)*1ØØ)/1ØØ
    ),2)
28Ø PRINTSPC(25)"{CTRL 9}{CTRL 2}{2 CRSR UP
    s}"T$TAB(3Ø)"SEC"TAB(34)"["MID$(STR$(W)
    ,2)"]":IFW<NTHEN22Ø
29Ø PRINT"{HOME}{23 CRSR DNs}"TAB(13)"{CTRL
     2}PRESS ANY KEY."
3ØØ GETA$:IFA$=""THEN3ØØ
```

—SCOTT M. HUSE, SALISBURY CENTER, NY

KEYBOARD TONE

Some computers have a built-in keyboard tone feature that emits a clicking sound to confirm that a key was pressed. My program adds this feature to a C-64. To disable the keyboard tone, press the run-stop/restore combination; to re-enable it, type SYS679.

```
1 REM C-64 KEYBOARD TONE-RICHARD PENN
1Ø FOR U=679TO755:READQ:POKEU,Q:CK=CK+Q:NEX
   T
11 IF CK<>9477THEN PRINT"ERROR IN DATA":END
12 SYS679
13 DATA 12Ø,169,18Ø,141,2Ø,3,169
14 DATA 2,141,21,3,88,96,166
15 DATA 197,228,2,24Ø,55,134,2
16 DATA 224,64,24Ø,49,169,15,141
17 DATA 24,212,169,Ø,141,5,212
18 DATA 169,24Ø,141,6,212,169,3Ø
19 DATA 141,1,212,169,Ø,141,Ø
2Ø DATA 212,169,17,141,4,212,16Ø
21 DATA Ø,162,Ø,232,224,255,2Ø8
22 DATA 251,2ØØ,192,12,2Ø8,244,169
23 DATA 16,141,4,212,76,49,234
```

—RICHARD PENN, MONTREAL, QUEBEC, CANADA

BAR CHART DEMO

This short program creates colorful bar charts to demonstrate a programming technique for presenting data graphically. The program uses random values to simulate the data needed to generate bars of various sizes and colors. If you've wanted to include bar charts in your Basic programming, but thought it might be too difficult, you might find helpful ideas in this demo program.

```
1Ø REM 64 BAR CHARTS-J.R.CHARNETSKI
2Ø POKE5328Ø,3:POKE53281,1:BW$="{CTRL 9}{2
   SPACEs}":CU$="{2 CRSR UPs}"
3Ø PRINT"{SHFT CLR}{CTRL 1}{2 CRSR DNs}"
4Ø FOR I=1TO2Ø:PRINT TAB(4)"{SHFT P}":NEXT
5Ø PRINTTAB(4);:FOR I=1TO32:PRINT"{COMD Y}"
   ;:NEXT:BX=6
6Ø BC=INT(RND(Ø)*15)+2
7Ø BY=INT(RND(Ø)*2Ø)+1:POKE 646,BC:PRINT CU
   $
8Ø FOR BAR=1TOBY:PRINT TAB(BX)BW$CU$:NEXT:P
   RINT"{CTRL 1}"
9Ø FOR CD=1TOBY:PRINT TAB(BX+2)"{CTRL J}":N
   EXT:BX=BX+3:IFBX<36 THEN 6Ø
1ØØ PRINT"{HOME}REPEAT DEMO (Y/N)?"
11Ø GET A$:IF A$="Y"THEN 3Ø
12Ø IF A$="N"THEN PRINT"{SHFT CLR}":END
13Ø GOTO11Ø
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

SCREEN ERASER

My subroutine adds a touch of magic to any Basic program by erasing the screen from four directions in a sequence that starts at the edge of the screen and erases toward the center. The more characters it has to erase, the more visually attractive is the effect.

```
1Ø REM 64 SCREEN ERASER-CHRIS CHARNETSKI
2Ø H$=CHR$(19):S$=" ":V$=S$
3Ø FOR A=1TO23:V$=V$+CHR$(157)+CHR$(17)+S$:
   NEXT:V$=V$+H$
4Ø FOR A=ØTO12:PRINT H$;TAB(A)V$:POKE781,A:
   SYS599Ø3
5Ø PRINT H$;TAB(39-A)V$:POKE781,24-A:SYS599
   Ø3:NEXT:SYS58692:REM RETURN
```

—CHRISTINE N. CHARNETSKI, PLAINS, PA

EASY C-64 BORDER

My short program prints a border on the C-64 screen. Because the program uses Pokes to print the border char- ►

acters, the border can occupy the edge of the screen, leaving a maximum area for your text and graphics. In line 10, S is the border character and C is its color. As listed, the border character is a reversed space and the color is white.

```
Ø REM EASY BORDER-ANDREW D RILEY
1Ø S=16Ø:C=1:L=1Ø23:PRINT"{SHFT CLR}{CTRL 2
   }":POKE5328Ø,Ø:POKE53281,Ø
2Ø FOR Z=1TO4:READX,Y:FOR I=1TOX:L=L+Y:POKE
    L+54272,C:POKE L,S:NEXT:NEXT
3Ø DATA 4Ø,1,24,4Ø,39,-1,23,-4Ø
```

—ANDREW D. RILEY, CAMDEN, OH

TYPING FROM RIGHT TO LEFT

I've written a subroutine for my Hebrew tutor programs so the user can type in text from right to left. For entering Hebrew or any language that reads from right to left, this routine is a must. It might also be helpful for certain games.

```
499 REM TYPING RIGHT-LEFT SUB-R.M. HARRIS
5ØØ PRINT CHR$(147):RO=Ø:CL=39
51Ø GET V$:IF V$=""THEN51Ø
52Ø IFV$="{COMD X}"THEN RETURN:REM EXIT
53Ø POKE781,RO:POKE782,CL
54Ø POKE783,Ø:SYS 6552Ø
55Ø PRINT V$;
56Ø CL=CL-1:IFCL<ØTHENCL=39:RO=RO+1
57Ø GOTO51Ø
```

—RICHARD M. HARRIS, SEATTLE, WA

CUSTOMIZED DOS WEDGE FOR YOUR C-64

Here's a way to customize the DOS 5.1 Basic loader. Save the following program with the filename "!"; be sure the DOS 5.1 ML program is also added to your disk.

```
Ø REM DOS LOADER+ BY KARL JOHNSON
1Ø IFA=ØTHENA=1:LOAD"DOS 5.1",8,1
2Ø OPEN1,8,15:PRINT#1,"M-W"CHR$(1Ø6)CHR$(Ø
   )CHR$(1)CHR$(133):CLOSE1
3Ø FORJ=679TO688:READK:POKEJ,K:NEXT:POKE77
   4,167:POKE775,2
4Ø SYS 52224:PRINT"{SHFT CLR}{CTRL 2}"
5Ø POKE5328Ø,12:POKE53281,Ø:FORJ=631TO634:
   READK:POKEJ,K:NEXT:POKE198,4:NEW
6Ø DATA 72,173,141,2,2Ø8,251,1Ø4,76,26,167
   ,177,36,48,13
```

Then load and run the program (see page 28 of the February 1986 *RUN* for a summary of the DOS Wedge commands).

Now you're ready to perform some time-saving magic. Type in this line:

L{SHFT O} "!",8:{SHFT RUN-STOP}

Like magic, the Wedge and Pause features are loaded and ready to use.

The program also lists the disk directory so that you can run any Basic program by moving the cursor up to the filename, typing an up arrow and pressing return. Line 20 reduces the head-knocking caused by some copy-protection schemes. You can freeze a scrolling screen with either the control, Commodore, shift or shift-lock keys. Release the key when you're ready to continue.

—KARL JOHNSON, HOUSTON, TX

DIRECTORY NAME ARRAY 64

The program below reads a disk directory, places each of the filenames into a one-dimensional array and prints out the filenames, using Basic code.

After you load and run the loader program, be sure to dimension a string array for the filenames as the first array in your program. Then call up the program with SYS828, which reads the filenames into the array with the number of files stored in location 254.

Here's an example of how to use the program, assuming the loader was run to poke the machine language into memory:

```
10 DIM A$(144):SYS 828:E=PEEK(254)
20 FOR C=1TOE:PRINT A$(C):NEXT:END
```

The program quickly reads the names into the array. The names are actually stored in the "free" area at 49152 ($C000), so you can store the array without using any of Basic's memory.

```
1Ø REM C-64 DIRECTORY READER-MARK NEWTON
15 C=Ø:FORA=828TO1ØØ6:READ B:POKE A,B:C=C+
   B:NEXT
2Ø IF C<>226Ø2 THEN PRINT"DATA ERROR..."
25 DATA 169,14,162,8,16Ø,Ø,32,186,255,169,
   4,162,235,16Ø,3,32,189,255,32,192
3Ø DATA 255,162,14,32,198,255,16Ø,Ø,14Ø,57
   ,3,132,25Ø,14Ø,56,3,165,48,133
35 DATA 254,24,165,47,1Ø5,7,144,2,23Ø,254,
   133,253,169,Ø,133,251,169,192,133
4Ø DATA 252,16Ø,1,32,2Ø7,255,166,144,24Ø,1
   5,32,2Ø4,255,169,14,32,195,255
45 DATA 172,56,3,136,132,254,96,192,6,144,
   45,2Ø1,34,2Ø8,1Ø,173,57,3,73,1
5Ø DATA 141,57,3,16,31,174,57,3,2Ø8,3Ø,192
   ,32,2Ø8,22,16Ø,Ø,165,25Ø,145,253
55 DATA 132,25Ø,24,165,253,1Ø5,3,144,2,23Ø
   ,254,133,253,76,119,3,2ØØ,76,121
6Ø DATA 3,14Ø,59,3,16Ø,Ø,145,251,165,25Ø,2
   Ø8,14,16Ø,1,165,251,145,253,2ØØ
65 DATA 165,252,145,253,238,56,3,23Ø,25Ø,1
   72,59,3,23Ø,251,2Ø8,2,23Ø,252,76
7Ø DATA 166,3,36,48,58,42
```

—MARK E. NEWTON, JAMESTOWN, IN

TURBO-CURSOR

These Poke commands will make the cursor move much faster around the screen, which is helpful in programs requiring frequent cursor use. Just enter this line:

```
POKE 650,128:POKE 56325,10
```

Poking location 650 with 128 enables all the keys to repeat. You can change the cursor's speed by poking different values into location 56325 (lower numbers give faster speeds).

—M. PELLEGRINO, SPENCER, MA

FADE-IN/FADE-OUT TEXT

I use the technique of "fading" in my screen titles to give my presentations a professional look. The subroutine I use (lines 1000–1080) shows how to employ the technique. I put my title or message in variable A$, the location numbers of the screen lines I want my message to appear on in variable A, and then call up the subroutine. If you want to pro-

duce a fade-out effect, just add REM in front of DATA in line 1060.

```
1Ø REM MAGIC FADING BY DON JONES
2Ø PRINT"{SHFT CLR}":POKE53281,Ø
3Ø A$="{17 SPACEs}FADING":A=2:GOSUB1ØØØ
4Ø A$="{19 SPACEs}IS":A=3:GOSUB1ØØØ
5Ø A$="{17 SPACEs}MAGIC!":A=4:GOSUB1ØØØ
6Ø A$="{14 SPACEs}BY DON JONES":A=6:GOSUB1
   ØØØ
7Ø PRINT"{CTRL 2}":END
1ØØØ REM *FADE-IN ROUTINE*
1Ø1Ø FOR L=1TO5
1Ø2Ø PRINT"{HOME}{CRSR UP}";:FORPD=1TOA:PR
     INT"{CRSR DN}";:NEXTPD
1Ø3Ø READC,D:POKE646,C:PRINTA$;
1Ø4Ø FORW=ØTOD:NEXT
1Ø5Ø NEXTL:PRINT:RESTORE:RETURN
1Ø6Ø DATA Ø,15,11,15,12,15,15,15,1,3ØØ
1Ø7Ø REM FADE OUT DATA
1Ø8Ø DATA 1,15,15,15,12,15,11,15,Ø,3ØØ
```

—DON JONES, VIRGINIA BEACH, VA

TWINKLE, TWINKLE, LITTLE STARS

The short routine below fills the screen with twinkling stars. I first designed it as a backdrop for a space game and later found it useful as a visual distraction for users during a program's short waiting periods.

```
1Ø REM TWINKLING STARS-MARCO BALAGUER
2Ø PRINT"{SHFT CLR}":DEF FNS(A)=INT(RND(Ø)
   *1ØØØ)
3Ø S=1Ø24:D=54272:C=S+D
4Ø FORX=1TO5Ø:F=FNS(X)
5Ø FORY=1TO2:FORR=1TO4:READA,B
6Ø POKES+F,A:POKEC+F,B
7Ø NEXT:RESTORE:NEXT:NEXT
8Ø DATA 86,1,91,5,42,7,46,1
```

—MARCO BALAGUER, BROOKLYN, NY

PERFECT TYPIST IMPROVEMENT

One part of *RUN*'s 64 Perfect Typist program that irritates me is the screen location of the checksum, which prints below the line I've just entered. This poses a problem when I want to check old listings or use an automatic line numbering program. So, I wrote the changes below to relocate the checksum to the home position. Make these line changes to the program.

Line 30: change ML + 154 to ML + 183
Line 40: change 16251 to 20566
Line 80: change ML + 141 to ML + 161

Also enter these lines:

```
Ø REM 64 PERFECT TYPIST IN HOME POS-M.B.
  ENDERS
26Ø DATA Ø21,141,24Ø,ØØ3,166,214,2Ø2,142
262 DATA 242,ØØ3,169,ØØØ,133,212
263 DATA 169,Ø19,Ø32,21Ø,255,169
266 DATA Ø18,Ø32,21Ø,255,169,Ø42,Ø32,21Ø
27Ø DATA 255,169,ØØØ,174,24Ø,ØØ3,Ø32,2Ø5
28Ø DATA 189,162,ØØ2,189,241,ØØ3,Ø32,21Ø
29Ø DATA 255,2Ø2,Ø16,247,164,Ø11,174,242
3ØØ DATA ØØ3,134,214,169,Ø13,Ø32,21Ø,255
31Ø DATA Ø96,146,Ø32,Ø32
```

Be sure you save the new program before running it.

—MICHAEL B. ENDERS, FORT WAYNE, IN

DIRECT MODE DISK-ERROR READER

The next time you need to read the disk error channel with your C-64 and you don't have the DOS Wedge in memory, try this handy line in Direct mode:

```
OPEN1,8,15:POKE58,0:{about 20 spaces}INPUT#1,A$,B$,C$,D$:
?A$,B$,C$,D$:CLOSE1
```

The exact number of spaces isn't important, as long as you type in about 20.

—RICHARD PENN, MONTREAL, QUEBEC, CANADA

GETSPEED

This short machine language program prints a sequential file to your monitor screen. It will prompt you for the filename, then print and close the file.

```
1Ø REM 64 GETSPEED - IVO SALMRE
2Ø FORA=82ØTOA+57:READB:POKEA,B:NEXT
3Ø DATA 169,ØØ5,162,241,16Ø,ØØ3,Ø32,189,25
   5,169
4Ø DATA ØØ3,162,ØØ8,16Ø,ØØ3,Ø32,186,255,Ø3
   2,192
5Ø DATA 255,162,ØØ3,Ø32,198,255,Ø32,159,25
   5,2Ø1
6Ø DATA Ø32,24Ø,Ø16,Ø32,183,255,2Ø1,Ø64,24
   Ø,ØØ9
7Ø DATA Ø32,2Ø7,255,Ø32,21Ø,255,Ø76,Ø78,ØØ
   3,169
8Ø DATA ØØ3,Ø32,195,255,Ø32,2Ø4,255,Ø96
9Ø INPUT"FILENAME TO READ";A$
1ØØ FORX=1TOLEN(A$):POKE1ØØ8+X,ASC(MID$(A$
    ,X,1)):NEXT
11Ø POKE821,LEN(A$):SYS82Ø
```

—IVO SALMRE, NORWALK, CT

WEDGE HANDLER

If you're like me, you'll want a copy of the DOS Wedge on each of your disks. I use the following program to load and boot the Wedge's DOS 5.1 program. Then, whenever I want to copy the machine language program onto other disks, that option is always available, and I can even save my wedge handler at the same time.

```
1Ø PRINT"{SHFT CLR}C-64 WEDGE HANDLER - JO
   E CHARNETSKI"
2Ø IF BY=Ø THEN BY=52224:F$="DOS 5.1":LOAD
    F$,8,1
3Ø INPUT"{CRSR DN}(B)OOT OR (C)OPY";A$:IFA
   $="B"THEN PRINT"{SHFT CLR}":SYS BY:NEW
4Ø ON-(A$<>"C")GOTO3Ø:INPUT"{CRSR DN}COPY
   THIS PROGRAM TOO (Y/N)";B$
```

```
5Ø PRINT"{CRSR DN}INSERT TARGET DISK - HIT
   ANY KEY"
6Ø GET C$:IF C$="" GOTO 6Ø
7Ø OPEN15,8,15,"I Ø":OPEN7,8,9,F$+",P,W"
8Ø INPUT#15,D,E$:IF D THEN PRINTE$:GOTO11Ø

9Ø PRINT#7,CHR$(Ø);CHR$(2Ø4);
1ØØ FOR I=ØTO857:PRINT#7,CHR$(PEEK(I+BY));
   :NEXT
11Ø CLOSE7:IF B$="Y"THEN SAVE "WEDGE HANDL
   ER",8:INPUT#15,D,E$:PRINT E$
12Ø IF D=Ø THEN PRINT"DONE."
13Ø CLOSE15:GOTO3Ø
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

INSTR FUNCTION

The C-128 has a handy INSTR function for finding the position of one string within another. The following subroutine will give the same results on the C-64:

```
1Ø REM 64 INSTR-DON JARVIS
1ØØØ XA=LEN(A$):XB=LEN(B$):XX=Ø:SP=1:REM S
     TART POS OPTIONAL
1Ø1Ø FORXE=SP TO XA-XB+1:IF MID$(A$,XE,XB)
     =B$ THEN XX=XE:XE=XA
1Ø2Ø NEXT:RETURN
```

Variables A$ and B$ are the long string and the substring you want to find, respectively. The position of the first letter match is returned in variable XX. A value of 0 means that no match was found. Be sure not to use the variables in the subroutine—XA, XB, XE, XX and SP—in other parts of your program. You might get strange results.

—DON JARVIS, MIAMI, FL

SIMPLE SPRITE EDITOR

I've written a very simple sprite editor for the C-64:

```
Ø REM SPRITE DESIGNER-CHRIS BUTLER
1Ø PRINT"{SHFT CLR}";:POKE65Ø,128
2Ø FOR T=1TO21:FORQ=1TO24:PRINT".";:NEXT:P
   RINT:NEXT
3Ø V=53248:POKEV+21,4:POKEV+41,1
4Ø POKEV+4,255:POKEV+5,2ØØ
5Ø POKE2Ø42,13:END
1ØØ Q=Ø:C=8:FORY=ØTO21:FORX=1TO24
11Ø P=PEEK(1Ø23+X+4Ø*Y)
12Ø C=C-1:IFP=42THENQ=Q+2{UP ARROW}C
13Ø IFC=ØTHENC=8:G=G+1:POKE831+G,Q:Q=Ø
14Ø NEXTX:NEXTY:END
2ØØ PRINT"{SHFT CLR}{2 CRSR DNs}":K=Ø:FORT
    =ØTO63:IFK=ØTHENPRINT"{5 SPACEs}DATA "
    ;
21Ø PRINTRIGHT$(STR$(1ØØØ+PEEK(832+T)),3)"
    ,";
22Ø K=K+1:IFK=8THENK=Ø:PRINT"{CRSR LF} "
23Ø NEXT:POKE53248+21,Ø:END
```

To use the program, run it, and the blank sprite will be printed on the screen. Now fill in the sprite, using the * character for dots you want on, and any other for dots off.

When the sprite is finished, move the cursor to the blank line above the Ready prompt and type in RUN 100. The program will scan the screen and print the sprite in actual size to the right of the grid. Then you can change it if necessary.

When your sprite is the way you like it, move the cursor above the word READY again and type in RUN200. This will create Data statements for the sprite. After they're printed to the screen, just add line numbers and press return for each line.

—CHRIS BUTLER, ANNAPOLIS COUNTY, N.S., CANADA

COMPACT MENUS

Here's an alternative to vertically oriented menus. My routine uses two lines at the top of the screen to display a professional-looking menu with eight options. To make your choice, press the cursor-right key until the desired option is highlighted and then press return. If you use other titles for the menu, be sure they're eight characters long.

```
1Ø REM C-64 MENU LINES-J.R.CHARNETSKI
2Ø POKE5328Ø,2:POKE53281,Ø
3Ø S=8:DIMM$(S):SP$=" ":HL$="{CTRL 2}"
4Ø MC$="{CTRL 5}":PRINT"{SHFT CLR}"MC$
5Ø FOR I=1TOS:M$(I)="OPTION "+CHR$(64+I):N
   EXT:GOTO9Ø
6Ø GET A$:IFA$="{CRSR RT}"GOTO9Ø
7Ø IFA$<>CHR$(13)GOTO6Ø
8Ø PRINT"{CTRL 2}";:ONXGOTO13Ø,13Ø,13Ø,13Ø
   ,13Ø,13Ø,13Ø,13Ø
9Ø PRINT"{HOME}{CTRL 9}";:X=X+1:IFX>STHENX
   =1
1ØØ FORI=1TOS:IFI<>XTHENPRINT SP$M$(I)SP$;
    :GOTO12Ø
11Ø PRINT SP$HL$M$(I)MC$SP$;
12Ø NEXT:PRINT:GOTO6Ø
13Ø PRINT "YOUR CHOICE: "M$(X)
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

SMALLEST C-64 TRACE

Here's the smallest trace program for the C-64, and it's very easy to use. Line 10 is the trace program and the other lines show an example of the trace. To turn the trace on, use POKE777,2 and turn it off with POKE777,167.

```
Ø REM SMALLEST 64 TRACE-DAVID PANKHURST
1Ø POKE74Ø,32:POKE741,194:POKE742,189:POKE
   743,76:POKE744,228:POKE745,167
2Ø POKE 777,2:REM TRACE ON
3Ø PRINT"TRACING"
4Ø PRINT X
5Ø REM
6Ø DATA 4
7Ø CLR
8Ø IF X=ØTHEN X=1
9Ø POKE 777,167:REM TRACE OFF
1ØØ X=1:Y=1:Z=1
```

—DAVID PANKHURST, MONTREAL, QUEBEC, CANADA

2. COMPUTERS—C-128

INPUT WINDOWS

The Commodore's Input routine can easily mess up your carefully planned screen format. How many times have you accidentally pressed a cursor key, only to send any additional input off to another part of the screen? You can avoid unnecessary delays by setting up a small window on the screen, as demonstrated in the following example:

```
10 REM WINDOW INPUT - LEE SEMEL
20 S=10:REM WIDTH OF WINDOW
30 PRINT"{2 HOMEs}":REM WINDOW=ENTIRE SCREE
   N
40 PRINT"{SHFT CLR}YOUR ANSWER"CHR$(27)"M"
50 WINDOW 0,1,S+1,1:REM WINDOW ON SECOND LI
   NE
60 INPUT A$:PRINTCHR$(27)"L"
70 PRINT"{2 HOMEs}"
```

The variable S establishes the width of the window, and the escape codes in lines 30 and 50 disable and enable the screen scroll, respectively. This will keep your text from going too far astray.

—LEE SEMEL, EDISON, NJ

KEY-REPEAT CONTROL

If you've upgraded to a C-128 from a C-64, you might prefer the keys on the C-128 to repeat as the C-64's keys do. Use POKE 2594,128 (the default) to make all the keys repeat; use POKE 2594,0 to make only the space bar, insert-delete and cursor keys repeat; use POKE 2594,64 to prevent all keys from repeating.

—DAVID C. MCKENZIE, CHARLOTTE, NC

LOWERCASE CHARACTERS

Have you ever wanted to use lowercase text on-screen in the C-128's 40-Column (hi-res) mode? Well, now you can, by simply including a CHR$(14) before the text you want to type. Look at the example below: The line will print an uppercase "M" and lowercase "agic":

```
0 REM LOWER CASE CHAR - CARLOS CASTELLANOS
1 :
2 REM ----DELETE ALL BUT LINE 10 TEXT----
3 :
10 CHAR 1,0,0,CHR$(14)+"{SHFT M}AGIC",1
```

—CARLOS A. NERI CASTELLANOS,
GUADALAJARA, JALISCO, MEXICO

EXTRA F KEYS

Did you know that you can add two function keys to the eight already on the C-128? The help key and the shift/run-stop combination can be redefined as function keys with the SYS commands in the listing below.

```
0 REM EXTRA F-KEYS - SHAWN K SMITH
10 BANK15:SYS DEC("60EC"),,8,,,"NO RUN *"
20 BANK15:SYS DEC("60EC"),,9,,,"DON'T HELP"
```

You can substitute anything you wish between the quotes, including CHR$, in place of the strings given in these examples.

—SHAWN K. SMITH, BRONX, NY

RESTORE DISABLE

If you type in the Pokes below, you'll never have to worry about accidentally using the run-stop/restore combination and risk losing important information:

```
POKE 792,51:POKE 793,255
```

—PABLO M. EDER, BUENOS AIRES, ARGENTINA

C-64 PROGRAMS ON THE C-128 II

Magic trick $326 (September 1986) recommends using the C-128 mode to type in C-64 programs because of the 128's extra editing features and its faster disk access. The trick also states that the programs should load and run without trouble in C-64 mode.

The advice is good, with one proviso: Don't let any Basic 7.0 keywords creep into your "C-64" programs. Should that happen, the C-128 will reduce the keyword to a 128 one- or two-character token the C-64 will not recognize. The only way of knowing you have this problem is when the line causes an error and, if listed, will either be missing a word or contain strange characters. For example, if you enter FOR LOOP = . . ., the C-128 will tokenize the (C-64) loop variable into a keyword token and will list in 64 mode as FOR CLOSE = ... You can simply edit the line in 64 mode and save the program to cure this problem. Or, if you recognize the keywords as they are entered in 128 mode, just type a Z between the first two letters. Basic will ignore the Z but will *not* tokenize the keyword.

—ROBERT IRVING, NORTHRIDGE, CA

SPEEDY SPRITES

My trick speeds up sprite animation on the C-128. By poking values directly into memory locations used by Basic to store speed information, a sprite can have a speed between 0 and 255. Enter this line in Direct mode to start a sprite moving:

```
SPRITE 1,1,1:MOVSPR1,45#15
```

Notice the speed of the sprite and then enter:

```
POKE 4478,35
```

This tells Basic to give the sprite a speed of 35. There is a limit to how fast a sprite can move without showing up at several locations on the screen at the same time. Try different values to see which work best for you. The memory locations needed to speed up the other sprites are as follows:

Sprite 1: 4478	Sprite 4: 4511	Sprite 7: 4544
Sprite 2: 4489	Sprite 5: 4522	Sprite 8: 4555
Sprite 3: 4500	Sprite 6: 4533	

—DAVID A. DYE, PHOENIX, AZ

LONG C-64 LINES

There are obvious advantages in using a C-128 to develop C-64 programs. But I've got a useful trick you may not be aware of.

In 128 mode, you can type up to 160 characters on each program line. This is helpful with long data sections and conditional clauses, and it can lead to fantastic "one-liners."

Once you've finished developing your program, save it. ►

Now comes the surprise. Load it in 64 mode—the program will run perfectly. Of course, such lines can then only be changed in 128 mode. You can also use this trick in reverse to edit long lines entered on a C-64 by using keyword abbreviations.

—GERHARD SCHILLING, HEMET, CA

HI-RES SCREEN SAVER

The August 1986 Magic contains a trick ($31A) that shows you how to save a text screen on the C-128. Until now, this utility couldn't save a hi-res screen.

First, draw your picture on the hi-res screen, and save it with:

```
BSAVE"screen",P7168 TO P16383
```

To recall it, set up the proper graphic mode with the Graphic command and type:

```
BLOAD"screen"
```

Voila!—there's your picture. Each picture will occupy 37 blocks on your disk.

—CHAD OLIVER, ST. ANNE, IL

DATAFILEREPORTMAIL

Mike Konshak's Datafile program can be improved by appending the DFReport and DFMail programs to the Datafile program. This is easily accomplished with a few changes.

First load Datafile. Then type the following line in Direct mode (without a line number) to set the "beginning" of the load:

```
Z = 65278 - FRE(0):POKE 45,ZAND255:POKE 46,Z/256
```

Next, load the DFReport program in the normal manner. Move the cursor up to the line above and press return again. Finally, load DFMail. The programs are now appended into one long program, but you must type the following line to restore the pointer to the start of the Datafile program:

```
POKE 45,1:POKE 46,28
```

Next, use the Delete command to delete lines 508–516 and 1010–1018 (be careful!). Now make the following changes and save the new program.

```
1 REM "C-128 {SHFT D}ATAFILE{SHFT R}EPORT{S
  HFT M}AIL-ED WILLIAMS
382 GOTO1ØØØ
384 GOTO5ØØ
636 IFC$="E"THENPRINT#4:CLOSE4:GOTO 1Ø
638 IFC$="M"THENPRINT#4:CLOSE4:GOTO1ØØØ
1124 IFC$="E"THENPRINT#4:CLOSE4:GOTO1Ø
1126 IFC$="R"THENPRINT#4:CLOSE4:GOTO5ØØ
```

You'll no longer have to access the disk drive when you want to use DFReport or DFMail; they'll always be in memory when you want them!

—ED WILLIAMS, WALKERVILLE, MT

SONATINA IN C-128

The following program plays the "Sonatina in C" by Mozart.

```
1Ø REM SONATINA IN C-JESSE B BROWN
2Ø TEMPO 24:PLAY"V1O4TØU11XØ":PLAY"V2O3T5U1
  1XØ"
3Ø A$="V1O5WCV2Ø3QCQGQEQGM V1O5HE V2O3QBQG
  V1O5QG V2O3QEQGM V1O4.HB V2O3QDQGQFQG V1
  O5ICIDM V1O5WC V2O3QCQGQEQGM"
4Ø B$="V1O5WB V2O3QCQAQFQAM V1O5HG V2O3QCQG
   V1O6HDV2O3QEQGM V1O5HG V2O2QBO3QGQD V1O
  5IGIFIE V2O3QG V1O5IFM V1O5WE V2O3QCQGQE
  QGM"
5Ø C$="V1O4QA V2O3QFQRHR V1O4QBO5QCQDQEQFQG
  M V2O3QF V1O5QAQGQFQE V2O3QAAF V1O5QDQCO
  4QBQA V2O3QAMQE V1O4QGQAQB V2O3QRHR V1O5
  QCQDQEQFM"
6Ø CC$="V2O3QE V1O5QGQFQEQD V2O3QGQE V1O5QC
  O4QBQAQGM"
7Ø D$="V2O3QD V1O4QFQGQA V2O3QRHR V1O4QBO5Q
  CQDQEM V2O3QD V1O5QFQEQDQC V2O3QFQD V1O4
  QBQAQGQF V2O3QFMQC V1O4QEQGV2O3QG V1O4.Q
  CV2O3QE V1O4.QC V2O3QG V1O4.QCM"
8Ø DD$="V1O4.HC V2O3QEQGQCQR V1O4QRM"
9Ø PLAY A$+B$:PLAY C$+CC$:PLAY D$+A$:PLAY B
  $+C$:PLAY CC$+D$:PLAY DD$
```

—JESSE B. BROWN, EUNICE, LA

C-128 VARIABLE STORAGE

When you edit a Basic line in your efforts to debug a C-64 program, all the variables are lost, which can be quite bothersome. The C-128 has two 64K banks of memory, and Basic 7.0 stores the program and variables separately. Therefore, when you edit a Basic 7.0 program line, the variables in memory are not affected. This can be a valuable, time-saving feature when you're debugging.

—RICK SELLERS, LITTLE ROCK, AR

ML BANK SWITCHING

The table below gives the value to store in the memory management unit—MMU ($FF00)—to change banks in machine language. You should be in "common" memory when you use this method, or your program will try to continue at the next location in the new bank.

Bank	Value	Bank	Value	Bank	Value
$0	$3F	$6	$96	$B	$EA
$1	$7F	$7	$D6	$C	$06
$2	$BF	$8	$2A	$D	$0A
$3	$FF	$9	$6A	$E	$01
$4	$16	$A	$AA	$F	$00
$5	$56				

—BEN KRANICH, WARREN, MI

INPUT CONTROL

In the September 1986 issue of *RUN*, trick $32F for the C-64 put an "invisible" quotation mark in an Input statement so that you could enter commas and colons when inputting data. My program does the same thing on the C-128 in 128 mode.

```
1Ø REM C-128 INPUT CONTROL-SUE HOFFMAN
2Ø PRINT"[PROMPT HERE]";:TC=RCLR(5):SW=PEEK
  (215):IFSW<>ØTHENSW=6
3Ø COLOR5,RCLR(SW):PRINT"{2 CRSR RTs}"CHR$(
  34)CHR$(27)"O{3 CRSR LFs}";
4Ø COLOR5,TC:POKE2Ø8,1:POKE842,29:INPUTA$
5Ø PRINT"A$="A$:IFA$<>"END"GOTO2Ø
```

—SUE HOFFMAN, HUDSON, WI

Continued on p. 67.

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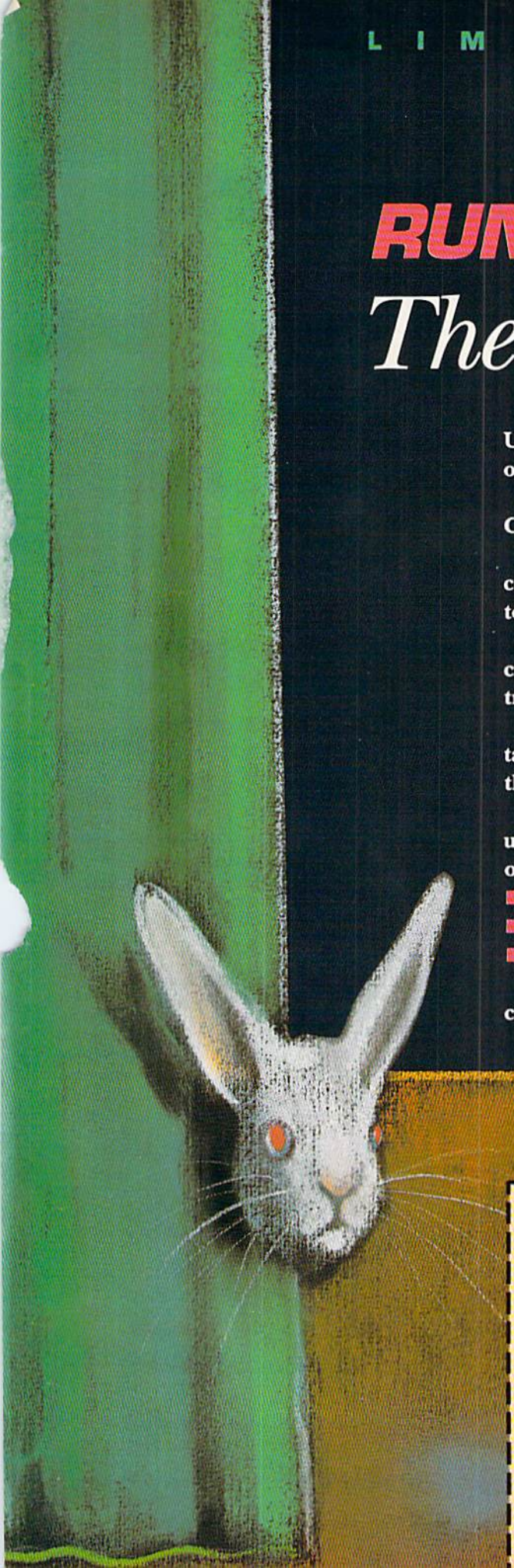
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Easy Applications

Flash Cards

If your child is learning arithmetic, or you're a bit rusty yourself, use this program for review.

By BARBARA SCHULAK

Flash Cards provides flash card-type arithmetic practice on the computer, eliminating the need to buy or make sets of paper cards. The program is designed for interactive use between a child and parent, but youngsters can use it alone to a certain extent. A joystick plugged into port 2 is required for operation.

When you run the program, it will first ask for the type of problem your child wants to practice: addition, subtraction, multiplication, division or an assortment of all four.

Then you must select the range, 0–9, of numbers to be used. For example, if you choose 0 as the lower limit and 5 as the upper limit after selecting multiplication, you'll get problems with a multiplier in the range 0–5 and a multiplicand (the number being multiplied) in the range 0–9. If you specify the same number for both the lower and upper limits, your child can practice just one multiplication table, such as 5 times 0 through 9. This flexibility in choosing numbers makes Flash Cards appropriate for children at all levels.

Your final choice is how long the program should run. You can select any length of time from one to nine minutes, depending on your child's attention span.

After you've responded to all the options, Flash Cards will begin displaying problems in large numerals on the screen. When your child gives a correct answer, push the joystick fire-button to advance to the next problem. If the child doesn't know the answer to a problem, push the joystick in the up direction to display the answer. Then, push the fire-button to move to the next problem.

Continue this process until time runs out. At the end of the program, the time elapsed and number of problems answered correctly are displayed. Press Y to play again.

I deliberated long and hard on whether to make Flash Cards respond to keyboard replies or to require a person-to-person verbal response. I finally settled on the verbal response, even though the computer can't check the correctness of the answers, because I felt typing might slow a child down in a speed drill. Also, verbal responses get parents involved in the learning experience.

My children have enjoyed Flash Cards, and their math skills have improved rapidly. I hope you and your youngsters enjoy it, too.

► **RUN it right: C-64**

Listing 1. Flash Cards program.

```
10 X=RND(-TI):S=54272:NP=0:DIMA
   $(9,5)                    :REM*66
20 W$="FLASH CARDS"          :REM*114
30 POKE53281,0:PRINT"{SHFT CLR}
   {CTRL 8}"                 :REM*212
40 FORI=0TO24:POKES+I,0:NEXT
                             :REM*198
50 FORI=1TO11:PRINT"{HOME}{10 C
   RSR DNs}"SPC(14)LEFT$(W$,I):
   POKE5328Ø,I:GOSUB133Ø:NEXT
                             :REM*146
60 FORI=0TO9:FORJ=1TO5       :REM*120
70 READA$(I,J)               :REM*186
80 NEXT:NEXT                 :REM*84
90 PRINT"{SHFT CLR}{CTRL 9}{COM
   D 1}{14 SPACEs}FLASH CARDS{1
   5 SPACEs}"                :REM*184
100 PRINT"{3 CRSR DNs}{CTRL 2}"
   SPC(5)"[1] ADDITION :REM*40
110 PRINTSPC(5)"[2] SUBTRACTION
                             :REM*192
120 PRINTSPC(5)"[3] MULTIPLICAT
   ION                       :REM*68
130 PRINTSPC(5)"[4] DIVISION
                             :REM*218
140 PRINTSPC(5)"[5] MIXED
                             :REM*198
150 GETK$:IFK$=""THEN150
                             :REM*178
160 T1=VAL(K$):IFT1<1ORT1>5THEN
   90                        :REM*18
170 T2=T1:IFT1=5THENT2=1
                             :REM*200
180 :                        :REM*156
190 PRINT"{SHFT CLR}{CTRL 9}{CO
   MD 6}{13 SPACEs}FLASH CARDS
   {16 SPACEs}"              :REM*38
200 PRINT"{3 CRSR DNs}{CTRL 2}{
   2 SPACEs}LOWER LIMIT OF PRO
   BLEMS (0-9):";            :REM*130
210 GETK$:IFK$=""THEN210:REM*12
220 R1=VAL(K$):IFR1<0ORR1>9THEN
   200                       :REM*80
230 PRINTK$                  :REM*232
240 PRINT"{3 CRSR DNs}{CTRL 2}{
   2 SPACEs}UPPER LIMIT OF PRO
   BLEMS (0-9):";            :REM*102
250 GETK$:IFK$=""THEN250:REM*54
260 R2=VAL(K$):IFR2<0ORR>9THEN2
   40                        :REM*105
270 PRINTK$                  :REM*17
280 IFR1>R2THEN190           :REM*65
290 R2=R2+1                  :REM*137
300 IFT1=4ORT1=5ANDR1=0ANDR2=1T
   HEN1460                   :REM*129
310 :                        :REM*31
320 PRINT"{SHFT CLR}{CTRL 9}{CO
   MD 7}{13 SPACEs}FLASH CARDS
   {16 SPACEs}"              :REM*233
330 PRINT"{3 CRSR DNs}{CTRL 2}"
   SPC(5)"PLAYING TIME (1-9 MI
   N): "                     :REM*9
340 GETK$:IFK$=""THEN340
                             :REM*113
350 TM=VAL(K$):IFTM<1ORTM>9THEN
   320                       :REM*151
360 TM=TM*100                :REM*215
370 PRINT"{SHFT CLR}{CTRL 9}{CT
   RL 5}{13 SPACEs}FLASH CARDS
   {16 SPACEs}"              :REM*157
380 PRINT"{5 CRSR DNs}{CTRL 2}" ►
```

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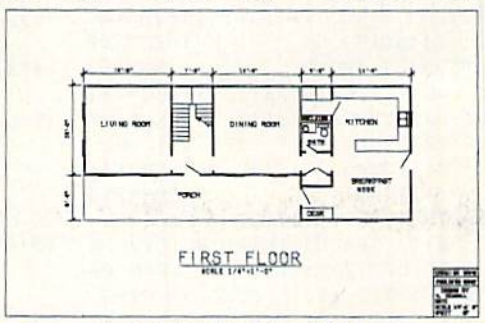
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```
    SPC(3)"PRESS {CTRL 9}FIRE{C
    TRL Ø} TO MOVE TO NEXT PROB
    LEM                    :REM*45
39Ø PRINTSPC(3)"{CRSR DN}MOVE J
    OYTICK {CTRL 9}UP{CTRL Ø} F
    OR ANSWER              :REM*139
4ØØ FORT=1TO2ØØØ:NEXT      :REM*25
41Ø :                      :REM*131
42Ø TI$="ØØØØØØ"           :REM*147
43Ø ONT1GOSUB1Ø7Ø,112Ø,118Ø,123
    Ø,129Ø                 :REM*139
44Ø ONT2GOSUB62Ø,74Ø,87Ø,99Ø
                           :REM*147
45Ø FB=PEEK(5632Ø)AND16:FR=15-(
    PEEK(5632Ø)AND15)      :REM*45
46Ø IFFR=1THENGOSUB139Ø :REM*83
47Ø IFVAL(TI$)>TMTHEN54Ø:REM*51
48Ø IFFB<>ØTHEN45Ø         :REM*197
49Ø NP=NP+1:GOSUB133Ø      :REM*19
5ØØ IFFLTHENNP=NP-1        :REM*2Ø3
51Ø FL=Ø                   :REM*173
52Ø IFVAL(TI$)<TMTHEN43Ø :REM*8
53Ø :                      :REM*252
54Ø PRINT"{SHFT CLR}{CTRL 9}{CT
    RL 5}{14 SPACEs}FLASH CARDS
    {15 SPACEs}"           :REM*68
55Ø PRINT"{2 CRSR DNs}{CTRL 2}"
    SPC(11)"TIME:"TM/1ØØ"{CRSR
    LF}:ØØ MIN"            :REM*15Ø
56Ø PRINTSPC(5)"# PROBLEMS:{2 S
    PACEs}"NP              :REM*214
57Ø PRINTSPC(5)"{2 CRSR DNs}PLA
    Y AGAIN [Y/N]          :REM*34
58Ø GETK$:IFK$=""THEN58Ø
                           :REM*162
59Ø IFK$="Y"THENRUN        :REM*64
6ØØ SYS2Ø48:END            :REM*156
61Ø :                      :REM*76
62Ø PRINT"{SHFT CLR}{CTRL 9}{CO
    MD 7}{9 SPACEs}FLASH CARDS:
     ADDITION{1Ø SPACEs}{2 CRSR
     DNs}{CTRL 3}"         :REM*194
63Ø FORI=1TO5:PRINTSPC(18)A$(X,
    I):NEXT                :REM*2ØØ
64Ø PRINT:PRINT            :REM*84
65Ø PRINTSPC(18)A$(Y,1):REM*164
66Ø PRINTSPC(18)A$(Y,2):REM*19Ø
67Ø PRINTSPC(13)"{CTRL 9}{CTRL
    2} {CTRL 3}{CTRL Ø}";SPC(4)
    ;A$(Y,3)               :REM*212
68Ø PRINTSPC(12)"{CTRL 9}{CTRL
    2}{3 SPACEs}{CTRL 3}{CTRL Ø
    }";SPC(3);A$(Y,4)      :REM*6Ø
69Ø PRINTSPC(13)"{CTRL 9}{CTRL
    2} {CTRL 3}{CTRL Ø}";SPC(4)
    ;A$(Y,5)               :REM*234
7ØØ PRINT                  :REM*36
71Ø PRINTSPC(12)"{CTRL 9}{CTRL
    2}{11 SPACEs}"         :REM*254
72Ø RETURN                 :REM*12
73Ø :                      :REM*196
74Ø PRINT"{SHFT CLR}{CTRL 9}{CO
    MD 6}{8 SPACEs}FLASH CARDS:
     SUBTRACTION{8 SPACEs}{2 CR
    SR DNs}{CTRL 3}"       :REM*4
75Ø IFL=1THENFORI=1TO5:PRINTSPC
    (18)A$(Z,I):NEXT       :REM*72
76Ø IFL=2THENFORI=1TO5:PRINTSPC
    (11)A$(Z1,I)SPC(2)"{CTRL Ø}
    "A$(Z2,I):NEXT         :REM*188
77Ø PRINT:PRINT            :REM*215
78Ø PRINTSPC(18)A$(Y,1)    :REM*39
79Ø PRINTSPC(18)A$(Y,2)    :REM*65
8ØØ PRINTSPC(18)A$(Y,3)    :REM*91
81Ø PRINTSPC(11)"{CTRL 9}{CTRL
    2}{3 SPACEs}{CTRL 3}{CTRL Ø
    }";SPC(4);A$(Y,4)      :REM*163
82Ø PRINTSPC(18)A$(Y,5):REM*143
83Ø PRINT                  :REM*167
84Ø PRINTSPC(1Ø)"{CTRL 9}{CTRL
    2}{13 SPACEs}"         :REM*27
85Ø RETURN                 :REM*143
86Ø :                      :REM*71
87Ø PRINT"{SHFT CLR}{CTRL 9}{CT
    RL 4}{7 SPACEs}FLASH CARDS:
     MULTIPLICATION{6 SPACEs}{2
     CRSR DNs}{CTRL 3}":REM*151
88Ø FORI=1TO5:PRINTSPC(18)A$(X,
    I):NEXT                :REM*195
89Ø PRINT:PRINT            :REM*79
9ØØ PRINTSPC(18)A$(Y,1):REM*159
91Ø PRINTSPC(18)A$(Y,2):REM*185
92Ø PRINTSPC(12)"{CTRL 9}{CTRL
    2} {CRSR RT} {CTRL 3}{CTRL
    Ø}";SPC(3);A$(Y,3)     :REM*15
93Ø PRINTSPC(12)"{CTRL 9}{CTRL
    2}{CRSR RT} {CRSR RT}{CTRL
    3}{CTRL Ø}";SPC(3);A$(Y,4)
                           :REM*251
94Ø PRINTSPC(12)"{CTRL 9}{CTRL
    2} {CRSR RT} {CTRL 3}{CTRL
    Ø}";SPC(3);A$(Y,5)     :REM*43
95Ø PRINT                  :REM*31
96Ø PRINTSPC(12)"{CTRL 9}{CTRL
    2}{11 SPACEs}"         :REM*249
97Ø RETURN                   :REM*7
98Ø :                      :REM*191
99Ø PRINT"{SHFT CLR}{CTRL 9}{CT
    RL 8}{9 SPACEs}FLASH CARDS:
     DIVISION{1Ø SPACEs}{5 CRSR
     DNs}{CTRL 3}"         :REM*19
1ØØØ PRINTSPC(16)"{CTRL 9}{CTRL
     2}{15 SPACEs}"        :REM*221
1Ø1Ø PRINTSPC(16)"{CTRL 9} {CTR
    L 3}"                  :REM*155
1Ø2Ø IFL=1THENFORI=1TO5:PRINTSP
    C(9)A$(X,I);"{CTRL 9}{CTRL
     2}{2 CRSR RTs} {2 CRSR RT
    s}{CTRL Ø}{CTRL 3}";A$(Z,I
    ):NEXT                 :REM*47
1Ø3Ø IFL=2THENFORI=1TO5:PRINTSP
    C(9)A$(X,I);"{CTRL 9}{CTRL
     2}{2 CRSR RTs} {2 CRSR RT
    s}{CTRL Ø}{CTRL 3}"A$(Z1,I
    )"{CTRL Ø} "A$(Z2,I):NEXT
                           :REM*128
1Ø4Ø PRINTSPC(16)"{CTRL 9}{CTRL
     2} "                  :REM*148
1Ø5Ø RETURN                :REM*88
1Ø6Ø :                     :REM*16
1Ø7Ø X=INT(RND(1)*1Ø)      :REM*12Ø
1Ø8Ø Y=INT(RND(1)*(R2-R1))+R1
                           :REM*94
1Ø9Ø Z=X+Y                 :REM*12Ø
11ØØ RETURN                :REM*138
111Ø :                     :REM*66
112Ø X=INT(RND(1)*1Ø)      :REM*17Ø
113Ø Y=INT(RND(1)*(R2-R1))+R1
                           :REM*144
114Ø Z=X+Y:Z$=STR$(Z):L=LEN(MID
    $(Z$,2))               :REM*1Ø8
115Ø IFL=2THENZ1=VAL(LEFT$(Z$,2
    )):Z2=VAL(RIGHT$(Z$,1))
                           :REM*23Ø
116Ø RETURN                :REM*198
117Ø :                     :REM*126
118Ø X=INT(RND(1)*1Ø)      :REM*23Ø
119Ø Y=INT(RND(1)*(R2-R1))+R1
                           :REM*2Ø4
12ØØ Z=X*Y                 :REM*38
121Ø RETURN                :REM*248
122Ø :                     :REM*176
123Ø X=INT(RND(1)*(R2-R1))+R1:I
    FX=ØTHEN123Ø           :REM*62
124Ø Y=INT(RND(1)*1Ø)      :REM*38
125Ø Z=X*Y:Z$=STR$(Z):L=LEN(MID
    $(Z$,2))               :REM*26
126Ø IFL=2THENZ1=VAL(LEFT$(Z$,2
    )):Z2=VAL(RIGHT$(Z$,1))
                           :REM*84
127Ø RETURN                :REM*52
128Ø :                     :REM*237
129Ø T2=INT(RND(1)*4)+1:REM*253
13ØØ ONT2GOSUB1Ø7Ø,112Ø,118Ø,12
    3Ø                     :REM*189
131Ø RETURN                :REM*93
132Ø :                     :REM*21
133Ø POKES+24,15:POKES+6,24Ø:PO
    KES+4,17               :REM*241
134Ø POKES+1,25:POKES,177
                           :REM*35
135Ø FORT=1TO2Ø:NEXT       :REM*55
136Ø POKES+4,16            :REM*87
137Ø RETURN                :REM*153
138Ø :                     :REM*81
139Ø PRINT"{HOME}{CTRL 2}{21 CR
    SR DNs}"SPC(12)"ANSWER:";
                           :REM*163
14ØØ IFT2=1THENPRINTZ      :REM*53
141Ø IFT2=2THENPRINTX      :REM*123
142Ø IFT2=3THENPRINTZ      :REM*2Ø1
143Ø IFT2=4THENPRINTY      :REM*19
144Ø FL=1:RETURN           :REM*73
145Ø :                     :REM*151
146Ø PRINT"{3 CRSR DNs}DIVISION
     BY ZERO NOT ALLOWED."
                           :REM*141
147Ø PRINT"PLEASE START OVER BY
     PRESSING ANY KEY.":REM*35
148Ø GETK$:IFK$=""THEN148Ø
                           :REM*221
149Ø RUN                     :REM*1
15ØØ :                     :REM*2Ø1
151Ø DATA "{CTRL 9}{5 SPACEs}"
                           :REM*49
152Ø DATA "{CTRL 9} {3 CRSR RTs
    } "                    :REM*247
153Ø DATA "{CTRL 9} {3 CRSR RTs
    } "                      :REM*1
154Ø DATA "{CTRL 9} {3 CRSR RTs
    } "                    :REM*12
155Ø DATA "{CTRL 9}{5 SPACEs}"
                           :REM*9Ø
156Ø :                       :REM*6
157Ø DATA "{CTRL 9}{2 CRSR RTs}
    {2 SPACEs}{CRSR RT}"
                           :REM*72
```

```
158Ø DATA "{CTRL 9}{2 CRSR RTs}
     {2 SPACEs}{CRSR RT}"
                          :REM*82
159Ø DATA "{CTRL 9}{2 CRSR RTs}
     {2 SPACEs}{CRSR RT}"
                          :REM*92
16ØØ DATA "{CTRL 9}{2 CRSR RTs}
     {2 SPACEs}{CRSR RT}"
                          :REM*1Ø2
161Ø DATA "{CTRL 9}{2 CRSR RTs}
     {2 SPACEs}{CRSR RT}"
                          :REM*112
162Ø :                    :REM*66
163Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*17Ø
164Ø DATA "{CTRL 9}{4 CRSR RTs}
      "                   :REM*16
165Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*19Ø
166Ø DATA "{CTRL 9} {4 CRSR RTs
     }"                   :REM*126
167Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*21Ø
168Ø :                    :REM*126
169Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*23Ø
17ØØ DATA "{CTRL 9}{4 CRSR RTs}
      "                   :REM*76
171Ø DATA "{CTRL 9}{2 CRSR RTs}
     {3 SPACEs}"          :REM*218
172Ø DATA "{CTRL 9}{4 CRSR RTs}
      "                   :REM*96
173Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*14
174Ø :                    :REM*186
175Ø DATA "{CTRL 9} {2 CRSR RTs
     } {CRSR RT}"         :REM*218
176Ø DATA "{CTRL 9} {2 CRSR RTs
     } {CRSR RT}"         :REM*228
177Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*54
178Ø DATA "{CTRL 9}{3 CRSR RTs}
      {CRSR RT}"          :REM*152
179Ø DATA "{CTRL 9}{3 CRSR RTs}
      {CRSR RT}"          :REM*162
18ØØ :                    :REM*247
181Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*95
182Ø DATA "{CTRL 9} {4 CRSR RTs
     }"                   :REM*31
183Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*115
184Ø DATA "{CTRL 9}{4 CRSR RTs}
      "                   :REM*217
185Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*135
186Ø :                    :REM*51
187Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*155
188Ø DATA "{CTRL 9} {4 CRSR RTs
     }"                   :REM*91
189Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*175
19ØØ DATA "{CTRL 9} {3 CRSR RTs
     } "                  :REM*117
191Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*195
192Ø :                    :REM*111
193Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*215
194Ø DATA "{CTRL 9}{3 CRSR RTs}
     {SHFT LB.} "         :REM*2Ø1
195Ø DATA "{CTRL 9}{2 CRSR RTs}
     {SHFT LB.} {CTRL Ø}{SHFT L
     B.}"                 :REM*165
196Ø DATA "{CTRL 9}{CRSR RT}{SH
     FT LB.} {CTRL Ø}{SHFT LB.}
      "                   :REM*135
197Ø DATA "{CTRL 9}{CRSR RT}{2
     SPACEs}{2 CRSR RTs}"
                          :REM*151
198Ø :                    :REM*171
199Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*19
2ØØØ DATA "{CTRL 9} {3 CRSR RTs
     } "                  :REM*217
2Ø1Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*39
2Ø2Ø DATA "{CTRL 9} {3 CRSR RTs
     } "                  :REM*237
2Ø3Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*59
2Ø4Ø :                    :REM*231
2Ø5Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*8Ø
2Ø6Ø DATA "{CTRL 9} {3 CRSR RTs
     } "                  :REM*22
2Ø7Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*1ØØ
2Ø8Ø DATA "{CTRL 9}{4 CRSR RTs}
      "                   :REM*2Ø2
2Ø9Ø DATA "{CTRL 9}{5 SPACEs}"
                          :REM*12Ø
```

The Menu Machine

With these instant menu routines, you can concentrate on writing the important parts of your program.

By E. E. ELLIOTT

I wrote The Menu Machine to circumvent the problem of coding menu routines. It will take over this uninspiring part of programming for you and create impressive menus for your programs.

Each menu created with The Menu Machine appears inside a border that's sized for that menu, and the entire display is centered on the screen. You make your choices by pressing the cursor-down key until the desired selection is highlighted and then hitting the return key.

Three limitations apply when you're using The Menu Machine. First, you can include no more than eight items in each menu, although you can chain together a number of menus to effectively have more than eight choices. Second, you can't use line numbers from 20000 to 20250 elsewhere in your program unless you renumber the menu routine created by The Menu Machine. Finally, the menu routine uses the following variable names: RE, LE, TP, M, I, PL, S, K$, C, R, T, TL$, TR$, ME$(0)–ME$(8), BL$, BR$, VR$ and HZ$. If you use these names elsewhere in your program, you must be sure to reset their values after exiting from the menu routine.

You'll find it helpful to finish writing your main program before creating your menu routine, because you'll need to know where each menu choice branches to in the program. As you're creating the menu routine, you must enter line numbers (target lines) where execution will go after each menu selection is made.

Entering Menu Information

When you run the first Menu program (Listing 1), it first asks you to enter the number of items, from one to eight, that you want the menu to have. For a sample menu, enter 4 and press the return key.

Then you must type in the title of your menu. Enter any title up to 30 characters long.

Next, you're prompted for the text of the first menu item. For your sample, enter SELECTION 1 and press return. You are then asked for the target line number that the program should jump to when this menu item is chosen. Enter 1000. Prompts for name and target line continue through all the menu items. Enter the following information for the choices two ► through four:

SELECTION 2, 2000
SELECTION 3, 3000
SELECTION 4, 4000

After you've completed the fourth entry, information begins flashing on the screen as the program creates your menu routine.

Now clear the memory, load in the second program (Listing 2) and save it to the work disk containing the menu routine that program 1 created. Finally, load in the third program (Listing 3) and then save it to the same work disk.

Putting It All Together

Now you're ready to watch The Menu Machine do its stuff. First, make sure that the work disk containing all three programs is in your disk drive. Then load in and run program 3 to append program 2 to the menu routine created by program 1. A prompt will appear asking Program to Append? Enter the filename of program 2 and press the return key. At the next prompt, specify your drive number.

When you see the cursor again, enter RUN and press the return key. At the first prompt, type in the filename of the menu routine you created with program 1 and press return. Once again, enter the device number and press return.

Finally, list the appended program and delete lines 1-6. Save the finished program to disk, and there you have it! A lean, mean, menu-driven machine.

When the menu routines are used in a program that requires information to be formatted on the screen, you can position your cursor anywhere by setting C equal to the column number and R equal to the row number. Then use a GOSUB 20240 to execute this feature.

► RUN it right: C-64

Listing 1. Menu program 1.

```
10Ø POKE5328Ø,6:POKE53281,6:POK
     E646,7:Q$=CHR$(34)   :REM*5Ø
11Ø LI$="{CRSR DN}{29 SHFT Es}{
     UP ARROW}(3Ø){34 CRSR LFs}{
     CRSR UP}             :REM*244
12Ø PRINT"{SHFT CLR}{2 CRSR DNs
     }ENTER NUMBER OF MENU ITEMS
      (1-8) : ";          :REM*56
13Ø GETZ$:IFZ$<"1"ORZ$>"8"THEN1
     3Ø                   :REM*94
14Ø PRINTZ$:I=VAL(Z$):TP=INT((2
     4-2*I)/2-1):BM=TP+2*I+2
                          :REM*68
15Ø PRINT"{2 CRSR DNs}{CTRL 9}E
     NTER MENU TITLE":PRINTLI$;:
     GOSUB29Ø:ME$(Ø)=IN$  :REM*72
16Ø FORT=1TOI:PRINT"{2 CRSR DNs
     }{CTRL 9}ENTER MENU ITEM"T"
     {CRSR DN}":PRINTLI$;:GOSUB2
     9Ø:ME$(T)=IN$        :REM*22Ø
17Ø PRINT"{CRSR DN}{CTRL 9}JUMP
     S TO LINE NUMBER -";:GOSUB2
     9Ø:LO(T)=VAL(IN$)    :REM*Ø
18Ø TL=LEN(ME$(T))+2:IFTL>PLTHE
     NPL=TL               :REM*52
19Ø NEXT:RE=INT((4Ø-PL)/2-1):LE
     =RE+PL+1             :REM*146
2ØØ PRINT"{SHFT CLR}2ØØØØ RE=";
     RE;":LE=";LE;":TP=";TP;":BM
     =";BM;":I=";I":PL=";PL
                          :REM*14
21Ø FORT=ØTOISTEP2:PRINT2ØØ1Ø+(
     1Ø*T);"ME$(";T;")="Q$;ME$(T
     );Q$;                :REM*238
22Ø IFME$(T+1)=""THENPRINT:GOTO
     24Ø                  :REM*158
23Ø PRINT":ME$(";T+1;")="Q$;ME$
     (T+1);Q$:NEXT        :REM*126
24Ø A$="":FORT=1TOI-1:A$=A$+STR
     $(LO(T))+",":NEXT:A$=A$+STR
     $(LO(I))             :REM*234
25Ø PRINT"2Ø23Ø ONTGOTO";A$
                          :REM*218
26Ø T=INT(I/2+.5)+4       :REM*87
27Ø POKE198,T+1:POKE631,19:FORI
     =1TOT:POKE631+I,13:NEXT
                          :REM*153
28Ø PRINT"GOTO 36Ø":END :REM*23
29Ø IN$="":ZQ$=CHR$(166)+CHR$(1
     57):PRINTZQ$;        :REM*195
3ØØ GETZ$:IFZ$=""THEN3ØØ:REM*71
31Ø Z=ASC(Z$):IFZ=13THENPRINT"
     ":RETURN             :REM*199
32Ø IFIN$<>""THENIFZ=2ØTHENPRIN
     TZ$;ZQ$;:IN$=LEFT$(IN$,LEN(
     IN$)-1):GOTO3ØØ      :REM*129
33Ø IFZ=2ØTHEN3ØØ         :REM*241
34Ø IFLEN(IN$)=3ØTHEN3ØØ
                          :REM*213
35Ø PRINTZ$;ZQ$;:IN$=IN$+Z$:GOT
     O3ØØ                 :REM*43
36Ø T=9Ø                  :REM*235
37Ø PRINT"{SHFT CLR}"T:PRINT"T=
     "T+1Ø;:IFT<37ØTHENPRINT":GO
     TO37Ø"               :REM*1Ø7
38Ø IFT=37ØTHENPRINT"{SHFT CLR}
     37Ø":PRINT"38Ø":PRINT"GOTO
     4ØØ"                 :REM*157
39Ø POKE198,4:POKE631,19:FORT=6
     32TO634:POKET,13:NEXT:END
                          :REM*2Ø7
4ØØ PRINT"{SHFT CLR}{6 CRSR DNs
     }YOUR MENU MAY NOW BE SAVED
     .":K$=CHR$(13):PRINT"{HOME}
     {CTRL 7}39Ø"K$"4ØØ" :REM*53
41Ø PRINT"41Ø"K$"42Ø"     :REM*11
42Ø POKE198,6:POKE631,19:FORT=6
     32TO635:POKET,13:NEXT:POKE6
     36,158:END           :REM*235
2Ø1ØØ K$=CHR$(13):PRINT"{SHFT C
     LR}{CRSR DN}";TAB(2Ø-(LEN
     (ME$(Ø))/2));"{CTRL 9}";M
     E$(Ø)                :REM*242
2Ø11Ø C=RE+2:R=TP+2:FORT=1TOI:G
     OSUB2Ø24Ø:TL$=CHR$(213):T
     R$=CHR$(2Ø1)         :REM*142
2Ø12Ø PRINTME$(T):R=R+2:NEXT:BL
     $=CHR$(2Ø2):BR$=CHR$(2Ø3)
     :VR$=CHR$(221)       :REM*174
2Ø13Ø HZ$=CHR$(192):R=BM+2:C=5:
     GOSUB2Ø24Ø:PRINT"MAKE CHO
     ICE AND PRESS <RETURN>
                          :REM*196
2Ø14Ø C=RE:R=TP:GOSUB2Ø24Ø:PRIN
     TTL$;:FORT=1TOPL:PRINTHZ$
     ;:NEXT:PRINTTR$      :REM*14
2Ø15Ø FORR=TP+1TOBM-1:GOSUB2Ø24
     Ø:PRINTVR$;TAB(LE);VR$:NE
     XT                   :REM*54
2Ø16Ø R=BM:GOSUB2Ø24Ø:PRINTBL$;
     :FORT=1TOPL:PRINTHZ$;:NEX
     T:PRINTBR$           :REM*192
2Ø17Ø C=RE+2:R=TP+2:T=1   :REM*28
2Ø18Ø GOSUB2Ø24Ø:PRINT"{CTRL 9}
     "ME$(T)              :REM*132
2Ø19Ø GETZ$:IFZ$<>CHR$(17)ANDZ$
     <>K$THEN2Ø19Ø        :REM*21Ø
2Ø2ØØ IFZ$=K$THEN2Ø23Ø    :REM*74
2Ø21Ø IFT=ITHENGOSUB2Ø24Ø:PRINT
     ME$(T):GOTO2Ø17Ø :REM*128
2Ø22Ø GOSUB2Ø24Ø:PRINTME$(T):T=
     T+1:R=R+2:GOTO2Ø18Ø
                          :REM*134
2Ø24Ø POKE211,C:POKE214,R:SYS58
     732:REM POSITION CURSOR
                          :REM*227
2Ø25Ø RETURN              :REM*163
```

Listing 2. Menu program 2.

```
999 RUN2ØØØØ              :REM*212
1ØØØ PRINT"{SHFT CLR}CONGRATULA
     TIONS! YOUR PROGRAM WORKS
                          :REM*151
1ØØ1 PRINT"PROPERLY!"     :REM*236
1ØØ2 FOR T=1TO2ØØØ:NEXT:RUN2ØØØ
     Ø                    :REM*75
2ØØØ POKE53281,1          :REM*141
2ØØ1 PRINT"{SHFT CLR}{CTRL 8}TH
     IS IS MENU SELECTION #2":G
     OTO 5ØØØ             :REM*174
3ØØØ POKE53281,7          :REM*133
3ØØ1 PRINT"{SHFT CLR}{CTRL 2}TH
     IS IS MENU SELECTION #3":G
     OTO5ØØØ              :REM*166
4ØØØ POKE 53281,5         :REM*1Ø9
4ØØ1 PRINT"{SHFT CLR}{COMD 8}TH
     IS IS MENU SELECTION #4":G
     OTO5ØØØ              :REM*168
5ØØØ FORT=1TO25ØØ:NEXT:POKE 532
     81,Ø:RUN2ØØØØ        :REM*1Ø3
```

Listing 3. Menu program 3.

```
1 INPUT"PROGRAM TO APPEND";A$:I
  NPUT"{5 SPACEs}DRIVE 8 OR 9";
  U: REM C-64 & VIC-2Ø :REM*117
2 A=PEEK(44):PRINT"{SHFT CLR}{3
   CRSR DNs}LOAD";CHR$(34);A$;C
  HR$(34);CHR$(44);U    :REM*2Ø8
3 PRINT"{4 CRSR DNs}POKE43,1:PO
  KE44,";A;"{HOME}"       :REM*3
4 POKE632,13:POKE633,13:POKE634
  ,13:POKE198,3           :REM*16
5 IFPEEK(45)<2THENPOKE43,PEEK(4
  5)-2+255:POKE44,PEEK(46)-1:EN
  D                       :REM*11
6 POKE43,PEEK(45)-2:POKE44,PEEK
  (46):END              :REM*92 ■
```

Mega-Magic

Easy-to-Use Subroutines and Utilities

Scroll Left, Scroll Right

Scroller is a brief machine-language routine that turns your display into a continuous band running in either direction across the screen. Type in and run Scroller Basic (Listing 1). It automatically saves to disk a machine-language program file called SCROLLERMLA.

To access SCROLLERMLA, type in SYS828. The entire screen will move one column to the left. Type in SYS892 and it'll shoot back to where it started. You can scroll any text screen endlessly this way, using a continuous loop such as: 10 SYS892:GOTO10. If you write a program with a series of Data statements to be printed vertically on the left margin of the screen, SCROLLERMLA will scroll a message as long as the available memory in your computer.

Random Scroller (Listing 2) demonstrates a potentially valuable feature of this scrolling program. By typing lines 30–70 into your program (perhaps as a subroutine) and setting the variables to appropriate values, you can scroll any section of the screen in either direction. Set T equal to the number (0–23) of the top screen line of the section to be scrolled, B to the number (1–24) of the bottom line of the section, R to the right margin and L to the left margin.

Load and run Random Scroller to see what I mean. Enter your own values for T, B, R and L. See if you can scroll different sections of the display in opposite directions at the same time. Experiment and have fun. One note of caution, however: Scrolling lines beyond line 24 will certainly Osterize your Basic program, and setting T to a value greater than B is likely to crash the computer.

—Robert Bixby, Kalamazoo, MI

► **RUN it right: C-64**

Listing 1. Scroller Basic program.

```
10 PRINT"{SHFT CLR}SCROLLER":FORI=828TO938STEP10:FOR
   A=0TO9:READB:C=C+B:POKEI+A,B                    :REM*132
20 IFF=0THENF=1:G=G+B:GOTO30:IFF=1THENF=0:H=H+B
                                                   :REM*250
30 NEXT:E=E+C                                      :REM*144
40 READD:IFC<>DTHENPRINT"ERROR IN DATA STATEMENT "I"
   {CRSR LF}.":END                                 :REM*124
50 C=0:NEXTI                                       :REM*102
60 PRINT"SAVING ML":GOTO190:END                    :REM*170
70 DATA 160,0,169,0,133,251,169,4,133,252,1271
                                                   :REM*130
80 DATA 177,251,141,253,3,165,251,201,232,240,1914
                                                   :REM*182
90 DATA 42,200,177,251,136,145,251,200,192,39,1633
                                                   :REM*80
100 DATA 144,245,173,253,3,145,251,160,0,32,1406
                                                   :REM*56
110 DATA 105,3,76,70,3,165,251,24,105,40,842       :REM*24
120 DATA 133,251,176,1,96,165,252,24,105,1,1204
                                                   :REM*62
130 DATA 133,252,96,96,160,39,169,0,133,251,1329
                                                   :REM*44
140 DATA 169,4,133,252,165,251,201,232,240,239,1886
                                                   :REM*230
150 DATA 177,251,141,253,3,136,177,251,200,145,1734
                                                   :REM*130
160 DATA 251,136,192,0,240,3,76,145,3,173,1219
                                                   :REM*168
170 DATA 253,3,145,251,160,39,32,105,3,76,1067
                                                   :REM*78
180 DATA 134,3,0,0,0,0,0,0,0,0,137                 :REM*20
190 OPEN15,8,15,"S:SCROLLERMLA"                    :REM*56
200 OPEN1,8,1,"0:SCROLLERMLA,P,W":PRINT#1,CHR$(60)CH
    R$(3);                                         :REM*220
210 RESTORE:FORI=828TO947:PRINT#1,CHR$(PEEK(I));:NEX
    T                                              :REM*130
220 CLOSE1:INPUT#15,A$,B$,C$,D$:PRINTA$,B$:CLOSE15:E
    ND                                             :REM*16
```

Listing 2. Random Scroller program.

```
1 REM RANDOM SCROLLER DEMO                         :REM*127
5 FORI=0TO26:PRINT"{CTRL 2}{COMD @}{COMD P}{COMD I}{
  SHFT F}{SHFT C}{SHFT D}{SHFT C}{SHFT F}{COMD O}{CO
  MD P}{COMD @}{COMD P}{COMD O}{SHFT F}{SHFT C}{SHFT
   D}{SHFT C}{SHFT F}{COMD I}{COMD P}{COMD @}{COMD P
  }{COMD I}{SHFT F}{SHFT C}{SHFT D}{SHFT C}{SHFT F}{
  COMD I}{COMD O}{COMD P}{COMD @}{COMD O}{SHFT C}{SH
  FT D}{SHFT C}{COMD O}";:NEXT                     :REM*47
10 T=0:B=25:L=0:R=39:N=RND(TI):IFN<.5THENGOSUB200
                                                   :REM*60
20 T=1024+T*40:T=T/256:POKE835,T:POKE899,T:T=(T-INT(
   T))*256:POKE831,T:POKE895,T                     :REM*230
30 B=1024+B*40:B=(B/256-INT(B/256))*256:POKE846,B:PO
   KE905,B:POKE829,L:POKE866,L                     :REM*184
40 POKE921,L:POKE857,R:POKE893,R:POKE933,R:GOSUB100:
   GOTO10                                          :REM*110
100 FORI=0TOM:SYS828:NEXT:FORI=0TOM:SYS892:NEXT:RETU
    RN                                             :REM*180
200 T=INT(RND(TI)*12):B=INT(RND(TI)*12+12):M=INT(RND
    (TI)*100)+1                                    :REM*250
210 L=INT(RND(TI)*19):R=INT(RND(TI)*19+20):RETURN
                                                   :REM*216
```

Error Channel Monitor

This vector-driven utility monitors the status of your disk drive's error channel and displays that status on the top line of the screen. It's written for a C-64 with a disk drive.

A vector is a program pointer that resides in a certain location in memory. It stores the two-byte address of another memory location to which a program should jump. It can also include a JMP instruction, for a total of three bytes.

Basic 2.0 contains many vectors in RAM for use as programs run. You can intercept execution and divert it to other assignments by altering these vectors. In this case, the program changes the vector at addresses $302 and $303 (decimal 770 and 771), which usually points to address $A483, to point to address $C000 (decimal 49152), which is where Error Channel Monitor resides.

To use Error Channel Monitor, type it in and save it to disk. *Don't* run it before you save it, because it erases itself when it runs. If you've typed in the listing correctly, when you do run it, the screen will clear, the top line will display ►

the error-channel status, and the word "Activated" will appear.

Error Channel Monitor will continue to monitor and display the disk drive's error-channel status as long as the computer and disk drive are both on. It won't interfere with most Basic programs, so you can use it when you're writing and debugging your own programs.

—SCOTT M. HUSE AND WILLIAM D. TAYLOR
SALISBURY CENTER, NY

► RUN it right: C-64; disk drive

Listing 1. Error Channel Monitor program.

```
10Ø REM ERROR CHANNEL BY SMH & WDT :REM*72
13Ø FORL=49152TO49263:READD:POKEL,D
                                   :REM*178
14Ø CK=CK+D:NEXT                   :REM*114
15Ø IFCK<>14986THENPRINT"ERROR":END
                                   :REM*1Ø8
16Ø SYS49152:PRINT"{SHFT CLR}{CRSR DN}ACTI
    VATED.":NEW                    :REM*6Ø
17Ø DATA169,Ø11,141,ØØ2,ØØ3,169    :REM*2Ø2
18Ø DATA192,141,ØØ3,ØØ3,Ø96,Ø56     :REM*8
19Ø DATAØ32,24Ø,255,142,112,192    :REM*2Ø8
2ØØ DATA14Ø,113,192,169,Ø19,Ø32    :REM*112
21Ø DATA21Ø,255,169,Ø18,Ø32,21Ø     :REM*66
22Ø DATA255,16Ø,Ø39,169,16Ø,153    :REM*11Ø
23Ø DATAØØØ,ØØ4,173,134,ØØ2,153     :REM*76
24Ø DATAØØØ,216,136,2Ø8,242,169     :REM*96
25Ø DATAØ62,Ø32,21Ø,255,169,Ø15    :REM*152
26Ø DATA162,ØØ8,16Ø,Ø15,Ø32,186     :REM*99
27Ø DATA255,169,ØØØ,Ø32,189,255    :REM*153
28Ø DATAØ32,192,255,162,Ø15,Ø32    :REM*135
29Ø DATA198,255,Ø32,2Ø7,255,2Ø1    :REM*129
3ØØ DATAØ13,24Ø,ØØ5,Ø32,21Ø,255    :REM*171
31Ø DATA2Ø8,244,174,112,192,172    :REM*1Ø3
32Ø DATA113,192,Ø24,Ø32,24Ø,255    :REM*127
33Ø DATA169,146,Ø32,21Ø,255,169    :REM*159
34Ø DATAØ15,Ø32,195,255,Ø32,2Ø4    :REM*255
35Ø DATA255,Ø76,131,164            :REM*151
```

FAST C-128 HI-RES SCREEN DUMPS

My program contains machine language code that dumps hi-res screens to Star-compatible printers and includes two size options and a reverse video option.

When you save the program, the code will also be saved to disk; when you run it, the ML file is loaded instead of reading the data and poking it into memory. At the Ready prompt, set up your graphics screen and load or draw a picture to print.

Turn on your Printer, poke the column or reverse data (see options below) and use the SYS command for the size printout you want. It takes 3–4 minutes to print an 8½ × 11-inch picture vertically on the page (use SYS 4864) and about a minute to print a picture vertically on a quarter page (use SYS 4867).

You can position smaller pictures with POKE 4883,nc, where nc is the number of columns from the left margin to the bottom of the printed picture. Use a value of 0 to print a picture on the left side, 20 to center the picture and 40 to print the picture on the right side of the page. This Poke only affects pictures smaller than a full page, and it remains in effect until you change it with another Poke.

Control the Reverse Video option with a Poke to location 4887. If this location contains a zero (the default), the printout results in pixels turned on as black and those turned off (background) as white. Use POKE 4887,255 to reverse the color of the printed dots. As with the Column Position option, any change remains until you poke a different value.

—JEFFREY K. GOODE, BURLINGTON, CT

► RUN it right: C-128; Star-compatible printer.

Listing 1. Screen Dump program.

```
1 REM C-128 HI-RES SCREEN DUMPS (4X AND 1X)
                                   :REM*131
2 REM BY JEFFREY K. GOODE           :REM*84
3 OPEN 4,8,4,"%4X ML,P,R":CLOSE4:IFLEFT$(DS
  $,2)="ØØ"THEN BLOAD "%4X ML",BØ:NEW
                                   :REM*217
4 FORX=4864TO5386:READ A:POKEX,A   :REM*24Ø
5 C=C+A:NEXT:IFC<>48274 THEN PRINT "ERROR I
  N DATA":END                      :REM*253
6 BSAVE"%4X ML",P4864 TO P5387:NEW  :REM*12
7 DATA 76,38,19,76,135,2Ø,8,65,27,64,27,1,1
  44,75,27,Ø,2ØØ,75,27,Ø,77,27       :REM*35
8 DATA 32,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,1,4,16,64,3
  2,85,2Ø,169,Ø,141,32,19            :REM*64
9 DATA 169,1,141,31,19,162,3,189,11,19,32,2
  1Ø,255,2Ø2,16,247,169,24,141,27  :REM*255
1Ø DATA 19,169,7,141,28,19,173,27,19,162,64
   ,16Ø,1,32,6Ø,2Ø,162,Ø,172,22,19 :REM*142
11 DATA 32,42,2Ø,32,15,2Ø,169,8,174,32,19,1
   6Ø,Ø,32,6Ø,2Ø,166,25Ø,164,251,32:REM*169
12 DATA 15,2Ø,32,42,2Ø,172,28,19,177,25Ø,32
   ,198,19,173,3Ø,19,77,23,19,32   :REM*1ØØ
13 DATA 21Ø,255,32,21Ø,255,2Ø6,28,19,16,231
   ,2Ø6,27,19,16,18Ø,32,Ø,21,2Ø6,31  :REM*1
14 DATA 19,173,31,19,48,3,76,51,19,173,32,1
   9,2Ø1,39,24Ø,6,238,32,19,76,46  :REM*234
15 DATA 19,162,1,189,9,19,32,21Ø,255,2Ø2,16
   ,247,32,Ø,21,169,4,32,195,255,32:REM*195
16 DATA 2Ø4,255,165,6,141,Ø,255,96,174,31,1
   9,24Ø,4,74,74,74,74,41,15,141,29:REM*118
17 DATA 19,169,1,141,33,19,169,Ø,141,3Ø,19,
   141,24,19,173,33,19,45,29,19,24Ø :REM*39
18 DATA 24,174,24,19,189,34,19,141,25,19,17
   3,3Ø,19,13,25,19,14,25,19,13,25  :REM*64
19 DATA 19,141,3Ø,19,14,33,19,238,24,19,173
   ,24,19,2Ø1,4,2Ø8,211,96,72,138  :REM*199
2Ø DATA 72,165,25Ø,174,24,19,141,24,19,134,
   25Ø,165,251,174,25,19,141,25,19 :REM*192
21 DATA 134,251,1Ø4,17Ø,1Ø4,96,134,252,132,
   253,24,165,25Ø,1Ø1,252,133,25Ø  :REM*199
22 DATA 165,251,1Ø1,253,133,251,96,141,26,1
   9,134,252,132,253,169,Ø,133,25Ø  :REM*66
23 DATA 133,251,174,26,19,24Ø,6,32,46,2Ø,2Ø
   2,2Ø8,25Ø,96,173,Ø,255,133,6,169 :REM*55
24 DATA Ø,141,Ø,255,169,4,17Ø,168,2ØØ,32,18
   6,255,169,Ø,32,189,255,32,192      :REM*6
25 DATA 255,162,4,32,2Ø1,255,144,5,1Ø4,1Ø4,
   76,17Ø,19,162,4,189,6,19,32,21Ø  :REM*67
26 DATA 255,2Ø2,16,247,96,32,85,2Ø,162,2,18
   9,19,19,32,21Ø,255,2Ø2,16,247   :REM*186
27 DATA 169,Ø,141,29,19,162,3,189,15,19,32,
   21Ø,255,2Ø2,16,247,169,24,141,27:REM*117
28 DATA 19,169,7,141,28,19,173,27,19,162,64
   ,16Ø,1,32,6Ø,2Ø,162,Ø,172,22,19 :REM*16Ø
29 DATA 32,42,2Ø,32,15,2Ø,169,8,174,29,19,1
   6Ø,Ø,32,6Ø,2Ø,166,25Ø,164,251,32 :REM*67
```

```
3Ø DATA 15,2Ø,32,42,2Ø,172,28,19,177,25Ø,77
   ,23,19,32,21Ø,255,2Ø6,28,19,16    :REM*84
31 DATA 24Ø,2Ø6,27,19,16,189,32,Ø,21,173,29
   ,19,2Ø1,39,24Ø,6,238,29,19,76     :REM*241
32 DATA 154,2Ø,76,17Ø,19,169,13,32,21Ø,255,
   169,1Ø,32,21Ø,255,96              :REM*198
```

Activating C-128 Keys in C-64 Mode

This program will let you use your C-128's keypad, no-scroll key and cursor keys while running programs in C-64 mode. It works by rewriting the IRQ routine so new keyboard-scan code can be added. The program stores itself at addresses 49152–49454, but, if you're familiar with machine language and have need, you should be able to move it elsewhere with little trouble.

The program activates the no-scroll key by changing the Kernal CHROUT vector to freeze the computer in the IRQ routine when the key is pressed. When you've paused printing, you can press any key to start it again, but I'd suggest using the no-scroll key.

The program may not work with some commercial software, but it should work with any Basic program that doesn't use the same memory addresses.

—Jim Borden, Carlisle, PA

► RUN it right: C-128 (in C-64 mode)

Listing 1. 128 Keys in 64 Mode program.

```
5 REM 128 KEYPAD IN 64 MODE - JIM BORDEN
                                      :REM*59
1Ø FOR X=49152TO49185:READ Z:POKEX,Z:CK=CK+
   Z:NEXT                             :REM*26
15 FOR X=XTO49285:POKE X,PEEK(X+1Ø77Ø):NEXT
                                      :REM*9
2Ø POKE49258,117:POKE49259,192        :REM*78
25 FOR X=XTO49454:READ Z:POKEX,Z:CK=CK+Z:NE
   XT                                 :REM*9
3Ø IFCK<>26162THENPRINT"ERROR IN DATA LINES
   ...":END                           :REM*184
35 PRINT"{SHFT CLR} IT'S MAGIC! 128 KEYPAD
   KEYS NOW ACTIVE. "                 :REM*2Ø1
4Ø PRINT"{3 SPACEs}[NO SCROLL] AND CURSOR K
   EYS, TOO.":SYS49152:NEW            :REM*2
45 DATA 12Ø,169,23,141,2Ø,3,169,192,141,21,
   3,169,24,141,38,3,169,193,141,39 :REM*13
5Ø DATA 3,88,96,32,234,255,173,216,192,24Ø,
   3,2Ø6,216,192,24Ø,6,32,39,193,76 :REM*48
55 DATA 154,234,168,32,13,193,2Ø8,6,142,47,
   2Ø8,76,38,235,169,254,141,47,2Ø8:REM*1Ø1
6Ø DATA 162,8,72,173,1,22Ø,2Ø5,1,22Ø,2Ø8,24
   8,74,144,21,2ØØ,192,25,2Ø8,5,1Ø4:REM*2Ø8
65 DATA 162,255,2Ø8,221,2Ø2,2Ø8,24Ø,56,1Ø4,
   42,141,47,2Ø8,2Ø8,221,1Ø4,185     :REM*65
7Ø DATA 245,192,17Ø,41,127,16Ø,255,14Ø,47,2
   Ø8,2Ø1,1,2Ø8,2Ø,32,13,193,2Ø8     :REM*48
75 DATA 251,169,Ø,24Ø,8,173,34,193,73,1,141
   ,34,193,76,148,192,2ØØ,217,129   :REM*139
8Ø DATA 235,2Ø8,25Ø,132,2Ø3,32,39,193,138,7
   6,228,234,255,56,53,255,5Ø,52,55 :REM*34
85 DATA 49,255,43,45,255,13,54,57,51,255,48
   ,46,145,17,157,29,1,169,Ø,141,47:REM*1Ø3
9Ø DATA 2Ø8,174,1,22Ø,224,255,96,32,2Ø2,241
   ,72,169,5,141,216,192,169,Ø,2Ø8    :REM*8
95 DATA 247,1Ø4,96,72,169,Ø,141,34,193,1Ø4,
   96                                 :REM*229
```

Ultra Hi-Res Pie Charts

I've added a pie-chart maker routine to *RUN*'s Ultra Hi-Res graphics program that appeared in the February and May 1986 issues. UH.Pie Charts works with version 1.1 of Ultra Hi-Res, which includes the @Fill and @HCopy commands.

To create a pie chart, boot up Ultra Hi-Res V1.1 and load and run the pie chart program. You'll be asked to give your chart a name, the number of sectors you want, the area of each sector as a percent of the circle, and a short description of each sector to print in the legend area. The routine won't fill a sector with a pattern if it occupies an area less than 1.5 percent of the chart, so if you have more than one such sector, you might want to group them into an "other" category.

—Cameron Goodair, Koolan Island, W. Australia

► RUN it right: C-128

Listing 1. Ultra Hi-Res Pie Charts program.

```
1Ø REM ULTRA HIRES PIE CHARTS-CAMERON GOOD
   AIR                                :REM*1Ø
2Ø POKE47,Ø:POKE48,68:CLR             :REM*194
3Ø BANK1:PRINTCHR$(27)"E":PRINT"{SHFT CLR}
   "                                  :REM*48
4Ø TRAP4ØØ:CM$="{23 CRSR DNs}":@TEXT
                                      :REM*196
5Ø FAST:PRINTCHR$(27)"U":PRINT"{CRSR DN}{3
   CTRL Is}{CRSR RT}NAME OF PIE CHART"
                                      :REM*23Ø
6Ø INPUT"{HOME}{2 CRSR DNs}{5 CTRL Is}{2 C
   RSR RTs}";N$                       :REM*58
7Ø PRINT"{SHFT CLR}"CM$"{3 CTRL Is}MAXIMUM
   OF 22 SECTORS PLEASE"              :REM*13Ø
8Ø INPUT"{HOME}{2 CRSR DNs}{3 CTRL Is} HOW
   MANY SECTORS";N                    :REM*238
9Ø IFN>22THENPRINTCHR$(15)"{HOME}"CM$"{3 C
   TRL Is}MAXIMUM OF 22 SECTORS PLEASE"CHR
   $(143):SLEEP5:GOTO7Ø               :REM*66
1ØØ DIMA(N),C$(N),W$(N),H(N),T(N):Q=36Ø:R=
   6Ø:C=2.4:YD=16Ø:RN=57.296          :REM*58
11Ø PRINT"{SHFT CLR}";:H=INT(8Ø/N):V=H*4:C
   G=LEN(N$):CG=CG*8:CN$="{CRSR DN}":CO$=
   ""                                 :REM*126
12Ø FORI=1TON:PRINT"{3 CTRL Is}PERCENTAGE
   OF SECTOR" I:NEXTI                 :REM*18
13Ø PRINT"{HOME}"CM$"{3 CTRL Is}PERCENTAGE
    SO FAR"                           :REM*98
14Ø G=O:FORI=1TON:PRINT"{HOME}"CO$;:INPUT"
   {6 CTRL Is}";W$(I):A(I)=VAL(W$(I))
                                      :REM*128
15Ø G=G+A(I):PRINT"{HOME}"CM$"{5 CTRL Is}{
   2 CRSR RTs}"G"{CRSR LF}{5 SPACEs}";:CO
   $=CO$+CN$:NEXTI                    :REM*8Ø
16Ø IFG<>1ØØTHENPRINT"{HOME}"CM$CHR$(15)"{
   3 CTRL Is}THE TOTAL MUST = 1ØØ%{4 SPAC
   Es}"CHR$(143):SLEEP5:GOTO11Ø       :REM*182
17Ø PRINT"{SHFT CLR}{2 CTRL Is}{CRSR DN}A
   SHORT DISCRIPTION FOR SECTOR"      :REM*244
18Ø PRINT"{HOME}"CM$"{3 CTRL Is}NO MORE TH
   AN"(H-1)"CHARACTERS":PRINT"{HOME}":FOR
   I=1TON                             :REM*84
19Ø PRINT"{6 CTRL Is}"I;:INPUT C$(I)
                                      :REM*128 ►
```

```
2ØØ IFLEN(C$(I))>(H-1)THENPRINT"{HOME}"CM$
    CHR$(15)"{3 CTRL Is}NO MORE THAN"(H-1)
    "CHARACTERS"CHR$(143):SLEEP5:GOTO18Ø:E
    LSE21Ø                              :REM*144
21Ø NEXTI:@GRAPHIC,Ø,2:@CLR,Ø           :REM*126
22Ø @DRAW,Ø,Ø,639,Ø,1:@DRAW,639,Ø,639,199,
    1:@DRAW,639,199,Ø,199,1:@DRAW,Ø,199,Ø,
    Ø,1                                 :REM*21Ø
23Ø X=319:Y=88:YR=R:XR=R*C:BANKØ        :REM*132
24Ø PRINT"{HOME}":@CHAR,53248,(32Ø-CG),3,1
    ,2,N$                               :REM*14Ø
25Ø @CIRCLE,1,X,Y,XR,YR                 :REM*176
26Ø @DRAW,X,Y,(X+XR),Y,1:BANK1:T=Ø:XD=Ø:S=
    Ø                                   :REM*77
27Ø YA=YD+16:X1=Ø:Y1=Ø:X9=XR-3:Y9=YR-3
                                        :REM*125
28Ø FORI=1TON:T=((A(I)/1ØØ)*36Ø):XA=XD+V
                                        :REM*149
29Ø S=T+S:IFT<2THENS1=S-1:ELSES1=S-3
                                        :REM*219
3ØØ X1=INT((COS(S/RN)*XR)+.5):Y1=INT((SIN(
    S/RN)*YR)+.5)                       :REM*161
31Ø XE=X+X1:YE=Y-Y1:XC=X+INT(COS(S1/RN)*X9
    ):YC=Y-INT(SIN(S1/RN)*Y9)           :REM*55
32Ø BANKØ:@DRAW,X,Y,XE,YE,1:BANK1       :REM*225
33Ø FORP=1TO8:READM(P):NEXTP:BANKØ:REM*253
34Ø @PAINT,XC,YC,1,M(1),M(2),M(3),M(4),M(5
    ),M(6),M(7),M(8)                    :REM*249
35Ø @BOX,XD,YD,XA,YA,1:BANK1:XF=XD+1:YF=YD
    +1:BANKØ                            :REM*1Ø3
36Ø @PAINT,XF,YF,1,M(1),M(2),M(3),M(4),M(5
    ),M(6),M(7),M(8)                    :REM*213
37Ø @CHAR,53248,XD,18Ø,1,1,C$(I)        :REM*155
38Ø BANK1:XD=XA+V:NEXTI:GETKEY A$       :REM*127
39Ø REM{3 SPACEs}@HCOPY,2,5             :REM*223
4ØØ @TEXT:HELP:PRINTCHR$(27)"S":PRINTCHR$(
    27)"F"                              :REM*51
41Ø REM FILL PATTERNS FOLLOW...         :REM*39
42Ø DATA255,255,255,255,255,255,255,255, 1
    28,192,224,24Ø,248,252,254,255:REM*137
43Ø DATAØ24,Ø24,Ø24,255,255,Ø24,Ø24,Ø24, 2
    31,231,231,ØØØ,ØØØ,231,231,231:REM*213
44Ø DATAØØØ,ØØØ,ØØØ,ØØØ,Ø85,17Ø,Ø85,17Ø, 1
    7Ø,Ø85,17Ø,Ø85,17Ø,Ø85,17Ø,Ø85 :REM*15
45Ø DATA129,195,1Ø2,Ø6Ø,Ø24,Ø6Ø,1Ø2,195, 2
    Ø4,2Ø4,2Ø4,2Ø4,2Ø4,2Ø4,2Ø4,2Ø4:REM*183
46Ø DATA254,252,248,24Ø,224,192,128,ØØØ, Ø
    8Ø,16Ø,Ø8Ø,16Ø,Ø8Ø,16Ø,Ø8Ø,16Ø:REM*111
47Ø DATAØØ3,ØØ6,Ø12,Ø24,Ø48,Ø96,192,128, 2
    55,255,ØØØ,ØØØ,255,255,ØØØ,ØØØ :REM*97
48Ø DATA252,249,243,231,2Ø7,159,Ø63,127, Ø
    24,Ø6Ø,126,255,255,126,Ø6Ø,Ø24:REM*159
49Ø DATAØØ1,Ø03,Ø07,Ø15,Ø31,Ø63,127,255, 1
    26,Ø6Ø,153,195,231,195,153,Ø6Ø :REM*61
5ØØ DATA127,Ø63,Ø31,Ø15,ØØ7,Ø03,Ø01,ØØØ, 1
    92,Ø96,Ø48,Ø24,Ø12,ØØ6,Ø03,Ø01 :REM*65
51Ø DATAØ51,153,2Ø4,1Ø2,Ø51,153,2Ø4,23Ø, Ø
    63,159,2Ø7,231,243,249,252,254 :REM*71
52Ø DATA255,255,255,255,ØØØ,ØØØ,ØØØ,ØØØ, 2
    Ø4,153,Ø51,1Ø2,2Ø4,153,Ø51,1Ø3:REM*46■
```


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C-64 Sprite ML Commands

This program must *be run and installed in memory* before *you run the Summer or Fall programs that are included on this Special Issue's Calendar insert.*

By LOUIS R. WALLACE

Have you ever tried to use sprites on your C-64, only to find that Basic's Peeks and Pokes were just too slow—or worse yet, too complex to understand? Here's a short machine language utility that will make the use of sprites in your programs easier, faster and more fun.

Once saved and run, the program in Listing 1 adds to Basic several new commands to define, turn on and animate your sprites. The commands and their parameters are:

HIGH-RESOLUTION SPRITE DEFINE—SYS 49152,sp#,0,c1(0–15),xpand(0–1), ypand(0–1)

MULTICOLOR SPRITE DEFINE—SYS 49152,sp#,1,c1(0–15),c2(0–15),c3(0–15), xpand(0–1),ypand(0–1)

Sp# is the sprite (0–7) that you wish to define or use. C1, C2 and C3 are the various colors that you can use, 1 in hires, 3 in multicolor. Note that *all multicolor sprites share the same color 2 and color 3.* Xpand and ypand are the sprite-expansion flags. Use 0 for no expansion, 1 to expand.

SPRITE ON/OFF—SYS 49155,sprite#, (0–1). The Sprite on-and-off routine turns on (1) and off (0) a specified sprite.

SPRITE MOVE—SYS 49158,sprite#, pointer#,x,y.

Sprite Move will position a given sprite (0–7) at any x (0–512) or y (0–255). In addition, it has the sprite pointer value, which tells the computer where the sprite is in memory. Pointers can be from 0–255, with each pointer equal to the address that corresponds to the pointer*64.

For examples of the use of these powerful sprite commands, see the *RUN* Special Issue Calendar programs called Summer Celebration and Fall Holidays. They not only employ the new commands, but they will not run unless this machine code program is in memory, so be sure and run this *before* running Summer or Fall! Ⓡ

Listing 1. Sprite ML Maker program.

```
1Ø REM SPRITE ML MAKER FOR C64
   CALENDAR PRGS.          :REM*58
2Ø REM RUN THIS PRG BEFORE RUNN
   ING SUMMER & FALL       :REM*212
3Ø FOR I=49152 TO 49587:READ A:
   POKE I,A:NEXT           :REM*1Ø6
4Ø PRINT"SPRITE ML INSTALLED FO
   R THE C64!"             :REM*162
5Ø PRINT"NOW LOAD & RUN THE C64
    PRGS"                  :REM*23Ø
6Ø PRINT"CALLED SUMMER AND FALL
   !"                      :REM*38
7Ø END                     :REM*72
8Ø REM SPRITE COMMAND ML DATA
                           :REM*138
9Ø REM CØØØ-C1B3 (49152-49588)
                           :REM*2Ø
1ØØ DATA 76,9,192,76,225,192,76
    ,22,193,32,145,193,165,2Ø,4
    1,7,141,173,193        :REM*24Ø
11Ø DATA 32,145,193,165,2Ø,41,1
    ,141,174,193,172,173,193,18
    5,155,193,141          :REM*254
12Ø DATA 171,193,174,174,193,22
    4,Ø,2Ø8,15,169,255,56,237,1
    71,193,45,28,2Ø8       :REM*112
13Ø DATA 141,28,2Ø8,76,69,192,1
    73,171,193,13,28,2Ø8,141,28
    ,2Ø8,32,145,193        :REM*136
14Ø DATA 165,2Ø,41,15,172,173,1
    93,153,39,2Ø8,174,174,193,2
    24,Ø,2Ø8,3,76          :REM*11Ø
15Ø DATA 112,192,32,145,193,165
    ,2Ø,41,15,141,37,2Ø8,32,145
    ,193,165,2Ø,41         :REM*6Ø
16Ø DATA 15,141,38,2Ø8,32,145,1
    93,165,2Ø,41,1,133,2Ø,2Ø1,Ø
    ,2Ø8,15,169,255        :REM*23Ø
17Ø DATA 56,237,171,193,45,29,2
    Ø8,141,29,2Ø8,76,149,192,17
    3,171,193,13,29        :REM*17Ø
18Ø DATA 2Ø8,141,29,2Ø8,32,145,
    193,165,2Ø,41,1,133,2Ø,2Ø1,
    Ø,2Ø8,15,169,255       :REM*22
19Ø DATA 56,237,171,193,45,23,2
    Ø8,141,23,2Ø8,76,186,192,17
    3,171,193,13,23        :REM*8
2ØØ DATA 2Ø8,141,23,2Ø8,32,145,
    193,165,2Ø,41,1,141,179,193
    ,2Ø1,1,2Ø8,15          :REM*8Ø
21Ø DATA 169,255,56,237,171,193
    ,45,27,2Ø8,141,27,2Ø8,76,22
    4,192,173,171          :REM*132
22Ø DATA 193,13,27,2Ø8,141,27,2
    Ø8,96,32,145,193,165,2Ø,41,
    7,141,173,193          :REM*34
23Ø DATA 168,185,155,193,141,17
    1,193,32,145,193,165,2Ø,41,
    1,2Ø1,Ø,2Ø8,15         :REM*36
24Ø DATA 169,255,56,237,171,193
    ,45,21,2Ø8,141,21,2Ø8,76,21
    ,193,173,171,193       :REM*172
25Ø DATA 13,21,2Ø8,141,21,2Ø8,9
    6,32,145,193,165,2Ø,41,7,14
    1,173,193,168          :REM*192
26Ø DATA 185,155,193,141,171,19
    3,32,145,193,165,2Ø,141,175
    ,193,172,173,193       :REM*2Ø3
27Ø DATA 153,248,7,32,145,193,1
    65,2Ø,141,176,193,165,21,14
    1,177,193,32,145       :REM*223
28Ø DATA 193,165,2Ø,141,178,193
    ,172,173,193,185,163,193,16
    8,165,2Ø,153,1         :REM*67
29Ø DATA 2Ø8,173,177,193,24,2Ø1
    ,Ø,2Ø8,28,169,255,56,237,17
    1,193,45,16,2Ø8        :REM*191
3ØØ DATA 141,16,2Ø8,172,173,193
    ,185,163,193,168,173,176,19
    3,153,Ø,2Ø8,76         :REM*227
31Ø DATA 144,193,173,16,2Ø8,13,
    171,193,141,16,2Ø8,172,173,
    193,185,163,193        :REM*245
32Ø DATA 168,173,176,193,153,Ø,
    2Ø8,96,32,253,174,32,158,17
    3,32,247,183,96        :REM*119
33Ø DATA 1,2,4,8,16,32,64,128,Ø
    ,2,4,6,8,1Ø,12,14,Ø,Ø,Ø,Ø,Ø
    ,Ø,Ø,Ø,Ø               :REM*159
```

■

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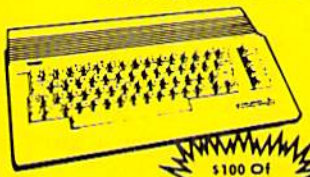
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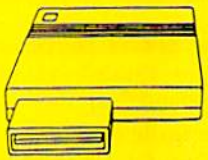
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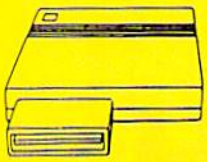


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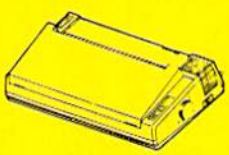


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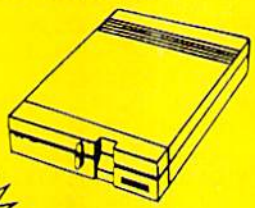
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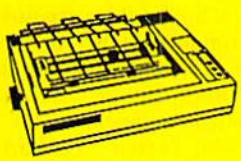
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From p. 32.

Machine Language

Q *I need a program that turns machine language programs into Basic so that I can debug them, and then reassembles the modified version. If this isn't possible, then how can I list machine language?*

—LEONARD ARNOLD
GLADSTONE, VA

A The only products that do what you request are some underground uncompilers that take a compiled Basic program and convert it back into an equivalent Basic source code. However, such programs work only if the compiled program is written in Basic, and compiled by one specific compiler.

Apart from that, the only way to do it is with an unassembler, also known as a symbolic disassembler. I developed a very simple one several years ago that's probably still in some user group libraries, but the best I've seen is Symbol Master by Schnedler Systems, 1501 North Ivanhoe, Arlington VA 22205; 703-237-4796.

Q *I don't completely understand the decimal values used in ASCII code. When I use a machine language monitor to view the decimal value of the equals sign, it displays a value of 178, while the actual ASCII code value is 61. What's going on?*

—OWEN HIXON
MANZANOLA, CO

A Actually, there are two equals signs in Basic. One is the normal ASCII character, which you'll see if you view a literal string containing one. The other code is actually the Basic token (keyword) for the operation of assigning a value to a variable, or making a comparison within an If statement. You can see both uses of the equals sign at once by using the monitor to view this line:

```
1 A$ = "A = B"
```

The first equals sign will have the decimal value 178 ($B2 hexadecimal), and the second sign will have the value 61 ($3D hex).

HARDWARE

Chips & Connections

Q *I want to speed up my C-128's disk operations for its C-128 and C-64 modes. Can you suggest a cartridge or a replacement for the Kernal ROM? Would replacing the Kernal ROM incur compatibility problems with protected software?*

—WESLEY BURCHARDT
TAMPA, FL

A I hear only good things about Access Software's Mach 128. Unlike speedup cartridges for the C-64, you don't have to unplug Mach 128 to use the 128 mode, and it speeds up disk access in both C-64 and C-128 modes. If you do encounter a protection problem, however, just remove the cartridge.

A new Kernal ROM would be more convenient and might also correct some of the problems with the original C-128 ROMs, but if you get one, be sure it has a switch to instantly revert to the built-in Kernal ROM. Otherwise, you are sure to have problems with some of the more paranoid among today's copy-protected programs.

Q *I've read that Commodore is developing a new ROM chip for the 1571 disk drive. Is this chip available yet, and if so, where can I get one?*

—RAYMOND HYMAN
PHILADELPHIA, PA

A A 1571 update ROM that upgrades the 1571 performance is indeed now available. I got mine today, thanks to a group purchase by the Fox Valley 64 Users Group. The part number of the new chip is 310654-05. With that information, any authorized Commodore service center should be able to order one for you. Fox Valley lists it as available from Microtech, 328 W. Hillside, N. Aurora, IL 60542; phone 312-892-3551.

The upgraded ROM was also listed in a recent ad from K. Boufal Consulting Services (244 Fitzwater St., Philadelphia PA 19147), so you won't have to go far to find it.

Q *Would I have any problems (in either 40- or 80-Column mode) if I replaced my C-128's Z80A chip with a faster version (such as the 8 MHz Z80H) and rigged a switch to toggle between normal 4 MHz speed and a new 8 MHz time base provided by a separate crystal?*

—LONNIE MCCLURE
MEMPHIS, TN

A At a bare minimum I would expect problems with support or problems with memory chips not being able to operate at twice the usual speed. The best way to speed up CP/M applications on your C-128 is by adding Commodore's 1700 or 1750 RAM cartridge to your system and moving program overlays and data to its RAM disk. Usually CP/M is disk-bound, rather than CPU-bound, and the RAM disk will correct that.

Q *With respect to possible damage, is there any difference between physically plugging or unplugging a cartridge with the computer on and electrically switching the cartridge on or off when it's mounted on an expansion board?*

—WILLIAM PACE
S. CHARLESTON, WV

A There's a huge difference! It is extremely dangerous to your system to physically connect or disconnect a cartridge with the computer on. If the cartridge doesn't mate precisely with the contacts in the cartridge port, they'll almost certainly short out and damage your computer.

To switch a cartridge on or off, either first turn off the computer and all connected accessories, or else use an expansion board with an on/off switch for the cartridge.

Q *I have a space problem behind my computer, so I'd like to use a ribbon cable to connect a multiple expansion module to the expansion port on my Commodore. Is it possible?*

—H. FELBER
FORT MYERS, FL

A Yes. Such cables are now available from at least two sources. Aprotek (1071-A Avenida Acaso, Camarillo, CA 93010) offers a 10-inch ribbon extender for about $23 postpaid, and Value Soft (3641 SW Evelyn St., Portland, OR 97219) has one that's 12 inches long for the same price.

Another reader asked the same question about extending the user port with a ribbon cable. That, too, is offered by Aprotek.

Q *My computer system and lights are all plugged into the same circuit, the computer system via a surge protector power strip, and both lights and equipment dim whenever the furnace kicks on. So far, the circuit breaker has tripped twice. Is there an uninterruptible power supply (UPS) for the Commodore? I don't want to relocate my system or reroute the wiring if I can avoid it.*

—KAREN LANDRETH
CAMDEN, SC

A Yes, there is. However, the least expensive UPS I could find is the UPS-210, a $250 unit from Power General Corp. (617-828-6216). Typical UPS prices run to several thousand dollars.

I can't recommend a UPS, however, even apart from its cost. You'd be better off installing a new circuit for your computer system and lights. Even using an extension cord in an outlet on a separate circuit would probably be safer than your current setup.

Q *Where can I buy a one-slot expansion board—just an adapter—that will plug directly into the game port so that game cartridges can plug into it and not the port itself? If I can't buy one, how would I go about making one?*

—ROBERT DESKO
ENDICOTT, NY

A Value-Soft of Portland, OR, has advertised exactly what you want in recent issues of *RUN*. The product is called 'LBow and sells for about $30.

Q *My kids are continually switching joysticks, and the plugging and unplugging seems to put a lot of stress on the connectors. Is there a 12-inch cable with suitable connectors that could be left plugged into each port, then the joysticks plugged into that?*

—J. VOGEL
WOBURN, MA

A Radio Shack sells a joystick extender cable somewhat longer than you want, but adequate for your needs. I use it to plug the oversized connector on Flexidraw's light pen into my C-128.

Q *My C-128 and peripherals are plugged into a six-receptacle surge suppressor. Lately, my monitor has been flickering once or twice each second and making crackling noises. I thought it might be interference from an appliance, but turning my appliances off didn't help. I've been using my Plus/4 with the same monitor, without any flickering or crackling. Does this suggest anything?*

—ROBERT SHANFELDER
ADDRESS UNKNOWN

A Yes. It suggests that you may be overloading your surge suppressor. If the suppressor includes a noise-filtering feature, it will be limited to a specific, and often low, wattage, and color monitors, printers and modems are all power hogs. In all likelihood your C-128 is putting more of a strain on your surge suppressor than is the Plus/4.

Try plugging just the C-128 and the monitor directly into a wall socket. If the problem persists, it's either in the C-128 or its power supply and should be investigated further by an authorized Commodore service center.

General

Q *Is it safe to leave a C-64 on for eight or more hours at a time?*

—JOHN HIND
BALTIMORE, MD

A Yes. Many C-64s are used around the clock and never turned off, including the one *RUN* uses for its RUNning Board BBS (603-924-9704). But you should keep the system from overheating, especially the power supply, which should have air flowing freely around it, including its underside. If you leave your system running unattended, it's a good idea to turn off the monitor.

Input Devices

Q *Is there a way to remove keys from a keyboard without ruining them? I want to swap some of the keytops on a C-16 keyboard (bought from Radio Shack for $5) that are incorrectly located for the C-64.*

—JERRY VAN VACTOR
SPEARFISH, SD

A Simply fashion a small hook from a paper clip, slip it into the gap between the keys, then into the recess underneath the keytop you want to remove, and gently pull up on the hook. The keytop should easily slip off its post. Then recap the post by gently pressing the C-16 keytop back onto it so that the slot in the keytop mates with the post.

Q *How do I use the right-hand button on my 1350 mouse with the C-128?*

—BILL LEAGANS
PRATTVILLE, AL

A The right-hand button on your mouse is connected to pin 9 of the control port, which was originally intended to be used by the potentiometer on one of a pair of game paddles. The May 1987 issue of *The Transactor* (416-878-8438) details the procedure for adding a 47K pull-up resistor between pins 7 and 9 to make the right button readable at address $D419; the issue also gives you the needed assembly language programming to use the button (and the rest of the mouse). It's not written for beginners, but it should solve your problem nicely, as long as you know how to use both a soldering iron and an assembler.

Q *I recently bought a Commodore 1350 mouse, and, after looking through the pamphlet that came with it, I realized that true 360-degree, variable-speed mouse control is impossible with the pins it uses. The pins control only one button and four directions, simulating a joystick. Did I waste my money?*

—REMY FOX
TORONTO, ONTARIO, CANADA

A Yes, if what you wanted was a true proportional mouse. What you really needed was the 1351 mouse, which is a true Amiga/Mac-like mouse for the C-64/128.

Data Storage Devices

Q *I own a VIC-20 and a 1540 disk drive. I've upgraded to a C-128, but I can't use the drive with it. Are there any chips available to turn the 1540 into a 1541?*

—LUIS RAMOS MARCIN
MEXICO D. F., MEXICO

A All you need to upgrade your 1540 to a 1541 is a replacement Kernal ROM for the 1541. You should be able to get one from any authorized Commodore service center. If not, order one from *The Transactor* (phone 416-878-8438) for $60 Canadian.

Q *Are there any 1571-compatible, non-Commodore disk drives on the market yet, and will the 1581 work with both the C-64 and C-128?*

—RONALD PACK
AURORA, CO

A Emerald Components (Eugene, OR, 1-800-356-5178) is advertising a 1571-compatible disk drive called the Excel-71.

As for the new 1581 3½-inch disk drive, yes, it works on both the C-64 and C-128, adding storage space to both.

Q *I have a C-64 and a 1541 disk drive, and I'll be purchasing a C-128 for office use. I want the 128 to be able to read 1541 program disks. The 1571 seems to provide the 1541 readability, faster loading and double side/double capacity. Will the 1572 disk drive provide these features, and does it com-* ►

pare favorably with the 1541 as far as my purposes go? Can the C-128 operate the 1541 drive without special tricks?

—ROGER STOKES
PARK FOREST, IL

A Sorry, but Commodore cancelled the 1572 drive. The 1571, however, is still readily available and reads 1541 disks quite well. Going the other way, yes, a C-128 will happily operate your 1541 disk drive, but you won't get faster loading speeds in 1541 mode.

Q *My 1541 disk drive is slower than the specified speed of the drive. Can I repair my drive so it will spin at the regular speed?*

—RYAN WONG
ALHAMBRA, CA

A First, how did you discover that the drive speed is incorrect? At least one well-known speed-measuring program was itself incorrect when it was first released. The best way to be sure of the drive speed is by looking at the strobe disk (on the bottom of the drive inside the case) under fluorescent light. When the drive motor is on, the strobe disk (the 60 Hz one in the United States and the 50 Hz one elsewhere) should appear to be standing still. If it isn't, adjust the small speed-adjustment screw, which is located in the small hole near the strobe disk. Be sure to notice its initial setting, in case you need to restore it later.

It probably will take you the better part of an hour to remove the drive case, view the strobe disk and put things together again. Since the 1541 works well within a fair range of speeds, I wouldn't recommend opening it unless the drive is giving you trouble, and then only after the warranty has expired.

Q *I have a C-128 and a 1571 disk drive. When I format one side of a disk, everything works fine, but when I format the flip side, the first side doesn't work. What's wrong? I've changed 1571s twice, but I still have the same problem.*

—RENE DEL VALLE
QUEENS, NY

A The "problem" is that the 1571 is already a double-sided drive and automatically formats both sides of the disk at the same time. The popular trick of cutting an extra hole in a disk to format its flip side is unnecessary on a 1571. Each time you flip the disk and reformat, you're destroying what you've already done on the first side.

Q *Is it possible to connect a hard disk drive to the C-128? If so, where could I find one at a reasonable price?*

—JEFF MILLER
MIDLAND, VA

A Xetec (Salina, KS) has a 20-megabyte hard disk drive for the C-64 and C-128, called the Lt. Kernal. The drive plugs into the computer via Fiscal Information's Lt. Kernal cartridge, allowing it to run several times faster than if it were connected to the serial bus. CSI (Melbourne, FL), ICT (Frederick, MD) and JCT (Grants Pass, OR) are also marketing hard disk drives. Drives are available in ten- and 20-megabyte configurations and range in price from around $700 to $1000.

Q *I'm considering souping up my 1541 with a more powerful electric motor to make up for the drive's slow speed. However, I'm afraid this might render my disks useless or even refuse to load or save programs. Any advice?*

—LEONARD ARNOLD
GLADSTONE, VA

A Actually, it isn't the motor in the 1541 that makes it run so slowly. The real slowpoke is the bit-serial interface method Commodore chose to use with the drive and computer in order to cut costs. So, even if you could increase the rotation speed of your floppy disks, you probably wouldn't notice any improvement in data transfer speed.

If you want to speed up your disk drive's performance, get a program that speeds data transfers, such as Mach 5, from Access Software.

Q *I regularly turn my 1541 disk drive off and on with the disk still in the drive. In my view, the equipment should have been designed to operate this way. Yet both you and my Emerald FSD-1 manual caution against this practice with near-religious fervor. I wish someone would clarify this point once and for all.*

—BEN JOHNSON
ADJUNTAS, PR

A I agree that the 1541 should be designed to work properly when switched off and on with a disk in place. Commodore knows how, having designed both its 8050 and 8250 drives properly in this regard. In all early 1541s, however, a serious problem can arise whenever power is lost with a disk in place.

When you cut off the power to your drive, the voltage that's used for save operations lingers longer than the voltage that's used to prevent a save operation from being executed. Thus, there is a small but real chance that erroneous data will be saved to your disk any time you switch off the power with the disk in place or if there's a power failure.

The simplest cure is to release the lever that loads the drive head so that the head is retracted from the disk. Then you won't need to actually remove the disk.

Q *What would make a 1541 lock up and produce a File Not Found error that can't be corrected by shutting down the system?*

—GENE BRICKER
SANTA FE, TX

A Most likely, your 1541 is losing track of where its drive head is, which is something it discovers only by brute force—banging the head up to 40 times against the track 1 stop. This is possibly a side effect of running copy-protected programs, or programs that copy copy-protected programs.

When you have this problem next time, try gently inserting into the drive the cardboard that you found in the drive when you first unpacked the unit. The cardboard will often push the head back into its normal position, allowing other commands to work.

Q *Reader's comments on copy protection in Mail RUN sparked some fears in my mind. Could my software damage my 1571 disk drive? While some programs are loading, I hear a chattering noise inside the drive. Could this cause head misalignment, and, if so, can you recommend a word processor that doesn't do this?*

—WESLEY BIBRO
ALGONQUIN, IL

A Chattering noises during a program load are indeed usually due to copy-protection tricks employed by the manufacturer of the program. Such tricks often cause drive misalignment on the 1541, requiring a costly adjustment or an even more costly permanent fix. Fortunately, the 1571 has an added track 1 sensor, which largely eliminates the stresses that led to misalignment on the 1541.

Even so, there is really no reliable substitute for backing up your important programs.

Two excellent and widely available

word processors that are no longer copy-protected are PaperClip, from Electronic Arts (1820 Gateway Drive, San Mateo, CA 94404), and Word Pro 128/S, from Spinnaker Software (One Kendall Square, Cambridge, MA 02139).

Q *I'm considering purchasing another 1571 disk drive, but I can't locate any information on how to use two disk drives with copy-protected software. I don't want to buy another 1571 and then discover that I can't use the second drive because the device number within the program can't be changed.*

—CHERYL MANSFIELD-EGANS
KINGWOOD, TX

A As you might already know, changing the device number of a 1571 drive is simply a matter of flipping a small switch on the back of the drive. C-128 Basic programs that can be modified are easy to adapt for use with added drives. For example, you can add the phrase ON U(9) to the end of disk commands intended for disk unit 9.

Copy-protected programs present a special challenge. Instead of trying to adapt these yourself, simply limit your purchases to programs that explicitly support multiple disk units. Such programs are becoming more and more common as Commodore owners expand their systems. Fortunately, CP/M programs, the ones most likely to require two disk drives, also are the least likely to be copy protected.

Output Devices—Video

Q *I'm looking for a color monitor for my SX-64. Any suggestions?*

—RUPERT TOBISCH
WALNUTPORT, PA

A I've used the Commodore 1702 monitor with excellent results, but if I were to buy one now, I'd probably get the 1902A for its 80-column color capability with other computers.

Q *How can I hook up more than one monitor to my C-128?*

—JASON MARINER
ALBUQUERQUE, NM

A Being able to hook up two monitors at once is one of the C-128's nicer features, which was part of Commodore's original demonstrations when they first released that computer.

Simply connect one monitor to the composite video port (the one with an 8-pin DIN plug), and the other to the RGB port (the one with a 9-pin subminiature D connector). Naturally, the one connected to the composite port needs to be a composite monitor, such as Commodore's 1702, while you'll need an RGB monitor for the RGB port, such as an IBM color graphics display. Or you can plug both connectors into Commodore's 1902A monitor, and use it in both modes alternately by selecting RGB or composite from a switch on the front of the monitor.

Output Devices—Audio

Q *For some time now my C-64 has refused to broadcast sounds that are a part of the programs I use. I took it to a computer repair store, and the staff there said the problem was a blown audio fuse. I'd like to install the fuse myself, but I haven't found a place that sells them. Can you help?*

—KEVIN BROWN
HANCEVILLE, AL

A First of all, find a new service center. There's only one fuse in the C-64, the power fuse, and it has nothing to do with audio. Had the fuse blown, your entire system would have stopped working.

However, before you take your 64 to someone else, check the volume and fine-tune controls on your TV or monitor. If all you hear is silence, try a different TV or monitor with a speaker that you know is working. If you do get sound from that unit, then the problem is in the original TV or monitor. Otherwise, the problem is in your computer, possibly in the SID (sound interface device) chip. An authorized Commodore service center can determine this by inserting a SID chip that works.

Output Devices—Modems

Q *I've been advised to buy the C-1660 modem to use with my C-64. I thought the C-1670 was the same kind of modem, only faster, with the ability to automatically switch to different speeds. Which modem is better?*

—RUSS HERLING
ROCKVILLE CENTRE, NY

A In the world of modems, faster is usually considered better, since most phone companies and on-line services charge by the minute. A 1200-baud modem (1670) transmits and receives information four times faster than a 300-baud modem (1660), potentially cutting down the time you pay for by a corresponding amount. On the other hand, some on-line services charge extra for 1200 baud, so, if all you want is to read and type messages, 300 baud may be preferable. A speed of 300 baud is comfortable for reading and faster than most people type.

If you think you'll ever want the added speed of a 1200-baud modem and can afford its higher price, buy the 1670. It works at both 300 and 1200 baud and has a handy, built-in speaker to inform you, in those seconds before you're connected to the system you're calling, of happenings on the phone line, such as dial tones, busy signals, electrical interference and irate people awakened in the middle of the night.

Q *Can I use my C-128 to communicate via modem with another C-128 in Iceland?*

—G. VIDARSSON
SANTA BARBARA, CA

A Sure. Almost any 1200-baud modem compatible with your system should be suitable. Unlike 300-baud modems, 1200-baud units use a compatible protocol in both the U.S. and Europe.

Output Devices—Printers

Q *I just received a new printer, and I'm happy with it except that it uses the same serial port on my computer as does the disk drive. I'm aware of a device that allows both a printer and a disk drive to be connected to the C-64 at the same time. Any information is appreciated.*

—BARRY ASHWORTH
TUCSON, AZ

A If you look at the back of your disk drive, you'll see a second serial bus connector. To use your disk drive and printer at the same time, connect the drive to the serial port at the back of the computer, and connect the cable running from the printer to the other port on the back of the drive. This is known as daisy-chaining, which allows you to hook up several devices at once.

Q *I own a C-64, 1541 disk drive and Gemini 10X printer. My problem is that the drive won't load or run many programs unless the printer is on if it's connected. Since I don't always need the printer, I sometimes disconnect it before turning on the system. Will this connecting and disconnecting* ►

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wear out the port prematurely, or will leaving the printer on all the time overheat it and wear it out prematurely?

—MILT WIGSMOEN
SAUK VILLAGE, IL

A The failure of your disk drive to operate with the printer off is probably due to the printer interface you're using. That feature was probably added intentionally to keep you from starting the system without the option of using the printer. The same problem may occur if the printer is turned on, but out of paper or off-line for another reason. Since this bothers you, look in your printer interface manual—there may be a way to disable its check for printer readiness.

Otherwise, just leave your printer on whenever the computer is on. It's in less danger of overheating than your computer and disk drive, and it uses very little power except when actually printing.

Q *Are the 1525, 1526, MPS-801 and MPS-802 all different printers or just two printers with different names?*

—MICHAEL SPINK
BRIDGEPORT, WV

A The 1525 and MPS-801 belong to one family of printers, different in appearance and some features, but sharing the same set of commands for such things as high-resolution graphics. The 1526 and MPS-802 also are similar in their commands and features, but both are quite different from the 1525 and MPS-801.

Although the 1526 and MPS-802 have some excellent features, most Commodore-compatible software is designed for the 1525 and MPS-801. This is especially true of programs that use graphics. The MPS-801 and MPS-802 are more recent and have replaced the 1525 and 1526 for the most part.

Q *I need your help in finding a letter-quality printer for my C-64. I use the C-64 with a dot matrix printer, which is fine for drafts, but not for correspondence.*

—JEAN SPENCER
GREENBELT, MD

A The key to success in choosing the right printer for word processing is to choose the one recommended by the manufacturer of your word processing program. It's the only way to be sure that the program will support all of the printer's advanced features, and that the printer will support all those of the program. I've always used models from the C. Itoh Starwriter line, using a Cardco interface, but other users are just as happy with one of a dozen other brands, so long as the printer and interface are supported by the word processing program that will be used with them.

One other warning. If you want a tractor-feed or sheet feeder, get one when you buy a printer. Later you might find both more costly to buy and very difficult to locate.

Q *I recently purchased an Okimate 20 printer. I find I'm using up a ribbon cartridge every two weeks, at a cost of $5–$6 per cartridge. Is there any better alternative?*

—KEN CHERRY
SPRING GROVE, PA

A You have discovered the Achilles heel of thermal and thermal transfer printers. Despite very attractive initial purchase prices and attractive printouts, the cost of their consumable supplies is usually quite high compared to other printers.

You might, however, be able to reduce your ribbon costs somewhat by going with another supplier or buying in bulk. One friend reports good success using "Pelican" ribbons. Another reputable supplier, Quill Corporation (100 S. Schelter Road, Lincolnshire, IL 60197) recently offered ribbons for the Okimate 20 at $3.58 each.

Q *I bought my Leading Edge Banana Gorilla printer from DAK Industries, and I want to use it with my C-64. The printer has a 25-pin female interface. Where can I buy the male counterpart?*

—RODNEY MULLINEAUX
IRVINE, CA

A As I recall, DAK Industries (8200 Remmet Ave., Canoga Park, CA 91304; 800-DAK-0800) sold an interface that connected to the user port of the C-64. However, the user port is not the best place to connect a printer, because few Commodore programs support RS-232 printers via the user port.

Instead, consider the Cardco PS printer interface, now being marketed by Supra Corporation (1133 Commercial Way, Albany, OR 97321; 503-967-9075). One end connects to Commodore's serial bus like other printer interfaces; the other end provides your

printer with the necessary unidirectional RS-232 port. Just be sure your Banana Gorilla can communicate at 1200 baud, since that is the only serial communication speed supported by the PS interface.

A more flexible interface is available from Omnitronix (760 Harrison St., Seattle, WA 98109). It costs a bit more, but it works at any desired baud rate and supports graphics on some printers.

Q *Will the graphics interfaces I've seen advertised for Commodore computers let my non-graphics printer print graphics characters?*

—VINNIE ZAK
SHELTON, CT

A No, normally they won't. Graphics interfaces are designed to convert the Commodore graphics commands for Commodore graphics printers into equivalent commands for other graphics printers. Such interfaces became necessary when Commodore chose not to support Centronics parallel printers or Epson graphics and not to offer its own high-quality graphics printer.

Q *Can you recommend a laser printer for use with our Plus/4 and 64C computers? What interfaces would be required for small-business use?*

—PAUL HEIL
LANCASTER, PA

A Jim Oldfield reports that his Mid-nite Press book *How to Get the Most Out of GEOS* was written using a Quadram Quadlaser printer, connected to a C-128 via a Xetec Super Graphix interface in Transparent mode, and using WordPro 128/S, from Spinnaker Software.

The Quadlaser comes with four built-in fonts and has a megabyte of RAM in which to load other fonts, so the only real difficulty in controlling it from a Commodore computer is making sure your favorite word processor allows you to embed long sequences of control characters within a document.

For a Plus/4, you may also want to consider using an MW350 printer interface. It is particularly recommended by the Plus Exchange, and also works well with the C-64 and C-128.

A far more costly but also more flexible laser printer is Apple's LaserWriter. You can use it with your 64C (but not the Plus/4) via the GEOS geoLaser driver and such GEOS programs as geoWrite and geoPublish. Since IBM has just joined Apple in endorsing the LaserWriter's Postscript page description language, the LaserWriter should be compatible with new products for years to come, making up for its relatively high initial price.

Q *My Epson LX-80 printer is slow in printing out graphics, but it works at normal speeds with programs that use only nongraphics characters. Is my printer interface causing the problem, and, if so, what type interface should I use instead?*

—MARK FRIED
CHATSWORTH, CA

A Most of the slowness is due to the computer and printer having to communicate far more information to print a line of graphics than to print a line of text. The text character set is already built into the computer and printer, and a single byte of information is all that's needed to be communicated in order for the printer to print any nongraphics character. On the other hand, high-resolution graphics are sent one pixel, or dot, at a time, and they require at least eight times as much information for each line of output. This guarantees that your word processor files will always print faster than those from graphics programs.

Another problem is that if each byte of graphics data is sent to the printer separately, there can be a long delay in transmission from the interface itself. Adding even one extra byte of buffer memory can help greatly, by sending a character from the computer to the interface at the same time the interface sends one to the printer. If you cannot tolerate the delays, consider getting a printer interface that includes extra buffer memory. It should speed up your printouts somewhat. If you do much word processing, get a buffer large enough to hold your longest document.

Q *I recently purchased an MPS-1000 printer for my C-64. Now I'm having problems with crooked printing on the hard copy. I've tried adjusting the paper setting, but that doesn't work. What should I do?*

—MIKE MEYN
BAYSIDE, NY

A Aligning paper on friction-feed printers like the MPS-1000 can be a problem. Although the first few sheets seem to be aligned, the misalignment becomes more apparent with each advance of a sheet. I've been told the reason is because the left side of the sheets ►

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receive more characters, and thus more pounding from the printhead, than the right side.

Years ago when I had the same problem with a printer, I fixed it by taping two pencils vertically to the back of the printer as paper guides, putting one on each side of the paper supply. It didn't solve the problem completely, but it did help immensely.

Be sure to place your paper supply directly behind the printer and level with or above the top of the platen, so that the paper feeds into the printer without making the printer mechanism work so hard.

Q *My Commodore DPS 1101 daisy wheel printer works great except it needs a tractor feed. Can one be purchased anywhere?*

—JIM WERRE
SAN JOSE, CA

A The 1101 was essentially a Juki printer under the skin, a model 6100, if I recall correctly. Since a tractor feed has definitely been available for the Juki, you should be able to use the same one on a 1101. Lyco Computers (800-233-8760) offered the Juki 6100 in a recent issue of *RUN*, so your might ask them about your tractor feed.

Specific Computers

Q *What are the differences between the C-128 and the B-128 computers?*

—JEREMIAH BROOKS
FRANCONIA, NH

A The B-128 was the last of the Commodore CBM models sold in the U.S. It included many of the features later incorporated into the C-128, such as an expanded version of Basic, expanded memory and an improved keyboard. However, it was a monochrome machine and largely incompatible with the C-64, even though the two machines could share simple Basic programs.

The B-128's primary disk drive, the 8050, was well made and possessed a much larger capacity than a 1541 or even a 1571. However, it used a format incompatible with the C-64, which prevented disk swapping with C-64 owners. Similarly, the B-128's printer, the 8023, used graphics commands different from the 1525's and 801's, so it was incompatible with graphics printing programs for the C-64.

The B-128 was also, in some respects, an unfinished machine, since the CP/M and MS-DOS options originally planned for it never materialized, at least not in the U.S. When the B-128 was discontinued, Commodore sold them at attractive closeout prices, primarily through a U.S. dealer.

The key difference between a B-128 and a C-128 now is that there probably won't be many new programs for the B-128. Thus, it's a good purchase only if the price is right and all needed programs are included.

Q *Is there a big difference between Commodore's new model 64C and my C-64? Also, would I need to buy a new disk drive to use with the 64C?*

—ALBERT SCHUMACHER
ADDRESS UNKNOWN

A The main changes in the 64C are the plastic housing, which has been redesigned to match the style of the C-128, and the inclusion of the GEOS operating system shell program. There have been some internal changes also, such as in the power supply, but nothing to justify replacing a properly working C-64 with a 64C. If you wish to own a copy of GEOS, it's regularly advertised in *RUN* and works fine on C-64s of any age.

Q *We're considering replacing our C-64, two 1541 disk drives and a 1702 monitor with a C-128, two 1571 drives and a 1902A monitor. We use our computer system for business, so it must be reliable. Are the 128 and 1571 reliable? Except for replacing a voltage regulator, one fuse (our fault) and aligning the disk drives, we haven't had to service our C-64 in over three years.*

—GARY SHERMAN
CERESCO, NE

A If reliability is your primary concern, you already have it. If you want additional reliability, then perhaps instead of replacing your current system, you should supplement it.

You already have two disk drives. If you had a spare computer and monitor or TV, you'd be assured of continued operation after any single failure. Naturally, buying a C-128 and 1902A is one good way to get that second computer and monitor.

Q *I bought my C-128 back in July 1985, and I'd like to know if the new 1700 and 1750 RAM packets will work on my computer?*

—WAYNE AARON
SCOTT HILLS, TN

A Some early C-128s had defective cartridge ports and thus may not work with RAM cartridges. One quick way to find out whether your cartridge port is defective is by trying out the Ranch cartridge from Spinnaker Software. If it runs, your cartridge port is good, and should also work with a RAM cartridge.

MISCELLANEOUS

Q *Where can I find programs to use with my 1520 printer plotter?*

—JOHN ELBERSON
BONITA, CA

A The International Commodore Products User Group (ICPUG) in England has just announced the resurrection of its 1520 user's group and the availability of a disk of programs for the 1520. You can order the disk from W.G.C. Austin, School of Geography, Faculty of Humanities, Newcastle Polytechnic, Lipman Building, Sandyford Road, Newcastle-Upon-Tyne, NE1 8ST England. The asking price is a disk with a program for the 1520 on it, together with return packing and money for postage. You might also offer to join ICPUG.

Q *I've called nearly every dealer in northeast Ohio for a copy of the* Programmer's Reference Guide for the Commodore Plus/4. *Where can I buy a copy? Also, does Commodore or any dealer carry software for the Plus/4?*

—KEITH SCHRODE
SALEM, OH

A According to the information I received from Calvin Demmon, president of the Plus/4 Users Group (PO Box 1001, Monterey, CA 93942), the reference guide is published by Scott Foresman Professional Publishing Group (1900 East Lake Ave., Glenview, IL 60025) and retails for $22. Any bookstore should be able to order it for you. You'll also be happy to know that you may order 50 or so programs for the Plus/4 directly from Commodore, and PLUG offers some public domain programs itself. Membership in PLUG is $20 a year, and it's probably a good investment for any Plus/4 owner. ■

From p. 46.

UNNEW PROGRAM

If you ever accidentally erase a program with the New command (a not uncommon occurrence—just wait till you do it yourself), you can restore it with the program below, which creates an Unnew program on disk as a machine language file. Insert the disk in the drive and type BOOT "%UNNEW" and hit return. If you have a graphic screen active at the time, type GRAPHIC1:GRAPHIC0 in Direct mode before booting %UNNEW. After you boot %UNNEW, your Basic program will be restored.

```
10 REM C-128 UNNEW-L. K. SNYDER
20 BANK 15:FORI=2816TO2833:READA:POKEI,A:NE
   XT
30 BSAVE"%UNNEW",B0,P2816TOP2834:END
40 DATA 165,45,133,251,165,46,133,252
50 DATA 160,0,169,1,145,251,32,229,94,96
```

—L. K. SNYDER, ADDRESS UNKNOWN

SYS IN REVERSE

I found a reference to an undocumented C-128 keyword in my copy of the *C-128 Programmer's Reference Guide*. The keyword is RREG, for *R*ead *REG*isters, and it works much like the SYS command. You can "read" the results of the last SYS you called with RREG A,X,Y,S. This reads the values of the Accumulator, X register, Y register and the Status register into variables A, X, Y and S, respectively. You can use any variables you like and can read any register by substituting commas to skip the other registers. For example, to put the value of the Y register into variable YR, use the command RREG ,,YR. This makes it very easy to pass parameters with SYS and read the results back into variables.

Here's a practical example that gives the current window size. Use ESC T to set the top of a window and ESC B to set the bottom.

```
10 REM C-128 RREG -JIM BORDEN
20 BANK15:SYS65517:RREG ,X,Y
30 PRINT"WINDOW IS"X+1"COLUMNS WIDE"
40 PRINT"AND"Y+1"LINES HIGH."
```

See "From Hi-Res to Ultra Hi-Res" on page 90 for another example.

—JIM BORDEN, CARLISLE, PA

CALCAID 128/64

CalcAid 64 (see *RUN*, November 1986) lets you view its spreadsheet only three columns at a time. Adding the lines below will give you full use of the C-128's 80-Column mode so that you can view seven columns at once and use the Fast mode. The C-128's function keys are redefined to the function key values for the C-64 (except that you cannot control the 80-column screen colors). Use CTRL/X to end the program and restore your original function key definitions. The 40-Column mode will also work, but, of course, CalcAid returns to the three-column display, and you must then use Slow mode.

```
2 REM CALCAID 64/128 - JIM BORDEN
3 REM CHANGES TO ALLOW 40/80 COL
6 PA=1:Z=0:P=100:SW=27:CW=2:IFFRE(0)=FRE(1)
  GOTO20
8 IFPEEK(215)THENSW=23:CW=6:SW$="{39 SPACEs
  }"
9 F9=1:FORCD=4096TO4113:POKE CD+238,PEEK(CD
  ):NEXT
10 FORCD=4096TO4113::READ R:POKE CD,R:NEXT
11 DATA 1,1,1,1,1,1,1,1,0,0:REM NEW F KEYS
12 DATA 133,137,134,138,135,139,136,140
70 IFG$=CHR$(29)THENIFC<SWTHENC=C+1:GOSUB10
   000:GOTO30
110 IFG$=CHR$(24)ANDF9=1THENFORCD=4096TO411
    3:POKE CD,PEEK(CD+238):NEXT:END
2160 C=VAL(MID$(IN$,2,2)):IFC>29-CWTHENC=29
     -CW
2162 IFASC(LEFT$(IN$,1))>70THENRD=6
2163 IFASC(LEFT$(IN$,1))<=70THENRD=ASC(LEFT
     $(IN$,1))-65
10010 PRINTCHR$(18);"{40 SPACEs}"SW$
10015 IFZ=1THENPRINTTAB(5);CT;TAB(16);C+1;T
      AB(27);C+2:GOTO10020
10019 PRINTTAB(5);C;TAB(16);C+1;TAB(27);C+2

10020 IFCW>2THENPRINT"{CRSR UP}"TAB(38);C+3
      ;TAB(49);C+4;TAB(60);C+5;TAB(71)C+6
10023 FORR=1TOCW:PRINTTAB(2+11*R);DA$(RD,C+
      R);:NEXT
10024 PRINT
10027 FORR=1TOCW:PRINTTAB(2+11*R);DA$(RT,C+
      R);:NEXT
10028 PRINT
10060 FORRR=1TOCW:PRINTTAB(2+11*RR);DA$(R,C
      +RR);:NEXT
10070 PRINT
```

—JIM BORDEN, CARLISLE, PA

DEBUGGING AID

I enjoy debugging programs, but clearing the screen, listing the offending line and then moving the cursor to make the correction is nothing but drudgery. Adding a few lines to my programs has restored the good times.

Line 10 traps the error and directs control to line 63000, which clears the screen below the cursor and prints the error message. Then line 63010 positions the cursor at the beginning of the offending line, with the error underscored (80-Column mode) or in reverse (40-Column mode). The only thing left for me to do is move the cursor to the error and correct it.

```
1 REM 128 DEBUG AID-EDWARD HORGAN
10 TRAP 63000
20 THIS IS AN INTENTIONAL ERROR
30 END
63000 PRINT CHR$(27)"@"ERR$(ER)
63010 HELP:PRINT"{4 CRSR UPs}":END
```

—EDWARD HORGAN, COATESVILLE, PA

SPRITES IN ML

As programmers are well aware, programming sprites in machine language on the C-128 can be a headache. To gain complete control over the sprites and sound, consult *C-128 Internals*, published by Abacus Software (Book 1 in its 128 series). It provides the information you need. Just turn off bit 0 of location $0A04 (2564), and the Basic sprite and sound IRQ will be ignored. Be sure to store the sprite image in a safe location in the C-128. The block from $0E00–$0FFF (3584–4095) is normally used to store sprites.

—JIM BORDEN, CARLISLE, PA ►

Automatic Load/Run Menu

Imagine loading and running any disk-based program without typing in the Load and Run commands and the filename. This three-liner uses only the shifted run-stop and return keys to load and run programs.

Save my program as the first program on your disk. Then, each time you use the disk, press shifted run-stop to display the directory on the screen, move the cursor to the line with the program you want to run and press return. *Presto!* Your program loads and runs like magic! If your menu fills more than one screen, press the stop key, type CONT, press return and repeat the procedure above.

I added screen colors to the automenu program; you may change the color values to suit your tastes.

```
10 PRINT"{SHFT CLR}"CHR$(27)"M":REM 128 MEN
   U LOAD-LON D. OLSON
20 SCNCLR:BG=16:BO=15:CH=12:COLOR0,BG:COLOR
   4,BO:COLOR5,CH:DIRECTORY:INPUTA$:I=0
30 I=I+1:B$=MID$(A$,I,1):IFB$=CHR$(34)THEN4
   0:ELSE GOTO30
40 I=I+1:C$=MID$(A$,I,1):IFC$=CHR$(34)THENP
   RINTCHR$(27)"L":RUN (D$):ELSE D$=D$+C$:G
   OTO40
```

—Lon D. Olson, Mesa, AZ

Custom Characters

Here's help for those of you who use custom characters on the C-64 but are having trouble with them on the C-128. To use them on the 128, you must first copy the ROM character set at locations 53248–55295 into RAM at 14336–16383 and then set bits 1, 2 and 3 of location 2604 to 1. This tells the 128 to look for characters beginning at 14336 in RAM.

Since Basic uses the area where the RAM characters will be, you need a GRAPHIC1:GRAPHIC0 command to move the start-of-Basic above this area and switch back to 40-Column mode. Don't use a hi-res screen, or the character set will be ruined.

The following program redefines the @character to an up arrow.

```
10 REM 128 CUSTOM CHARS-NELSON SEARCY
20 GRAPHIC1:GRAPHIC0:REM FOR 40 COL ONLY
30 POKE 2604,30:POKE217,4:FAST
40 BANK14:FOR A=53248 TO 55295:B=PEEK(A):PO
   KEA-38912,B:NEXT:BANK0:SLOW
50 FORA=14336 TO 14343:READ B:POKEA,B:NEXT:
   REM "@ TO {UP ARROW}"
60 DATA 0,24,60,126,24,24,24,24
```

—Nelson Searcy, Forest City, NC

Fancy Screen Clears

My program contains a number of subroutines to clear your C-128's screen in fancy ways. Line 200 in the program fills the screen to demonstrate the effect; you need to eliminate that line in your programs.

```
0 REM C-128 40-COL SCREEN CLR - RAY SONIER
10 PRINT"{2 HOMEs}{SHFT CLR}":CHAR 1,15,1,"
   ENTER 1-7"+CHR$(13)
15 GETKEY A$:Z=INSTR("1234567",A$):ON Z GOT
   O 20,30,40,50,60,70,80:GOTO15
20 GOSUB200:FOR A=0TO19:WINDOW 19-A,0,20+A,
   24,1:NEXT:GOTO10
30 GOSUB200:FOR A=0TO12:WINDOW 0,12-A,39,12
   +A,1:NEXT:GOTO10
40 GOSUB200:X=24:FOR A=35 TO 0 STEP-5:X=X-3
   :WINDOW A,X,39,24,1:NEXT:GOTO 10
50 GOSUB200:X=0:FOR A=4TO39 STEP5:X=X+3:WIN
   DOW 0,0,A,X,1:NEXT:GOTO10
60 GOSUB200:FOR A=0TO12:WINDOW 12-A,12-A,27
   +A,12+A,1:NEXT:GOTO10
70 GOSUB200:FOR A=0TO39:WINDOW A,0,A,24,1:N
   EXT:WINDOW 0,0,39,24,0:GOTO 10
80 GOSUB 200:FOR A=0TO39:WINDOW39-A,0,39-A,
   24,1:NEXT:WINDOW 0,0,39,24,0:GOTO 10
200 FOR X=1TO25:PRINT"**********************
    ******************":NEXT:RETURN
```

—Ray Sonier, Bremerton, WA

Multiple Directories

I've got an easy way to put two directories side by side on the 80-column screen. First, clear the screen, then issue a Directory command for the first disk. Home the cursor and press the tab key five times. Next, press ESC T to set the top of a new window. Put your second disk in the drive and ask for a directory again. The directories will appear side by side. You can also use this procedure to compare program lines.

—Al Blakey, Barre, VT

Instant Directory Display

I have a way to instantly call up a directory display without interrupting any work I'm doing in 64 mode. Before going to 64 mode, I load the disk directory I'll be working with to the 128's 80-column screen. When I need to view the directory, I simply switch my monitor to 80-Column mode.

—Al Blakey, Barre, VT

Easy Temporary Saves

When you're typing in program listings, it's a good idea to save the program lines to disk every 15 minutes or so. I like the way Perfect Typist saves programs for me by adding this line to it:

```
9 KEY1,"SC{SHFT R}" + CHR$(34) + "Z" + CHR$(34) +
  ":D{SHFT S}" + CHR$(34) + "Z" + CHR$(13)
```

When you press the F1 key, answer the prompt with a Y and press return. Perfect Typist will replace the old version of the program you saved with the new version and the filename Z. After you've finished typing in the program, use the Rename command to change the program's name to one that's more descriptive.

If you'd like to make the scratch automatic, use the following line instead:

```
9 KEY1,"SC{SHFT R}" + CHR$(34) + "Z" + CHR$(34) +
  CHR$(13) + "Y" + CHR$(13) + ":D{SHFT S}" +
  CHR$(34) + "Z" + CHR$(13)
```

—M/Sgt. John R. Stevenson, APO New York, NY

ML Monitor Hard Copy

The *C-128 System Guide* doesn't outline a method for printing hard copies from the built-in monitor. Use the following steps to get a printout.

First list the machine language program you want to print out and note the sections you want to disassemble or dump

as memory. Exit the monitor with the X key, then type in OPEN 4,4:CMD 4," ":MONITOR. Send the sections, along with the starting and ending addresses, to the printer by typing in D for Disassembly or M for Memory dump. After all sections are listed, exit the monitor and type PRINT#4: CLOSE4 to restore the screen as the output device.

If your video monitor or TV is the 40-column-only type, the memory dumps will only print eight bytes per line to the screen and printer. You can use ESC X to switch to 80-Column mode and type the memory dump addresses without seeing what you type. This will print 16 bytes per line on the printer. Be careful typing, since you can't see the 80-column text with a 40-column-only video monitor.

—FRANK HARBIN, MOBILE, AL

PARTIAL DIRECTORIES

When I want to print part of a disk directory that I've just loaded, I first enter the Renumber command, list the directory and delete any unwanted text. Then I print it out with OPEN4,4:CMD4:LIST. The only disadvantage is that the block count for the files will be incorrect.

—ADAM KAPLAN, ADDRESS UNKNOWN

CUT-AND-PASTE C-128 BASIC EDITING

Modifying the C-128's screen editor with the line below enables your computer to "cut out" part of one program line and "paste" it into another. Type:

```
KEY 1,CHR$(27)+"P{5 CRSR LFs}KEY4,"+CHR$(34)+CHR$(13)
```

and press return. Now move the cursor to the character before the text you want to grab and press F1. Then move the cursor to the point you want to insert the text and press F4. The text will pop into place.

Keep in mind that the text you want to move cannot contain quotes, and it must start at column 6 or beyond to allow the KEY4, command to fit in front of the text.

—CONSTANTINO GROSSE, PHILADELPHIA, PA

ELECTRONIC STAMP PAD

This program draws any set of one to eight sprites on a high-resolution screen. Use a joystick in port 2 to position the sprite on the screen and press the fire-button to copy it to the screen. When you're finished, press the space bar to select another sprite, or select sprite 0 to exit the program. When prompted for the template name, enter the name of a binary file containing the desired sprite shapes.

```
1Ø REM STAMPER 2/15-MATTHEW THIE
2Ø PRINT"{SHFT CLR}":GRAPHIC1,1:GRAPHICØ:D
   IRECTORY
3Ø INPUT "{CRSR DN}TEMPLATE NAME";TN$:BLOA
   D(TN$)
4Ø PRINT"{SHFT CLR}":E=4Ø: FORQ=1TO8: SPRI
   TEQ,1,7,1,Ø,Ø,Ø: MOVSPR Q, E, 5Ø:E=E+32
   :NEXT
5Ø PRINT"{3 CRSR DNs}{3 SPACEs}1{3 SPACEs}
   2{3 SPACEs}3{3 SPACEs}4{3 SPACEs}5{3 SP
   ACEs}6{3 SPACEs}7{3 SPACEs}8"
6Ø INPUT"{2 CRSR DNs}SPRITE NUMBER (1-8) Ø
    TO QUIT";SN:IFSN<ØORSN>8THEN6Ø
7Ø IF SN=ØTHENGRAPHICØ:FORU=1TO8:SPRITEU,Ø
   :NEXT:END
8Ø GRAPHIC1:SPRSAV SN,B$
9Ø IFJOY(2)=1ANDTY>ØTHENTY=TY-1Ø
1ØØ IFJOY(2)=7ANDTX>ØTHENTX=TX-1Ø
11Ø IFJOY(2)=5ANDTY<19ØTHENTY=TY+1Ø
12Ø IFJOY(2)=3ANDTX<31ØTHENTX=TX+1Ø
13Ø IFJOY(2)=128THEN GSHAPE B$,TX,TY
14Ø GETA$:IFA$=CHR$(32)THENGRAPHICØ:GOTO6Ø
15Ø MOVSPR SN,TX+24,TY+5Ø:GOTO9Ø
```

—MATTHEW THIE, INDIANAPOLIS, IN

ENGINEERING DISASTER

Run this program to see a picture of an object that cannot exist in three dimensions. It's a classic illustration of engineering gone wild!

```
Ø REM IMPOSSIBLE BLOCK-THOMAS SMITH
1Ø COLOR1,7:COLORØ,2:GRAPHIC1,1:CIRCLE,58,
   158,11,9
2Ø CIRCLE,111,158,11,9: CIRCLE,162,158,11,
   9
3Ø DRAW,49,153TO18Ø,6ØTO273,6ØTO151,154
4Ø DRAW,174,16ØTO273,8ØTO273,6Ø
5Ø DRAW,7Ø,16ØTO184,75TO234,75TO123,16Ø
6Ø DRAW,1ØØ,153TO184,9ØTO184,75:DRAW,184,9
   ØTO215,9Ø
```

—THOMAS B. SMITH, GALLIPOLIS, OH

SPRITE PRINTER

If you need an enlarged version of your sprite images on hard copy, just load your sprites and run this program.

```
Ø REM SPRITE PRINTER-M.G.HAGELSIEB
1Ø FORI=2816TO2933:READA:POKEI,A:C=C+A:NEX
   T:IFC<>14ØØØTHENPRINT"CHECK DATA!":END
2Ø INPUT"{SHFT CLR}SPRITE #";S:S=352Ø+S*64
   :GOSUB6Ø:POKE2827,D:POKE2831,B:S=S+63:G
   OSUB6Ø
3Ø INPUT"SCREEN OR PRINTER (S/P)";P$:IFP$=
   "P"THENOPEN4,4:CMD4
4Ø POKE2914,D:POKE2923,B:SYS2816
5Ø IF P$="P"THEN PRINT#4:CLOSE4:END: ELSE
   END
6Ø B=INT(S/256):D=S-256*B:RETURN
7Ø DATA 169,Ø,141,116,11,169,7,141,117,11,
   169,128,133,252,169,14,133,253
8Ø DATA 172,116,11,177,252,141,118,11,169,
   7,141,117,11,173,118,11,24,1Ø,141
9Ø DATA 118,11,176,8,169,32,32,21Ø,255,76,
   54,11,169,35,32,21Ø,255,2Ø6,117
1ØØ DATA 11,174,117,11,224,255,2Ø8,223,238
    ,116,11,173,116,11,2Ø1,3,2Ø8,23
11Ø DATA 169,Ø,141,116,11,24,169,3,1Ø1,252
    ,133,252,165,253,1Ø5,Ø,133,253,169
12Ø DATA 13,32,21Ø,255,169,191,197,252,24Ø
    ,3,76,18,11,169,14,197,253,24Ø,3
13Ø DATA 76,18,11,96,Ø,255
```

—MARCOS GLEZ. HAGELSIEB,
GUADALAJARA, JALISCO, MEXICO ►

Help-Key Caution

The reverse-video highlight on the 40-column Help display can cause a problem within quotes. To see why, run this program:

```
10 B$=" BELL"
20 R$="RING"+B
30 PRINT R$
```

Now press the help key, move the cursor up to line 20 and add a $ after the letter B. Press return and run the program again to see what happens. Use the help key to find the error, but list the line to edit it in 40-Column mode.

—Jack Norvell, Memphis, TN

Quick Function Key Disable

Entering a single Poke command will convert your C-128's function keys to the C-64's function key values. To perform this magic, enter the incantation POKE828,183. It will change the vector that's used to interpret all function keys. The Get command will now return the regular values for the C-64, but the run key will give an ASCII value of 131 and the help key will give a value of 132. Enter POKE 828,173 to get back your old definitions.

—Charles Lavin, Coral Gables, FL

Directory Name Array 128

I liked the C-64 version of the Directory Name Array (see page 42) so much that I wrote this version for the C-128. In addition, I added a variable F$ for pattern matching.

```
5 REM C128 DIR READ-JON R CURTIS
10 FORI=3072TO3279:READX$:X=DEC(X$):POKEI,
   X:T=T+X:NEXT
15 IFT<>28041THENPRINT"DATA ERR.":END
20 POKE58,243:CLR:F$="$":X=LEN(F$)
25 FORI=1TOX:POKEI+3282,ASC(MID$(F$,I)):NE
   XT:POKE3082,X
30 DATA 169,14,162,8,160,0,32,186,255,169,
   1,162,211,160,12,32,189,255,32,192
35 DATA 255,162,14,32,198,255,160,0,140,21
   0,12,132,250,140,209,12,165,50,133
40 DATA 254,24,165,49,105,7,144,2,230,254,
   133,253,169,0,133,251,169,243,133,252
45 DATA 160,1,32,207,255,166,144,240,13,32
   ,204,255,169,14,32,195,255,174,209,12
50 DATA 202,96,192,6,144,54,201,34,208,10,
   173,210,12,73,1,141,210,12,16,40,174
55 DATA 210,12,208,39,192,32,208,31,169,25
   3,141,185,2,165,250,162,1,160,0,32
60 DATA 119,255,132,250,136,24,165,253,105
   ,3,144,2,230,254,133,253,76,192,12
65 DATA 200,76,61,12,140,208,12,160,0,162,
   251,142,185,2,162,1,32,119,255,165
70 DATA 250,208,25,160,1,165,251,162,253,1
   42,185,2,162,1,32,119,255,200,165,252
75 DATA 162,1,32,119,255,238,209,12,230,25
   0,172,208,12,230,251,208,2,230,252
80 DATA 192,255,240,3,76,104,12,200,240,24
   0
85 :
90 DIMA$(145):SYS3072:RREG,N
95 FORI=1TON:PRINTA$(I):NEXT
```

As with the C-64 version, the array that stores the directory must be the first array dimensioned. In my demo, A$(0) contains the disk name with the filenames starting in A$(1). The number of filenames is passed to Basic with the RREG,N command. Be sure to use a comma before the variable.

—Jon R. Curtis, Central Point, OR

3. Disk Operation/Recording

Easy Load and Run

I've found a quick and easy way to load and run a Basic program on any Commodore computer:

```
LOAD "filename",8:{SHFT/RUN-STOP}
```

When you press the shift/run-stop combination, which stores the Run and Return commands in the buffer, your program will run automatically.

If you use this trick to load programs from the directory, the programs must begin with a line 0.

—Carlos Villalpando, Weslaco, TX

Shortest File-Reader

Here's a one-liner for reading sequential files. It should work with any Commodore computer. In the line below, change "filename" to the name of your sequential file and type in RUN. It will open the file, display its contents on the screen and close the file when finished.

```
1 REM FILE READER-R. W. BENJAMIN
2 OPEN8,8,8,"FILENAME":FORI=0TO1:GET#8,A$:
  I=ST:PRINTA$;:NEXT:CLOSE8:END
```

—Robert W. Benjamin, Wysox, PA

More Automatic Auto Menu

Those of you who use Auto Menu (*RUN*, April 1986) to load and run your programs might want to make it self-running by modifying it with the Auto-Run program (*RUN*, January 1986). By making Auto Menu a self-running program, you need only enter LOAD"AUTO MENU",8,1. The program will then run itself and allow you to load and run other programs with a single keystroke.

—Eddie L. Phipps, Moore, OK

Disk File Counter

Usually a disk fills to capacity long before its directory does, but if you've saved many short files, you may not know how full the directory actually is. If you use my program to read your disk directory and count the number of files, you'll know when to start using a fresh disk.

```
10 REM FILE COUNTER-LEO BRENNEMAN
20 PRINT"{SHFT CLR}":OPEN1,8,15,"I0:":Z$=C
   HR$(0)
30 OPEN 2,8,2,"#":S=1
40 PRINT#1,"U1:";2;8;18;S
50 GET#2,T$,S$:T$=T$+Z$:S$=S$+Z$
60 FORI=2TO226STEP32
70 PRINT#1,"B-P:";2;I
80 GET#2,A$:IFA$<>""THENN=N+1:GOTO110
90 GET#2,A$,A$
100 FORJ=1TO16:GET#2,A$:NEXTJ
```

```
11Ø NEXTI
12Ø T=ASC(T$):S=ASC(S$):IFT>ØTHEN4Ø
13Ø CLOSE2:CLOSE1
14Ø PRINT"{3 SPACEs}THERE ARE"N"FILES ON T
    HIS DISK."
```

—Leo W. Brenneman, Erie, PA

Save Time by Saving to Side B First

Using a disk that's been formatted in 1571 mode theoretically saves time by eliminating the need for disk swaps when you save and access data files. However, in reality, the time advantage is lost, because when the drive program is saving to side B, it has to check the block allocation map (BAM) on side A after writing every block.

To overcome this problem, format a new disk and then run my BAM Filler program, which allocates all blocks on side A (except the directory). Then save the main program and support files to side B. Finally, use the Collect command to free side A once again.

Wait until after Collect finishes executing to put an autoboot program on the disk. Otherwise, it will free the autoboot block.

```
1Ø REM SIDE A BAM FILLER-IAN PEARSE
2Ø NU$=CHR$(Ø)
3Ø OPEN15,8,15,"IØ":OPEN8,8,8,"#":PRINT#15
   ,"UA:8,Ø,18,Ø"
4Ø PRINT#15,"B-P:8,4":FORX=4TO71:PRINT#8,N
   U$;:NEXT
5Ø PRINT#15,"B-P:8,76":FORX=76TO143:PRINT#
   8,NU$;:NEXT
6Ø PRINT#15,"UB:8,Ø,18,Ø":PRINT#15,"IØ":CL
   OSE8:CLOSE15
```

—Ian W. Pearse, Earlville, Qld., Australia

Scratching with Wild Cards

If you intend to scratch several files beginning with the same few characters by using a wild-card character (* or ?), it's easy to see which files will be scratched by using the same character with the DOS Wedge or the Directory command. For example, if you're thinking of scratching all files whose names start with FILE, use @$0:FILE with the Wedge, or type in DIRECTORY "FILE*" on the C-128. Then you can go ahead and use the wild card, or individually scratch only those files you really want to eliminate.

—Ian W. Pearse, Earlville, Qld., Australia

1541 vs 1571 Sector Interleave

I write C-64 programs on both the C-64 and C-128, with 1541 and 1571 disk drives. When I use fast-loaders, C-64 programs that I've saved with a 1571 drive require nearly twice as much time to load as those saved with a 1541 drive.

Investigation showed that the blocks in the 1541-saved files were separated by ten blocks (interleave = 10), while blocks in the the 1571-saved files were separated by six blocks (interleave = 6). Typically, a 1541 fast-loader program can transfer *two* blocks of a program to the computer with each revolution of the disk. When programs are saved with a 1571, however, the blocks are too close, and the fast-loaders can read only *one* block per revolution.

In 1571 mode, the drive is fast enough to pick up three blocks on each spin. Unfortunately, the default interleave is 6 in both 1571 and 1541 modes. Fortunately, you can change the interleave default with this program line:

```
1Ø REM 64/1571 INTERLEAVE-RAY ROBERTS
2Ø OPEN 15,8,15:PRINT#15,"M-W"CHR$(1Ø5)CHR
   $(Ø)CHR$(1)CHR$(1Ø):CLOSE15
```

The final CHR$ value is the interleave value, in this case, 10. If you use this line before saving programs on a 1571, your C-64 fast-loaders will work at full speed. However, using this line for 128 programs will make them load more slowly in 1571 mode.

—Ray Roberts, Gainesville, FL

1541 DOS Wedge Command Summary

Many new C-64 users may not be aware of the full usefulness of the DOS Wedge utility that comes on the demo disk supplied with the disk drive. Here's a summary of the commands available with this very handy utility. Refer to the drive manual for a full explanation of the DOS commands. Note, however, that not all the DOS Wedge commands listed here are covered in the older manuals.

@—Returns the current disk status.
@$—Lists the directory to the screen without disturbing the program in memory. (Note: Tap the space bar to stop and start the directory.)
@I0—Initializes the disk drive.
@UJ—Software reset for the DOS.
@V0—Validates disk.
@#N (where N is the drive number 8 to 15)—If you have two or more drives, this command lets you switch the DOS Wedge commands back and forth between drives (@#9 will send DOS Wedge commands to drive 9).
@N0:DISK NAME,ID—Formats a disk. (*Warning:* This command destroys all data on a disk.)
@C0:NEW FILENAME = 0:OLD FILENAME—Makes a copy of old file on the same disk under new filename.
@R0:NEW NAME = 0:OLD NAME—Renames a file on the disk.
@S0:FILENAME—Scratches a file from the disk.
/FILENAME—Loads a Basic program.
↑FILENAME—Loads and runs a Basic program.
%FILENAME—Loads a program back into memory to the exact place it was saved from. (For binary files such as DOS 5.1.) Note: The last three commands above can be used in a directory listing by typing the first character in the first column and pressing return; the Wedge will only see the filename within quotes and ignore any other characters on the line!
←FILENAME—Saves a program to disk.
@Q—Disables the DOS Wedge program.

Note that > can be used instead of @. Also, to use DOS Wedge commands in a program requires a different syntax. First type the @ and then include the command within quotes. For example, 10 @"I0" will initialize the drive (assuming the Wedge is active).

—Don Griffey, Hopkinsville, KY

New First File

After you have a number of files on a disk, you might find that you want to place the file you use the most first in the directory. When it's in that position, you can load the file after turning on your computer by entering LOAD"*",8—without having to type the filename. The program below will let you swap the first file in a directory with any other file►

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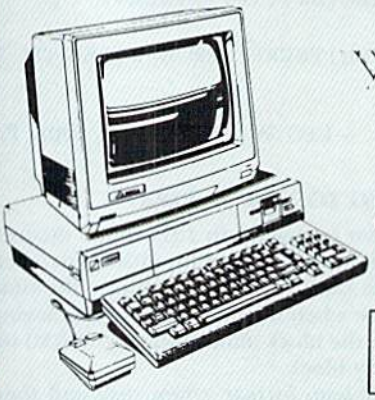


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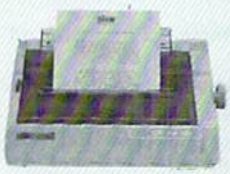
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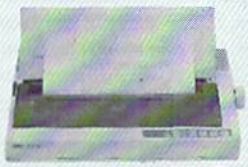


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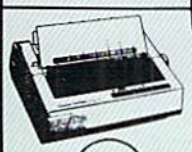
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on the disk. Try this program on a back-up disk first, to be sure it's typed in correctly. Otherwise, you could lose everything on the disk.

```
1Ø REM 1ST FILE-ANTHONY AGUIRRE
2Ø INPUT" NAME OF CURRENT FIRST PROGRAM ";
   F$
3Ø INPUT"NAME OF PROGRAM TO BE FIRST";P$
4Ø PRINT"VALIDATING DISK":OPEN15,8,15,"VØ"
5Ø PRINT"SWAPPING FILES":F1$=F$+".":P1$=P$
   +"."
6Ø PRINT#15,"CØ:"+F1$+"=Ø:"+F$:PRINT#15,"S
   Ø:"+F$
7Ø PRINT#15,"CØ:"+P1$+"=Ø:"+P$:PRINT#15,"S
   Ø:"+P$
8Ø PRINT#15,"RØ:"+P$+"=Ø:"+P1$:PRINT#15,"R
   Ø:"+F$+"=Ø:"F1$
9Ø CLOSE15:PRINT"{2 CRSR DNs}ALL DONE!"
```

—ANTHONY AGUIRRE, HAVERTOWN, PA

FILE-COPYING TIP

You can do a favor for both your disks and drive by using a file-copy, rather than disk-copy, program to copy files to a new disk. Here's why. When you use a disk-copy program to copy files, your drive spends a lot of time searching for free blocks to copy the files in the order in which they appear on the original disk. This results in greater wear and tear on the drive during the load and save process.

However, copying a disk with a file-copy program wastes no time searching for free blocks and reproduces the files in the same order as they appear on the original disk.

—ROBERT B. COOK, BRAINTREE, MA

C-128 DIRECTORY RUN

Loading and running programs on your C-128 is easy with my method. Append your filenames with a shifted space and a shifted @ before you save them. Then, when you're ready to load and run a program, list the directory, move the cursor to the filename and press F6. That's all there is to it!

—FRANK KLEIN, SOUTH ELGIN, IL

C-128 AND LOCKED FILES

Unlike the C-64, the C-128 can't load locked files. But you can get around this by first loading the locked file in 64 mode to unlock it, then copying the file to another disk. Now your unlocked copy is ready to load in C-128 mode. You can use the locked copy as a backup.

—L. M. LABAR, BETHLEHEM, PA

1571 DOUBLE-SIDE RESTORE

Use my program to restore to 1571 format any double-sided disk that you've unintentionally validated in 1541 mode.

```
1Ø PRINT"{SHFT CLR}FIX 1571 DISK AFTER 154
   1 MODE VALIDATE":REM BILL DEVOS
2Ø PRINT"INSERT 1571 DISK AND HIT RETURN"
3Ø GET A$:IFA$=""THEN3Ø
4Ø OPEN15,8,15,"IØ":PRINT#15,"UØ>M1":GOSUB
   1ØØ
5Ø OPEN1,8,5,"#":PRINT#15,"U1:5 Ø 18 Ø"
6Ø PRINT#15,"B-P: 5 3":FX$=CHR$(128)
7Ø PRINT#1,FX$;:PRINT#15,"U2:5 Ø 18 Ø"
8Ø GOSUB 1ØØ:PRINT#15,"IØ"
9Ø CLOSE1:CLOSE15:PRINT"DONE":END
1ØØ INPUT#15,EN,EM$,ET,ES
11Ø IFEN<2ØTHEN RETURN
12Ø PRINT"DISK ERROR!"
13Ø PRINT EN;EM$;ET;ES
14Ø CLOSE1:CLOSE15:END
```

—BILL DE VOS, CLIFTON, NJ

A BETTER FILENAME

Here's a time-saver that will simplify your disk loads. Just add a two-character prefix to a filename, then type a shifted space and any remark you'd like, up to the 16-character limit.

Here's an example. Save the RUN Script boot program to disk with "WP{shifted space}RUN SCRIPT 128". It will appear as "WP"RUN SCRIPT 128 in the directory. As far as the disk is concerned, the file is named WP and can be loaded with LOAD "WP",8. Try it with several programs. I'm sure you'll like it!

—ERIC PEDERSEN, APO, NY

RIGHT ON?

My Write-Protect Check checks the write-protect status of the disk in your drive. It's compatible with the 1541 or 1571 and any Commodore computer.

The program examines a byte in the drive's memory to determine whether the disk is write-protected. If it is, a message is printed and the computer will wait for you to remove the write-protect tab and press a key. After it checks again and finds the tab is off, it continues with the rest of the program. You can use this routine in any program that writes files to the disk.

```
1Ø REM WRITE-PROTECT CHECKER-NGHIA TRAN
2Ø OPEN 15,8,15
3Ø PRINT#15,"M-R"CHR$(3Ø)CHR$(Ø)
4Ø GET#15,V$:V=ASC(V$+CHR$(1))
5Ø IF V=1 THEN 7Ø
6Ø IF V=16 THENPRINT"TAB OFF":GOTO11Ø
7Ø PRINT"PLEASE REMOVE WRITE-PROTECT TAB"
8Ø PRINT"PRESS ANY KEY WHEN READY"
9Ø GET B$:IF B$="" THEN 9Ø
1ØØ GOTO 3Ø
11Ø CLOSE 15
12Ø REM -- YOUR PROGRAM STARTS HERE --
```

—NGHIA TRAN, PETALUMA, CA

4. PRINTERS/PRINTER OPERATION

CUSTOM CHARACTERS ON STAR PRINTERS

Although the user manual accompanying Star printers is clearly written, one point is barely mentioned. When you're defining your own characters, DIP switch number five *must* be turned off. Turn the printer off, push DIP switch number five to the off position and then turn the printer back on (see the DIP switch section of your manual for your particular

model). Now your characters will turn out fine!

—MIKE DRYJA, WASHINGTON, MI

LETTER BOXES

This program prints a border along the edges of your posters and letters. First print the border (use 8½ × 11-inch paper), then run the paper through a second time to print your text. It should work with any 1525-compatible printer and on other printers with a few changes to the program.

```
1Ø REM BORDER - TOM FONTANA
2Ø W=8Ø:H=1Ø7:W$=STR$(W-1)
3Ø W$=RIGHT$(W$,LEN(W$)-1)
4Ø CLOSE4:OPEN4,4,Ø
5Ø FORX=1TOW:TP$=TP$+"{COMD P}":NEXT
6Ø FORX=1TOW:BM$=BM$+"{COMD Y}":NEXT
7Ø PRINT#4,TP$CHR$(8):PRINT#4,CHR$(15);
8Ø FORX=1TOH:PRINT#4,CHR$(15)"{COMD J}"CHR
   $(16)W$"{COMD L}"CHR$(8):NEXT
9Ø PRINT#4,CHR$(15)BM$:CLOSE4
```

—TOM FONTANA, KANSAS CITY, MO

C-128 ADDRESS LABELS SAVER

The standard 3½-inch address labels are too big for the return address on small envelopes, so I wrote a program that prints the address twice in Condensed mode on the same label, to cut in half the size and number of labels you use.

You can input up to five lines per label. If you need just three lines, press return over the first and last lines. If your name or address is very long, change the value of the SPC(30) in line 120. A smaller number will print the two labels closer together.

```
1Ø REM MINI LABELS- MARY E. WILSON
2Ø PRINT CHR$(14):OPEN4,4,7:ES$=CHR$(27)
3Ø PRINT#4,ES$+"{SHFT B}"+CHR$(3);:REM COM
   PRESSED
4Ø PRINT#4,ES$+"Ø";:REM 1/8" SPACING
5Ø PRINT"{SHFT CLR}{2 CRSR DNs} IF COMMAS
   ARE DESIRED, ENCLOSE LINE IN QUOTES{2 C
   RSR DNs}"
6Ø INPUT"HOW MANY LABELS";N
7Ø FORZ=1TO5:PRINT"LINE"Z;:INPUTA$(Z):NEXT

8Ø PRINT"{2 CRSR DNs}IS THIS CORRECT? (Y/N
   )"
9Ø GET AN$:IFAN$<>"Y"ANDAN$<>"N"THEN9Ø
1ØØ IF AN$="N"THEN RUN
11Ø FOR I=1 TO N:PRINT#4
12Ø FORZ=1TO5:PRINT#4,A$(Z)SPC(3Ø-LEN(A$(Z
    )))A$(Z):NEXT Z
13Ø PRINT#4:PRINT#4:NEXT:CLOSE4
```

—MARY E. WILSON, CLEARWATER, FL

VARIABLE TABS FOR ANY PRINTER

Tabs as they appear on the screen do not print out the same way on hard copy. The following program will show how to align columns at the right or the left. It will work with any printer or screen display.

```
1Ø REM PRINTER COLUMNS-GEORGE VOGLER
2Ø OPEN4,4:H=2Ø:REM COL WIDTH
3Ø FORI=1TO8:READ DA$:HT=H-LEN(DA$)
4Ø PRINT#4,SPC(HT)DA$SPC(H)DA$SPC(HT)"."
5Ø NEXT:PRINT#4:CLOSE4
6Ø DATA 2,1ØØ,2ØØ2,393939,55,5335,8,4321
```

The program prints four columns of data. The first column is left-justified, the second column is blank, the third is right-justified, with the "cursor" ready for the fourth column. The fourth column is just a "." to show that it is properly aligned. By using this method, your programs will work with any printer and any Commodore computer.

—GEORGE W. VOLGER, HOUSTON, TX

C-64 EASY PRINTER CONTROL

My program adds two new commands to the Basic vocabulary to help you deal with the hassle of making your printer obey your computer.

The first command is *P, which directs all output from the screen to the printer. It's equivalent to OPEN4,4,0:CMD4. The second command is *S, which redirects the output back to the screen. It's equivalent to PRINT#4:CLOSE4. The device number is the second 4 in line 80 and the secondary address is the 0 in line 80. These can be changed as required (along with the checksum value in line 20).

```
Ø REM OUTPUT CONTROL-GEOFFREY KERCHNER
1Ø C=Ø:FORA=49152TO49233:READB:POKEA,B:C=C
   +B:NEXT
2Ø IFC<>9125THENPRINT"DATA ERR.":END
3Ø SYS49152:PRINT"NEW COMMANDS:"
4Ø PRINT:PRINT"*P - OUTPUT TO PRINTER"
5Ø PRINT"*S - OUTPUT BACK TO SCREEN"
6Ø DATA 169,11,162,192,141,8,3,142,9,3,96,
   32,115,Ø,2Ø1,172,24Ø,6,32,121,Ø,76
7Ø DATA 231,167,32,115,Ø,2Ø1,8Ø,24Ø,7,2Ø1,
   83,24Ø,33,76,8,175,169,Ø,32,189,255
8Ø DATA 169,4,162,4,16Ø,Ø,32,186,255,32,19
   2,255,162,4,32,2Ø1,255,134,154,32,115
9Ø DATA Ø,76,174,167,162,4,32,195,255,32,2
   Ø4,255,32,115,Ø,76,174,167
```

—GEOFFREY KERCHNER, OAK RIDGE, TN

PRINT QUALITY

I was very pleased with my printer's performance until I happened to notice that the print quality was very weak compared to the printers at my office. The ribbon deteriorates so slowly that it is often difficult to detect any change in print quality right away. I now keep a sample sheet printed with a new ribbon for comparison.

—DAVID M. PALO, ESCANABA, MI

5. VIDEO/AUDIO DEVICES

CHECKING MONITOR RESOLUTION

The next time you shop for an 80-column monitor, test its resolution right in the store with this short program:

```
10 PRINT CHR$(14):FOR A = 1TO40*23:PRINT",V";:NEXT►
```

Enter the program and run it. The screen will fill with 23 lines of commas and lowercase v's. To check the resolution, look at the single pixel that forms the point of the center of the v or the tail of the comma. On a monochrome monitor the pixels should be a single round point of light. On a color monitor only one color should predominate, with only slight spilling of the primary colors (red, green and blue) at the edges of the display area. You might want to try different color combinations for the screen and text, too.

Since only one "gun" is used to produce the monochrome picture, the image is sharper and clearer than the color image. Remember that adjusting the brightness, contrast, color and tint also affects picture quality.

—PAUL L. HUBBARD, BALTIMORE, MD

MONITOR HEARING AID

For about $15, you can add sound to your video-only monitor with an audio cable plug, a Radio Shack amplifier-speaker (part # 277-1008B) and an adapter (part # 274-330).

—NELSON HAMBLIN, EDGAR, NE

6. ENTERING/EDITING PROGRAMS

LINE MARKER

When I type in a program from *RUN*, I use a small sheet of Scotch Post-it pad to mark my place and to help my eyes follow the line I'm entering. This magic paper easily sticks to my magazine without damaging it, and I can restick the paper under the next line, then the next, and so on. Now I never skip lines while typing in a program.

—JOHN KIM, SPRING VALLEY, NY

A SAFE SAVE-AND-REPLACE ROUTINE

Whenever I type in a long Basic program, I always begin the listing with this time-saving routine. Then, when I'm ready to update the program on disk or quit for the day, I just enter RUN 2. The routine will scratch the previously saved version and save the latest version. When the entire program is entered and tested, I add :STOP to the end of line 2, then I run line 2 one last time. Finally, I delete lines 1-3 and save the finished program in the usual way.

```
Ø REM SAFE SAVE+REPLACE - CHRISTINE N CHARN
  ETSKI
1 GOTO [FIRST LINE #]
2 N$="PROGRAM NAME":PRINT"SCRATCH";:OPEN1,8
  ,15,"SØ:"+N$:CLOSE1
3 PRINT" AND SAVE.":SAVE N$,8:END
```

—CHRISTINE N. CHARNETSKI, PLAINS, PA

DISK MODE CHANGER

I write and edit C-64 Basic programs on the C-128 in 128 mode, but the 1571 disk drive can cause delays when it first tries to read the directory off some 1541-formatted disks. To operate in 1541 mode without the delays, type in my program. Use the F4 key to switch to 1541 mode and the F8 key to switch to 1571 mode. Press F1 to use the 40-column screen in Slow mode.

```
1 REM 1571/1541 MODE SELECT-L.L.PANKEY
1Ø KEY4,"OPEN1,8,15,"+CHR$(34)+"UØ>MØ"+CHR$
   (34)+":CLOSE1:FAST"+CHR$(13)
2Ø KEY8,"OPEN1,8,15,"+CHR$(34)+"UØ>M1"+CHR$
   (34)+":CLOSE1:FAST"+CHR$(13)
3Ø KEY1,"SLOW"+CHR$(13)
```

—L. L. PANKEY, DANA POINT, CA

STARTING AT THE BOTTOM

The next time you use *RUN*'s Perfect Typist program to check old listings, start at the end of the listing and work back to the beginning. Checking programs this way prevents the checksum from overwriting the line you check next. After checking the lines on the screen for accuracy, bring down the next group of lines by listing to the line at the top of the screen minus one. For example, if the top line is 5200, type LIST -5199.

—CHING KO, MCPHERSON, KS

CHECKING THE CHECKSUM

If you're typing in a program that contains Data statements and a built-in checksum, there's an easy way to check for errors without executing the program. Find the line that contains the Poke and delete it. Also put a Stop command just after the line that checks the value of the checksum. Then run the program.

If the checksum generates an Error message, find the mistake in the Data statements and make the needed changes, and then run the program again. If you get another error message, look for another mistake. When you run the program and get a Break message in the line that holds the checksum, you know your data is correct. Then type the Poke command (with variables) back in, remove the Stop command you added and save the program.

—STAN JONES, FAIRBANKS, AK

BASIC REF STATEMENT

I've found that including the source of a program I've gotten from a magazine in a REM statement at the beginning of the listing saves me time when I need to reference the source. I include the name of the magazine, the issue and the page on which the program begins.

—RODNEY L. PRAEGITZER, APO, NY

SCREEN EDIT TRICK

Here's a quick and simple way to move part of one line to merge with another line in a listing. Let's combine lines 10 and 40, below.

```
10 A=6:B=1:A$="XYZ"
20 IF A$=""THEN 100
30 X=Q*5+120
40 C$="TO"
```

First, add a colon before the C$ in line 40, move the cursor back to the colon and use the insert-delete key to put in enough spaces to move the colon just past the text you want to insert. Hit the return key. You should now have a display like this:

```
10 A=6:B=1:A$="XYZ"
20 IF A$="" THEN 100
30 X=Q*5+120
40                    :C$="TO"
```

Now move the cursor to line 20 and list line 10. This will place line 10 in the blank spaces without erasing the original line 40 text. The screen should look like this:

```
10 A=6:B=1:A$="XYZ" LIST10
30 X=Q*5+120
10 A=6:B=1:A$="XYZ":C$="TO"
```

Now just move the cursor back up and type 40 over the 10 in your revised line and hit return. If the original line 10 is not needed, delete it.

This seems more difficult than it is. It'll come easy after you use it a few times.

—JEFF STAFFORD, ROCHESTER, IN

EDITING CURSOR MOVEMENTS

It's happened to all of us: You've typed the wrong cursor character in a line within quotes and you've got to correct it. Here's an easy way to correct the line without retyping all of it.

List the line and move the cursor to the character after the error, press the delete key once and the insert key once. This will put you in Quote mode so that you can substitute the correct character. Type in the correct character to exit Quote mode, and press return to enter the changed line.

Try this a few times on a practice line containing a Print statement with several cursor characters inside quotes.

—L. M. LABAR, BETHLEHEM, PA

7. LANGUAGES—BASIC

BASIC DIRECTORY

There will be times when you'll need to call up the disk directory while your program's running. Include this short subroutine in your programs, and you'll have instant access to the directory.

```
1Ø REM BASIC DIRECTORY - LUTHER W BRISKY
9ØØ OPEN5,8,Ø,"$":GET#5,A$,A$
91Ø GET#5,A$,A$:IFA$=""THENCLOSE5:GOTO96Ø
92Ø GET#5,B$,L$
93Ø LN$=STR$(ASC(B$+CHR$(Ø))+ASC(L$+CHR$(Ø)
    )*256):PRINTLN$" ";
94Ø GET#5,A$:PRINTL$;A$;:IFA$=""THENPRINT:G
    OTO91Ø
95Ø GOTO94Ø
96Ø END : REM OR RETURN FOR SUB
```

—LUTHER W. BRISKY, VANCOUVER, WA

SCROLL CONTROL TIP

Memory location 214 always contains the physical screen line number of the cursor (0 to 24), and, in programming, it is a useful location for controlling loop output to the screen. For example, when PEEK (214) is equal to a line number you've chosen, branch to a routine that waits for the user to press a key, then clear the screen and continue output. You can use 214 only on the C-64. In C-128 mode, use location 235, and on the Plus/4, use location 205.

—JOSEPH R. CHARNETSKI, DALLAS, PA

NUMBERS VS VARIABLES

Placing a number (such as .006347582) or a variable (N) equal to the number inside a For-Next loop can make an amazing difference in a Basic program's execution time. Try the program below, and note the time, in jiffies, used by the program.

```
10 Z=TI:X=1:N=.006347582
20 FOR T=1TO1000
30 X=X+.006347582
40 NEXT:PRINT "X=":X:PRINT TI-Z"JIFFIES."
```

Now change line 30:

```
30 X=X+N
```

and run the program, again noting the time in jiffies.

Although the only difference between the two programs is line 30 (using a number versus using a variable), the second version runs almost eight times faster. So, if you use a number more than a few times in a program, assign it to a variable instead.

—GARY ROBERTSHAW, ATASCADERO, CA

BASIC-BLOCKS-FREE FINDER

If you need to know how much room is left on a disk while you're running a Basic program, just include this short subroutine. It should work with any Commodore computer. You'll have the answer along with the diskname almost instantly. Keep in mind that with double-sided disks formatted for the 1571 but being used in 1541 mode (or in a 1541 drive), the subroutine will show you only the blocks free on the single side.

```
1Ø REM BLOCKS FREE FINDER-J.R.CHARNETSKI
2Ø OPEN1,8,15,"I Ø:":OPEN8,8,Ø,"$Ø:"
3Ø FORJ=1TO18:GET#8,A$,B$:C$=C$+A$+B$
4Ø NEXT:CLOSE8
5Ø B=ASC(A$+CHR$(Ø))+256*ASC(B$+CHR$(Ø))
6Ø PRINT B;"BLOCKS FREE"
7Ø PRINT"ON DISK: ";MID$(C$,7,16)
8Ø PRINT#1,"UJ":FORZ=1TO1ØØØ:NEXT
9Ø CLOSE1:REM RETURN
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

USEFUL GOTO

Here's an easy way to put comments in your programs without wasting time or using extra space typing REM. Put your comments at the start of your program, beginning with line 2, and put the Goto command in line 1:

```
1 GOTO20
2 YOUR COMMENTS
3 ON LINES 2-19
```

If you use a renumber utility, you can include a Goto and the line number in your comments, along with a brief name for each subroutine. These will be renumbered, along with the program, but will not cause any problems when you run the program.

—CHANCE AGRELLA, PRESCOTT, AZ

C-64 LIMITED INPUT SUBROUTINE

My routine lets you control the kind of data you want to enter into Input statements on the C-64. First, you control the prompt with a Print statement. The variable L is used to limit the length of the input. If L=5, for example, only five characters may be entered. ►

The variable T controls the type of character it will accept. If you set T equal to 0, it'll accept any printable character; if it equals 1, it'll accept only numbers; and if it equals 2, it'll accept only letters. The variable S$ holds the string you input. Here are some examples:

```
PRINT "ANY STRING: ";:T=0:L=80:GOSUB10000 PRINT "UP TO 10 CHARACTERS: ";:T=0:L=10:GOSUB10000 PRINT "SOME NUMBERS= ";:T=1:L=80:GOSUB10000 PRINT "UP TO 8 LETTERS? ";:T=2:L=8:GOSUB10000
```

Experiment with these examples in Direct mode. I'm sure you'll agree that this is a versatile routine.

```
9999 REM ULTIMATE INPUT ROUTINE-GEOFFREY K
     ERCHNER
10000 POKE204,0:Z=0:S$="":PRINT" {CRSR LF}
     ";:POKE198,0:IF L=0THEN L=255
10010 GET A$:IFA$=""THEN 10010
10020 IF L$="" THEN 10050
10030 L=0:FOR J=1TOLEN(L$):IF A$=MID$(L$,J
     ,1)THENL=1
10040 NEXT:ON L+1 GOTO 10010,10100
10050 IF A$=CHR$(13)THEN PRINT" ":POKE204,
     1:POKE 207,0:L=0:T=0:RETURN
10060 IF A$=CHR$(20)ANDZ<>0THENZ=Z-1:S$=LE
     FT$(S$,Z):PRINT" {2 CRSR LFs} {CRSR
     LF}";:GOTO10010
10070 A=ASC(A$):IFA<32OR(A<160 AND A>127)
     OR L=Z THEN10010
10080 IF T=1 AND (A<48 OR A>57) THEN 10010

10090 IF T=2 AND (A<65 OR A>90) AND A<>32
     THEN 10010
10100 PRINTA$;:POKE212,0:PRINT" {CRSR LF}"
     ;:Z=Z+1:S$=S$+A$:IFL$=""THEN10010
10110 PRINT" ":POKE204,1:POKE207,0:L$="":L
     =0:RETURN
```

—Geoffrey Kerchner, Oak Ridge, TN

Faster If-Thens

If-Then statements containing the word AND execute more quickly if you replace each AND with THEN IF. This method works faster because program execution is automatically transferred to the next line if any single condition proves false. Try to put the condition most often false first to get the greatest gain in speed. Use this short program to compare the AND and THEN IF methods:

```
10 REM FASTER IF/THEN-GEORGE MONTELEONE
20 REM LINES 20-40 SHOW OLD METHOD
30 TI$="000000":FORI=1TO1000
40 IF I=100 AND I/3*20=4 AND INT(I/256)+39
   =I THEN F=F+1
50 NEXT:PRINT"TIME FOR OLD METHOD:"TI
60 REM LINES 70-90 DO SAME AS ABOVE
70 REM EACH 'AND' REPLACED BY 'THEN IF'
80 TI$="000000":FORI=1TO1000
90 IF I=100 THEN IF I/3*20=4 THEN IF INT(I
   /256)+39=I THEN F=F+1
100 NEXT:PRINT"TIME FOR NEW METHOD:"TI
```

—George Monteleone,
Windsor, Ontario, Canada

C-64 Input with Sound

This Get routine disables the cursor keys and other non-printing keys. It also produces a soft beeping sound as each character is typed in.

```
90 REM INPUT WITH SOUND EFFECTS-JOSEPH R.
   CHARNETSKI
100 R=54272:FORJ=RTOR+23:POKEJ,0:NEXT
110 POKER+5,28:POKER+24,15:PRINT"{SHFT CLR
    }
120 PRINT"[PROMPT HERE] ";
130 PRINT"{CTRL 9} {CRSR LF}{CTRL 0}";
140 GETA$:IFA$=""GOTO140
150 IFA$=CHR$(13)THENPOKER+1,32:POKER+4,21
    :PRINT" ":POKER+4,20:GOTO220
160 IFA$=CHR$(20)ANDLEN(C$)THENC$=LEFT$(C$
    ,LEN(C$)-1):GOTO190
170 IFA$<CHR$(32)ORA$>CHR$(127)ANDA$<CHR$(
    160)GOTO140
180 C$=C$+A$
190 POKER+1,28:POKER+4,17:PRINTA$;
200 IFA$=CHR$(34)THENPOKE212,0
210 POKER+4,16:GOTO130
220 REM CONTINUE HERE...
```

—Joseph R. Charnetski, Dallas, PA

8. Languages—ML

Better than a Basic Loader

If you have some utilities in the form of Basic loaders (with Read and Poke statements and many Data lines), you can load, run and save them directly to memory with an ML monitor. Then you can load the programs directly with LOAD "program",8,1. Look at the C-64 Wedge program on your copy of the 1541 demo disk for an example. It loads your utilities much faster, since they don't have to be read and poked by Basic.

—Rolf Stein, Naucalpan, Edo. Mexico, Mexico

C-64 BSave Command

I frequently need to save parts of memory on the C-64. I wrote the program below to add a BSave-type command to the C-64.

```
5 REM MEMORY SAVER-HAZEM JAUNI
10 REM SYNTAX= !"NAME",START ADR,END AD
   R+1
15 FOR N=5120TO5133:READQ:POKEN,Q:C=C
   +Q
20 NEXT:IFC<>16574THENPRINT"ERROR!":END
25 DATA 120,169,13,160,200,141,8,3,140,
   9,3,88,96,120,160,1,177,122,201,33
30 DATA 208,77,32,115,0,32,115,0,201,34
   ,208,67,160,1,177,122,240,61,201,34
35 DATA 240,12,201,44,240,53,153,239,20
   0,200,192,17,208,236,152,56,101,122
40 DATA 133,122,169,0,101,123,133,123,1
   36,152,162,240,160,200,32,189,255
45 DATA 169,2,162,8,160,1,32,186,255,32
```

```
   ,253,174,32,1Ø3,2ØØ,169,25Ø,32,216
5Ø DATA 255,88,76,174,167,88,76,228,167
   ,32,138,173,32,247,183,32,253,174
55 DATA 165,2Ø,133,25Ø,165,21,133,251,3
   2,138,173,32,247,183,166,2Ø,164,21
6Ø SYS512ØØ:NEW : DATA 96
```

If you want to use the routine to save memory to tape, add the following line to the listing.

```
23 POKE 51278,1
```

The syntax for the new command is !"filename",start address,end address + 1.

—HAZEM JAUNI, E. JERUSALEM, ISRAEL

PROTECT YOUR ML

Commodore 128 programmers who use the Graphic1: Graphic5 commands to relocate the start of Basic to $4000 to open up a large area in shared RAM ($1300–$3FFF) might place their programs in jeopardy!

Here's why: The Graphic5 command does not clear location $D8 as Graphic0 does. $D8 must be cleared to send text to the current screen, using the CHAR command rather than to the bit-mapped screen where your code is stored. If the byte is not cleared, CHAR will print the text over your ML code!

Therefore, always issue a Graphic0 command prior to Graphic5 or store a 0 in location $D8 (216 decimal). The program you save may be your own!

—BOB KODADEK, ASTON, PA

ML MEMORY TRANSFER

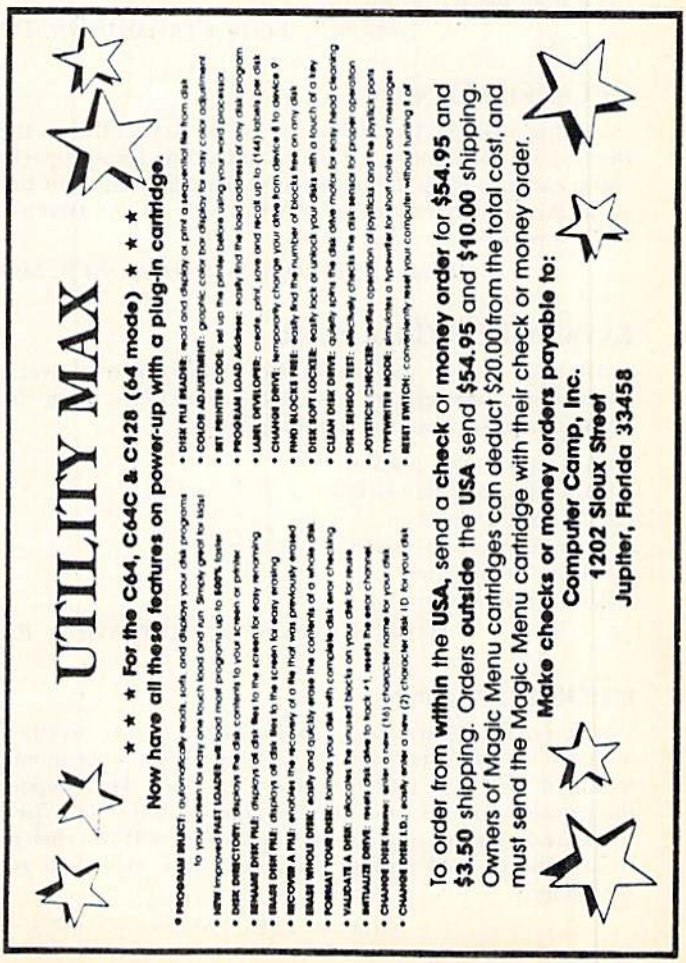
Transferring large blocks of memory on the C-64 sometimes seems to take an eternity. Machine language routines can transfer it quickly, but why reinvent the wheel? The answer is the Basic ROM routine at $A3EC (41964). This built-in routine will move the character set (2K of memory) in less than a second.

You must provide a starting and ending address of the area to be copied and a new starting address to copy it to. These are entered in lines 50 and 80 of the program below. This program will demonstrate the transfer command by copying the character set (uppercase/graphics only) and customize it for an underlined cursor. The subroutine at line 120 calculates the addresses required and does the actual transfer.

```
1Ø REM MEMORY XFER
2Ø REM -XFER CHAR ROM-
3Ø POKE52,56:POKE55,Ø:POKE56,56:CLR
4Ø POKE56334,Ø:POKE1,51
5Ø SA=53248:EA=55296:NS=14336:GOSUB12Ø
6Ø POKE1,55:POKE56334,1:POKE53272,3Ø
7Ø REM -REV TO U.LINE-
8Ø SA=14336:EA=15359:NS=1536Ø:GOSUB12Ø
9Ø FORI=15367TO1639ØSTEP8:POKEI,255:NEXT
1ØØ END
11Ø REM -TRANSFER MEMORY SUB-
12Ø EA=EA+1:L=EA-SA:NE=L+NS
13Ø X=INT(L/256):Y=L-256*X
14Ø A=INT((NE-Y)/256):B=NE-256*A-Y
15Ø C=INT((EA-Y)/256):D=EA-256*C-Y
```




Circle 416 on Reader Service card.



Circle 418 on Reader Service card.

```
16Ø POKE781,X+1:POKE782,Y
17Ø POKE88,B+1:POKE89,A
18Ø POKE9Ø,D+1:POKE91,C
19Ø SYS41964:RETURN
```

—ROBERT B. COOK, BRAINTREE, MA

9. GEOS

FLIPPING FASTER THROUGH GEOS DISK DIRECTORIES

One undocumented feature of GEOS lets you view the pages of a disk directory in Icon mode without the joystick. Just press the control key and the number key corresponding to the page number you wish to see.

—HENRY H. TOLBERT, MARIETTA, GA

GEOS AND THE RESTORE KEY

When you exit from GEOS to Basic, the restore key is redefined to reboot GEOS. You can eliminate this function either by typing POKE 792,71 and pressing return or by turning the computer off and on again.

—R. V. TAYLOR, LITTLE ROCK, AR

A STAR WITH GEOS

Use your Star SG-10 printer with GEOS by setting the DIP switches to the ON position.

—MARK L. ELLIS, GERMANTOWN, TN

GEOS FILE DANGER

Leaving a GEOS, GEOS Boot or GEOS Kernal file on the Desktop will prevent your C-64 from loading files properly, and it can also keep the master disk from booting. You can avoid this problem by never leaving a file on the Desktop when you close the master disk.

—ROBERT M. ROBY, WHITEMAN AFB, MO

EXTRA GEOS CHARACTERS

Although they're not mentioned in the manual, several additional characters are available in GEOS by using the Commodore key with the following keys:

[makes a { (curly left bracket)
] makes a } (curly right bracket)
/ makes a \ (backslash)
@ makes an è (accent mark)
* makes a ~(tilde mark)
↑ makes a | (vertical bar)

—BARRY SOLOMON, MONTOURSVILLE, PA

GEOS FONT STYLES

If you're having trouble changing GEOS font styles (such as italic to bold), try this trick. Activate the style menu, highlight the Plain Text style and click once. Then repeat the process, but this time highlight the desired style. When you start typing, the new style will be displayed. If you change from italic to bold without plain text between, you'll get bold italic.

—WILLIAM LEES, SAN FRANCISCO, CA

10. PROGRAMMING TIPS—GENERAL

MYSTERIOUS ERRORS REVEALED

For all of you who've ever gotten an error in a "perfectly good" line containing a Read statement (and who hasn't?), here's some magic for you. These errors usually result from poking a value greater than 255 (an Illegal Quantity error) or typing the letter O for a 0 in a data line (a Type Mismatch error). To ferret out the culprit, type in the appropriate line below:

For the C-64, Plus/4 and C-16: PRINT PEEK(63) + PEEK(64)*256
For the C-128: PRINT PEEK(65) + PEEK(66)*256

Now list the line number printed on the screen; you'll find the error in that line.

—JIM BORDEN, CARLISLE, PA

CHEAT SHEETS

Many programs have important key commands on the keyboard that perform special functions. A good way to remember these keys is to list them on an index card. This simple trick saves me both time and effort, and I can now spend time at the keyboard that would otherwise be taken up in fiddling through my manuals for the information.

—ADAM JACKSON,
SAULT STE. MARIE, ONTARIO, CANADA

CAPS-LOCK-Q FIX

Some of you have already discovered that you cannot get an uppercase Q with the caps lock key on the C-128. You can fix the bug by entering my one-line program.

```
1Ø REM CAPS-LOCK-Q FIX - JERRY KIRK
2Ø FAST:BANK15:FORJ=ØTO88:POKE6333+J,PEEK(6
   4484+J):NEXT:POKE84Ø,189:POKE841,24:POKE
   6395,2Ø9:SLOW
```

—JERRY KIRK, HEISKELL, TN

DEVICE PRESENT CHECK

The following short program works with any Commodore computer and will detect if the disk drive and/or printer is on. You can modify it to wait until the device is turned on to avoid incurring a Device Not Present error in your program.

```
1Ø REM DEVICE CHECK-STEPHEN FREITAG
2Ø OPEN15,8,15:CLOSE15:REM DRIVE
3Ø IF ST=Ø THEN PRINT"DRIVE IS ON":GOTO5Ø
4Ø PRINT"DRIVE IS OFF"
5Ø OPEN15,4,15:CLOSE15:REM PRINTER
6Ø IF ST=Ø THEN PRINT"PRINTER IS ON":END
7Ø PRINT"PRINTER IS OFF"
```

—STEPHEN FREITAG, SAUQUOIT, NY

BLOCKS REQUIRED

If you regularly fill up the space on your disks, then enter the line below for your computer. It will tell you how many blocks are required to save a program.

For the C-64 use:

```
X=PEEK(45)+256*PEEK(46)-2049:PRINT INT(X/254)+1"DISK BLOCKS REQ'D"
```

For the C-128 use:

```
GRAPHIC CLR:X=58109-FRE(0):PRINT INT(X/254)+1"DISK BLOCKS REQ'D"
```

For the C-64, X calculates the end of your Basic program and subtracts the starting address (2049) from it. The C-128 version is easier to calculate, since all of Bank 0 except 7427 bytes are available for program storage.

—JEFF ROSS, NEWARK, DE

IS THIS YOUR EXIT?

When I add a menu to a program I'm working on, I include a Quit option. I also put in Print statements to remind me of lines I'll need to change, the values of variables, and so on. When I'm finished with the program, I remove any statements I used while I was debugging. By putting this option's code at the end of the listing, deleting such lines will not disturb the order of line numbers in the main program.

—BOB DAY, MONROVIA, CA

SIMPLE NO-PROMPT INPUT

Once in a while, the question mark prompt gets in the way when I'm using the Input statement. My two-liner puts an end to this pest:

```
10 PRINT "PLEASE ENTER YOUR NAME":PRINT ":";
20 OPEN1,0:INPUT#1,N$:CLOSE1:PRINT
```

The Print statement at the end of line 10 prints a prompt, but you may drop the line if you wish. The Print statement in line 20 moves the cursor to the next line when you're done with the Input statement.

—DAVE BIUNNO, JACKSON HEIGHTS, NY

NO-SCROLL KEY DISABLE

You can disable the no-scroll key on the C-128 by entering POKE 247,PEEK(247)OR64.

—DAIHUNG DO, EAST MOLINE, IL

C-128 ESCAPE ESC

I've found an undocumented escape function in the C-128's screen editor. Just press the escape key twice. The double escape disables Reverse, Underline, Insert (from the insert-delete key) and Quote modes. This result is the same as pressing ESC O, but it's easier to type.

—CHARLES LAVIN, CORAL GABLES, FL

CUSTOMIZER PROGRAM

Here's a program I use to customize my C-128 in either C-128 or C-64 mode automatically. It will also load a menu program for you, remind you what computer you're using when you're in 40-Column mode and display the function keys at the bottom of the 128 screen. (You should change these to match your own definitions.) If you use a C-64 only, eliminate the If statement at the end of line 40. You need not enter lines 90–140.

```
10 REM C-64/128 CUSTOMIZER-BOB KNIBB
20 M$="DO YOU WISH TO SEE A MENU (Y/N) {CT
   RL O}?"
30 POKE5328Ø,Ø:POKE53281,Ø:PRINTCHR$(142)"
   {2 HOMEs}{SHFT CLR}";
40 FORS=55333TO55335:POKES,1:NEXT:IF FRE(Ø
   )<>FRE(1)THEN9Ø
50 POKE646,7:POKE1Ø62,54:POKE1Ø63,52:PRINT
   "{CRSR DN}"M$;
60 GETA$:IFA$=""THEN6Ø
70 PRINT"{CRSR LF}"A$:IFA$="N"THEN NEW
80 POKE46,PEEK(44)+8:CLR:LOAD"MENU64",8
90 KEY1,"DATA ":KEY4,"PRINT":KEY8,"RENUMBE
   R"+CHR$(13):COLOR5,15:POKE235,22
100 IFPEEK(215)THENFAST:COLOR6,1:PRINT:L=4
    :GOSUB13Ø:WINDOWØ,Ø,79,23:GOTO12Ø
110 POKE1Ø61,49:POKE1Ø62,5Ø:POKE1Ø63,56:GO
    SUB13Ø:GOSUB13Ø:WINDOWØ,1,39,22
120 COLOR4,8:PRINTM$:GETKEYA$:PRINT"{SHFT
    CLR}":IFA$="Y"THENRUN"MENU128":ELSE NE
    W
130 PRINT:FORI=1TOL+4:READF$,K$:PRINT"{CTR
    L 9}"F$"{CTRL Ø} "K$"{2 SPACEs}";:NEXT
    :RETURN
140 DATA F1,DATA,F2,LOAD,F3,DIREC,F4,PRINT
    ,F5,SAVE,F6,RUN ,F7,LIST ,F8,RENUM
```

—BOB KNIBB, WALKERSVILLE, MD

LONG C-64 LINES

The Basic On-Gosub command is quite helpful, but sometimes you need to use it in a line with more line numbers than will fit on an 80-character line. To get around this, just split the line numbers into two lines. Here's an example:

```
100 ON A GOSUB 1100,1200,1300,1400,1500,1600,1700,
    1800,1900,2000,2100,2200,2300,2400,2500
```

This line is too long, so we'll break it into two lines as follows:

```
100 IF A>8THEN110
103 ON A GOSUB 1100,1200,1300,1400,1500,1600,1700,1800
106 GOTO 120
110 ON A-8 GOSUB 1900,2000,2100,2200,2300,2400,2500
120 . . . program continues here . . .
```

By breaking up the long line, you can still use the On-Gosub command with almost any number of target lines.

—STEPHEN TANG, ADDRESS UNKNOWN

11. PROGRAMMING TIPS—MATH/EDUCATION

BASE CONVERSIONS

Did you ever wish there was an easy way to convert a number from one number base to another? The C-128's Monitor mode makes conversion easy! Just type MONITOR and press return (or use the F8 key) to put you into the built-in monitor. To change a number from one base to another, type +, $, & or % and the number. You'll be given the decimal (+), hexadecimal ($), octal (&) and binary (%) equivalents. Just precede the number with the appropriate symbol, and you can convert from any base to the others. To return ►

to Basic, type X and press return.

—KENNETH H. HOTTES, DANBURY, CT

DECIMAL-TO-BINARY CONVERTER

My one-line program converts decimal numbers 0–255 to their binary equivalents.

```
1 REM DEC TO BIN-JAMES R SCHWARTZ
1Ø INPUT D:FORI=7TOØSTEP-1:B$=B$+MID$(STR$(
   SGN(D AND 2{UP ARROW}I)),2):NEXT:B=VAL(B
   $):PRINTB
```

—JAMES R. SCHWARTZ, MICHIGAN CITY, IN

HEX-TO-DECIMAL CONVERTER

My program converts hex numbers to decimal form. It can convert numbers up to $3B9AC9FF (999,999,999 in decimal). The program works on any Commodore computer.

```
1Ø REM LARGE HEX CONVERSION (ALL)-ROGER MO
   ORE
2Ø INPUT"NUMBER IN HEX";H$:L=LEN(H$):S=Ø
3Ø FORI=LTO1STEP-1:A=ASC(MID$(H$,I,1))
4Ø IFA>64ANDA<71 THEN S=S+(A-55)*16{UP ARR
   OW}(L-I):GOTO7Ø
5Ø IFA<48ORA>57 THEN8Ø
6Ø S=S+(A-48)*16{UP ARROW}(L-I)
7Ø NEXT:PRINT"DECIMAL EQUIVALENT IS:"S:GOT
   O2Ø
8Ø PRINT"THAT IS NOT A VALID HEX NUMBER!"
```

—ROGER MOORE, OAK RIDGE, TN

NUMBER TUTOR

This simple program for the C-128 amazes children and helps them to think of a number in relation to another.

```
Ø REM NUMBER TUTOR - MARY HUBBARD
1Ø COLORØ,7:COLOR4,5:PRINT"{SHFT CLR}{3 CRS
   R DNs}THINK OF A NUMBER BETWEEN 1 AND 1Ø
   Ø"
2Ø PRINT"AND {SHFT I} WILL GUESS YOUR NUMBE
   R!":H=1ØØ:L=1:T=Ø
3Ø DO:M=INT((H-L)/2)+L:T=T+1
4Ø PRINT"{3 CRSR DNs}IS IT"M"?"CHR$(7):PRIN
   T"{2 CRSR DN¤}MY GUESS IS (H)IGH, (L)OW
   OR (R)IGHT ?"
5Ø GETKEY S$:IFS$="H"THENH=M:ELSE IF S$="L"
   THEN L=M:ELSE IF S$="R"THEN EXIT:ELSE GO
   TO5Ø
6Ø LOOP
7Ø SCNCLR:TEMPO15:PLAY"V1O6T9U15XØO5QCGO6IC
   CCO5IGGGQEGECCEO6ICCCO5IGGGEEEQGEC"
8Ø PRINT"I GUESS IT IN ONLY"T"TRIES!":PRINT
   "WANT TO TRY AGAIN?":PRINT"(Y)ES OR (N)O
   "
9Ø GETKEYS$:IFS$="Y"GOTO1Ø:ELSE END
```

—MARY JO HUBBARD, CARPENTERSVILLE, IL

WORD MIXER

Here's a short program that scrambles the letters in words and prints them out to use in a word game. Load and run the program and input up to 20 words from a selected topic. The scrambled words will be printed on one sheet of paper and the answers on the next sheet. The program should work with any computer/printer combination. The CHR$(95) in line 40 is for non-Commodore printers, but it won't affect Commodore printers.

```
Ø PRINT"{SHFT CLR}{4 CRSR DNs}{7 SPACEs}*
  WORD MIXER BY T J RYAN *"
1Ø INPUT "{4 CRSR DNs}{5 SPACEs}TOPIC";T$
2Ø INPUT "{CRSR DN} # OF WORDS";N:IFN>2ØTH
   ENPRINT"2Ø WORDS MAX!":GOTO2Ø
3Ø DIM B(3Ø),J$(N),L$(3Ø),W$(N)
4Ø FOR J=1TO2Ø:B$=B$+CHR$(95):NEXT
5Ø FORW=1TON:PRINT"{CRSR DN} WORD #";W;:IN
   PUT W$
6Ø L=LEN(W$):W$(W)=W$:FORK=1TOL:L$(K)=MID$
   (W$,K,1):B(K)=K:NEXT
7Ø FORK=1TOL:D=INT(RND(1)*L+1):E=INT(RND(1
   )*L+1):T=B(D):B(D)=B(E):B(E)=T:NEXT
8Ø FORK=1TOL:J$(W)=J$(W)+L$(B(K)):NEXT:NEX
   T
9Ø OPEN4,4:CMD4:REM SEND WORDS TO PRINTER
1ØØ PRINT SPC((8Ø-LEN(T$))/2);T$:PRINT
11Ø PRINT:PRINT:FORJ=1TON:PRINTSPC(3Ø-LEN(
   J$(J)));J$(J);"{2 SPACEs}";B$:PRINT:NE
   XT
12Ø FORJ=1TO61-2*N:PRINT:NEXT:FORJ=1TON:PR
   INT W$(J):NEXT
13Ø PRINT#4:CLOSE4
```

—T. J. RYAN, NORWOOD, OH

FASTER FRACTION ACTION

The program below converts terminating decimals into common fractions in lowest terms quickly. It takes advantage of the fact that terminating decimal fractions can be reduced only by dividing by powers of 2 and 5. This saves the time of fruitless division by other integers. The program should work on all Commodore computers.

```
1Ø REM FAST COMMON FRACTIONS-B.R.HICKERSON
2Ø INPUT"GIVE ME A DEC. NO. ";N$
3Ø FORX=1TOLEN(N$)
4Ø IFMID$(N$,X,1)="."THENFLAG=1:D=X
5Ø NEXT:IFVAL(N$)=ØTHEN END
6Ø IF FLAG<>1THENPRINT N$:GOTO2Ø
7Ø L$=LEFT$(N$,D-1):R$=RIGHT$(N$,LEN(N$)-D
   )
8Ø T$="1":FORY=1TOLEN(R$):T$=T$+"Ø":NEXT
9Ø PRINT L$" "R$"/"T$" IN LOWEST TERMS IS:
   "
1ØØ R=VAL(R$):T=VAL(T$)
11Ø IFR/2=INT(R/2)ANDT/2=INT(T/2)THENR=R/2
   :T=T/2:GOTO11Ø
12Ø IFR/5=INT(R/5)ANDT/5=INT(T/5)THENR=R/5
   :T=T/5:GOTO12Ø
13Ø IFT/R=INT(T/R)THENT=T/R:R=R/R
14Ø R$=STR$(R):T$=STR$(T):R$=RIGHT$(R$,LEN
   (R$)-1):T$=RIGHT$(T$,LEN(T$)-1)
15Ø PRINTL$" "R$"/"T$:RUN
```

—BRYCE R. HICKERSON, CARMICHAEL, CA

Spelling Practice

Students of all ages will enjoy this program as they improve their typing, spelling and word-recognition skills. It should run on any Commodore computer.

A word from the word list is displayed on the screen in turn, then wiped out, and the student types in the correct spelling. The program displays any misspelled word to give the student a second chance before advancing to the next word.

To change the word list, enter your new words in the Data statement in line 200 of the listing. Add extra Data statements to accommodate additional words. Be sure to scratch the old listing and save the new version.

```
10 REM SPELLING PRACTICE-JOE CHARNETSKI
20 INPUT"{SHFT CLR}DISPLAY SPEED 1-12";S
30 READW$:R=1
40 PRINT" {SHFT CLR} {CRSR DN} {CRSR DN} {
   CTRL 9} "W$
50 IFW$="END"GOTO150
60 X=1:FORZ=1TO1400-50*S:NEXT
70 FORZ=1TO10:GET A$:NEXT
80 T=T+1:INPUT"{SHFT CLR}{2 CRSR DNs}THE W
   ORD IS";A$:PRINT
90 IFA$=W$THENW$="<<OKAY>>":C=C+1:R=0
100 PRINTTAB(13)W$"{CRSR UP}"
110 FORZ=1TO150:NEXT:X=X+1:IFXAND1GOTO100
120 IFX<12THENPRINT"{CTRL 9}";:GOTO100
130 IFRTHENR=0:GOTO40
140 GOTO30
150 PRINT"{CRSR DN}RIGHT=";C
160 PRINT"{CRSR DN}WRONG="T-C
170 INPUT"{CRSR DN}WANT TO PRACTICE MORE (
    Y/N)";K$
180 IFK$="Y"THENRUN
190 PRINT"{CRSR DN}BYE..."
200 DATA ACCOMMODATE,WEIRD,SUPERSEDE,PSYCH
    OLOGY
999 DATA END
```

—Joseph R. Charnetski, Dallas, PA

Prime Numbers

This short and relatively fast program determines if a number is prime. Numbers up to 10,000 will take only a few seconds; larger numbers will take up to a minute (9,999,973 takes about 40 seconds on a C-64). The program should work on any Commodore computer.

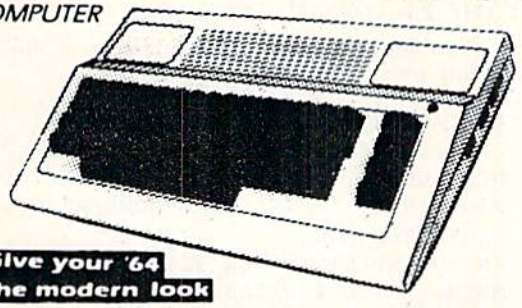
```
10 REM PRIME BRIAN DUCHESNEAU
20 PRINT"{SHFT CLR}"
30 INPUT"{CRSR DN}";X:Z=SQR(X):Y=1:IFX=0TH
   EN END
40 IF X/2=INT(X/2)THENPRINT"{CRSR DN}COMPO
   SITE":GOTO30
50 FORY=3TOZSTEP2:D=X/Y:I=INT(D):S=D-I
60 IF S>0THEN NEXT
70 IF S=0THENPRINT"{CRSR DN} COMPOSITE":GO
   TO30
80 PRINT"{CRSR DN} PRIME":GOTO30
```

—Brian Duchesneau, St. Albans, VT ►

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Just the Factors, Please

This short program will find the factors of any whole number and print them on the screen.

```
10 REM FACTOR FINDER-DARYL BRANSON
20 POKE53280,0:POKE53281,12
30 PRINT CHR$(14)
40 PRINT:INPUT "WHAT'S THE NUMBER";N:N1=N
50 IF N=0THEN END
60 IFN<1ORINT(N)<>NTHEN PRINT"ONLY WHOLE N
   UMBERS ABOVE 0 PLEASE!":GOTO40
70 FORFP=2TON
80 IF N/FP=INT(N/FP) THEN PRINTFP"*";:Z=1:
   N=N/FP:GOTO70
90 NEXT:PRINT"{CRSR LF}="N1:GOTO40
```

—Daryl Branson, Branson, MO

Finding Your Roots

Everyone knows how to find a square root on his Commodore, but how do you find other roots? The answer is in the power, or up-arrow, function. Just raise the number to the reciprocal of the root you want. For example, to find the cube root of 1860867, enter PRINT 18608671 (1/3) to get the answer of 123. Be sure to use parentheses for the reciprocal part of the calculation.

—Lance Sloan, Swartz Creek, MI

12. Programming Tips—Screen Display

Byte-Size Sprite Animation

In conventional sprite animation, several sprites, each showing a different stage of the given motion, are successively flashed on the screen. But you can also produce sprite animation with the Poke command to change individual bytes in the memory map of a given sprite. This will produce corresponding changes in the sprite as seen on the screen. The following routine shows one general approach:

```
10 REM BYTE-SIZE SPRITES-MARK AKSOY
20 FORI=1TO64:POKE16255+I,0:NEXT:REM CLEAR
   SPRITE
30 POKE 53248,200:POKE53249,200:POKE53287,7
   :POKE53281,0
40 POKE2040,254:POKE53271,1:POKE 53277,1:PO
   KE53269,1
50 FOR J=1TO200:RB=INT(RND(1)*64)+16256
60 POKERB,102:FORD=1TO15:NEXT D:POKE RB,0:N
   EXT
```

Line 20 pokes 64 zeros into the sprite map beginning at location 16256. Lines 30 and 40 set the sprite parameters for the "empty" sprite. You can flash on any pattern of bytes in this sprite. In this case, line 60 pokes 102 and then 0 into an address randomly chosen in line 50 and is repeated 200 times within loop J. You can use this pattern of blinking yellow bars as the exhaust of a rocket sprite or as an underwater shimmer effect if shown over a predrawn fish sprite. You can modify the above routine to yield numerous animated patterns with widespread applications, from simulating fire to enhancing the illusion of movement by other sprite objects. And it's all done byte by byte!

—Mark Aksoy, Glenolden, PA

Sidewinder

My one-liner scrolls a message (A$) across the top of the screen, showing only 36 characters at a time. Add a few blank spaces at the beginning of A$ to more easily read the message.

```
0 REM SCREEN SCROLL-MIKE FRANDSEN
1 A$="{23 SPACEs}LINE 10 IS A ONE LINER THA
  T WILL PRINT A$ AT THE "
2 A$=A$+"TOP OF THE SCREEN AND SCROLL THE M
  ESSAGE AS YOU READ IT.{2 SPACEs}THE 50 CA
  N "
3 A$=A$+"BE CHANGED TO ALLOW A FASTER OR SL
  OWER DELAY.{2 SPACEs}CURSOR DOWNS CAN BE
  "
4 A$=A$+"ADDED AFTER THE HOME TO MOVE THE M
  ESSAGE DOWN."
9 :
10 FORA=1TOLEN(A$):PRINT"{HOME}":FORI=1TO50
   :NEXTI:PRINT"{2 SPACEs}"MID$(A$,A,36)" "
   :NEXTA
```

—Mike Frandsen, Missoula, MT

Bi-Directional Screen Printer

My bi-directional printing program adds a special touch of magic to your screen titles. You can also use this technique to enhance game scenarios, help messages, even menus.

You can vary the printing speeds by increasing or decreasing the time delay loops in lines 120 and 150, respectively. This program should work on any Commodore computer with a 40-column monitor. If you use 80 columns, change 40 to 80 in line 180.

```
10 REM SCREEN TITLES - SUSAN CHARNETSKI
20 RVS=1:PRINT"{SHFT CLR}{8 CRSR DNs}"
30 A$="*{3 SPACEs}* ***** ***** * *****":G
   OSUB1000
40 A$="** ** *{3 SPACEs}* *{5 SPACEs}* *{4
    SPACEs}":GOSUB1300
50 A$="* * * ***** *{2 SPACEs}** * *{4 SPA
   CEs}":GOSUB1000
60 A$="*{3 SPACEs}* *{3 SPACEs}* *{3 SPACE
   s}* * *{4 SPACEs}":GOSUB1300
70 A$="*{3 SPACEs}* *{3 SPACEs}* ***** * *
   ****":GOSUB1000
80 A$=" BY SUSAN CHARNETSKI "
90 RVS=0:PRINT:GOSUB1300:END
100 GOSUB1800:GOSUB1600:FORLR=1TON
110 PRINTTAB(LR+X)MID$(A$,LR,1);
120 FORTD=1TO30:NEXT:NEXT:PRINT:RETURN
130 GOSUB1800:FORRL=NTO1STEP-1:GOSUB1600
140 PRINTTAB(RL+X)MID$(A$,RL,1);"{CRSR UP}
    "
150 FORTD=1TO25:NEXT:NEXT:PRINT:RETURN
160 IFRVS=1THENPRINT"{CTRL 9}";
170 RETURN
180 N=LEN(A$):X=(40-N)/2-1:RETURN
```

—Susan M. Charnetski, Plains, PA

Permanent Screen Mapper

I'd like to share an improvement I made to the C-64 Screen Mapper trick on page 38. I glue a screen map produced by the Screen Mapper program to a stiff sheet of cardboard and cover it with a clear plastic cover. I use a grease pencil

for drawing, and wipe off the plastic with a damp cloth when I'm finished.

—DALE PIZZO, ROXBOROUGH, PA

C-128 RADAR LOCATOR

While I was using the Draw command, I got unexpected results, and upon checking my program, I found that I had used a syntax that allows a line to be drawn out a certain distance from the center at a given angle. After further experimentation, I found that the Locate command allows the same syntax. This short program shows how this use of Draw and Locate works:

```
Ø REM C-128 RADAR-ANDRES KICELEFF
1Ø COLORØ,1:COLOR1,2:GRAPHIC1,1:CIRCLE1,16
   Ø,1ØØ,83,83:CIRCLE1,16Ø,1ØØ,4Ø,4Ø
2Ø L=35:DI=Ø:VE=5:LOCATE16Ø,1ØØ
3Ø DRAW1,16Ø,1ØØTOL;DI:LOCATE1Ø;DI:DRAW1,R
   DOT(Ø),RDOT(1)TOL;DI:LOCATE16Ø,1ØØ:DRAW
   Ø,16Ø,1ØØTOL;DI:LOCATE1Ø;DI:DRAWØ,RDOT(
   Ø),RDOT(1)TOL;DI:DI=DI+VE
4Ø IFDI>36ØTHENDI=DI-36Ø:GOTO3Ø:ELSEGOTO3Ø
```

—ANDRES KICELEFF, BUENOS AIRES, ARGENTINA

80-COLUMN REGISTER TABLE

With this program, you can examine each of the 37 registers of the C-128's 8563 chip. It also shows how to use the RREG command to pass the computer's registers back to the Basic program. (See "C-128 SYS in Reverse" on page 67 for more about the RREG command.)

If you have a copy of the *Commodore 128 Programmer's Reference Guide*, you can use the printout to better understand the 8563 chip by comparing the printout to the register map on page 294.

The program should work with any printer. If you don't have a printer, change the OPEN4,4 in line 4 to OPEN4,3 to display the chart on the screen.

```
Ø REM 8563 REG.TABLE-TOM SMITH
2 PRINT"{SHFT CLR}{3 CRSR DNs}{2 SPACEs}BE
   SURE PRINTER IS ON...":PRINT"PRESS ANY
  KEY TO START..."
4 GETKEYA$:OPEN4,4:GOSUB18:PRINT#4,"! * *
  * * 8563 8Ø-COL CHIP REGISTERS * * * * !

6 GOSUB18:PRINT#4,"!{12 SPACEs}!{7 SPACEs}
  BINARY BIT TABLE{8 SPACEs}!"
8 PRINT#4,"! REG#{2 SPACEs}DEC# ! 7 ! 6 !
  5 ! 4 ! 3 ! 2 ! 1 ! Ø !":GOSUB18
1Ø FORZ=ØTO36:SYS52698,,Z:RREG A:PRINT#4,"
   ! "N;SPC(4-LEN(STR$(N)))A;
12 PRINT#4,SPC(5-LEN(STR$(A)))"!";
14 FORL=7TOØSTEP-1:PRINT#4,-((AAND2{UP ARR
   OW}L)=2{UP ARROW}L)"!";:NEXT:PRINT#4:N=
   N+1:NEXT
16 GOSUB18:PRINT#4:CLOSE4:END
18 FORL=1TO23:PRINT#4,"--";:NEXT:PRINT#4:R
   ETURN
```

—THOMAS B. SMITH, GALLIPOLIS, OH

C-64 CURSOR LOCATOR

This is my method of placing the cursor where I want it on my 64 screen. It's less trouble to use than some other routines I've tried, and it requires only 36 bytes of memory. I usually place the routine beginning at location 679, but you may relocate it to any available 36 bytes. Put this short routine in your programs:

```
Ø REM 64 PRINT @-HARRY SIMMS
1Ø SA=679:FORJ=SATOSA+35:READ B:C=C+B:POKE
   J,B:NEXT
15 IFC<>4639 THEN PRINT"DATA ERROR!!"
2Ø DATA 32,253,174,32,158,183,138,56,2Ø1,4
   Ø,144,5,162,14,76,139,227,72
3Ø DATA 32,253,174,32,158,183,138,56,2Ø1,2
   5,176,238,1Ø4,168,24,76,24Ø,255
```

After this section is run in your program, just use SYS SA,C,R to move the cursor. The value of SA is the beginning of the ML code. The column is passed next as C (0 to 39) and the row is passed last as R (0 to 24). You may use any number or variable in place of C or R as long as they are within the legal range.

—HARRY SIMMS, TEXARKANA, TX

C-128 JUMBO HI-RES TEXT

This short subroutine takes advantage of the C-128's powerful graphics commands to create double-size characters on the hi-res, 40-column screen. Three variables are used in the subroutine:

—T$ for the text to be printed
—XT for the horizontal (X) position
—YT for the vertical (Y) position

Here's the subroutine with an example:

```
1Ø REM JUMBO HI-RES TEXT-JASON S. MACDONAL
   D
2Ø GRAPHIC2,1,2Ø:REM-EXAMPLES-:
3Ø XT=25:YT=35:T$="MAGIC IS":GOSUB1ØØØ
4Ø XT=55:YT=6Ø:T$="GREAT FUN!!":GOSUB1ØØØ:
   END
1ØØØ CHAR1,Ø,24,T$:FORA=1TOLEN(T$)*8:SSHAP
     E A$,A-1,192,A-1,2ØØ:GSHAPEA$,XT+X1-1
     ,YT:GSHAPE A$,XT+X1,YT:X1=X1+2:NEXT:X
     1=Ø
1Ø1Ø CHAR1,Ø,24,"{4Ø SPACEs}":RETURN
```

For an added twist, add YT = YT + .5: before the NEXT in line 1000.

—JASON S. MACDONALD, MENA, AR

LO-RES DRAW PROGRAM

My program lets you make simple drawings on the C-64's 40-column screen, and it's easy enough for a child to use. Use a joystick in port 2 to control the cursor. The fire-button or any key except home changes colors. Change the color to black to erase the drawing. Use the home key to clear the screen and start a new picture.

```
1Ø REM LO-RES DRAW - ADAM MILLER
2Ø POKE53281,Ø:POKE5328Ø,Ø:C=1:X=Ø:Y=Ø:PRI
   NT"{SHFT CLR}"
3Ø J=PEEK(5632Ø):F=JAND16:J=15-(JAND15):IF ►
```

```
   J=1ORJ=5ORJ=9THENY=Y-1
4Ø IFJ=2ORJ=6ORJ=1ØTHENY=Y+1
5Ø IFJ=4ORJ=5ORJ=6THENX=X-1
6Ø IFJ=8ORJ=9ORJ=1ØTHENX=X+1
7Ø GETA$:IFA$>""OR F=Ø THENC=C+1:IFC=16THE
   NC=Ø:FORJ=1TO2ØØ:NEXT
8Ø IFA$="{HOME}"GOTO2Ø
9Ø IFX>39THENX=Ø
1ØØ IFY>24THENY=Ø
11Ø IFX<ØTHENX=39
12Ø IFY<ØTHENY=24
13Ø POKE1Ø24+X+4Ø*Y,81:POKE55296+X+4Ø*Y,C
14Ø GOTO3Ø
```

—ADAM MILLER, BRANDON, SD

C-128 SPRITE REDUCTION

The following program produces seven consecutive reductions of any sprite you've designed to give the illusion that an object is moving away from the viewer. The program will ask for the sprite number of the sprite you want to reduce. Be sure that any other sprites are saved, since the new sprites will be stored in the sprite area. After the reduction is complete, the sprites will be displayed on the screen for you to view.

```
1Ø REM SPRITE REDUCER-MARCO HAGELSIEB
2Ø INPUT "{SHFT CLR}{4 CRSR DNs} SPRITE NU
   MBER (1-8)";SN:IFSN<1ORSN>8THEN2Ø
3Ø COLOR Ø,7:COLOR4,7:COLOR1,8:GRAPHIC1,1:
   ES=1:SPRSAV SN,A$:GSHAPE A$,2Ø,2Ø
4Ø CHAR 1,9,13,CHR$(14)+"{SHFT W}ORKING...
   {SHFT P}LEASE {SHFT W}AIT"
5Ø FOR I=1TO7:ES=ES-.1:EY=ES+.Ø6:PX=1:PY=1

6Ø FOR XX=ØTO24:FORYY=ØTO21
7Ø LOCATE XX+2Ø,YY+2Ø:IFRDOT(2)<>ØTHEN GOS
   UB 12Ø
8Ø NEXTYY,XX,I:SPRSAVA$,1:PRINT"{SHFT CLR}
   "
9Ø FOR I=1TO7:SSHAPE B$(I+1),I*25+21,5Ø,I*
   25+43,71:NEXT:GRAPHICØ
1ØØ FOR I=1TO8:SPRITE I,1,1,1:MOVSPR I,5Ø+
    3Ø*I,115:SPRSAV B$(I),I
11Ø NEXT:END
12Ø X1=((I*25)+((XX*ES)+(12-(12*ES))))+2Ø:
    Y1=5Ø+((YY*EY)+(1Ø-(1Ø*EY)))
13Ø DRAW 1,X1,Y1:RETURN
```

—MARCO HAGELSIEB
GUADALAJARA, JALISCO, MEXICO

MAGIC 80-COLUMN CURSOR

Unlike on the C-64, it's very easy to program a blinking cursor on your C-128's 80-column screen. You simply need only turn the 8563's Cursor mode on and then off when you're done. To turn it on, use BANK15:SYS49182,70. This prints an ESC F through the escape character routine at $C01E. The accumulator contains the value for the character F. Use SYS 52684,16,10 to turn it off. This will write to register 10 in the 8563 VDC by calling the screen editor routine at $CDCC in bank 15. The X register must contain the value for the VDC register, and the accumulator holds the data you wish to write (in this case, 16). The demo program below will show how to put the magic cursor to work in your own programs.

```
1Ø REM MAGIC CURSOR DEMO-BOB KODADEK
2Ø IFPEEK(215)=ØTHENPRINT"8Ø COL ONLY!":EN
   D
3Ø PRINT:PRINT"1. VIEW DIRECTORY"
4Ø PRINT"2. LIST PROGRAM"
5Ø PRINT"3. QUIT DEMO":PRINT
6Ø PRINT"ENTER CHOICE: ";
7Ø BANK 15:SYS49182,7Ø:REM CURSOR ON
8Ø GETKEY A$:K=VAL(A$):IFK<1ORK>3THEN8Ø
9Ø PRINT A$:SYS52684,16,1Ø:REM CURSOR OFF
1ØØ ON K GOSUB 12Ø,13Ø,14Ø
11Ø IF K<>3THEN3Ø:ELSE END
12Ø CATALOG:RETURN
13Ø LIST:RETURN
14Ø PRINT"ALL DONE!":RETURN
```

—BOB KODADEK, ASTON, PA

80-COLUMN TOGGLER

Use this simple ML program to toggle between two 80-column screens. Type in the listing below and run it for a brief demo. Note that you should always clear the second screen the first time it is accessed. One warning: If you have any bank-switching in your program, just remember that the routine will always exit in bank 15.

```
1Ø REM TOGGLER 8Ø-EDWARD B SULLIVAN
2Ø PA=4864:FORX=PATOPA+51:READE:POKEX,E:C=
   C+E:NEXT
3Ø IFC<>5611THENPRINT"ERROR!":STOP
4Ø DATA 169,Ø,141,Ø,255,162,12,32,2Ø4,2Ø5,
   141,46,1Ø,169,8,162,2Ø,32,2Ø4,2Ø5
5Ø DATA 141,47,1Ø,96,234,169,Ø,141,Ø,255,1
   69,16,162,12,32,2Ø4,2Ø5,141,46,1Ø
6Ø DATA 169,24,162,2Ø,32,2Ø4,2Ø5,141,47,1Ø
   ,96,234
7Ø S1=PA:S2=PA+25: REM ** DEMO
8Ø PRINT"{SHFT CLR}":KEY1,"SYS"+STR$(S1)+C
   HR$(13):KEY2,"SYS"+STR$(S2)+CHR$(13)
9Ø DIRECTORY:PRINT"SCREEN #1 IS THE DEFAUL
   T SCREEN":GETKEYA$
1ØØ SYS S2:PRINT"{SHFT CLR}ALWAYS CLEAR SC
    REEN # 2 THE FIRST TIME ACCESSED":LIST
    :GETKEYA$
11Ø SYSS1:GETKEYA$:SYSS2:GETKEYA$:GOTO11Ø
```

—EDWARD B. SULLIVAN, BRANSON, MO

C-64 FANCY BORDER PRINTER

The following routine prints a border around the screen in a unique and visually interesting way. The routine starts printing in the middle of the top line and extends toward both sides, then downward and finally inward to the middle of the bottom line. When the routine is finished, the cursor appears at the upper-left corner of the screen.

```
1Ø REM C-64 BORDER PRINTER-J.R.CHARNETSKI
2Ø C$="{CTRL 9}*":PRINT"{SHFT CLR}";
3Ø FORI=1TO19:PRINTTAB(2Ø-I)C$TAB(19+I)C$"
```

```
   {HOME}";:NEXT
4Ø FORI=1TO24:PRINTC$SPC(38)C$;:NEXT
5Ø PRINTC$TAB(38)C$"{CRSR LF}{SHFT INST} {
   CRSR UP}"
6Ø FORI=1TO19:PRINTTAB(I)C$TAB(39-I)C$"{CR
   SR UP}":NEXT
7Ø FORL=217TO242:POKEL,PEEK(L)OR128:NEXT
8Ø PRINT"{HOME}":REM RETURN
9Ø GETA$:IFA$=""THEN9Ø
1ØØ PRINT"{SHFT CLR}";:IFA$="R"THEN3Ø
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

C-64 SCREEN ROW CLEAR

You can clear any single line on the C-64's screen with this line:

```
POKE 781,X:SYS59903
```

The value of X determines the line to be cleared and ranges from 0 to 24. You can clear a section of the screen with a short loop. As an example, the following clears the top 5 lines:

```
FOR X=0 TO 4:POKE 781,X:SYS59903:NEXT
```

—JING BO LI, BROOKLYN, NY

13. PROGRAMMING TIPS—SOUND

CHARMING MUSIC

I've converted the "Snake Charmer" theme to C-128 music format in the following program. I hope you'll find it "charming" also.

```
1Ø REM SNAKE CHARMER-JESSE B BROWN
2Ø ENVELOPE 3,3,Ø,14,4,Ø:TEMPO 27
3Ø PLAY "V1O4T3U13XØ":PLAY"V2O3T9U6XØ":PLAY
   "V3T9O3U6XØ"
4Ø A$="V2HR V1O4QDQEM V2O3WA V3O3WD V1O4HFH
   EM V2O3WA V3O3WD V1O4HDQDQEM V2O3WA V3O3
   WD V1O4QFQAQEQFM V2O3WA V3O3WD V1O4HDQDQ
   EM"
5Ø B$="V2O3WA V3O3WD V1O4HFHEM V2O3WA V3O3W
   D V1O4HDQDQEM V2O3WA V3O3WD V1O4QFQAQEQF
   M V2O3WA V3O3WD V1O4HDQFQGM"
6Ø C$="V2O3WA V3O3WD V1O4QAQAQAQAM V2O3WA V
   3O3WD V1O4QAQGQEQFM V2O3WA V3O3WD V1O4QG
   QGQGQGM V2O3WA V3O3WD V1O4QGQFQDQEM"
7Ø D$="V2O3WA V3O3WD V1O4HFHEM V2O3WA V3O3W
   D V1O4HDQDQEM V2O3WA V3O3WD V1O4QFQAQEQF
   M V2O3HA V3O3HD V1O4HDM"
8Ø PLAY A$+B$:PLAY C$+D$
```

—JESSE B. BROWN, EUNICE, LA

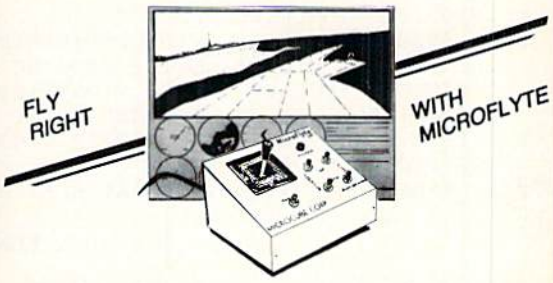
IRISH JIG 128

Ah, the luck of the Irish! Bring out the "wee bit o' Irish" in your C-128 with this popular Irish jig.

```
1Ø REM AN IRISH JIG-JESSE BROWN
2Ø ENVELOPE Ø,2,Ø,15,5,2,2ØØ:TEMPO 19
3Ø PLAY "V1O4TØU15XØ":PLAY"V2O3T5U15XØ":PLA
   Y"V3O3T6U15XØ"
4Ø A$="V1O4WRV2O3.HG V3O3.HCM V1O4WR V2O3.H
   G V3O3.HCM V2O3.HC V3O3.HG V1O5QEICQEICM
   V2O3.HC V3O3.HG V1O5QEICIGIFIEM V2O3.HC►
```


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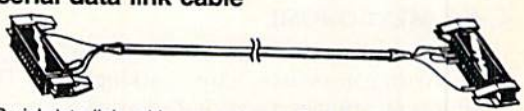


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```
    V3O3.HG V1O5QFIDQFIDM"
5Ø B$="V2O3.HC V3O3.HG V1O5QFIDIFIEIDM V2O3
   .HC V3O3.HG V1O5QEICQEICM V2O3.HC V3O3.H
   G V1O5QEICIGIFIEM V2O3QD V1O5IFIEIF V2O3
   IRQG V1O5QD V2O3IR V1O5IGM"
6Ø BB$="V2O3QC V1O5IEICIC V2O3IR V1O5QC V2O
   3QC V1O5IR V2O3IRM"
7Ø PLAY A$:PLAY B$:PLAY BB$+A$:PLAY B$+BB$
```

—JESSE B. BROWN, EUNICE, LA

BACH IS BACK

This program plays a short song written by Johann Sebastian Bach. Just type in the program, run it and enjoy.

```
1Ø REM HARPSICHORD PLAYER-JESSE BROWN
2Ø TEMPO 17:FILTER 15ØØ,1,Ø,Ø,15
3Ø A$="V1O4T6X1HA V2O3T5X1QDQAQD V1O4IG#IF
    V2O3QA V1O4IEIDM V1O4HA V2O3QDQAQD V1O
   4IG#IF V2O3QA V1O4IEIDM V2O3WD V1O4#IFI
   GQA#QFM"
4Ø AA$="V2O3HA V1O4QE V2O3HD V1O4#QFQDM"
5Ø AB$="V2O3HA V1O4QEOAHD V2O3HDM"
6Ø C$="V2O3WA V1O4IE#IFQGIE#IFQGM V2O3WD V
   1O4#QFQAHAM V2O3WA V1O4IE#IFQGIE#IFQGM
   V2O3WD V1O4#QFQDHDM"
7Ø PLAY A$:PLAY AA$:PLAY A$:PLAY AB$:PLAY
   C$:PLAY A$:TEMPO 15:PLAY AB$
```

—JESSE B. BROWN, EUNICE, LA

C-64 WINNING FANFARE

Here's a sound effect to reward a winning game player or acknowledge a correct answer. Use it as a subroutine in your C-64 programs.

```
Ø REM WINNING FANFARE-J.R.CHARNETSKI
8ØØ T=87:N$="251331421502421502"
81Ø S=54272:POKES+6,96:POKES+24,15
82Ø FORI=1TO18 STEP3
83Ø POKES+1,VAL(MID$(N$,I,2)):POKES+4,33
84Ø FORJ=1TOT*VAL(MID$(N$,I+2,1)):NEXT
85Ø POKES+4,Ø:NEXT:REM [RETURN]
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

C-64 METRONOME

Here's a program that will transform your C-64 into a tempo-setting instrument for marking time. The program produces an animated screen display with a metronome-like sound and runs until you press any key.

```
1Ø PRINT"{SHFT CLR}C-64 METRONOME - JOSEPH
    R. CHARNETSKI"
2Ø INPUT "{CRSR DN}BEATS PER MINUTE (4Ø-2Ø
   8)";N
3Ø IFN<4Ø OR N>2Ø8THEN END
4Ø FORI=1TO9
5Ø B$=B$+"{SHFT M}{CRSR DN}":C$=C$+"{CRSR
   UP} "
6Ø D$=D$+" {CRSR DN}":E$=E$+"{CRSR UP}{SHF
   T N}"
7Ø NEXT
8Ø H$="{HOME}{9 CRSR DNs}{1Ø CRSR RTs}"
9Ø A$(Ø)=H$+B$+"*"+C$:A$(1)=H$+D$+"*"+E$
1ØØ S=54272:FORJ=STOS+23:POKEJ,Ø:NEXT
11Ø POKES+1,84:POKES+6,9:POKES+24,15
12Ø Y=1:Z=INT(1299/N*45-N/2)
13Ø PRINT A$(XANDY):POKES+4,21
14Ø FOR T=1TOZ:NEXT:POKES+4,2Ø
15Ø GETK$:IFK$=""THEN X=Y-X:GOTO13Ø
16Ø PRINT"{SHFT CLR}":POKES+24,Ø
```

—JOSEPH R. CHARNETSKI, DALLAS, PA

C-64 SYSOUND

Programming the 64's sound chip is tedious at best. My program simplifies the process. To play a sound, use:

SYS 679,AD,SR,HF,LF,W,D

where AD is the attack/decay rate (use values 0–255), SR is the sustain/release rate (values 0–255), HF is the high frequency of the note (INT(frequency/256)), LF is the low frequency (frequency – HF*256), W is the waveform (triangle = 17, sawtooth = 33, noise = 129) and D is the duration of the sound (0–255). If you accidentally use a duration that's too long, stop it with run-stop/restore. The program uses only voice #1.

```
Ø REM C-64 SOUND-RICHARD PENN
1Ø FORU=679TO753:READQ:POKEU,Q:C=C+Q:NEXT
2Ø IFC<>9932THENPRINT"CHECK DATA":STOP
3Ø PRINT:PRINT"SYS 679,A/D,S/R,HF,LF,W,D":
   SYS679,Ø,24Ø,34,75,17,25
4Ø DATA 32,23Ø,2,169,15,141,24,212,32,241,
   183,142,5,212,32,241,183,142
5Ø DATA 6,212,32,241,183,142,1,212,32,241,
   183,142,Ø,212,32,241,183,142
6Ø DATA 4,212,32,241,183,134,2,162,1Ø,16Ø,
   255,136,2Ø8,253,2Ø2,2Ø8,248,198
7Ø DATA 2,165,2,2Ø8,24Ø,32,23Ø,2,96,16Ø,24
   ,169,Ø,153,24,212,136,2Ø8
8Ø DATA 25Ø,96,Ø
```

—RICHARD PENN, MONTREAL, QUEBEC, CANADA

14. PROGRAMS—AMUSEMENTS/DELIGHTS

COMMODORE KENTUCKY DERBY

You needn't wait till May to catch triple-crown fever. My program, which runs on the C-64 and C-128 (in 40-Column mode) simulates a thoroughbred race with a field of seven horses and generates odds for each horse. The program gives you $500 for betting, and the races continue until you run out of money or quit with the stop key.

```
Ø REM DARBEE BY PHILIP GEISER
1 M=5ØØ:POKE5328Ø,6:POKE53281,6
2 PRINTCHR$(142)"{SHFT CLR}{4 SPACEs}{CTRL
  8}{CTRL 9} KAINTUCKEE DARBEE {CTRL Ø}"
3 FORO=1TO7:O(O)=INT(RND(1)*26+1):PRINT"{CO
  MD 5}{CTRL 9} HORSE"O"{CRSR LF} {CTRL Ø}
  ODDS ARE"O(O)"TO 1"
4 PRINT"{CTRL 2} {PI}{CRSR DN}":NEXT:FORO=1
  TO7:P(O)=Ø:NEXT:PRINT:PRINT"{2 CRSR UPs}
```

```
  {CTRL 9}YOU HAVE $"M
5 INPUT"{2 SPACEs}-WHAT HORSE TO BET ON";H:
  IFH>7ORH<1THENPRINT"{2 CRSR UPs}":GOTO5
6 INPUT"{2 SPACEs}-HOW MUCH MONEY TO BET";B
  :IFB>MTHENPRINT"{2 CRSR UPs}":GOTO6
7 X=INT(RND(1)*7+1):P(X)=P(X)+1
8 PRINT"{HOME}";:FORD=1TOX*3-1:PRINT"{CRSR
  DN}";:NEXT:FORP=1TOP(X):PRINT" ";:NEXT:PR
  INT"{CTRL 2}{PI}"
9 IFP(X)=39THENPRINT"{HOME}"TAB(24)"{CTRL 9
  } WINNER IS #"X:GOTO11
1Ø GOTO7
11 IFX<>HTHEN13
12 M=M-B+B*O(X):FORQ=1TO3ØØØ:NEXT:GOTO2
13 M=M-B:FORQ=1TO3ØØØ:NEXT:IFM<=ØTHENPRINT"
   {SHFT CLR}{CTRL 9}* * YOU ARE OUT OF MON
   EY * *":END
14 GOTO2
```

—PHILIP GEISER, STRONGHURST, IL

KALEIDOSCOPE

Turn your C-128's 40-column screen into an electronic kaleidoscope. The program will run until you press any key.

```
Ø REM KALEIDOSCOPE - ROBERT BIXBY
1Ø GRAPHIC3,1:SCALE1,64Ø,2ØØ:COLORØ,1
2Ø A=INT(RND(TI)*32Ø):B=INT(RND(TI)*2ØØ):C
   =INT(RND(TI)*32Ø):D=INT(RND(TI)*2ØØ):DR
   AW1,A,BTOC,D
3Ø FORI=1TO3:COLORI,RND(TI)*16+1:DRAWI,A,B
   TOC,D
4Ø DRAWI,319-A,199-BTO319-C,199-D
5Ø DRAWI,319-A,BTO319-C,D
6Ø DRAWI,A,199-BTOC,199-D:A=C:B=D:C=INT(RN
   D(TI)*32Ø):D=INT(RND(TI)*2ØØ):COLORI,RN
   D(TI)*16+1:NEXT:GET A$:IF A$="" GOTO3Ø:
   ELSE GRAPHIC Ø:COLOR5,2:END
```

—ROBERT BIXBY, KALAMAZOO, MI

MAGIC NUMBER-GUESSER

Amuse and mystify your friends with my magic number-guesser program. Just follow the prompts on the screen.

```
1Ø REM MAGIC NUMBER-NEVIN FAHS
2Ø PRINT"{SHFT CLR}{2 CRSR DNs}FOR FURTHER
    INSTRUCTIONS PRESS ANY KEY"
3Ø PRINT"WRITE DOWN ANY 5 DIGIT RANDOM NUM
   BER":GOSUB11Ø
4Ø PRINT"NOW RE-ARRANGE THE DIGITS IN ANY
   ORDER{2 SPACEs}";
5Ø PRINT "AND SUBTRACT SMALLER FROM LARGER
   .":GOSUB11Ø
6Ø PRINT"CROSS OUT ANY DIGIT (EXCEPT ZERO)
    AND{3 SPACEs}TYPE IN THE REMAINING NUM
   BER"
7Ø INPUT A$
8Ø FORT=1TO4:X=X+VAL(MID$(A$,T,1)):NEXT
9Ø X=X-INT(X/9)*9
1ØØ Y=9-X:PRINT"{SHFT CLR}THE NUMBER YOU C
    ROSSED OUT WAS"Y:END
11Ø GET S$:IFS$=""THEN11Ø
12Ø PRINT:RETURN
```

—NEVIN FAHS, HONOLULU, HI

SIMPLE C-64 PIANO

I programmed this short top-row keyboard piano for quick key response. I find it nice to play simple tunes on. The number row is for sharps and flats and the second row is for regular notes.

```
1Ø REM 64 PIANO-ANDREW SENFT
2Ø S=54272:FORZ=STOS+27:POKEZ,Ø:NEXT:POKES
   +24,15:POKES+6,127:POKES+4,35
3Ø F%=1145:DATA62,59,9,8,14,17,16,22,19,25
   ,24,3Ø,33,32,38,35,41,46,43,49,48,54
4Ø FORZ=ØTO127:POKE49152+Z,Ø:NEXT:FORZ=1TO
   22:READK%:T%=2{UP ARROW}(1/12)*F%+.5
5Ø F%=T%:POKE49152+K%,T%/256:POKE49216+K%,
   (T%/256-PEEK(49152+K%))*256:NEXT
6Ø DATA 166,197,189,Ø,192,2Ø1,Ø,24Ø,247,14
   1,1,212,189,64,192,141
7Ø DATA Ø,212,228,197,24Ø,252,169,Ø,141,1,
   212,141,Ø,212,76,128,192,Ø
8Ø FORZ=ØTO32:READA%:POKE4928Ø+Z,A%:NEXT
9Ø PRINT"{2 CRSR DNs}SIMPLE PIANO BY ANDRE
   W SENFT":SYS4928Ø
```

—ANDREW SENFT, AUBURN, NY

REFLECTIONS ON THE C-128

This program lets you create some interesting graphics displays. It uses a joystick in port 1 to move the cursor around the hi-res screen. (Draw in the lower-left corner so the cursor directions will seem correct.) The display is reflected four times around the screen as the cursor draws. Clear the screen with the fire-button.

```
1Ø REM REFLECTIONS - JON ALLEN
2Ø SLOW:GRAPHIC1,1:COLORØ,1:COLOR1,8
3Ø COLOR4,1:SCALE1:X=75Ø:Y=25Ø
4Ø J=JOY(1):IFJ=128THENSCNCLR
5Ø IFJ=1ORJ=2ORJ=8THENY=Y+1Ø
6Ø IFJ=6ORJ=5ORJ=4THENY=Y-1Ø
7Ø IFJ=8ORJ=7ORJ=6THENX=X-1Ø
8Ø IFJ=2ORJ=3ORJ=4THENX=X+1Ø
9Ø IFX<ØTHENX=Ø
1ØØ IFX<ØTHENX=Ø
11Ø IFY<ØTHENY=Ø
12Ø IFX>1ØØØTHENX=1ØØØ
13Ø IFY>1ØØØTHENY=1ØØØ
14Ø DRAW1,X,Y:DRAW1,1ØØØ-X,Y
15Ø DRAW1,X,1ØØØ-Y:DRAW1,1ØØØ-X,1ØØØ-Y
16Ø GETA$:IFA$="{LB.}"THENGRAPHICØ:PRINT"{
   CTRL 2}":END
17Ø GOTO4Ø
```

—JON ALLEN, NEWFANE, NY

15. PROGRAMS—COMMERCIAL SOFTWARE

STUCK ON KOALAPAD

I've got a simple solution for those of you who are tired of hunting down the stylus for your KoalaPad every time you need to use it—attach it to the pad with Velcro. Put the soft, furry part of the Velcro on the stylus and the hooked part►

on the pad, right behind the buttons. The buttons provide additional protection for the stylus.

—CHANCE AGRELLA, PRESCOTT, AZ

MAKE IT EASY ON YOURSELF

Make a hard copy of the different fonts and type styles available in GEOS. It's much easier to select the style and size this way.

—ADA D. KIRKMAN, MT. PLEASANT, SC

DFMAIL RECORD GROUPS

Adding the following lines to DFMail (*RUN*, December 1984) will print selected parts of a mailing list. It's useful, for example, for addressing a mailing to club members who have not paid their dues. First, sort on a field containing dues payment information, then view to see the first and last record numbers of those who have not paid. You can then print labels for just the delinquent members.

```
1Ø47 PRINT"{CRSR DN}{4 SPACEs}{CTRL 9}C{CTR
     L Ø}ONSECUTIVE GROUP OF RECORDS"
1Ø59 IFC$="C"GOTO1326
1326 INPUT"BEGIN WITH WHICH RECORD (Ø TO EX
     IT)";FS:IFFS=ØGOTO1Ø4Ø
1328 IFFS>XTHENPRINT"NO SUCH RECORD":GOTO13
     26
133Ø INPUT"END WITH WHICH RECORD (Ø TO EXIT
     )";LS:IFLS=ØGOTO1Ø4Ø
1332 IFLS<FSTHENPRINT"TRY AGAIN!":GOTO1326
1334 FORI=FSTOLS:GOSUB1268:NEXT:GOTO1Ø4Ø
```

—STANLEY L. ANDERSON, TISHOMINGO, OK

FROM HI-RES TO ULTRA HI-RES

My program converts a 40-column hi-res picture to Ultra Hi-Res format. The original picture should be loaded in as a picture (use BLOAD"NAME",P8192 to load just the picture, and substitute P7168 in the BLoad command to load the picture and color) and then saved to disk with BSAVE "filename", B0, P8192 TO P16384. Then load and run the VIC/Ultra Hi-Res program.

The program converts the 320 × 200-pixel format of the VIC screen to the 640 × 200 format of the 80-column hi-res screen. In addition, the width is stretched in the process. This takes about five minutes in Fast mode. Now load the Ultra Hi-Res program and run it. You can then load your picture with @LOAD,0,"filename".

```
1Ø REM VIC=>U.H.RES-DANIEL MONTES
2Ø REM ML SUB BY JIM BORDEN
3Ø FAST:DIM A$(319)
4Ø FOR K=4864TO49Ø4:READX:POKEK,X:NEXT
5Ø DATA 141,41,19,169,2,141,42,19,169,Ø,162
6Ø DATA 255,232,224,4,24Ø,1Ø,14,41,19,144,2
   46
7Ø DATA 29,37,19,176,241,72,2Ø6,42,19,2Ø8,2
   31
8Ø DATA 1Ø4,17Ø,1Ø4,96,192,48,12,3
9Ø PRINT:INPUT"SOURCE FILENAME";S$
1ØØ DOPEN#8,(S$+",P"):IF DSTHENPRINT:PRINTD
    S$:DCLOSE#8:GOTO9Ø
11Ø PRINT:INPUT"ULTRA FILENAME ";T$
12Ø DOPEN#9,(T$+",P,W"):IF DSTHENPRINT:PRIN
    TDS$:DCLOSE#9:GOTO11Ø
13Ø PRINT:PRINT"WORKING ON ROW:";
14Ø GET#8,C$,C$:FORF=1TO25:PRINTF;
15Ø FORI=ØTO319:GET#8,A$(I):NEXT
16Ø FORJ=ØTO7:FORI=JTOJ+312STEP8
17Ø A1=(ASC(A$(I)+CHR$(Ø)))
18Ø SYS4864,A1:RREG A1,X1
19Ø PRINT#9,CHR$(A1)CHR$(X1);
2ØØ NEXT:NEXT:NEXT:DCLOSE:PRINTCHR$(7)
```

—DANIEL MONTES, CORDOBA, ARGENTINA

DATAFILE FIND OPTION IMPROVEMENT

I've made some changes to Mike Konshak's excellent Datafile program so that you can use its Find option to locate a keyword anywhere within a field. The original Datafile only found a match at the beginning of a field. Make these changes to the program:

```
1 REM DATAFILE SUBSTRING FIND-KENNY LAWSON
229 LT=LEN(T$)
231 FORQQ=1TOLEN(REC$(K%(I),SF)-LT+1)
232 IFT$=MID$(REC$(K%(I),SF),QQ,LT)GOTO236
233 NEXT
```

The changes should work on any Commodore computer. However, if you're using a C-128 in 128 mode, you can use this line to replace all of the above lines:

```
232 IFINSTR(REC$(K%(I),SF),T$)GOTO236
```

Please note that this could be used as a keyword search subroutine in your own applications programs, also. Just be sure that your program uses the proper variable names.

—KENNY LAWSON, INDIANAPOLIS, IN

ULTRA HI-RES HELPER

The Ultra Hi-Res Graphics program from the February 1986 issue of *RUN* is fantastic, but trying to draw at the right locations can be a real problem. The Ultra Hi-Res Helper routine to the rescue!

Place the Helper at the end of the Draw statements in your program. When you run your program, use the keypad to move the dot you see on the screen to the location you want, then press the plus key, and the current X and Y locations will be printed on the screen. You can then move to another location and press the plus key again. When you've located all the points, press the minus key to exit the program. If your program already has an error trap at 10000, you can leave out line 10000.

```
1 REM ULTRA HI RES HELPER-J. W. JARVIS
1ØØØ X=32Ø:Y=1ØØ
1ØØ2 @DOT,X,Y,1:GETKEY K$:K=VAL(K$)
1ØØ4 IFK$="+"THEN L$="X="+STR$(X)+" Y="+STR
     $(Y):@CHAR,53248,2ØØ,1ØØ,1,1,L$
1ØØ6 IFK$="-"THEN 1ØØØØ
1ØØ8 IF K=5 OR K=ØTHEN1ØØ2:ELSE @DOT,X,Y,Ø
1Ø1Ø IFK=2 THEN Y=Y+1
1Ø12 IFK=8 THEN Y=Y-1
1Ø14 IFK=4 THEN X=X-1
1Ø16 IFK=6 THEN X=X+1
1Ø18 IFK=7 THEN X=X-1:Y=Y-1
1Ø2Ø IFK=9 THEN X=X+1:Y=Y-1
1Ø22 IFK=3 THEN X=X+1:Y=Y+1
1Ø24 IFK=1 THEN X=X-1:Y=Y+1
1Ø26 GOTO 1ØØ2
1ØØØØ @TEXT:HELP:END
```

—JERRY W. JARVIS, SPOKANE, WA

Easy Eye-Catcher

For our users group's computer fair, I altered the White Hole trick (below), which prints messages on the screen, to generate a continuous display timed by a For-Next loop. It works on both the C-64 and C-128.

```
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
```

I made the following changes to the trick:

```
5 PRINT"{SHIFT CLEAR}
60 FOR X=1TO3500:NEXT
70 GOTO 5
```

I then used lines 30–50 for the message. Extra lines can be added to allow several screens of text. The display is easy to write and a real attention-getter!

—Harry A. Tellier, Denton, NC

Print Shop Mailers

My program prints mailers for the quarter-fold cards created by The Print Shop. It prints a mailer on a sheet of standard paper, then moves to the next sheet so you can print another one. If you own a word processor with a mail-merge option, you can print the mailer outline, then run the paper through a second time and use mail-merge to address it.

```
1Ø REM PRINT SHOP ENVELOPES-LONNIE BROWN
2Ø OPEN4,4:CMD4
3Ø PRINTSPC(1Ø);:PRINT"!";:FORX=1TO56:PRINT
   "-";:NEXT:PRINT"!"
4Ø FORZ=2TO12:PRINTSPC(1Ø)"!";:FORX=1TO56:P
   RINT" ";:NEXT:PRINT"!":NEXT
5Ø PRINTSPC( 4)"!";:FORX=1TO68:PRINT"-";:NE
   XT:PRINT"!"
6Ø FORZ=14TO39:PRINTSPC(4)"!"SPC(5)"!";:FOR
   X=1TO56:PRINT" ";:NEXT
7Ø PRINT"!"SPC(5)"!":NEXT
8Ø PRINTSPC( 4);:PRINT"!";:FORX=1TO68:PRINT
   "-";:NEXT:PRINT"!"
9Ø FORZ=4ØTO59:PRINTSPC(1Ø)"!";:FORX=1TO56:
   PRINT" ";:NEXT:PRINT"!":NEXT
1ØØ PRINTSPC(1Ø);:PRINT"!";:FORX=1TO56:PRIN
    T"-";:NEXT:PRINT"!"
11Ø FORX=1TO4:PRINT#4:NEXT:CLOSE4
```

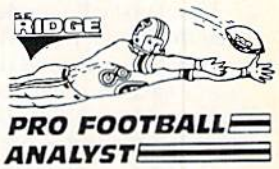
—Lonnie Brown, Lakeland, FL ►

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Fast Load Directory Pause

Directories longer than 25 lines are difficult to view with the Fast Load cartridge, since there's no provision for pausing the screen. To pause the directory listing, load the directory as a Basic file with the command /$ and list it. Slow down the scrolling listing with the control key and pause it with the stop key. Of course, this method will overwrite any program in memory when the directory is loaded.

—Rudy McDaniel, APO, NY

Reminder 128 Revisited

If you make Reminder 128, *RUN*'s electronic desk calendar (see the January 1987 issue), the autoboot program on your most frequently used disk, such as your word processor, you won't have to remember to run it. I use RUN Script often, so I made up a disk with the RUN Script files on it along with the Reminder 128 program. You can put Reminder 128 as the first program and run it with the shifted run-stop key or add a boot sector. Make the following change to the Reminder 128 program before saving it to the new disk:

```
2295 PRINT "LOADING RUN SCRIPT..."
2297 RUN "BOOT"
```

If you want to run a machine language program, replace the Run command with BOOT in line 2297. Now, after your appointment calendar is checked, your word processor will be loaded for your use. (Change the text in quotes to suit your own program.)

—Randy W. Barthel, Cincinnati, OH

Fast-Run

The instruction manual for my Epyx Fast Load cartridge does not give a command for loading and running any Basic program. However, you can easily do this by adding a delimiter to the end of the filename. Then use shifted run-stop. The asterisk (*) is the best delimiter, since it will serve double-duty as both a wild card in the filename and as the delimiter.

Here's an example of loading the first file on the disk that begins with the letters DO: /DO*{shift/run-stop}

Note that a colon isn't necessary.

—Robert E. Tum Suden, Floral Park, NY

Helpful C-128 Keypad

After using the 128 Keypad program in 64 mode (see *RUN*'s Mega-Magic, May 1987) for a while, I decided to try it with Timework's Electronic Checkbook program. It works just fine!

If you have a C-128 and use it for C-64 commercial software, try loading and running the 128 Keypad program before you load the commercial program. If they work together, entering numeric data is much easier.

—James R. Jones, Chillicothe, OH

Enhanced 64 Notepad Menu

Here's an enhanced version of the main menu of Bob Kodadek's fine 64 Notepad V3.0 program (see listing 3 on page 47 of the June 1987 issue of *RUN*). Load that listing and change or add the lines below:

```
Ø REM NOTEPAD MENU-FRANK S RUARK
1ØØ PRINT CHR$(147)SPC(92)F$
11Ø PRINT SPC(82)"1.PRESS CTRL-O TO OPEN W
    INDOW."
111 PRINT SPC(44)"A. SHIFT-CLR ERASES GARB
    AGE"
112 PRINT SPC(4)"B. CTRL-D LISTS 1-KEY DOS
     COMMANDS"
113 PRINT SPC(4)"C. CTRL-P CHANGES TEXT CO
    LOR"
114 PRINT SPC(4)"D. F1 SAVES WINDOW"
115 PRINT SPC(4)"E. F3 PRINTS WINDOW"
116 PRINT SPC(4)"F. F5 PRINTS FULL SCREEN"

117 PRINT SPC(4)"G. F7 LOADS A SAVED WINDO
    W"
12Ø PRINT SPC(42)"2.PRESS CTRL-C TO CLOSE
    WINDOW."
13Ø PRINT SPC(82)"3.PRESS RUN/STOP-RESTORE
     TO DISABLE."
14Ø PRINT SPC(82)"4.TO RE-ENABLE, ENTER SY
    S 51Ø72.":SYS51Ø72
15Ø NEW
```

Slight changes in the SPC( ) entries of lines 100, 110, 120, 130 and 140 make room for the new lines 111–117 above. Now all functions appear on the menu, indented to show that they are executed inside the opened window.

—Frank S. Ruark, Winston-Salem, NC

16. Programs—Useful Applications

Universal Note-Maker

You can make a mini word processor by entering text as program lines. Use a Poke to remove the line numbers when you're ready to print out or to just display it on the screen. First type in your message just like a Basic program, with line numbers. Don't worry about syntax; just don't begin your lines with REM. The following line works with the C-64, Plus/4 and C-16, but you cannot use shifted characters in this "word processor", since Basic will ignore them.

```
POKE22,35:OPEN4,4:CMD4:LIST:PRINT#4:CLOSE4:POKE22,25
```

For the C-128, change the values to POKE24,37 and POKE24,27, respectively.

—Mark A. Hermann, Park Ridge, IL

Guitar-Tuning Aid

This C-64 program produces reference tones by which to adjust the string tensions on your guitar. Each reference tone continues to sound until you press the space bar for the next tone.

```
1Ø PRINT"{SHFT CLR}C-64 GUITAR TUNING AID
   - J.R.CHARNETSKI"
2Ø FORI=1TO6:READL(I),H(I):NEXT
3Ø R=54272:FORI=RTOR+23:POKEI,Ø:NEXT
4Ø POKER+5,1Ø2:POKER+6,1Ø2:POKER+24,15
5Ø PRINT"{2 CRSR DNs}PRESS{CRSR DN}"
6Ø PRINT"ANY KEY TO TURN SOUND ON OR OFF"
7Ø PRINT"SPACE BAR FOR NEXT STRING SOUND"
8Ø PRINT"ANY FUNCTION KEY TO END PROGRAM"
9Ø GET A$:IF A$=""THEN9Ø
```

```
ØØ POKER+4,Ø
 1Ø IFA$=CHR$(32)THENI=I+1:GOTO14Ø
 2Ø IFA$>CHR$(132) AND A$<CHR$(141)THENPOK
    ER+24,Ø:END
13Ø IF X THEN X=Ø:GOTO9Ø
14Ø IFI>6THENI=1
15Ø POKER,L(I):POKER+1,H(I)
16Ø POKER+4,33:X=I:GOTO9Ø
17Ø DATA 71,5,12,7,1Ø4,9,142,12,21Ø,15,3Ø,
    21
```

—Joseph R. Charnetski, Dallas, PA

Watching IRA Grow

This short program shows you how your IRA account can grow. It's only an estimate, because interest rates vary over the years. Also, the program uses simple interest added once a year, rather than compound interest, so your IRA will probably earn more than this program indicates.

```
1Ø REM IRA ESTIMATE-DAVID ADAMS
2Ø PRINT"HOW MUCH WOULD YOU LIKE TO"
3Ø INPUT"INVEST YEARLY";A:PRINT
4Ø PRINT"HOW MANY YEARS WOULD YOU"
5Ø INPUT"LIKE TO INVEST YOUR MONEY";X:PRIN
   T
6Ø PRINT"WHAT PERCENT INTEREST WILL"
7Ø INPUT"YOU BE RECEIVING (DECIMAL)";C
8Ø PRINT:PRINT:PRINT"YEAR","BALANCE","INTE
   REST","TOTAL"
9Ø FORZ=1TO39:PRINT"*";:NEXT:PRINT
1ØØ FORY=1TOX:B=A+T:I=C*B:T=B+I:Z=T+Z:L=L+
    I
11Ø PRINTY,B,I,T:NEXT Y
12Ø FORZ=1TO39:PRINT"*";:NEXT:PRINT
13Ø PRINT:PRINT:PRINT"THE TOTAL RECEIVED W
    AS"T
14Ø PRINT"THE TOTAL INTEREST WAS"L
```

—David Adams, Portage, IN

Interesting Figures

If you're speculating on the future value of an investment that accumulates interest at a fixed rate, use this program to calculate the interest on your principal when interest is compounded daily, monthly or quarterly. The program displays the interest and rounds the total (interest and principal) to two decimal places. It works on any computer.

```
1Ø REM INTEREST CALCULATOR-MARIE CHARNETSK
   I
2Ø PRINT"{SHFT CLR}{CRSR DN}IS THE INTERES
   T COMPOUNDED BY"
3Ø INPUT "(D)AY (M)ONTH OR (Q)UARTER";A$
4Ø INPUT"{CRSR DN}ANNUAL INTEREST RATE (AS
    %)";R
5Ø INPUT "{CRSR DN}AMOUNT OF PRINCIPAL";P
6Ø INPUT "{CRSR DN} FOR HOW MANY MONTHS";T

7Ø I=12:IFA$="D"THEN I=365
8Ø IF A$="Q" THEN I=4
9Ø C=R/1ØØ/I:J=T/12*I:S=P
ØØ R=C+1:P=R{UP ARROW}J*P
1Ø T$=MID$(STR$(INT(P/.Ø1+.5)),2)
12Ø T$=LEFT$(T$,LEN(T$)-2)+"."+RIGHT$(T$,2
   )
13Ø PRINT"{CRSR DN}TOTAL INTEREST={CTRL 9}
   "P-S
14Ø PRINT"{CRSR DN}PRINCIPAL+INTEREST= $"T
   $
```

—Marie Charnetski, Plains, PA

Checklist Printer

This handy program makes it easy to create checklists that have the customary box for the check mark before each item. The program's default values give a left margin of 10 and single spacing. I wrote the program for the MPS-803 printer, but if you have a Star printer, remove the first REM in line 35. The box will be slightly smaller. It works on any computer.

```
Ø REM CHECKLIST PRINTER-J.R.CHARNETSKI
1Ø PRINT"{SHFT CLR}"
2Ø A$=CHR$(8):B$=CHR$(255):C$=CHR$(193)
3Ø A$=A$+B$+C$+C$+C$+C$+B$+CHR$(15)+" "
35 REM A$=CHR$(175)+" ":REM FOR STAR PRINT
   ER
4Ø INPUT"HOW MANY ITEMS";N:DIM I$(N)
5Ø FOR J=1TON:INPUT I$(J):NEXT
6Ø M=1Ø:INPUT"LEFT MARGIN";M
7Ø S=1:INPUT"SPACING (1-3)";S:OPEN4,4,7
8Ø FORJ=1TON:PRINT#4,SPC(M)A$I$(J)
9Ø IFS>1THENFORL=2TOS:PRINT#4:NEXT
1ØØ NEXT:INPUT"PRINT IT AGAIN (Y/N)";K$
11Ø IFK$="Y"GOTO8Ø
12Ø CLOSE4
```

—Joseph R. Charnetski, Dallas, PA

17. Programs—Utilities

PET-to-ASCII

Have you discovered to your chagrin that non-Commodore computers do not appreciate receiving PETASCII character codes sent by modem? Try using this short program to convert your sequential text files to standard ASCII before you send them to one of those computers.

```
Ø REM PET-TO-ASCII - GREG DIXON
1Ø OPEN2,8,2,"SOURCEFILE,S,R":OPEN5,8,5,"EN
   DFILE,S,W"
2Ø IFEX=64 GOTO 8Ø
3Ø GET#2,Z$:Z=ASC(Z$):PRINTZ$;:EX=ST
4Ø IFZ>192 THEN IF Z<219 THEN Z=Z-128:GOTO6
   Ø
5Ø IFZ>64 THEN IF Z<91 THEN Z=Z+32
6Ø Z$=CHR$(Z):PRINT#5,Z$;
7Ø GOTO2Ø
8Ø CLOSE2:CLOSE5:END
```

—Greg Dixon, North Vancouver, B.C., Canada

Solo Labels

If you need to print just one address label and don't want to bother with loading the database, try this easy-to-use program. Just follow the prompts. Use the run-stop/restore combination when you're finished with the program. ►

Because this is an input/output program, you cannot use commas, colons or semicolons in your data unless you begin the text with quotes. You also have to set your own print tabs for the printer you have (see your printer manual for details).

```
1Ø REM ONE LABEL-MARK GALLOWAY
2Ø INPUT"{SHFT CLR}{CTRL N}{2 CRSR DNs}NAME
   {6 SPACEs}";N$
3Ø INPUT"ADDRESS{3 SPACEs}";AD$
4Ø INPUT"CITY/STATE";CT$
5Ø INPUT"ZIP CODE{2 SPACEs}";ZP$
6Ø PRINT"{2 CRSR DNs}IS THIS CORRECT? (Y/N)
   "
7Ø GET A$:IF A$=""GOTO 7Ø
8Ø IF A$="Y" GOTO 1ØØ
9Ø IF A$="N" GOTO2Ø
1ØØ OPEN 3,4
11Ø CMD3:PRINT:PRINTN$
12Ø PRINTAD$:PRINTCT$"{2 SPACEs}"ZP$
13Ø PRINT#3:CLOSE3:GOTO2Ø
```

—Mark C. Galloway, Bedford Hills, NY

Help-File Reader

In order to print a help screen within a program I was writing, I needed a routine like C-128 GETspeed, but altered so it wouldn't interfere with the program in memory.

I also had to relocate the code so I could use cassette or disk. I chose $1300 (decimal 4864) as the starting location and made these changes to the original program:

```
1Ø REM HELP FILES-RICHARD HERRMANN
2Ø FORI=4864TO4918:READT:POKEI,T:CK=CK+T:N
   EXT
3Ø IFCK<>7665THENPRINT"ERROR":END
4Ø DATA 16Ø,Ø,185,64,19,24Ø,3,2ØØ
5Ø DATA 2Ø8,248,152,162,64,16Ø,19,32
6Ø DATA 189,255,169,5,168,162,8,32
7Ø DATA 186,255,32,192,255,162,5,32
8Ø DATA 198,255,32,2Ø7,255,32,21Ø,255
9Ø DATA 32,183,255,24Ø,245,32,2Ø4,255
1ØØ DATA 169,5,32,195,255,96,ØØ
19999 END
2ØØØØ FOR I=1TOLEN(H$):POKE 4927+I,ASC(MID
      $(H$,I,1)):NEXT
2ØØ1Ø POKE 4927+I,Ø:SYS4864:GETKEY K$:RETU
      RN
2ØØ2Ø REM END FILENAME:CALL ML:WAIT FOR KE
      YPRESS
```

The subroutine at 20000 pokes the filename into memory for the machine language code. Of course, you must run lines 20–100 above before accessing the File Reader subroutine. An example of how to use the program, assuming that you name your help file HELPFILE, is shown below:

```
1000 GETKEY Q$:IF Q$="{CTRL H}" THEN
     H$="HELPFILE":GOSUB20000
```

I hope other readers find this trick as useful as I have.

—Richard Herrmann, Brookhaven, NY

Envelope Addresser

Here's a program to address business-size envelopes. I use it each month when paying bills and sending letters to friends. Once you save the program, load and list it, change the lines to the address you need and save it under a new name. When you run the program, it will print your return address first and then the recipient's address.

```
Ø REM ENVELOPE ADDRESSER-JUDY ROBERTS
1Ø OPEN1,4:CMD1,"";
2Ø PRINT"{SHFT Y}OUR ADDRESS HERE"
3Ø PRINT"{SHFT Y}OUR STREET"
4Ø PRINT"{SHFT C}ITY, {SHFT S}TATE ZIP"
5Ø FORX=1TO8:PRINT:NEXT
6Ø PRINTSPC(3Ø)"{SHFT A}DDRESSEE'S NAME"
7Ø PRINTSPC(3Ø)"{SHFT A}DDRESSEE'S STREET"

8Ø PRINTSPC(3Ø)"{SHFT A}DDRESSEE'S CITY, S
   TATE, ZIP"
9Ø PRINT#1:CLOSE1
```

—Judy Roberts, Phelps, KY

Page Printer

When printing program listings on my MPS-801 printer, I find it difficult to line up the paper so that some line of text isn't cut in half by the perforations. The short program below allows you to set a bottom margin to overcome this problem.

```
1Ø REM PAGE - MICHAEL MYERS
2Ø FORI=531ØØTO53189:READQ:POKEI,Q:CK=CK+Q
   :NEXT
3Ø IFCK<>13Ø39THENPRINT"ERROR IN DATA"
4Ø DATA 169,157,141,38,3,169,2Ø7,141,39,3,
   169,3,133,252,32,253
5Ø DATA 174,32,1Ø7,169,165,2Ø,72,198,252,2
   Ø8,243,1Ø4,141,172,2Ø7,1Ø4
6Ø DATA 141,166,2Ø7,1Ø4,141,148,2Ø7,169,66
   ,133,251,32,253,174,76,164
7Ø DATA 166,2Ø1,13,2Ø8,31,198,251,165,251,
   2Ø1,2,2Ø8,21,138,72,162
8Ø DATA 3,189,192,2Ø7,32,21Ø,255,198,251,2
   Ø8,249,1Ø4,17Ø,173,148,2Ø7
9Ø DATA 133,251,169,13,76,2Ø2,241,141,1Ø,1
   Ø
```

To use the new page lister, use the following syntax:

OPEN4,4:CMD4:SYS53100,page length,bottom margin,device number,range

The Open and CMD statements are only required for output to the printer. The page length should be from two to 66 lines, and the bottom margin must be at least one line, but less than the page length. Send the listing to the screen with device number 3, or use your printer's device number for a hard copy. The range is the same as that used after the Basic list command.

To send output to your printer, type PRINT#4:CLOSE4 to clear the channel. You should press run-stop/restore when the listing is finished to restore the pointers used by the Kernal CHROUT routine.

If you want to double-space your listing, use a page length of 2 and a bottom margin of 1.

—Michael Myers, Beardstown, IL

Universal Disk Default

This update to Magic trick $3CE (April 1987) runs on any Commodore computer. The program allows you to relocate

the machine language code to any 15 free bytes in memory. Just change SA to 49152 or 828 in line 5 and save the program.

```
1Ø REM UNIVERSAL DISK DEFAULTER-BEN FROST
2Ø SA=49152:REM CHANGE THIS ADDR
3Ø V1=SA/256
4Ø V2=(V1-INT(V1))*256
5Ø FORT=SATO T+15:READN:POKET,N:NEXT
6Ø POKESA+11,PEEK(816):POKESA+12,PEEK(817)

7Ø POKESA+14,PEEK(818):POKESA+15,PEEK(819)

8Ø POKE816,V2:POKE817,V1:POKE818,V2+2:POKE
   819,V1
9Ø DATA 16Ø,1,162,8,134,186,192,1,2Ø8,3,76
   ,Ø,Ø,76,Ø,Ø
```

—Ben Frost, Edmore, MI

C-128 Checksum List

If you submit your Magic trick program listings to *RUN* in hard copy, it'll help the staff type in the listings if you use the following program to print out checksums:

```
1Ø REM 128 CHECKSUM LIST-LARRY PANKEY
2Ø KEY1,CHR$(147)+"L=VAL(L$):L=L+1Ø:L$=STR
   $(L)"+CHR$(13)+"KEY3,"+CHR$(34)+"LIST"+
   CHR$(34)+"+L$+CHR$(13)"+CHR$(13)
3Ø KEY5,"{4 CRSR UPs}"+CHR$(13)
4Ø KEY7,"{15 SHFT INSTs}PRINT#4,L$"+CHR$(3
   4)+":REM*"+CHR$(13)
5Ø KEY4,"CLOSE4:OPEN4,4:L$="+CHR$(34)+CHR$
   (34)+CHR$(13)+"63999 :"+CHR$(13)+CHR$(1
   47)
6Ø KEY8,"L$="+CHR$(34)+CHR$(34)+":CLOSE4"+
   CHR$(13)+"63999"+CHR$(13)+CHR$(147)
7Ø PRINTCHR$(147):END
```

My program generates checksums for lines starting with 10 and incremented by 10.

Once you have your trick debugged, renumber it. To use the checksum generator, first load and run the 128 Perfect Typist program. Then load and run the checksum generator program, and finally load your trick. Turn your printer on and align the paper, then press F4 to open a file to the printer. Now press F1, F3, F5 and F7 in that order. This will send the first line and the checksum to the printer.

Repeat the sequence until you get an error. This will indicate that all lines are done. Then, press the F8 key to close the printer file. Finally, add the checksums to the trick.

—Larry Pankey, Dana Point, CA

18. Word Processors

RUN Script Default File

Forgetting to give your document a filename when saving it in RUN Script 2.40 makes the program save the file with the default load name, " ", as the filename. Take advantage of this "error" by giving the default load name to a file you use often. Then, to load it, you just have to press F1 and L. When you want to scratch the file from RUN Script, use a question mark as the filename. Just be sure no other single-character filenames are on the disk, or they'll be erased, too.

—Jim Borden, Carlisle, PA

A Simple Thought Processor

If your word processor has a block-move function, as in RUN Script 64 or 128, you already have a simple and easy-to-use thought, or outline, processor. For readers not familiar with this type of word processor, a thought processor organizes your thoughts into a coherent outline. They're particularly useful in writing assignments, such as reports in business and terms papers in English courses, even for writing letters.

First type in each thought as a simple sentence, followed by a blank line. Then use the block-move feature to arrange your sentences in the appropriate order. Now you have an organized outline to work from. It's that easy!

—Ditto and E.T. Bjornsen, Hillsboro, NH

Search and Destroy?

When using your word processor's search-and-replace option, take care to replace only what you really want. You could, for example, use the letters US throughout a document for United States and later replace the abbreviation with the complete spelling. However, some word processors will find both upper- and lowercase versions. So it's possible you might replace "must" with "mUnited Statest". To prevent this, use an unusual combination, such as u1s or u*s. This should ensure that you do not destroy any text you don't want to replace.

—Jeremy A. Michele, Big Timber, MT

RUN Script 128 Magic

I'd like to share two undocumented features of RUN Script 128 with other readers.

To toggle in and out of Insert mode, press the tab key instead of using the CTRL/I combination.

The short file below prints both the return address and the destination address on a small envelope. To print on a business envelope, change the sixth line to .el8.l + 45.

```
.cm "env address"
.lm3.tm1. + 30
Your name
Your address
Your city state zip
.el6.l + 30
.cm mailing address
RUN Magic
80 Elm St.
Peterborough, NH 03458
```

To enter a new destination address, position the cursor on the first line and press F8 twice to clear to the end. Then enter the new address and print the next envelope.

—John D. Clark, Lutherville, MD

19. Seasonal

Christmas Magic

Season's Greetings! The holiday season is again upon us, and in keeping with the spirit of Christmas, here's a little Yuletide magic. Type in the program, place your monitor ►

on the fireplace mantle or in the bay window, and settle back in your favorite recliner with a hot toddy to watch the action!

```
1 REM CHRISTMAS MAGIC - RICHARD PENN
5 POKE5328Ø,.:POKE53281,.:PRINT"{SHFT CLR}"
  :FORT=1TO23:PRINTTAB(RND(1)*39)"{CTRL 1}.
  ":NEXT
1Ø A$="**********":S=19:PRINT"{HOME}{CRSR
   DN}"TAB(12)"{CTRL 2}MERRY CHRISTMAS!{CRS
   R DN}{CTRL 6}":FORT=1TO11STEP2
2Ø FORL=1TO3:PRINTTAB(S)LEFT$(A$,T):NEXT:S=
   S-1:NEXT:PRINTTAB(19)"*{CRSR DN}{CRSR LF
   }*{CRSR DN}{3 CRSR LFs}*****"
3Ø S=.:DIMF(138):FORT=1Ø24TO2Ø23:IFPEEK(T)=
   42ORPEEK(T)=46THENF(S)=T+54272:S=S+1
4Ø NEXT:S=139:T=15:L=1
5Ø POKEF(S*RND(L)),T*RND(L)+L:GOTO5Ø
```

—Richard Penn, Montreal, Quebec, Canada

Here Comes the Bride

This program is dedicated to all you romantic people out there. After the program ends, press any key to exit Graphic mode.

```
1Ø REM WEDDING RING -JASON HANRAHAN
2Ø GRAPHIC 1,1,24:COLORØ,1:COLOR4,1:COLOR1
   ,8
3Ø FOR X=196 TO 2Ø8:CIRCLE 1,X,125,35,57:
   NEXT
4Ø DRAW 1,2ØØ,68 TO 2Ø8,68 TO 2ØØ,58 TO 19
   6,68 TO 2ØØ,68
5Ø DRAW 1,2Ø8,68 TO 216,48 TO 2ØØ,58
6Ø DRAW 1,2Ø8,68 TO 224,45 TO 216,48
7Ø DRAW 1,196,68 TO 188,48 TO 2Ø4,58
8Ø DRAW 1,196,68 TO 176,45 TO 188,48
9Ø DRAW 1,176,45 TO 192,4Ø TO 188,48 TO 21
   6,48
1ØØ DRAW 1,192,4Ø TO 2Ø2,48 TO 212,4Ø TO21
    6,48
11Ø DRAW 1,192,4Ø TO 212,4Ø
12Ø DRAW 1,212,4Ø TO 224,45
13Ø GETKEY A$:GRAPHICØ
```

—Jason Hanrahan, Whitetail, MT

White Christmas

This program plays a C-64 version of Irving Berlin's White Christmas and simultaneously produces a screen display that simulates falling snow.

```
1Ø REM WHITE CHRISTMAS-J.R.CHARNETSKI
2Ø POKE5328Ø,5:POKE53281,Ø:PRINT"{SHFT CLR
   }{CTRL 2}"
3Ø S=54272:FORI=STOS+23:POKEI,Ø:NEXT
4Ø POKES+24,15:POKES+5,9:POKES+6,9:FORJ=1T
   O68:READHF,DU:CS=CS+HF+DU:POKES+1,HF
5Ø POKES+4,17:FORE=ØTO28*(DU+1)
6Ø IFD=XTHENPRINT"{HOME}{CRSR DN}";SPC(RND
   (1)*38+1);".{HOME}{CRSR DN}{CRSR LF}"CH
   R$(148):POKE218,156:X=X+1Ø
7Ø NEXT:POKES+4,16:X=Ø:NEXT:POKES+24,Ø
8Ø IFCS<>6422THENPRINT"DATA ERROR":END
9Ø PRINT"{SHFT CLR}MERRY CHRISTMAS!!!"
1ØØ DATA 84,3,89,,84,,79,,84,,89,3,94,
11Ø DATA 1ØØ,3,112,,126,,134,,15Ø,,134,
12Ø DATA 126,,112,,1ØØ,5,67,,75,,84,1
13Ø DATA 84,1,84,,112,1,1ØØ,,67,1,67,1
14Ø DATA 67,,1ØØ,1,89,,84,2,84,,89,,84,
15Ø DATA 75,,67,,75,5,84,3,89,,84,,79,
16Ø DATA 84,,89,3,94,,1ØØ,2,112,,126,
17Ø DATA 134,,15Ø,,134,,126,,112,,1ØØ
18Ø DATA 5,67,,75,,84,1,84,1,84,,112,1
19Ø DATA 1ØØ,,134,5,67,,75,,84,1,84,1
2ØØ DATA 112,,63,,63,1,63,,67,5
```

—Joseph R. Charnetski, Dallas, PA

Jingle Bells

My program plays a lively C-64 version of this song by J. S. Pierpont.

```
1 REM C-64 JINGLE BELLS-J.R.CHARNETSKI
2 A$="GGGGGGGO>BGIIIIIGGGGBBGBOGGGGGGGO>BG
  IIIIIGGGOOIB>6GB>666GB>99IGB<OOIBG6G"
3 B$="B>666GB>99IGBOOOOUOIB>OGGGGGGGO>BGII
  IIIGGGGBBGBOGGGGGGGO>BGIIIIIGGGOOIB>"
4 C$="BBDBBDBBCAHBBCABBCABBBBDDBBDBBDBBCAH
  BBCABBCABBBBHBBBBGABBBBHBBBBHBBBBHBB"
5 D$="BBGABBBBHBBBBBBCABBBBDDBBDBBDBBCAHBB
  CABBCABBBBDDBBDBBDBBCAHBBCABBCABBBBH"
6 A$=A$+B$:D$=C$+D$:W=54272:FORI=WTOW+23:P
  OKEI,Ø:NEXT:POKEW+5,9:POKEW+24,15
7 FORI=1TO144:POKEW+1,ASC(MID$(A$,I,1))-29
  :POKEW+4,33
8 FORJ=1TO1ØØ*(ASC(MID$(D$,I,1))-64):NEXT:
  POKEW+4,32:NEXT:POKEW+24,Ø
```

—Joseph R. Charnetski, Dallas, PA

20. Miscellaneous

Printer Space

If you need more desk space around your printer, place a low-cost letter tray upside down and set the printer atop it. Store the fanfold paper underneath the letter tray—you've just found yourself almost 100 square inches of desk space.

—Michael Lenoski, Tucson, AZ

Easy-Access DIP Switches

When I use my Card? +G interface with my software, I frequently need to change the positions of interface switches 7 and 8 on the circuit board, and the board has to be removed each time to make the change.

I solved this annoying problem by soldering flexible wires to these switches on the bottom of the circuit board and bringing them out to miniature SPST switches mounted in a small box outside the interface. I also mounted another SPST switch to control power from the cassette port to the interface.

Now, when I load a program and find that one or both switches need to be changed, I just change the SPST switches. Be *sure* you turn the SPST power switch off before flipping the other switches, and then on again afterwards.

—F. C. Horn, Jekyll Island, GA ■

COMMODORE SERVICE CENTERS

In the following pages, you'll find the latest official list of Commodore Service Centers. They are all arranged alphabetically by state, and alphabetically by city within each state. Bring any errors or omissions to our attention by calling RUN *editorial, free, at 800-441-4403.*

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Birmingham, AL 35206
205-591-3150

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207 Loehmanns Village
Birmingham, AL 35244
205-988-0003

Sequential Systems, Inc.
1420 Glenn St. SW
Decatur, AL 35603
205-355-9273

Video, Etc.
5 Boll Weevil Plaza, 84 Bypass
Enterprise, AL 36331
205-393-4138

T.C. Electronics
Highway 36W PO Box 1129
Hartselle, AL 35640
205-773-1077

Abax Data Systems
2806B S. Memorial Parkway
Huntsville, AL 35801
205-536-7292

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Mobile, AL 36608
205-645-0807

Mall Tel Communications
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Tuscaloosa, AL 35401
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Wasilla, AK 99687
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Flagstaff, AZ 86001
602-774-0307

A2D Electronix
5119 W. Thunder Bird Rd.
Glendale, AZ 85306
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Mesa, AZ 85201
602-834-4686

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Phoenix, AZ 85014
602-230-1888

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4130 N. 75th Ave., #105
Phoenix, AZ 85033
602-849-4795

Phoenix Shaver & Electronics Center
1808 N. Central Ave.
Phoenix, AZ 85004
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Entech (Dynacor, Inc.)
4401 S. 36th St.
Phoenix, AZ 85040
602-445-7646

J & M Computer Service
Highway 89 N. Granite Dells
Prescott, AZ 86313
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Shav-tronics
5110 S. Rural Rd.
Tempe, AZ 85285
602-838-4306

DJ's Electronics
5441 E. Pima St.
Tucson, AZ 85712
602-326-6174

ARKANSAS

Dugger's Custom Printing
203 S. Main St. PO Box 351
Bald Knob, AR 72010
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Bentonville, AR 72712
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Hot Springs, AR 71913
501-767-0248

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Jonesboro, AR 72401
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Little Rock, AR 72209
501-568-8023

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Texarkana, AR 75502
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1494 Solano Ave., Suite 4
Albany, CA 94706
415-527-9619

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Alhambra, CA 91803
818-282-1114

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1130A N. Kraemer Blvd.
Anaheim, CA 92806
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Commerce, CA 90040
213-722-0803

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Concord, CA 94520
415-827-1555

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Costa Mesa, CA 92626
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3209 S. Brea Canyon Rd., Suite A
Diamond Bar, CA 91765
714-594-2641

DES Computer Repair Co.
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Downey, CA 90241
213-923-9361

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Escondido, CA 92025
619-480-4422

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Valley, CA 92708
714-775-2495

Microcomputer Service Network
3849 Peralta Blvd., Suite A
Fremont, CA 94536
415-797-4724

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Hollywood, CA 90038
213-851-2226

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Huntington Beach, CA 92647
714-841-1355

Cirvis, Inc.
5082 Bolsa Ave., Suite 112
Huntington Beach, CA 92649
714-891-2000

Century Computer Systems
1040 E. Whittier Blvd.
La Habra, CA 90631
213-694-8426

Electronix Extraordinaire
43019 Bloomingpark St.
Lancaster, CA 93536
805-943-8797

Tad Electronics Service
44920 N. Beech Ave.
Lancaster, CA 93534
805-949-6056

Delta Computers
104 N. School, Suite 218
Lodi, CA 95240
209-369-9081

Computer Clinic
1500 E. Chestnut Court, Suite A
Lompoc, CA 93436
805-736-9727

Sunrise Electronics, Inc.
10439 Los Alamitos Blvd.
Los Alamitos, CA 90720
213-598-9525

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Los Angeles, CA 90036
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Los Angeles, CA 90034
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Ken's Computer
25856 Muirland Blvd.
Mission Viejo, CA 92691
714-472-0965

Star Computers
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Morro Bay, CA 93442
805-772-7827

Skyles Electric Works
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Mountain View, CA 94041
415-965-1735

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Mount Shasta, CA 96067
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National City, CA 92050
619-477-3106

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Oceanside, CA 92054
619-433-4119

Associated Electronic Service
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Ternes Office Equipment
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Petaluma, CA 94952
707-762-3556

User's Depot (Datatex, Inc.)
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Pinole, CA 94564
415-724-2067

Golden West Systems
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Porterville, CA 93257
209-781-6700

Second Source Engineering
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Rancho Cordova, CA 95670
916-635-3725

Vic's TV & Computer Service
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Brown Knows Computing, Inc.
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Redlands, CA 92373
714-798-4937

On Line Computer Repair
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Reseda, CA 91335
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Riverside, CA 92503
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Rohnert Park, CA 94928
707-584-4040

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N. Salinas, CA 93907
408-449-8800

Bit Zero
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San Bernardino, CA 92405
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Computer Nook, Inc.
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San Bernardino, CA 92408
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Stockton, CA 95207
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213-696-6250

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Colorado Springs, CO 80907
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DMA Digital Computer System
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Colorado Springs, CO 80903
303-475-2490

Danin Electronics
1619 W. Colorado Ave.
Colorado Springs, CO 80904
303-633-0459

Computer Hospital
1604 E. 17th Ave.
Denver, CO 80218
303-321-6221

SERVICE CENTERS

AB & K Services, Inc.
1459 S. Pearl St.
Denver, CO 80210
303-777-4408

Micro Doctor
1655 Central St.
Denver, CO 80211
303-458-6713

Colorado Showpiece
2839 Hartford Ave.
Grand Junction, CO 81503
303-245-6082

Electronic Service Center of Greeley
1228 8th Ave.
Greeley, CO 80631
303-353-5252

Micro World Electronix
3333 S. Wadsworth Blvd.
Lakewood, CO 80227
303-987-9531

Advanced Computer Service
1531 N. Lincoln Ave.
Loveland, CO 80537
303-663-0172

Hytech Service Center
3706 W. 72nd Ave.
Westminster, CO 80030
303-427-5561

CONNECTICUT

Video Connection
45 Ronal Drive
Berlin, CT 06037
800-624-6555

Chetlen's Serve-A-Set
2615 Fairfield Ave.
Bridgeport, CT 06605
203-335-2893

Computer Development Systems
63 North St.
Bristol, CT 06010
203-583-5993

Multi Business Computer Systems
136 Berlin Rd.
Cromwell, CT 06416
203-635-3568

JRB Enterprises, Inc.
31 Main St.
Danielson, CT 06239
203-774-0291

Software Kingdom, Inc.
838 Silver Lane
East Hartford, CT 06118
203-627-8180

New Haven Appliance
1627 Dixwell Ave.
Hamden, CT 06514
203-288-6229

JRB Enterprises, Inc.
Route 12, Box 365C
Lisbon, CT 06351
203-376-0553

Terry's Electronic Service
111 Quinnipiac Ave.
North Haven, CT 06473
203-787-1128

Tricom Computers
Route 6, Airport Plaza
North Windham, CT 06256
203-456-8535

Academy Electronic & Sound Systems
812 W. Thames St.
Norwich, CT 06360
203-887-0595

Personal Computer Center
16 Franklin St.
Norwich, CT 06360
203-886-2073

Petzold's Electronics, Inc.
255 Bank St.
Seymour, CT 06483
203-888-0170

Computer Doctor
816 E. Main St.
Stamford, CT 06902
203-348-9826

Computer Outlet
Plaza 83, Route 83
Vernon, CT 06066
203-872-2667

Electronic Service Corp.
501 Post Rd.
E. Westport, CT 06880
203-227-7291

DELAWARE

Products Plus, Inc.
377 W. N St.
Dover, DE 19901
302-734-1519

AMS Service Center
1 Lore Ave.
Wilmington, DE 19809
302-764-7768

DISTRICT OF COLUMBIA

Computer Clinic Center, Inc.
4517 Wisconsin Ave. NW
Washington, DC 20016
202-362-9702

FLORIDA

Computer Base of Brandon
222 Oakfield Drive
Brandon, FL 33511
813-681-9020

Harrison Communication
603 Brenda Drive
Brandon, FL 33511
813-685-3375

M.S.I. Business Systems
416 W. Broad St.
Brooksville, FL 33512
904-799-7700

Latham's TV
Route 2, Box 345A
Crestview, FL 32536
904-682-1001

Data Base
8962 State Rd. 84
Davie, FL 33324
305-474-3355

National Business Machines
231 S. Florida Ave.
Deland, FL 32721
904-736-1122

Glidden Electronics, Inc.
1548 N. Woodland Blvd.
Deland, FL 32720
904-724-9278

Newton's Radio & TV
2201 NE 2nd Ave.
Delray Beach, FL 33444
305-278-1414

Bytes Computer Service, Inc.
3733 NW 16th St.
Fort Lauderdale, FL 33311
305-791-6678

Brocato Computer Care
13663 McGregor Village, #17
Fort Myers, FL 33907
813-482-6077

Random Access Computers
298 N. Elgin Parkway
Fort Walton Beach, FL 32548
904-862-7763

Florida Book Store
1614 W. University Ave.
Gainesville, FL 32604
904-376-5606

Compu-A-Shoppe
1103 N. Main St.
Gainesville, FL 32601
904-375-0339

A.L.A. Computer Lab
808 Tarpon Terrace
Harbor Heights, FL 33950
813-625-0574

A1 Computer Service Center
2019 Harrison St.
Hollywood, FL 33020
305-923-5115

AA Computers
9394 Arlington Expressway
Jacksonville, FL 32211
904-724-7499

AA Computers
6001-55 Argyle Forest Blvd.
Jacksonville, FL 32244
904-771-2437

AA Computer Exchange
2726 Park St.
Jacksonville, FL 32205
904-388-6520

Computer City
303 Margaret St.
Key West, FL 33040
305-294-3538

Mobile Home Computer Repair
918 Park Ave., D
Lake Park, FL 33403
305-842-6313

Electronic City
233 Interlake Blvd.
Lake Placid, FL 33852
813-465-4372

Harris Systems
4130 10th Ave. N.
Lake Worth, FL 33461
305-967-9222

SOS Computer
13850 Walsingham Rd.
Largo, FL 33544
813-581-3040

Microcomputer Center
2980D E. Bay Drive
Largo, FL 33541
813-531-2614

Lloyd Electronics
Highway 59, Interstate 10
Lloyd, FL 32337
904-997-4070

AA Computer Center, Inc.
370 N. Highway 17-92
Longwood, FL 32750
305-331-1200

Pro-Tech Services
1620 E. 9th St.
Lynn Haven, FL 32444
904-265-4334

Computer Specialties
7705 Technology Drive
Melbourne, FL 32940
305-725-6574

Computer Image
10055 Sunset Drive
Miami, FL 33173
305-477-9019

Latta TV & Video, Inc.
11347 S. Dixie Highway
Miami, FL 33156
305-235-1771

Creative Equipment
6864 W. Flagler St.
Miami, FL 33144
305-261-7866

New Age Technologies, Inc.
32218 U.S. Highway 441, Suite 1
Mount Dora, FL 32757
904-383-3882

Miami Appliance
18755 W. Dixie Highway
North Miami Beach, FL 33180
305-931-6066

Cross Country Computer, Inc.
Westwood Square
830 Eyrie Drive
Oviedo, FL 32765
305-365-1176

Gulf Coast Computer Electronics, Inc.
674 W. 23rd St.
Panama City, FL 32405
904-763-1202

Pensacola Computer Repair
44 Flynn Drive
Pensacola, FL 32507
904-453-5572

Computer Bar
3300 N. Pace Blvd.
Pensacola, FL 32505
904-438-4118

Advanced Video Tech, Inc.
1310 S. Dixie Highway, Suite 18W
Pompano Beach, FL 33060
305-785-2490

Computer Trends
6806 Ridge Rd.
Port Richey, FL 33568
813-847-4914

Force Technologies, Inc.
1587 S. Niemeyer Circle
Port St. Lucie, FL 33452
305-337-0333

Office World
1242 Whitfield Ave.
Sarasota, FL 34243
813-753-6779

Computers Plus
(Soft Byte Solutions Corp.)
2355C S. Ridgewood Ave.
South Daytona, FL 32019
904-756-2983

New Age Electronics
2311 28th St. N.
St. Petersburg, FL 33713
813-323-8389

Computer Supply Mart
2810 Scherer Drive, Suite 100
St. Petersburg, FL 33702
813-576-1070

Education Computers, Etc.
1651 N. Monroe St.
Tallahassee, FL 32303
904-681-0786

►

SERVICE CENTERS

Computer Corner
1511B E. Fowler Ave.
Tampa, FL 33612
813-977-1280

Computer Base Enterprises
3643 S. Westshore Blvd.
Tampa, FL 33629
813-831-4763

Technical Services National, Inc.
4010 State St.
Tampa, FL 33609
813-872-5625

Computer Repair Service, Inc.
2199 Garden St.
Titusville, FL 32796
305-267-4655

Authorized TV Service, Inc.
605 6th St. SE
Winter Haven, FL 33880
813-294-1522

GEORGIA

Athens Microcomputers Clinic
2173 W. Broad St.
Athens, GA 30606
404-549-0337

The 64 Store (A & S Software)
2969C Cobb Parkway
Atlanta, GA 30339
404-952-6625

Computer Shoppe, Inc.
4015 Washington Rd.
Augusta, GA 30907
404-868-8911

Computer Systems, Inc.
1801 Wynnton Rd.
Columbus, GA 31906
404-324-7000

Lanier Electronics, Inc.
115 Merchant Square
Cumming, GA 30130
404-889-3858

Cardinal Computers
903 N. Glenwood Ave.
Dalton, GA 30720
404-226-0502

Acom Corp.
3042 Oakcliff Rd.
Doraville, GA 30340
404-451-8455

Ampex Systems
6433 Warren Drive
Norcross, GA 30093
404-263-9190

Harris TV
1 E. Montgomery Cross Rd.
Savannah, GA 31406
912-927-2084

Computer Command
2910B N. Ashley St.
Valdosta, GA 31602
912-244-2108

B & W Enterprises
1931 Memorial Drive
Waycross, GA 31501
912-285-7286

HAWAII

J & C Repair
98-027 Hekaha Building 3, Unit 11
Aiea, HI 96701
808-488-4994

Computer Store, Inc.
291 Keawe St.
Hilo, HI 96720
808-969-1166

Logical Data Systems, Inc.
333 Ward Ave.
Honolulu, HI 96814
808-526-1196

Servco Pacific, Inc.
2850B Pukoloa St.
Honolulu, HI 96819
808-834-7627

Otsuka Sales & Service, Ltd.
1624 Kuhio Highway
Kapaa, HI 96746
808-822-7766

Kauai Electronics, Inc.
4259 Halenani St.
Lihue, HI 96766
808-245-6413

IDAHO

Technicom Service Center
2309 Mt. View Drive, Suite 175
Boise, ID 83706
208-375-0282

ABI Video
1732 W. State St.
Boise, ID 83702
208-465-7515

Digital Doohickeys, Inc.
1725 W. Broadway St.
Idaho Falls, ID 83402
208-529-5830

ILLINOIS

Digital World, Inc.
711 Army Trail Rd.
Addison, IL 60101
312-628-9222

Call-Tech, Inc.
505 W. Golf Rd.
Arlington Heights, IL 60005
312-956-7135

Rex Service Co.
1125 S. Arlington Heights Rd.
Arlington Heights, IL 60005
312-952-1661

Modern Management Consultants
620 W. Park
Aurora, IL 60506
312-892-9898

B-A Business Computers
150 Houston St., Suite 308
Batavia, IL 60510
312-879-2350

Kappel's Computers
125 E. Main
Belleville, IL 62220
618-277-2354

In Service, Inc.
765 Route 83, Suite 114
Bensenville, IL 60106
312-860-9822

Keepin' Pace Computers
1510 N. Neil St.
Champaign, IL 61820
217-356-1883

Rex Service Co.
6011 S. Pulaski Rd.
Chicago, IL 60629
312-448-5558

Rex Service Co.
6450 N. Milwaukee Ave.
Chicago, IL 60631
312-792-2575

Ken's Electronics
12200 N. Brentfield Drive
Dunlap, IL 61525
309-243-9940

Software or Systems
5900 N. Illinois
Fairview Heights, IL 62208
618-624-2211

JFE Computers
RFD 2, Box 262
Geneseo, IL 61254
309-944-3412

Rex Service Co.
18666 S. Dixie Highway
Homewood, IL 60430
312-799-7800

Newingham's Office Equipment
110 S. State St.
Jerseyville, IL 62052
618-498-2646

Ideal Computer Systems
101 S. Schuyler Ave.
Kankakee, IL 60901
815-935-8505

Rex Service Co.
721 E. Roosevelt
Lombard, IL 60148
312-495-4545

Dan's TV
6905 Elm Ave.
Loves Park, IL 61111
815-633-5579

Computer Clinic
195 S. State St.
Manhattan, IL 60442
815-478-4995

Service Network, Inc.
Lourdes Rd., RR 5
Metamora, IL 61548
309-383-4143

Basic Software Shop, Inc.
4734 W. 147th St.
Midlothian, IL 60445
312-385-8435

O'Rourke Brothers Distributors
1909 5th Ave.
Moline, IL 61265
309-762-7936

Diversified Electronic Service
5915 Lincoln Ave.
Morton Grove, IL 60053
312-470-1600

Memory Expansion
309 W. Beaufort, Suite 8
Normal, IL 61761
309-454-7110

Davis Computer Services
448 N. Rocky Hollow
Oregon, IL 61061
815-732-7380

Rex Service Co.
14600 S. LaGrange Rd.
Orland Park, IL 60462
312-349-8300

Warren Radio Co.
800 SW Jefferson St.
Peoria, IL 61605
309-674-5998

Ken's Electronics
1507 E. Mossville Rd., Route 4
Peoria, IL 61615
309-243-9940

R/D Computer Sales & Service
1622 4th St.
Peru, IL 61354
815-223-0102

Video Service
1312 N. 24th
Quincy, IL 62301
217-223-2323

Sound Clinic & Video Lab
3840 Broadway
Rockford, IL 61108
815-398-0560

KNW Radio & Television
1011 E. 162nd St.
South Holland, IL 60473
312-331-1214

Beatty Televisual, Inc.
1287 Wabash Ave.
Springfield, IL 62704
217-787-4855

Computer Tutor, Inc.
1410 S. MacArthur Blvd.
Springfield, IL 62704
217-789-7164

Unique Computer Shop
1411 E. 4th St.
Sterling, IL 61081
815-625-5018

Keyboard Studio
304 N. Maple, #203
Urbana, IL 61801
217-328-3975

Illini TV
1403 E. Washington
Urbana, IL 61801
217-328-3600

Software Plus Corp.
731 W. Dundee
Wheeling, IL 60090
312-520-1717

Rex Software Co.
7030 W. 111th St.
Worth, IL 60482
312-448-5558

INDIANA

TSC Service Corp.
303 N. Curry Pike
Bloomington, IN 47401
812-334-0411

Eastern International, Inc.
938 S. Morton St.
Bloomington, IN 47401
812-333-1784

Dave's Computer World
107 W. 3rd St. PO Box 218
Brookston, IN 47923
317-563-3504

Computer Works
910 S. Rangeline Rd.
Carmel, IN 46032
317-848-0123

Delta I Computer Center
211 Broadway
Chesterton, IN 46304
219-926-4840

SERVICE CENTERS

Computer Exchange
105 N. Green River Rd.
Evansville, IN 47715
812-473-5020

Bytrex, Inc.
5958 Stellhorn Rd.
Fort Wayne, IN 46815
219-485-7511

Computer Corner
6720 E. State Blvd.
Fort Wayne, IN 46815
219-493-6505

Miller Corp.
2004-2006 45th St.
Highland, IN 46322
219-924-2707

Electronic Services
515 N. Jefferson St.
Huntington, IN 46750
219-356-2070

ICM Corp. (Impair)
4812 E. Michigan St.
Indianapolis, IN 46201
317-783-6167

AVC Corp.
2702 Applegate St.
Indianapolis, IN 46203
317-783-6167

Micro Computers, Inc.
3350 N. High School Rd.
Indianapolis, IN 46224
317-291-8882

American Consolidated Electronics
2802 Lafayette Rd.
Indianapolis, IN 46222
317-926-5337

Spectrum Sound, Inc.
3533 W. 30th St.
Indianapolis, IN 46222
317-923-7868

Bill Kellar Computer Service
9535 E. 24th St.
Indianapolis, IN 46229
317-897-2619

Computer Center
417 Main St.
Jasper, IN 47546
812-634-1550

Bob Hahn TV
1411 N. 14th St.
Lafayette, IN 47904
317-742-2064

Von's Computers
318 W. State St.
Lafayette, IN 47906
317-743-4041

Computer Corner
1044 N. Baldwin Ave.
Marion, IN 46952
317-662-7160

Quality TV Service
39 N. St. Clair
Martinsville, IN 46151
317-342-4198

Computer People, Inc.
900 Highway 212
Michigan City, IN 46360
219-879-8557

Microworld, Inc.
108 E. Main St.
North Manchester, IN 46962
219-982-7219

CBM Service Center
300 W. Lincoln Highway
Schererville, IN 46375
219-322-3004

Michiana Business Machines
1117 Mishawaka Ave.
South Bend, IN 46615
219-287-2348

Alpha Electronics
905 Portage Ave.
South Bend, IN 46616
219-234-6689

Burkat Computer Center
3105 Mishawaka Ave.
South Bend, IN 46615
219-287-3344

IOWA

EMC
1630 State St., Suite 4
Bettendorf, IA 52722
319-359-7497

Pratt Audio Visual & Video Corp.
200 3rd Ave. SW
Cedar Rapids, IA 52404
319-363-8144

RJS Electronics, Inc.
704 S. 2nd St.
Clinton, IA 52732
319-242-7963

Advanced Computer & Electronics
6538 University Blvd.
Des Moines, IA 50311
515-255-1506

Gronert Computers, Ltd.
4505 Forest Ave.
Des Moines, IA 50311
515-255-0618

Computer Doctors, Inc.
1476 Central Ave.
Dubuque, IA 52001
319-582-9331

Micro Computer Applications
19 S. Center St.
Marshalltown, IA 50158
515-752-8845

Channel One Video, Inc.
1138 E. 9th St.
Muscatine, IA 52761
319-263-4124

Precise Bytes
4639 Lonetree Rd.
Palo, IA 52324
319-851-6231

Executive Computer Systems
925 Pierce St.
Sioux City, IA 51101
712-277-8223

Sky Shepard Software
RR 2, 318 Nevada St.
St. Charles, IA 50240
515-297-2289

KANSAS

Thoroughbred Computers
11 E. 6th Ave.
Emporia, KS 66801
316-342-0221

Micro Media
621 E. 8th
Hays, KS 67601
913-628-6611

Darrel's Electronics, Inc.
102 E. Santa Fe
Holyrod, KS 67450
913-252-3562

Midwest Computer Systems
503 N. Washington
Junction City, KS 66441
913-238-1100

Computype 1123A
Moro St.
Manhattan, KS 66502
913-537-1075

Mid-Kansas Computer
204 W. 6th St.
Newton, KS 67114
316-283-0208

Computer Connection
215 W. Cloud
Salina, KS 67401
913-825-2096

Data Bank Corp.
6700 W. Central St., Suite 100
Wichita, KS 67212
316-942-0225

Radio Shop, Inc.
1211 E. 1st St.
Wichita, KS 67214
316-265-1851

TD Service, Inc.
2033 S. Seneca
Wichita, KS 67213
316-262-1610

KENTUCKY

Corbin Communications
Highway 25 E. Bypass
Corbin, KY 40701
606-523-0528

Business Equipment Distributors
817 Mill St.
Henderson, KY 42420
502-827-9500

Computer Dimensions, Inc.
171 W. Lowry Lane
Lexington, KY 40503
606-277-1458

Factory Electronics
2422 Palumbo Drive
Lexington, KY 40509
606-269-7341

Computer Store
3034 Bardstown Rd.
Louisville, KY 40205
502-456-5011

Woidich Appliance Service
2221 Crittenden Drive
Louisville, KY 40217
502-637-8440

Roddenjon Co.
3920 Dupont Square S.
Louisville, KY 40207
502-897-0561

Acom Corp.
1305 Dunnett Lane
Louisville, KY 40213
502-368-6330

Doc's Electronics Service Center
910 S. Main St.
Nicholasville, KY 40356
606-885-9761

Software Alternative
Route 3, Box 346
Pikeville, KY 41501
606-432-3539

LOUISIANA

Personal Computers
1311 Peterman Drive
Alexandria, LA 71301
318-442-5123

MicroSystems Development
11861 Coursey Blvd.
Baton Rouge, LA 70816
504-295-3555

MISSCO
1835 Riverside St. N.
Baton Rouge, LA 70802
504-387-5131

Software Solutions
7167 Florida Blvd.
Baton Rouge, LA 70806
504-928-2613

BB Computer Service, Inc.
1316 Violet Ave
Bossier City, LA 71112
318-742-6538

Burlet TV & Electronics
1529 Franklin St.
Gretna, LA 70053
504-362-5547

Computer Clinic
108 Rena Drive
Lafayette, LA 70503
318-981-1177

Computer Basics & Electronics
2112 Enterprise Blvd.
Lake Charles, LA 70611
318-439-6888

Tele-Comp Computer Systems
1731 W. Sale Rd.
Lake Charles, LA 70605
318-478-0540

Micro-Lab Electronics
5040 Westbank Expressway
Marrero, LA 70072
504-341-2885

Modern Business Machines
4609 Fairfield St.
Metairie, LA 70006
504-885-5961

Computer Library
322 Danny Park
Metairie, LA 70002
504-455-5330

Image Computer Systems
1010 N. 18th St.
Monroe, LA 71201
318-325-8610

Executec, Inc.
7720 Linwood Ave.
Shreveport, LA 71106
318-687-9113

Smith's Repair Shop
Route 5, Box 10
Slidell, LA 70460
504-641-2358

MAINE

Valley Computers, Inc.
164 Turner St.
Auburn, ME 04210
207-784-1944

Computer Barn, Inc.
Biscay Rd.
Damariscotta, ME 04543
207-563-5000

►

SERVICE CENTERS

Don's Electronic Repair
68 E. Main St.
Fort Kent, ME 04743
207-834-5742

Ayer Electronics
RFD 1, Box 6
New Sharon, ME 04955
207-778-9828

Rod's Consumer Products
6 Cottage Rd.
South Portland, ME 04106
207-767-2724

Comstock Electronics
1160 Old Gilmore Rd.
Starks, ME 04911
207-696-3817

Applied Computer Group, Inc.
208 College Ave.
Waterville, ME 04901
207-873-3317

MARYLAND

Compucats Computer Center
939I Beards Hill Rd.
Aberdeen, MD 21001
301-272-4195

Panaservice, Inc.
516 S. Broadway
Baltimore, MD 21231
301-327-7220

Logical Device Repair
8008 Liberty Rd.
Baltimore, MD 21207
301-922-0773

Professional Micro
100 W. 22nd St.
Baltimore, MD 21218
301-366-0010

Computer Tech Institute
2401A Cleanleigh Drive
Baltimore, MD 21234
301-668-2690

Compudeo
5808 Allentown Way
Camp Springs, MD 20748
301-449-3131

Compuvision
6656 E. Dobbins Rd.
Columbia, MD 21045
301-381-3390

Computer Bar
224 Rock Willow Ave.
Hagerstown, MD 21720
301-791-1278

Computerworld
2112 Philadelphia Ave.
Ocean City, MD 21842
301-289-4111

Buried Treasure, Inc.
5536 Randolph Rd.
Rockville, MD 20852
301-770-6778

Clockwork Computers, Inc.
4612 Holly Ridge Rd.
Rockville, MD 20853
301-924-5509

RW Computers
160 Ritchie Highway
Severna Park, MD 21146
301-544-0727

Baltimore Gas & Electric Co.
2034 Greenspring Drive
Timonium, MD 21093
301-561-2780

Waldorf Computer
Charles County Plaza H
Waldorf, MD 20601
301-843-1005

Advanced Computer Service
68 W. Main St.
Westminster, MD 21157
301-876-7576

MASSACHUSETTS

Com-Pair Computer Repair
70 Essex St.
Andover, MA 01810
617-475-7285

D-Five Associates
19 Crosby Drive
Bedford, MA 01730
617-275-8892

Computer Turnkey Systems
1135 N. Main St.
Brockton, MA 02401
617-588-2766

Digital Rework, Inc.
133 1st St.
Cambridge, MA 02141
617-492-2432

Electronics Associates, Inc.
4 Fletcher St.
Chelmsford, MA 01824
617-256-5588

Commonwealth Computer Group
15 Benton Drive
East Longmeadow, MA 01028
413-525-7404

ServiceWorld, Inc.
280 Irving St.
Framingham, MA 01701
617-872-8700

Northern Electronics, Inc.
495 Worcester Rd.
Framingham, MA 01701
617-875-5507

Validata
32 Mount Farms Mall
Hadley, MA 01035
413-586-7405

Atlantic Systems Electronic
24 Rockland St.
Hanover, MA 02339
617-826-8760

Digital Repair
47 Cameron Rd.
North Falmouth, MA 02556
617-563-2441

Electronics Center
32 Pleasant St.
Northampton, MA 01060
413-586-2270

Tycom, Inc.
503 East St.
Pittsfield, MA 01201
413-442-9771

Berkshire Electronics
274A Wahconah
Pittsfield, MA 01202
413-499-0981

Whalley Computer Associates
549 College Highway
Southwick, MA 01077
413-569-5931

Computer Marketplace, Inc.
1777 Main St.
Tewksbury, MA 01876
617-851-5317

Omnitek Computers International
1300 Main St.
Tewksbury, MA 01876
617-851-4580

The Bit Bucket
1294 Washington St.
West Newton, MA 02165
617-964-3080

DOX Computer Center
320 Main St.
Williamstown, MA 01267
413-458-4420

Baystate Audio Visual & Appliances
1326 Main St.
Worcester, MA 01603
617-753-2995

MICHIGAN

Lenawee Computer
825 W. Beecher St.
Adrian, MI 49221
517-265-7872

RACC Enterprises
8948 M-68
Alanson, MI 49706
616-548-5705

Galaxy Computers, Inc.
7437 Rosedale
Allen Park, MI 48101
313-381-7717

Saylor's Music Studio
10550 E. Cleveland Rd.
Bannister, MI 48807
517-862-4659

Creative Computing, Ltd.
1013 N. Johnson St.
Bay City, MI 48708
517-892-8115

Family Computer Center
3895 12-Mile Rd.
Berkley, MI 48072
313-543-0520

O'Lear Computer Systems, Inc.
G4065 Fenton Rd.
Burton, MI 48529
313-235-0666

National Computer Clinic
G3514 S. Saginaw Rd.
Burton, MI 48529
313-742-7100

Canton Computer, Inc.
5906 Sheldon Rd.
Canton, MI 48187
313-459-4340

Graham's TV & Furniture
417 McEwan St.
Clae, MI 48617
517-386-3429

Edge Connector 124
N. Mill
Clio, MI 48420
313-686-1070

Elect-tronics Center
1305 Woodside Ave.
Essexville, MI 48732
517-895-5915

Alternate Computer Supply
17150 Robbins Rd., Box 289
Grand Haven, MI 49417
616-842-1891

Repair America
1550 Lake Drive SE
Grand Rapids, MI 49506
616-456-8460

Mill Creek Computer Service, Inc.
1000 Three Mile Rd., Suite D
Grand Rapids, MI 49504
616-784-9196

Computerlab, Inc.
307 Michigan NE
Grand Rapids, MI 49503
616-451-3778

Consolidated Enterprises
2715 Bedford Rd.
Hastings, MI 49058
616-945-5330

ESL, Inc.
23309 Dequindre
Hazel Park, MI 48030
313-541-4080

Repair America, Inc.
193 Chicago Drive
Jenison, MI 49528
616-457-4290

Skory TV
4721 W. Saginaw
Lansing, MI 48917
517-323-7122

Skory TV
901 Cleveland St.
Lansing, MI 48906
517-485-9551

Direct Access Computers
2824 N. Grand River
Lansing, MI 48906
517-321-8958

Computer Consignment
5501A S. Cedar St.
Lansing, MI 48911
517-394-4408

Midwest Micro Computer Service
1575 Gray Rd.
Lapeer, MI 48446
313-664-5666

Sterling Electronics, Inc.
1477 Dix
Lincoln Park, MI 48146
313-382-1111

Micro Computer Services, Inc.
15084 Middlebelt Rd.
Livonia, MI 48154
313-427-0102

AAA Electronic Service
28147 W. Eight Mile Rd.
Livonia, MI 48152
313-478-3048

Slipped Disk
31044 John R. St.
Madison Heights, MI 48071
313-583-9803

Lighthouse Computers
6740 S. River Rd.
Marine City, MI 48039
313-765-9656

Electronics Plus
HCR 1, Box 32
Menominee, MI 49858
906-863-6164

SERVICE CENTERS

Computronix Corp.
423 S. Saginaw Rd.
Midland, MI 48640
517-631-8060

Bits Computer Systems, Inc.
218 S. Main St.
Milford, MI 48042
313-684-1119

KD Systems
667 Cooper Ave.
Monroe, MI 48161
313-241-0902

Byte Intellect Co.
3054 E. Hile Rd.
Muskegon, MI 49444
616-777-3784

Byte Intellect Co.
3284 Raffie Rd.
Muskegon, MI 49444
616-773-8869

Computer Time
770 Penniman Ave.
Plymouth, MI 48170
313-453-2202

Dell Service, Inc.
320 E. Centre
Portage, MI 49081
616-327-6736

Phoenix Data Services, Inc.
1685 W. Hamlin Rd.
Rochester, MI 48063
313-852-1333

L & D Radio & TV Service
25933 Gratiot Ave.
Roseville, MI 48066
313-776-8348

Professional Computer Systems
2603 S. Cleveland Ave.
St. Joseph, MI 49085
616-429-9616

Macomb County Radio Repai
33739 King Richard
Sterling Heights, MI 48077
313-978-0351

Roseville Computer Store
15090 13 Mile Rd.
Warren, MI 48093
313-772-0760

Ye Olde Computer Shoppe
516 W. Cross St.
Ypsilanti, MI 48197
313-482-6382

MINNESOTA

Midwest Computer Services
20841 Highway 75
Clearwater, MN 55320
612-558-2844

Computers, Etc.
2133 Cliff Rd.
Eagan, MN 55122
612-452-1308

MCD of Hibbing, Inc.
Mesabi Mall
Hibbing, MN 55746
218-262-5516

H&H TV & Electronics
2625 Louisiana Ave. S.
Minneapolis, MN 55426
612-929-1721

Computer Exercise World
4110 W. Minnetonka Blvd.
Minneapolis, MN 55416
612-920-7500

West Central Computers
131 NW 2nd St.
Ortonville, MN 56278
612-839-6155

Associated Data
5249 W. 134th St.
Savage, MN 55378
612-890-0273

ECS, Inc.
8420 Sunset Rd. NE
Spring Lake Park, MN 55432
612-786-8940

Valiant, Inc. (Computer Division)
224 Commercial
Stillwater, MN 55082
612-439-6743

MISSISSIPPI

Enterprises Unlimited, Inc.
2735 Old Brandon Rd.
Jackson, MS 39208
601-932-3920

Central School Supply
310 Airport Rd.
Pearl, MS 39208
601-932-1901

MISSOURI

Mom & Pop's Computer Shop
RR 2, Box 119
Cainsville, MO 64632
816-872-6311

Instant Replay, Ltd.
14416 S. Outer 40 Rd.
Chesterfield, MO 63017
314-576-0544

Avant Service Center
711 Vandiver Drive
Columbia, MO 65202
314-874-3792

Computer Systems Consultant
3620 Santiago Drive
Florissant, MO 63033
314-838-7701

Electronic Data Associates
12400 Blue Ridge
Grand View, MO 64030
816-966-0669

Systems Plus (Fidelity Television)
12500A E. 40 Highway
Independence, MO 64055
816-373-8984

I Compute
3720 W. Truman Mall Ridge
Jefferson City, MO 65101
314-634-5028

Software Center
804 E. 15th
Joplin, MO 64801
417-624-3844

Hobbs Typewriter Co.
4500 E. 7th
Joplin, MO 64801
417-624-6322

Kansas City Digital Systems
1503 Westport Rd.
Kansas City, MO 64111
816-561-7100

Computer Plus
7186 Manchester Rd.
Maplewood, MO 63143
314-647-3817

Lectroplex
2255 Brookview Lane
Pacific, MO 63069
314-257-5054

Midwest Computers
2140 N. Westwood
Poplar Bluff, MO 63901
314-686-2292

Associated Computer Service
1306 E. Sunshine St.
Springfield, MO 65804
417-887-7373

Babcock Appliance
2608 1/2 Messanie St.
St. Joseph, MO 64501
816-233-2350

Syntax Error, Inc.
2104 St. Joseph Ave.
St. Joseph, MO 64505
816-232-4778

Systems Plus (Fidelity Television)
7435 Watson, 119 Kenrick Plaza
St. Louis, MO 63119
314-961-2323

Data-Byte Computer Co.
9516 Lackland Rd.
St. Louis, MO 63114
314-423-3469

Comm-Tech
3651 N. Lindberg, Suite 10
St. Louis, MO 63074
314-291-0114

Alpha Tech Electronics
1411 S. Big Bend Blvd.
St. Louis, MO 63117
314-645-5250

MONTANA

RAM Electronics
13 S. Tracy
Bozeman, MT 59715
406-586-2408

Computer Resource Center
16800 Mullan Rd.
Frenchtown, MT 59834
406-626-4707

Applegren Computer Systems
1201 10th Ave. S., Suite 107
Great Falls, MT 59405
406-761-5076

Second Byte, Inc.
2005 South Ave. W.
Missoula, MT 59801
406-721-6462

NEBRASKA

Micro Creations
4211 O St.
Lincoln, NE 68510
402-489-9454

Double E Electronics, Inc.
12027 Pacific St.
Omaha, NE 68154
402-334-7870

Cornerstone Business Systems
1408 Harney
Omaha, NE 68102
402-342-2611

NEVADA

Hotel Computers, Inc.
376 W. Sahara Ave.
Las Vegas, NV 89102
702-384-9440

Computer World (ABC Investments)
4110 S. Maryland Parkway, #33
Las Vegas, NV 89109
702-796-1377

Computer House 155
Glendale Ave.
Sparks, NV 89431
702-356-7216

NEW HAMPSHIRE

Electronic Repair Center
Route 16B
Dover, NH 03820
603-749-4707

Cocci Computer Service, Inc.
1191 Daniel Webster Highway N.
Manchester, NH 03104
603-622-1188

D.C. Audio and Video Service
882 Islington St.
Portsmouth, NH 03801
603-964-6318

NEW JERSEY

TKS, Inc.
391 Pompton Ave.
Cedar Grove, NJ 07009
201-239-2190

Dependable Parts
168 Main St.
Chatham, NJ 07928
201-635-5922

Golden Hedge, Inc.
1334 Brace Rd.
Cherry Hill, NJ 08034
609-772-0022

2M Corp.
3 Astro Place
Denville, NJ 07834
201-625-8100

Software Center
372 Highway 18
East Brunswick, NJ 08816
201-257-7778

BBK, Inc.
105 Abbington Drive
East Windsor, NJ 08520
609-443-6196

ACA TV & Electronics, Inc.
2076 Woodbridge Ave.
Edison, NJ 08817
201-985-7000

SR Data
2141 Woodbridge Ave.
Edison, NJ 08817
201-985-5017

Karl's Electronics
40 Darmstadt Ave. RR 3, Box 107
Egg Harbor City, NJ 08215
609-965-0319

Computer Madness, Inc.
270D Route 9
Englishtown, NJ 07726
201-462-9696

Family Computer Center
636 N. Route 46 E.
Fairfield, NJ 07006
201-678-0008 ►

SERVICE CENTERS

Dash Electronics
10 N. 2nd. Ave.
Highland Park, NJ 08904
201-247-5124

Micro-Aide
21401 Oak Tree Rd.
Iselin, NJ 08830
201-283-1914

Telsar Electronics, Inc.
829 Stone Rd.
Laurel Springs, NJ 08021
609-783-8500

Gimm Consultants
190 Route 73
Maple Shade, NJ 08052
609-667-6900

DGL Computer Service Center
63 Woodside Ave.
Midland Park, NJ 07432
201-670-1849

Atom Video & Electronics
100 Ryders Lane
Milltown, NJ 08850
201-745-2700

ESU, Inc.
260 Washington
Newark, NJ 07102
201-676-1800

Repair Tech, Inc.
185 Spring St.
Newton, NJ 07860
201-579-1068

Computer & Software Store
507 9th St.
Ocean City, NJ 08226
609-391-0033

AVECO
777 Route 17
Paramus, NJ 07652
201-652-9222

Z-Tech Corp.
3495 Haddonfield Rd.
Pennsauken, NJ 08110
609-662-0330

One Knight Only TV & Computer
1 Davis Ave.
Pompton Plains, NJ 07444
201-696-0976

Video Connection
900 Easton Ave.
Somerset, NJ 08873
201-545-8733

Business Micro Service, Inc.
Route 37 & Parkwood Ave.
Toms River, NJ 08753
201-929-1212

Atlantic Computer Systems
Ideal Plaza, 224 Route 37 E.
Toms River, NJ 08753
201-240-3101

Quality Electronics
254 Route 37 E.
Toms River, NJ 08753
201-244-2232

Blue Chip Computer Repair
1751 Black Horse Pike
Turnersville, NJ 08012
609-728-9546

Triton Scientific Corp.
2215 Morris Ave.
Union, NJ 07083
201-851-0851

JRM Electronics, Inc.
Route 206, RR 10
Vincentown, NJ 08088
609-859-2106

Jonach Electronics, Inc.
622 Route 10
Whippany, NJ 07981
201-428-9440

NEW MEXICO

Video Mart
1500 N. White Sands
Alamogordo, NM 88310
505-434-4548

New Horizons Computer Systems
1200 N. White Sands
Alamogordo, NM 88310
505-437-9117

Omega Business Products
3275 Candelaria NE
Albuquerque, NM 87107
505-883-4545

Instrument Service Lab
680 Haines Ave. NW
Albuquerque, NM 87102
505-842-1107

Technological Concepts
3700 Paradise Lane
Las Cruces, NM 88005
505-526-6029

NEW YORK

Albany Cash Register Co.
224 Central Ave.
Albany, NY 12206
518-434-6331

Ski Electronics
13879 Allen Rd.
Albion, NY 14411
717-589-7711

Computer Service Group
4005 Sheridan Drive
Amherst, NY 14226
716-839-1139

Computersmith
14 Currie Court
Ballston Spa, NY 12020
518-885-4376

Marty's Electronic Service Center
72 5th Ave.
Bayshore, NY 11706
516-665-5048

Bob's Amp Repair
32 W. State St.
Binghamton, NY 13901
607-723-1057

Computersoft Center, Inc.
175 E. Main St.
Brewster, NY 10509
914-279-5001

Comp-U-Doc, Inc.
1722 Kings Highway
Brooklyn, NY 11229
718-645-1881

Sysut 1 Corp.
2505 Avenue U
Brooklyn, NY 11229
718-743-8303

HMR Television & Data
1949 Bath Ave.
Brooklyn, NY 11214
718-256-9880

Interboro Electronics
4823 Avenue N
Brooklyn, NY 11234
718-252-1380

Prime-Time Electronics, Inc.
7621 13th Ave.
Brooklyn, NY 11228
718-232-7770

Dale Integrated Service
747 Clinton St.
Buffalo, NY 14210
716-845-6060

Island Video & Computer Service
51 Modells Shopping Plaza
Centereach, NY 11720
516-467-4352

Island Video & Computer Service
35 Middle Country Rd.
Coram, NY 11727
516-736-1001

Computerware
2384 Hempstead Turnpike
East Meadow, NY 11554
516-731-7939

Damonics Computer Systems
111 N. Main St.
Elmira, NY 14901
607-732-5122

Electra Tech Audio Video
140-11A Cherry Ave.
Flushing, NY 11355
718-463-1192

Expert Electronics Center
63-56 108th St.
Forest Hills, NY 11375
718-897-6101

Software Center International
114-47 Queens Blvd.
Forest Hills, NY 11375
718-793-8112

CDP Computer Specialties
182 Doris Ave.
Franklin Square, NY 11010
516-328-0419

Roan Electronic
65-56 Fresh Meadow Lane
Fresh Meadow, NY 11365
718-461-1888

Aardvark Electronic Service
44 Castle St.
Geneva, NY 14456
315-789-5295

Ray Supply, Inc.
Upper Glen St., Box 745
Glens Falls, NY 12801
518-792-5848

P & T Computer
74 Middle Neck Rd.
Great Neck, NY 11021
516-487-1130

Island Video & Computer Service
719 E. Jericho Turnpike
Huntington Station, NY 11746
516-271-9060

OHM Electronics, Inc.
609 W. Clinton St.
Ithaca, NY 14850
607-273-8406

Computer Outlet
14 E. 2nd St.
Jamestown, NY 14701
716-487-0176

Software Supermarket
3162½ Delaware Ave.
Kenmore, NY 14217
716-873-5321

Sight & Sound Service Center
603 Waterster Shaker Rd.
Latham, NY 12110
518-785-6004

Latham Eletronics & Appliances
7 Herbert Drive
Latham, NY 12110
518-785-5816

Ray Supply, Inc.
106 E. Main St.
Malone, NY 12953
518-483-3241

Mor Tech Computer Service
Route 49
Marcy, NY 13403
315-724-7964

Star Tech Systems
7 Water St.
Massena, NY 13662
315-764-1560

Systems Repair Co.
61 Maple Ave.
New City, NY 10956
914-634-7596

Computer Doctor
64 Madison Ave.
New York, NY 10016
212-213-8440

Central Ventures
42 E. 33rd St.
New York, NY 10016
212-686-0930

TC Terminals, Inc.
45 West 27th St., 3rd Floor
New York, NY 10001
212-233-6356

Blumenthal's
234 N. Union
Olean, NY 14760
716-375-4608

Ray Supply, Inc.
439 Cornelia St.
Plattsburg, NY 12901
518-561-3870

Dac Data Systems, Inc.
352 Port Washington Blvd.
Port Washington, NY 11050
516-944-5920

Tedrow Business Products
1600 W. Ridge Rd.
Rochester, NY 14615
716-621-5981

Leon's Computer Mart
103 Clinton Ave. S.
Rochester, NY 14604
716-325-2787

Serviceland of Upstate NY
3259 Winton Rd. S.
Rochester, NY 14623
716-427-0880

J & R Electronics
2181 Rome Oriskany Rd.
Rome, NY 13440
315-339-1242

Video Computer Center
407 W. Liberty St.
Rome, NY 13440
315-336-0266

SERVICE CENTERS

Computer Palace
1245 Middle Country Rd.
Selden, NY 11784
516-331-7974

Software City
1474 Hylan Blvd.
Staten Island, NY 10305
718-351-9217

R & Z Service Corp.
40 Broadway
Staten Island, NY 10310
718-448-1424

Working Computer
1320 Stony Brook Rd., Suite 9
Stony Brook, NY 11790
516-689-3102

Computer Emporium
356 Windsor Highway
Vails Gate, NY 12584
914-562-3131

Computer Service Associates
181B Route 94 N.
Warwick, NY 10940
914-986-0233

Amherst Computer Exchange
5687 Main St.
Williamsville, NY 14221
716-626-5111

NORTH CAROLINA

Pegasus Electronics
104 S. Morehead Ave.
Atlantic Beach, NC 28512
919-726-1646

PC Shop
1147 Commercial Ave.
Charlotte, NC 28205
704-373-0553

Software City
901C N. Wendover Rd.
Charlotte, NC 28211
704-366-5218

Southern Photo Technical Service, Inc.
2610 South Blvd.
Charlotte, NC 28209
704-523-0012

TDS Computers
2710 Hillsborough Rd.
Durham, NC 27705
919-286-3775

Computer Solutions
2725 Bragg Blvd.
Fayetteville, NC 28303
919-323-9600

Triad Computers
3402E W. Wendover Ave.
Greensboro, NC 27407
919-299-0391

RCM Electronics, Inc.
219 E. Main St., Suite 2
Havelock, NC 28532
919-447-4355

Computer Alternatives
2035 Highway 64-70 SE
Hickory, NC 28603
704-324-2040

C.A.S.P.E.R. Corp.
124 Harbord Drive
Jacksonville, NC
919-353-1223

Computer Connection
1157 N. Wesleyan Blvd.
Rocky Mount, NC 27804
919-977-6566

Musselwhite TV & Computer
1021 Princess St.
Wilmington, NC 28401
919-762-3329

Triad Computers
3068 Trentwest Drive
Winston-Salem, NC 27103
919-765-0433

NORTH DAKOTA

Ultra Systems, Inc.
408 E. Bowen
Bismark, ND 58501
701-258-2546

Digital Hospital Service Center
221 N. NP Ave.
Fargo, ND 58102
701-280-0067

Computer Clinic
1100 S. Broadway
Minot, ND 58701
701-838-3967

OHIO

Lake's Consumer Electronics
3232 S. Main St.
Akron, OH 44319
216-644-3194

Trans American Electronics
23 S. Broadway St.
Akron, OH 44308
216-384-1516

Infopro
6 E. Main St.
Ashland, OH 44805
419-289-1122

Dale's Color TV & Appliances
2236 N. Cleveland Mass Rd.
Bath OH 44210
216-659-9339

R & M Electronics
5456 S. Market St.
Berlin, OH 44610
216-893-2773

Comtech
1750 Southgate Parkway
Cambridge, OH 43725
614-432-4259

Micro-Sys Computer
2521 NE 34th St.
Canton, OH 44705
216-492-8161

Chillicothe Telephone
68 E. Main St.
Chillicothe, OH 45601
614-772-8238

T.A.B. Service
506 Harrison Lane
Cincinnati, OH 45244
513-528-6983

Alpha Cine Service, Inc.
800 Main St.
Cincinnati, OH 45202
513-621-4293

Ohio Office Machines, Inc.
124 Burkhart Ave.
Cincinnati, OH 45215
513-761-7121

Cinsoft
2235 Losantiville Ave.
Cincinnati, OH 45237
513-396-7638

Warner Electronics, Inc.
1240 Valley Belt Rd.
Cleveland, OH 44131
216-661-0304

Bexley Electronics & TV, Inc.
2733 E. Main St.
Columbus, OH 43209
614-235-0698

Earthrise Micro Systems
1332 Bethel Rd.
Columbus, OH 43220
614-451-1100

Main Office Supply
504 Main St.
Coshocton, OH 43812
614-622-7115

Professional Microcare, Inc.
730 S. Main St., Suite 103
Dayton, OH 45402
513-223-234

Dayprom Computer
3035 Dryden Rd.
Dayton, OH 45439
513-299-1748

RC Video
14887 E. Liverpool Rd.
East Liverpool, OH 43920
216-385-5672

AAA Electronic Service Co.
53 East Ave.
Elyria, OH 44035
216-323-8383

Fairborn Home Computer, Inc.
608 W. Middle St.
Fairborn, OH 45324
513-879-1681

Microwave Magic & Computers
6625 Dixie Highway
Fairfield, OH 45014
513-874-6560

Tri-Con Micro Repair, Inc.
562 Northland Blvd.
Forest Park, OH 45240
513-825-8200

Compucash Business Supplies
13369 Madison Ave.
Lakewood, OH 44107
216-226-3120

B & G Electronics
15729 Madison Ave.
Lakewood, OH 44107
216-521-2855

Lancaster Computer Center
154 W. Main St.
Lancaster, OH 43130
614-654-7667

Lima Computer & Electronics
2133 Elida Rd.
Lima, OH 45805
419-229-1009

Home Electronic Tech
16 Eagle St.
Madison, OH 44057
216-428-6161

First Computer & Software
284 Front St.
Marietta, OH 45750
614-373-9729

Marion Computer Center, Inc.
474 N. Main St.
Marion, OH 43302
614-382-2881

Buckeye Service Co.
610 Chestnut St.
Marysville, OH 43040
513-644-1625

Computer Center at Mentor
7516 Mentor Ave.
Mentor, OH 44060
216-942-4132

Wayne's TV Sales & Service
3309 Mogadore Rd.
Mogadore, OH 44260
216-628-2528

Turner & Wilson, Inc.
214 W. National Drive
Newark, OH 43055
614-323-1213

Basic Computer Systems
Unit 220, Eastwood Mall
Niles, OH 44446
216-652-0056

Valley Micro Computer Sales
227 Youngstown Rd.
Niles, OH 44446
216-652-1477

Spaceage Electronics, Inc.
2966 Barber Rd.
Norton, OH 44203
216-753-3054

Big Bytes
1301 Boardman-Poland Rd.
Poland, OH 44514
216-758-0009

George T. Saxton Associates
1717 E. Perkins Ave.
Sandusky, OH 44870
419-625-8093

Digital Hardware Support
1631 Selma Rd.
Springfield, OH 45505
513-322-8570

Computer Site
14763 Pearl Rd.
Strongsville, OH 44136
216-572-3580

MSI Microtek, Inc.
8370 Dow Circle, Building B
Strongsville, OH 44136
216-234-8040

Quality Computer Applications
555 S. Reynolds Rd.
Toledo, OH 43615
419-536-3646

Walker's Electronic Services
1175 Waldo Way
Twinsburg, OH 44087
216-425-9040

Computers Plus of Ohio
131 W. Wyandot Ave.
Upper Sandusky, OH 43351
419-294-5723

North Coast Programming
35101 Euclid Ave.
Willoughby, OH 44094
216-953-1535

►

SERVICE CENTERS

OKLAHOMA

Colonel Video
500D SE Washington Blvd.
Bartlesville, OK 74006
918-335-0026

Video Computers, Inc.
1030 NW 38th St.
Lawton, OK 73505
405-335-9798

Software Center
306 N. Main
Miami, OK 74354
918-542-6198

Syntec Micro Systems
1108 W. Stovall Rd.
Wilburton, OK 74578
918-465-5675

OREGON

Pacific Electronics, Inc.
1225 E. Pacific Blvd.
Albany, OR 97321
503-928-4462

Video & Software
8118 SW Hall Blvd.
Beaverton, OR 97005
503-224-2220

Computer Service Center at Bend
841 NW Bond
Bend, OR 97701
503-382-7882

Clackamas Computers
16140 SE 82nd Drive
Clackamas, OR 97015
503-650-0379

Mr. Television, Inc.
780 Blair Blvd.
Eugene, OR 47402
503-485-4876

Comm-Shack
3881 River Rd. N.
Keizer, OR 97303
503-393-5472

Sunshine Computer
930 Summit Ave.
Medford, OR 97501
503-773-3608

User's Corner
1133 S. Riverside, Suite 26
Medford, OR 97501
503-773-8868

Russell & Associates
1020 Taylor Building, Suite 660
Portland, OR 97205
503-222-4860

Computron Business Systems
1139 SW 11th Ave.
Portland, OR 97205
503-224-2220

Electromatic, Inc.
6110 NE Union Ave.
Portland, OR 97211
503-282-7751

Microcare, Inc.
1447 NE Sandy Blvd.
Portland, OR 97232
503-230-0770

IB Computers
1519-21 SW Marlow
Portland, OR 97225
503-297-8425

Marv's Video Express
812 W. Harvard Blvd.
Roseburg, OR 97470
503-672-4672

Trace-1 Computer
2524 19th St. SE
Salem, OR 97302
503-364-9771

Computer U.S.E.R.S.
650 Main St.
Springfield, OR 97477
503-726-8500

Computron Business Systems
11705 SW Pacific Highway
Tigard, OR 97223
503-639-6780

PENNSYLVANIA

Alpha Omega Computer Co.
928 Broadhead Rd.
Aliquippa, PA 15001
412-375-4848

Blair Office Equipment
1508 12th Ave.
Altoona, PA 16601
814-944-8485

Digital Solutions, Inc.
1122 9th St.
Altoona, PA 16601
814-944-0405

J.E. Foss Co., Inc.
3328B Industrial Blvd.
Bethel Park, PA 15102
412-831-7460

Data Link, Inc.
608 Washington
Bridgeville, PA 15017
800-445-5465

TRS
1016 Beaver St.
Bristol, PA 19007
215-788-0533

Software Corner
316 N. Main St.
Butler, PA 16001
412-282-1773

Energy Center
Bazaar Shopping Center, Store 417
Clifton Heights, PA 19018
215-623-3911

North Central Digital Systems
800 Continental Blvd.
Danville, PA 17821
717-275-7713

Downingtown Computer Center
719 E. Lancaster Ave.
Downingtown, PA 19335
215-269-3025

Circle Computer Co.
1685 W. Main St.
Ephrata, PA 17522
717-733-7868

Erie Computer Co.
2765 W. 8th St.
Erie, PA 16505
814-838-6386

Parke T. Morrow, Inc.
627 W. 26th St.
Erie, PA 16508
814-455-7566

GIT Computer Center
302 W. Otterman St.
Greensburg, PA 15601
412-838-1641

Digital Doctor
Highland & White Streets
Greensburg, PA 15601
412-832-0140

Basic Computer Systems
2481 E. State St.
Hermitage, PA 16148
412-342-5505

Weniger Electronics, Inc.
645 Main St.
Honesdale, PA 18431
717-253-1110

Triangle Computers
1721 Route 286 W.
Indiana, PA 15701
412-463-1300

MVS Electronics
119 1st St.
Irwin, PA 15642
412-863-9436

Siska's Computers
1715 Scalp Ave.
Johnstown, PA 15904
814-467-6827

Gruss Electronic Repair
Hills Plaza
Johnstown, PA 15904
814-266-1395

Main Street Software
172 Main St.
Landisville, PA 17538
717-898-2946

A.C.H. Electronics
306 N. 1st St.
Leighton, PA 18235
215-377-4617

Software Unlimited
934 Woodburne Rd.
Levittown, PA 19056
215-949-0400

Leslie Dresbold, Inc.
Monroeville Mall
Monroeville, PA 15146
412-371-6575

Peripherals Computer & Supply
2457 Perkiomen Ave.
Mount Penn, PA 19606
215-779-0522

Business Computer Products
3318 Wilmington Rd.
New Castle, PA 16105
412-654-2999

Computer Corner
Routes 63 & 309
North Wales, PA 19454
215-643-5030

Imtech
183 W. Lancaster Ave.
Paoli, PA 19301
215-647-5104

Software Hut, Inc.
2534 S. Broad St.
Philadelphia, PA 19145
215-462-2268

Appliance & Electronics
2010 Levick St.
Philadelphia, PA 19149
215-288-4700

Top-Tech International, Inc.
2344 Perot St.
Philadelphia, PA 19130
215-236-9901

Leslie Dresbold, Inc.
604 Liberty Ave.
Pittsburgh, PA 15222
412-281-8320

Leslie Dresbold, Inc.
2138 Murray Ave.
Pittsburgh, PA 15217
412-421-2445

Leslie Dresbold, Inc.
925 Main St.
Pittsburgh, PA 15215
412-781-1308

Leslie Dresbold, Inc.
S. Hills Village Shopping Center
Pittsburgh, PA 15241
412-563-0330

Leslie Dresbold, Inc.
Parkway Center Mall
Pittsburgh, PA 15220
412-928-8318

Leslie Dresbold, Inc.
3613 Forbes Ave.
Pittsburgh, PA 15213
412-6881-0990

Pittsburgh Computer Store
47 Clairton Blvd.
Pittsburgh, PA 15236
412-655-8220

Delta Electronic Appliance
Box 61
Portersville, PA 16051
412-368-3779

AVJ Computers
High & Hanover Sts.
Pottstown, PA 19464
215-326-9920

Appliances Unlimited, Inc.
E. Neversink Rd.
Reading, PA 19606
215-779-2000

Computers & Games
3326B Plaza Drive
Reading, PA 19605
215-929-0540

Bett TV & Video Service
306 Huntington Pike
Rockledge, PA 19111
215-663-0590

Keystone Electronics
436 S. Main St.
Shrewsbury, PA 17361
717-235-5469

Arnold's Electronic Systems
550A W. Street Rd.
Warminster, PA 18974
215-675-4227

Alpha Omega EBE
100 Liberty St.
Warren, PA 16365
814-726-2300

Leslie Dresbold, Inc.
Century III Mall West
Mifflin, PA 15122
412-653-7878

Siska's Computer & Electronics
1246 Horn Rd.
Windber, PA 15963
814-467-6827

SERVICE CENTERS

Baker Computers
206 N. Sherman St.
York, PA 17403
717-854-9411

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Microcomputer Store of Puerto Rico
Repto Metropolitano
Shopping Center
Rio Piedras, PR 00921
809-754-0670

RHODE ISLAND

BLC Sales & Service
881 Waterman Ave.
East Providence, RI 02914
401-434-3777

International Computer Services, Inc.
165 Dyerville Ave.
Johnston, RI 02919
401-273-1001

Micro Limits, Inc.
10 Cedar Swamp Rd.
Smithfield, RI 02917
401-231-3252

Elwin TV & Appliance, Inc.
55 Electronic Drive
Warwick, RI 02888
401-467-9300

Software Connection, Inc.
101 W. Natick Rd.
Warwick, RI 02886
401-738-3430

SOUTH CAROLINA

Protronics TV, Inc.
6995 Dorchester Rd.
Charleston, SC 29418
803-552-3960

Software Haus, Inc.
7565 Rivers Ave.
Charleston, SC 29418
803-797-6860

Clemson Electronics, Inc.
412 Highway 123
Clemson, SC 29631
803-654-2855

Horizon II
3715 E. North St. Extension
Greenville, SC 29615
803-235-7922

Lancaster Computer Center
1123B Bypass 9
Lancaster, SC 29720
803-285-1228

Protronics TV, Inc.
1220 Highway 703
Sea Island Center
Mount Pleasant, SC 29464
803-881-8309

Electric Shop
Highway 76, Route 2, Box 176
Newberry, SC 29108
803-276-2713

R.B.S. Electronics, Inc.
12A W. Lee Rd.
Taylors, SC 29687
803-244-3692

Avcom International, Inc.
2224 Airport Blvd.
West Columbia, SC 29169
803-796-4396

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DSB Computer Services
120 Main
Aberdeen, SD 57401
605-225-6804

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201 E. 2nd St.
Mitchell, SD 57301
605-996-5655

West River Audio Visual
1212 E. Oregon St.
Rapid City, SD 57701
605-348-3389

Hi Tech Service, Inc.
409 Maple Ave.
Rapid City, SD 57701
605-341-4888

Computer Business Center
1215 E. St. Patrick
Rapid City, SD 57701
605-342-2879

Sodak Electronics
603 S. Mable Ave.
Sioux Falls, SD 57103
605-361-0632

Ultra Systems, Inc.
1018 14th St. SE
Watertown, SD 57201
605-882-1555

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Computer Systems & Supplies
907 Congress Parkway
Athens, TN 37303
615-745-1363

Bristol Micro Technology
724 State St.
Bristol, TN 37620
615-968-1146

Data International, Inc.
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Chattanooga, TN 37343
615-875-8540

Supersafe Computers
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Clarksville, TN 37041
615-552-0514

Hi-Tech Electronic Services
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Kingsport, TN 37660
615-247-8406

Advanced Electronics
1138 N. Broadway
Knoxville, TN 37917
615-673-0138

Integrated Systems, Inc.
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Memphis, TN 38118
901-365-2495

Computer Hardware Service
1023 8th Ave. S
Nashville, TN 37203
615-244-0111

Video Home Library
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Oak Ridge, TN 37830
615-482-3893

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Computer Stop
4201R N. 1st St.
Abilene, TX 79603
915-677-9104

CEM Corp.
Route 4, 108 N. Brooks
Brazoria, TX 77422
409-798-1208

Vid Com
2370-6 N. Expressway
Sunrise Mall
Brownsville, TX 78521
512-544-6441

Intertechnology, Inc.
48 N. Park Plaza
Brownsville, TX 78521
512-544-1612

Compu-Care Tech Service
1904A Spid
Corpus Christi, TX 78416
512-852-5477

Action Computer Repair
11407 Emerald St., Suite 109
Dallas, TX 75229
214-484-7838

Regency Educational Systems, Inc.
4951 Airport Parkway, Suite 600
Dallas, TX 75248
214-934-3030

Larson's Computer Service
4010 Joseph Hardin, Suite 280
Dallas, TX 75236
214-337-4876

El Dorado Computer Center
7301 Boeing Drive, Suite E
El Paso, TX 79925
915-772-0880

Software Terminals
3014 Alta Mere Drive
Fort Worth, TX 76116
817-244-4150

Your Personal Computer Store
2724-6 61st St.
Galveston, TX 77551
409-740-3220

Kwik Fix Electronics
906 S. Ann Blvd.
Harker Heights, TX 76543
817-690-3010

Sabel Electronics
5700 Hillcroft St.
Houston, TX 77036
713-953-9955

Electro Comp Services, Inc.
1802 Crockett St.
Houston, TX 77007
713-869-5887

ALMA Engineering Services
723 W. Mount Houston Rd.
Houston, TX 77038
713-999-4443

Colonel Video (Videorama)
2425 Bay Area Blvd.
Houston, TX 77058
713-486-5288

Vidicomp Distributors, Inc.
1430 FM 1960 Rd. W.
Houston, TX 77090
713-444-6415

Roy's Hobbies & Electronics
217 E. Kleberg
Kingsville, TX 78363
512-592-3149

Brazosport Computer Co.
201B This Way
Lake Jackson, TX 77566
409-297-9695

International Computer Sales & Service
2820 San Bernardo, #3
Laredo, TX 78040
512-726-4235

Computer Time
3500 McCann Rd.
Longview, TX 75601
214-753-5761

Southwest Computer Centre
5603 N. Highway 35, Suite 1
Laredo, TX 78041
512-724-1133

Accounting Systems Computers
6701 Aberdeen, #9
Lubbock, TX 79424
806-794-1655

Raven Comtech Electronics
2533 Franklin Drive, Suite 2B
Mesquite, TX 75150
214-285-1552

Abacus Computers, Inc.
4370 W. Illinois Ave.
Midland, TX 79703
915-689-0744

Sertec
302 W. Shaw Ave.
Pasadena, TX 77506
713-473-1406

Personal Computer Systems
4749 Twin City Highway
Port Arthur, TX 77642
409-963-3003

Micro Computer Repair
105B N. McKinney St.
Richardson, TX 75081
214-644-3770

Micromend Corp.
2116 E. Arapaho, #359
Richardson, TX 75081
214-437-0970

Computer Hardware Service
43H White Chapel
Roanoke, TX 76262
817-481-5445

AB Computer Electronics Center
1732 N. Mays St.
Round Rock, TX 78664
512-244-2090

Computer Store
3000 W. Harris Ave.
San Angelo, TX 76901
915-942-7505

San Antonio Systems, Inc.
4245 Centergate St.
San Antonio, TX 78217
512-654-1631

Computer Experience
5525 Blanco Rd., Suite 114
San Antonio, TX 78216
512-340-2901

J & M Electronics, Inc.
4766 Research Drive
San Antonio, TX 78240
512-699-0404

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Tarplay Radio & TV, Inc.
1108 W. Adams
Temple, TX 76501
817-773-5928

All Makes Computer Service
Route 8, Box 324-9
Highway 155 S.
Tyler, TX 75703
214-581-5537

Electronic Repair Station
2523 E. 5th St.
Tyler, TX 75701
214-592-8348

Jolly's C-B Sales
1313 Sam Houston Drive
Victoria, TX 77901
512-578-2755

Computer Hospital
325 Cotton Drive, Suite C
Waco, TX 76710
817-772-4611

Electronic System
Route 10, Box 247H
Waco, TX 76708
817-836-4670

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420 N. Main
Clearfield, UT 84015
801-773-4834

United Service & Computer
790 S. Main St.
Logan, UT 84321
801-753-3709

Computerwise Computers
55 N. Main St.
Logan, UT 84321
801-752-2500

Certified Careers Institute
411 W. 7200 S, Suite 100
Midvale, UT 84047
801-562-9035

Computers Plus
5630 S. Redwood Rd.
Murray, UT 84123
801-968-3901

DSI Computer Repair
1664 Washington Blvd.
Ogden, UT 84404
801-627-2321

DSI Computer Repair
1814 S. Columbus Lane
Orem, UT 84058
801-225-3044

Computer Hospital
625 N. State St.
Orem, UT 84057
801-226-1616

Integrated Computer Systems
2255 N. University Parkway 39
Provo, UT 84604
801-373-2901

DSI Computer Repair
163 N. Main
Richfield, UT 84701
801-896-6716

DSI Computer Repair
2951 S. State St.
Salt Lake City, UT 84115
801-484-4374

Wasatch Electronics
2724 S. 3600 W, Suite L
Salt Lake City, UT 84119
801-964-9622

Armadillo Brothers
3330 S. State St.
Salt Lake City, UT 84115
801-484-2791

VERMONT

Computeam, Inc.
205 Dorset St.
South Burlington, VT 05403
802-862-2802

Ray Supply, Inc.
150 Dorset St.
South Burlington, VT 05403
802-658-9375

Tutt Enterprises
RF 2, Box 123, Melody Lane
Springfield, VT 05156
802-674-5684

VIRGINIA

J.C. Services
4815A Eisenhower Ave.
Alexandria, VA 22304
703-461-0860

STS Video Supply
14506B Lee Rd.
Chantilly, VA 22021
703-631-4949

Willoughby Electronics
923 Preston Ave.
Charlottesville, VA 22901
804-977-5002

Maurice TV & Electronics
4000 E. Indian River Rd.
Chesapeake, VA 23325
804-420-1642

Comtron, Inc.
820G Live Oak Drive
Chesapeake, VA 23320
804-424-3400

Computer Repair Technologies
2812D Merrilee Drive
Fairfax, VA 22031
703-849-8558

Better Business Machines
1632 Lafayette Blvd.
Fredericksburg, VA 22401
703-371-5545

B & K Technical Service
602 E. Nine Mile Rd.
Highland Springs, VA 23075
804-737-5180

Action Electronics
Route 1, Box 6, Highway 16S
Marion, VA 24354
703-784-6054

Systems Hardware Support
1493 Chain Bridge Rd., Suite 100
McLean, VA 22101
703-821-1505

Viewtronics Service
7923 Chesapeake Blvd.
Norfolk, VA 23518
804-588-3366

Computer Works
314 Exchange
Petersburg, VA 23803
804-861-1010 or 733-1010

Appliance & Electronics, Inc.
4011 W. Broad St.
Richmond, VA 23230
804-353-5508

Software City (Davisoft)
9944 Midlothian Turnpike
Richmond, VA 23235
804-320-2244

Commercial Business Systems
504 Research Rd.
Richmond, VA 23236
804-379-0783

J & D Electronics
1113 W. Church Rd.
Sterling, VA 22170
703-450-4237

Computer Service Specialist
105B S. Witchduck Rd.
Virginia Beach, VA 23462
804-473-0400

Micro Marketing
5312 E. Virginia Beach Blvd.
Virginia Beach, VA 23462
804-490-8384

L & Y Electronics
13644C Jefferson Davis Highway
Woodbridge, VA 22191
703-494-3444

Virginia Micro Systems, Inc.
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Woodbridge, VA 22191
703-491-6502

WASHINGTON

Bellingham Computer
2300 James St., Suite 1E
Bellingham, WA 98225
206-647-0086

Superior Software
1290 N. Moore Rd.
Camano, WA 98292
206-629-4852

Digital Test Systems
602 W. Main
Centralia, WA 98531
206-736-2628

Com-Soft
9502 19th Ave. SE
Everett, WA 98204
206-338-0934

Butler's TV & Computer Service
28717 Pacific Highway S
Federal Way, WA 98003
206-941-9096

Harbor Electronic Communications
2614 Simpson Ave.
Hoquiam, WA 98550
206-532-3474

Take-A-Byte, Inc.
815 W. Columbia Drive
Kennewick, WA 99336
509-582-3311

OC Plus Electronics
8130 W. Imnaha Ave.
Kennewick, WA 99336
509-735-7746

Tech Star
7036 S. 188th St.
Kent, WA 98032
206-251-9040

Cosygn, Inc.
19219 W. Valley Highway
Kent, WA 98032
206-251-5070

Erik's Place
12455 116th Ave. NE
Kirkland, WA 98034
206-823-8088

Martha Lake Electronics
16521 13th Ave. W
Lynnwood, WA 98037
206-743-4178

Family Computer
3333 184th St. SW, Suite W
Lynnwood, WA 98037
206-775-3530

Isletech
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Oak Harbor, WA 98277
206-675-7526

Discount Computer Software
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Seattle, WA 98166
206-431-0180

Accurate Data Service
1414 N. Fiske St., Suite D
Spokane, WA 99202
509-535-0590

Bits, Bytes & Nibbles
450 Northtown Mall
Spokane, WA 99207
509-487-1601

Computers Plus, Inc.
10310 S. Tacoma Way
Tacoma, WA 98499
206-581-5151

TS Electronics
15101 Union Ave. SW
Tacoma, WA 98498
206-588-1510

CT Compu-Teck
2713 6th Ave.
Tacoma, WA 98406
206-383-6346

Tumwater Video
5109 Capitol Blvd.
Tumwater, WA 98501
206-352-9503

Ramtronix
4221 NE St. Johns Rd., Unit C
Vancouver, WA 98661
206-699-4500

Northwest Video
1226 N. Wenatchee Ave.
Wenatchee, WA 98801
509-662-8356

WEST VIRGINIA

Computers Plus
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Charleston, WV 25389
304-342-4848

Business Computer Service
1210 Smith St.
Charleston, WV 25301
304-343-9471

Today's Computer Business Center
214 Capitol St.
Charleston, WV 25301
304-345-5566

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Lectronix Computer Service, Inc.
4810 W. Pea Ridge Rd.
Huntington, WV 25705
304-736-8035

J.S. Latta, Inc.
1502 4th Ave.
Huntington, WV 25726
304-523-9433

Solid State Sales & Service
2645 Charles St.
Wellsburg, WV 26070
304-737-2467

Stone Church Video
204 Kruger St.
Wheeling, WV 26003
304-242-6062

WISCONSIN

J & J Electronics at Appleton
2518 N. Richmond
Appleton, WI 54911
414-739-1610

Microtek Systems
West 63, N. 124 Washington Ave.
Echo Plaza Shopping Center
Cedarburg, WI 53012
414-377-0381

Cash Controls Systems, Inc.
2104 Highway 12
Eau Claire, WI 54701
715-832-9922

Wood's Electronics
3335 London Rd.
Eau Claire, WI 54701
715-832-7143

Computer Fix
1300 Industrial Drive
Fennimore, WI 53809
608-822-3374

Software Shoppe
344 S. Military Rd.
Fond du Lac, WI 54935
414-921-8448

Tri Lake Service
Highway 67 & 3rd Ave.
Fontana, WI 53125
414-275-5788

Authorized TV
810 9th St.
Green Bay, WI 54304
414-499-4215

TMW Software of Green Bay
1270 Main St.
Green Bay, WI 54302
414-432-7638

River City Software
115 S. 6th St.
La Crosse, WI 54601
608-782-5540

American TV
2601 Whalen Lane
Madison, WI 53713
608-271-9300

Active TV
4234 N. Teutonia Ave.
Milwaukee, WI 53209
414-444-0117

Systech Electronics
9617 W. Greenfield Ave.
Milwaukee, WI 53214
414-475-7475

Platteville Telephone Co.
135 N. Bonson St.
Platteville, WI 53818
608-348-3025

Colortron Computers
2111 Lathrop Ave.
Racine, WI 53405
414-637-5884

Computer Paradise & Video
4901 Washington Ave.
Racine, WI 53406
414-633-7003

Mom's Computers
1332 Strongs Ave.
Stevens Point, WI 54481
715-344-3703

System Forms
1260 W. Main St.
Sun Prairie, WI 53590
608-837-3277

American TV & Appliances
W. 229, N. 1400 Westwood Drive
Waukesha, WI 53186
414-549-3440

North American Computer
150 South St.
Waukesha, WI 53186
414-547-6222

Larson Electric
511 S. Main St.
Waupaca, WI 54981
715-258-3910

TMW Software
207 Scott St.
Wausau, WI 54401
715-848-2164

Comtech Industries Corp.
2446 8th St. S
Wisconsin Rapids, WI 54494
715-424-4169

WYOMING

Western States Marketing
1122 Logan Ave.
Cheyenne, WY 82001
307-632-0770

Harvey & Associates, Inc.
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Laramie, WY 82070
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DEALER INQUIRIES WELCOME

HOW TO TYPE RUN LISTINGS

To simplify typing *RUN*'s C-64 and C-128 program listings, we include checksum numbers. These follow a REM statement at the end of each line (e.g., :REM*123) and necessitate your using *RUN*'s Perfect Typist programs, listed below.

Type in 64 Perfect Typist (Listing 1) for 64 programs, or 128 Perfect Typist (Listing 2) for 128-mode programs, 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. Jot down the two SYS numbers that appear on your screen. 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*. After you press the return key to log in each line, a 1-, 2- or 3-digit number will appear below the line at the left margin. This is the checksum number, ranging from 0 to 255.

If this matches the checksum printed in the listing after the :REM*, you have typed that line correctly. Then type the next program line over the previous line's checksum value. If the checksum numbers do *not* agree, analyze the line on screen for errors or omissions. Make the needed changes and press the return key again to log them in. A new checksum 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 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, but before attempting to run it, turn the 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. To do so, reload and run the Perfect Typist program, then load the program you were working on, list it, and continue from 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. Follow instructions inside curly brackets. For example, {SHIFT L} means 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. R

Listing 1. 64 Perfect Typist program.

```
1 REM 64 PERFECT TYPIST
2 REM BY: JAMES E BORDEN
1Ø POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
2Ø PG=PEEK(56):ML=PG*256+6Ø
3Ø FORX=ML TO ML+154:READD:T=T+D:POKEX,D:N
   EXT
4Ø IFT<>16251 THEN PRINT"ERROR IN DATA..."
   :END
6Ø POKEML+4,PG:POKEML+1Ø,PG:POKE ML+16,PG
7Ø POKE ML+2Ø,PG:POKE ML+32,PG:POKE ML+38,
   PG
8Ø POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
   ************************"
9Ø SYS ML:PRINT "{CRSR RT}** 64 PERFECT TY
   PIST IS NOW ACTIVE{2 SPACEs}**"
1ØØ PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs
    }SYS"ML+3Ø"=OFF **"
1Ø1 PRINT"{CRSR RT}**********************
    ***************":NEW
```

```
11Ø DATA 173,ØØ5,ØØ3,2Ø1,ØØ3,2Ø8,ØØ1,Ø96
12Ø DATA 141,1Ø5,ØØ3,173,ØØ4,ØØ3,141,1Ø4
13Ø DATA ØØ3,162,1Ø3,16Ø,ØØ3,142,ØØ4,ØØ3
14Ø DATA 14Ø,ØØ5,ØØ3,Ø96,234,234,173,1Ø4
15Ø DATA ØØ3,141,ØØ4,ØØ3,173,1Ø5,ØØ3,141
16Ø DATA ØØ5,ØØ3,Ø96,Ø32,124,165,132,Ø11
17Ø DATA 162,ØØØ,142,24Ø,ØØ3,142,241,ØØ3
18Ø DATA 189,ØØØ,ØØ2,24Ø,Ø51,2Ø1,Ø32,2Ø8
19Ø DATA ØØ4,164,212,24Ø,Ø4Ø,2Ø1,Ø34,2Ø8
2ØØ DATA ØØ8,Ø72,165,212,Ø73,ØØ1,133,212
21Ø DATA 1Ø4,Ø72,238,241,ØØ3,173,241,ØØ3
22Ø DATA Ø41,ØØ7,168,1Ø4,Ø24,Ø72,Ø24,1Ø4
23Ø DATA Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1Ø9
24Ø DATA 24Ø,ØØ3,141,24Ø,ØØ3,232,2Ø8,2ØØ
25Ø DATA 173,24Ø,ØØ3,Ø24,1Ø1,Ø2Ø,Ø24,1Ø1
26Ø DATA Ø21,141,24Ø,ØØ3,169,Ø42,Ø32,21Ø
27Ø DATA 255,169,ØØØ,174,24Ø,ØØ3,Ø32,2Ø5
28Ø DATA 189,162,ØØ3,189,211,ØØ3,Ø32,21Ø
29Ø DATA 255,2Ø2,Ø16,247,164,Ø11,Ø96,145
3ØØ DATA Ø13,Ø32,Ø32
```

Listing 2. 128 Perfect Typist program.

```
1 REM 4Ø/8Ø COL C128 PERFECT TYPIST
2 REM BY: JAMES E BORDEN
1Ø FORX=512ØTO5379:READD:T=T+D:POKEX,D
2Ø NEXT:IFT<>28312 THENPRINT"{2 CRSR DNs}E
   RROR IN DATA...":END
25 A$="":IFPEEK(215) THENA$="{2Ø SPACEs}"
3Ø PRINT"{SHFT CLR}"A$" ****************
   ******************"
4Ø PRINTA$" ** 128 PERFECT TYPIST IS NOW A
   CTIVE **"
5Ø PRINTA$" **{2 SPACEs}SYS 512Ø=ON{7 SPAC
   Es}SYS 515Ø=OFF{2 SPACEs}**"
6Ø PRINTA$" ****************************
   ********":SYS512Ø:NEW
7Ø DATA 173,5,3,2Ø1,2Ø,2Ø8,1,96,141,45,2Ø,
   173,4,3,141,44,2Ø,162,43,16Ø,2Ø
8Ø DATA 142,4,3,14Ø,5,3,96,234,234,173,44,
   2Ø,141,4,3,173,45,2Ø,141,5,3,96
9Ø DATA 32,13,67,14Ø,255,19,162,Ø,142,252,
   19,142,253,19,142,254,19,189,Ø,2
1ØØ DATA 2Ø1,32,24Ø,8,2Ø1,48,144,7,2Ø1,58,
    176,3,232,2Ø8,238,189,Ø,2,24Ø,54
11Ø DATA 2Ø1,32,2Ø8,5,172,254,19,24Ø,42,2Ø
    1,34,2Ø8,1Ø,72,173,254,19,73,1
12Ø DATA 141,254,19,1Ø4,72,238,253,19,173,
    253,19,41,7,168,1Ø4,24,72,24,1Ø4
13Ø DATA 16,1,56,42,136,16,246,1Ø9,252,19,
    141,252,19,232,2Ø8,197,173,252
14Ø DATA 19,24,1Ø1,22,24,1Ø1,23,141,252,19
    ,169,42,32,241,2Ø,32,188,2Ø,16Ø
15Ø DATA 2,185,185,2Ø,32,241,2Ø,136,16,247
    ,165,116,2Ø8,9,165,117,2Ø8,5,169
16Ø DATA 145,32,241,2Ø,172,255,19,96,13,32
    ,32,162,Ø,173,252,19,232,56,233
17Ø DATA 1ØØ,176,25Ø,1Ø5,1ØØ,2Ø2,24Ø,3,32,
    232,2Ø,2Ø1,1Ø,176,5,2Ø5,252,19
18Ø DATA 24Ø,15,162,Ø,232,56,233,1Ø,16,25Ø
    ,24,1Ø5,1Ø,2Ø2,32,232,2Ø,17Ø,72
19Ø DATA 138,9,48,32,241,2Ø,1Ø4,96,17Ø,173
    ,Ø,255,72,169,Ø,141,Ø,255,138,32
2ØØ DATA 21Ø,255,1Ø4,141,Ø,255,96
```

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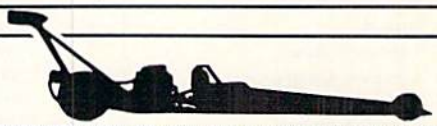
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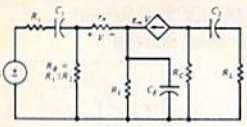
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