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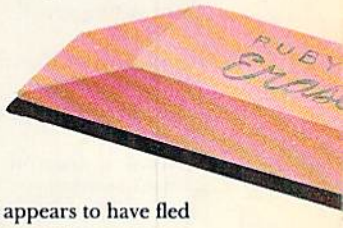
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RUNning Ruminations

An Education in Computers

I've always been a big fan of computers in education.

At home, I've used a C-64 with my own kids—to help with their math and spelling, to learn the capitals of the states (Affairs of State), to help learn history (The Sea Voyagers), geography (Carmen Sandiego series) and even science (Body in Focus).

I've witnessed the effective use of Commodore computers in the classroom—at the elementary, high school and even college level. At one time, *RUN* boasted the only monthly column devoted to the uses of Commodores in education.

Like many of *RUN*'s readers—educators and administrators who have related their experiences using Commodores with their students—I believe that youngsters should be exposed to as much computer time in the classroom as possible. That's why Commodores are so attractive to schools. It's a natural match—school budgets are generally tight, Commodore computers are inexpensive and, most of all, they are easy to use, so they don't frighten students. . .or teachers.

Is Commodore trying to push the wrong computer into the schools?

◇

I remember when Commodore was a welcome name in teachers' lounges across the country. Why? Because, as they used to claim in their ads, "Commodore. . .put[s] more students on computers for less money." Obviously, the more computers in the classroom, the more will be available for students to use.

So now Commodore is attempting to reenter the educational market—a market in which Commodore was once very active, but one which is now dominated by Apple and (most recently) IBM. This time Commodore hopes to reemerge in this market with the Amiga, their powerful, but pricey, line of computers. Their offer ranges from $800 for an Amiga 500 to almost $3700 for a loaded Amiga 2000. How many educators can justify that kind of expenditure?

If Commodore hadn't abandoned the education market with the 64/128, then perhaps their comeback efforts with the Amigas might be a little more believable. As it is, I'm afraid that they'll face a tough time trying to increase their market share against the likes of Apple and IBM.

Before educators spend a penny, they must consider the CPS (computers per student) factor; that is, how many students will be served by the computer purchase.

If the object is to get as many students on computers as possible, then the computer of choice remains the C-64, not the Amiga. Commodore remains today the best value for the money—whether you're buying for the home or for the classroom. Any other choice merits a failing grade.

Dennis Brisson

Dennis Brisson
Editor-in-Chief

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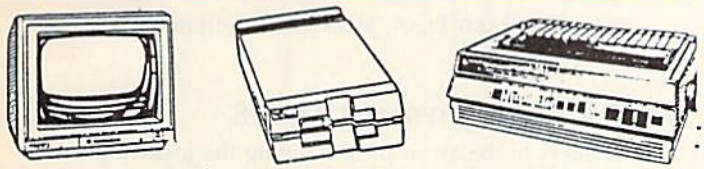
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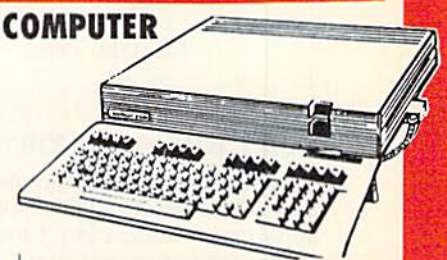
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By TIM WALSH

$5A0 Drive Lighter 64/128

If you want to program the activity light on your Commodore disk drive, it's an easy process, regardless of whether you use a 1541, 1571 or 1581. My demo program, Drive Light Controller, shows how to program the drive light to go off and on by pressing the space bar in either 64 or 128 mode. Use it as a subroutine in your own programs or by itself as a stand-alone program.

```
Ø REM DRIVE LIGHT CONTROLLER - RICHARD PEN
  N                                    :REM*49
1Ø PRINTCHR$(147)"DISK DRIVE ERROR LIGHT D
   EMO"                                :REM*148
2Ø PRINT"PRESS SPACEBAR & WATCH THE DRIVE
   LIGHT"                              :REM*176
3Ø C$="{HOME}{2 CRSR DNs}DRIVE LIGHT IS":F
   $=" ON ":G$=" OFF"                  :REM*222
4Ø GETA$:IFA$=""THEN 4Ø                :REM*224
5Ø OPEN8,8,8,"#"                       :REM*173
6Ø PRINTC$;F$                          :REM*237
7Ø GETB$: IF B$<>" " THEN 7Ø           :REM*78
8Ø CLOSE 8:PRINT C$;G$:GOTO 4Ø         :REM*161
```

—Richard Penn, Montreal, Quebec, Canada

$5A1 Joystick Port Comparison

Commodore 64 programmers usually avoid using joystick port 1 because of conflicts with keypresses. While this is an important consideration, I found another, more significant, reason to limit joystick port 1 to use with a mouse—it slows down program speed.

When a key is pressed, a routine in the C-64's ROM decodes the keypress. Since joystick activity in port 1 is interpreted as keypresses, program execution times are affected. The short demo program I wrote, Joystick Port Comparison 64, clearly shows the difference. Run it in 64 mode, and you're certain to be surprised at the results!

```
Ø REM FASTER JOYSTICK PORT DEMO - RICHARD
  PENN                                 :REM*147
1Ø PRINTCHR$(147)CHR$(5);:WAIT 197,64:GOSU
   B 8Ø:PRINT"NORMAL SPEED":PRINT:PRINT
                                       :REM*2Ø8
2Ø PRINTCHR$(159)"PRESS & HOLD FIREBUTTON
   ON JOYSTICK IN{2 SPACEs}PORT 2" :REM*98
3Ø WAIT 5632Ø,16,16:GOSUB8Ø:PRINT"WITH FIR
   EBUTTON ON IN{2 SPACEs}PORT 2":PRINT:PR
   INT:B=X                             :REM*19
4Ø PRINTCHR$(155)"PRESS & HOLD FIREBUTTON
   ON JOYSTICK IN{2 SPACEs}PORT 1" :REM*56
5Ø WAIT 56321,16,16:GOSUB8Ø:PRINT"WITH FIR
   EBUTTON ON IN{2 SPACEs}PORT 1":C=X:PRIN
   T                                   :REM*125
6Ø PRINTCHR$(158)"FIREBUTTON IN PORT 1 MAD
   E EXECUTION"                        :REM*2Ø3
7Ø PRINTC-B"JIFFIES OR":PRINTINT(C/B*1ØØ-1
   ØØ)"PERCENT SLOWER":END             :REM*29
8Ø PRINT"PLEASE WAIT, RUNNING BENCHMARK...
   ":A=Ø                               :REM*238
9Ø TI$="ØØØØØØ":FORT=1TO1ØØØ:A=A+1:NEXT:X=
   TI:PRINT "TOOK"X"JIFFIES ";:RETURN
                                       :REM*21Ø
```

—Richard Penn, Montreal, Quebec, Canada

$5A2 Either Joystick 64/128

Newcomers to the art of programming the joystick ports on their Commodore 64 or 128 will appreciate Either Joystick 64/128. This short routine, which works in both 64 and 128 modes, shows the direction the joystick in either port is being pressed. It also shows when the firebutton is pressed.

```
Ø REM EITHER JOYSTICK PORT 64/128 - WARD S
  HRAKE                                :REM*179
1Ø JY=(PEEK(5632Ø)ANDPEEK(56321))AND31
                                       :REM*5
2Ø IF JY=3Ø THEN PRINT "UP"            :REM*16
3Ø IF JY=29 THEN PRINT "DOWN"          :REM*255
4Ø IF JY=27 THEN PRINT "LEFT"          :REM*97
5Ø IF JY=23 THEN PRINT "RIGHT"         :REM*225
6Ø IF JY=15 THEN PRINT "FIREBUTTON"
                                       :REM*2Ø7
7Ø GOTO1Ø                              :REM*192
```

—Ward Shrake, Covina, CA

$5A3 C-128 Tabbing Trick

Indentation for For-Next and Do loops in your Basic 7.0 programs makes for easily deciphered Basic listings. Unfortunately, the C-128's tab key doesn't have an effect in Basic. This problem can be overcome by entering the following in Direct mode:

```
KEY 1, CHR$(160)+CHR$(9)
```

Now, by pressing the F1 key, you can tab across the screen in Basic, and the tabs will be recorded by the Basic editor. Using this process, when you enter a line number and press the F1 key, you'll create a line number that consists of *just* ►

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that line number, which gives your structured programs a unique appearance.

—SCOTT G. AUGE, LAURIUM, MI

$5A4 64 TAB KEY

The C-64, unlike the C-128, lacks a tab key. My program, 64 Function Key Enhancer, adds a tab key to the 64. After running the program, pressing control/F1 tabs seven spaces across the screen. It's not a true tab key, because it erases characters as it moves across the screen, so use it cautiously.

The program also adds the Delete function, which is used by pressing the control/F3 combination. This delete key erases everything beneath the cursor and "sucks in" characters on the same line from right to left. You'll find this utility to be a useful addition to your bag of programming tricks.

```
Ø REM FUNCTION KEY ENHANCER - BARRY SMITH
                                        :REM*216
1Ø FOR T = 49152 TO 49252:READ A:C=C+A:POK
   E T,A:NEXT                           :REM*44
2Ø IF C <> 1Ø621 THEN PRINT"ERROR IN DATA.
   .":END                               :REM*5Ø
3Ø PRINT"{SHFT CLR}ENHANCED FUNCTION KEYS
   ACTIVE!"                             :REM*2Ø4
4Ø PRINT"CTRL/F1 FOR TAB KEY"           :REM*96
5Ø PRINT"CTRL/F3 FOR DELETE KEY":SYS49152
                                        :REM*12
6Ø DATA 173,2Ø,3,141,6Ø,3,173,21,3,141,61,
   3,12Ø,169,25,141,2Ø,3,169,192        :REM*137
7Ø DATA 141,21,3,88,96,165,198,2Ø1,Ø,2Ø8,4
   5,173,62,3,2Ø1,4,24Ø,38,2Ø1,5        :REM*223
8Ø DATA 24Ø,34,173,141,2,2Ø1,4,2Ø8,27,165,
   197,2Ø1,4,24Ø,7,2Ø1,5,24Ø,25         :REM*17
9Ø DATA 76,76,192,162,Ø,169,32,157,119,2,2
   32,224,5,48,246,134,198,165          :REM*232
1ØØ DATA 197,141,62,3,1Ø8,6Ø,3,169,32,141,
    119,2,169,2Ø,141,12Ø,2,169,2        :REM*11Ø
11Ø DATA 133,198,76,76,192              :REM*239
```

—BARRY E. SMITH, VINTON, VA

$5A5 ATTENTION, C-128/128D USERS!

When you're using a word processor such as RUN Script and want to type in capital letters, it's better to use the caps-lock key, rather than the shift-lock key. Why? Because the caps-lock key only affects the lettered keys. The number keys, cursor movement, and other frequently used keys, such as the insert-delete key and the return key, will function in the regular manner.

—*RUN* EDITORS ■

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NEWS AND NEW PRODUCTS

Plenty of new games—shoot-'em-ups, role-playing, sports simulations and educational—came out of the summer Consumer Electronics Show.

By HAROLD R. BJORNSEN

A HOLE IN ONE EVERY TIME

IRVINE, CA—**Greg Norman's Shark Attack!**, a golf simulation for the C-64, features pre-game practice, matchplay, strokeplay and Texas Scramble, all handicapped according to adjustable attributes, with single- and team-play options. You can design your own swing and receive instruction in the best golfing form. A 3-D perspective lets you rotate through 360 degrees from any point. $29.99. Virgin Mastertronic, 18001 Cowan St., Irvine, CA 92714.

DRAG RACES, ADVENTURES, QUESTS, AND MORE!

SAN MATEO, CA—Electronic Arts (1820 Gateway Drive, San Mateo, CA 94404) is distributing several new games for the C-64.

In **Street Rod** (California Dreams), a 50s hot rodding action-construction set, you're a hot rodder who wants to topple the local king of the streets. You begin by customizing one of 25 street rods with over 35 parts. As you win bets in drag or road races, you buy better cars and parts for a showdown with the king. $29.95.

Blockout (California Dreams) is a 3-D game based on the Soma cube. By maneuvering 3-D blocks as they fall into the playing pit, you fit them together to form complete layers. The more layers you clear, the higher your score, and the faster the blocks start falling. $29.95.

In **Questmaster** (Miles Computing), the evil lord Colnar has popped up unexpectedly from another dimension. He's obliterated the peaceful Elders and wreaked havoc on the planet. As the last of the Tellasien race, you must avenge their deaths. $34.95.

King's Bounty (New World Computing) is an action-adventure game that plunges you into the Kingdom of the Four Continents. As a legendary hero or heroine, you explore four continents, raise armies and attack castles while pitting yourself against villains who've stolen the king's Scepter of Order. $39.95.

Might and Magic II: Gates to Another World (New World Computing) transports you to a mythical role-playing universe of sorcery and swordplay, pitfalls and wandering monsters. Features include a high-level combat system, animated 3-D graphics and an auto-mapping system. $39.95.

As a newcomer to the ancient mythological race of creatures known as **Nightbreed** (Ocean), the fabled hero Boone must defend the city of Median. Boone's been accused of a series of murders he didn't commit, he's fleeing from a disturbed past and an empty future, and Median is his only refuge. $29.95.

In the role-playing adventure, **Secret of the Silver Blades** (SSI), miners have disturbed an ancient vault and released scores of horrific creatures that now infest the mine shaft and threaten to escape into the world above. You must find a way to contain this scourge by unraveling the mysteries surrounding this evil infestation. $39.95.

As a brave Solamnic Knight in **DragonStrike** (SSI), you must ride into aerial combat on the back of your trusty, powerful dragon of Krynn. As you progress through three different orders of Knighthood, you gain more powerful dragon mounts to ride in over 20 different missions. Battling alongside other good dragons, you'll fight enemy dragons as well as ships, archers and flying citadels. $39.95.

DISNEY ON DISK

BURBANK—Walt Disney Computer Software (500 South Buena Vista St., Burbank, CA 91521) announces several new programs for the C-64.

"Big Boy" Caprice and his boys are waging a crime war, and only you can stop them in **Dick Tracy**, an action-strategy game. Search for clues and informants, including the seductive Breathless Mahoney, linking criminals to crimes occurring throughout the city. $29.95.

In **Ducktales: The Quest for Gold**, Flintheart Glomgold has issued a challenge to Scrooge McDuck for the title of Duck of the Year. Now Scrooge, Launchpad and the nephews must travel to exotic locales in a race against Glomgold to collect the most treasures. The winner then has to survive dangerous mountain climbs and treacherous jungle safaris to attain the most riches. $29.95.

Arachnophobia is an arcade-action game pitting one or two players against spiders that are lethally poisonous, aggressive and intelligent. Your mission is to destroy the deadly Queen spiders and their fatal offspring before they take over the country. $29.95.

Donald's Alphabet Chase is a game of tag that also teaches letter recognition. Letter-shaped creatures are running wild in Donald Duck's house, and preschool children can help Donald catch them by pressing the matching alphabet keys. $14.95.

Mickey's Runaway Zoo introduces numbers to preschoolers by engaging them in a game of hide-and-seek. Goofy left the gate open in the zoo, and the animals wandered out and got lost. Children can help Mickey and Goofy find them by pressing number keys that correspond to numerically themed hiding places. $14.95.

In **Goofy's Railway Express**, preschoolers ride Goofy's magical train with other Disney characters and learn about colors and shapes. By simply pressing the space bar, children can catch the shapes from Goofy's smokestack and watch them turn into animals, buildings, vehicles and plants. $14.95.

MOST EXCELLENT, DUDE!

MIAMI—In **Bill and Ted's Excellent Adventure**, a C-64 arcade-adventure based on the movie, Bill and Ted take you on a wacky trip through history: finding answers for Socrates, taking notes for Beethoven, munching Twinkies with Genghis Khan and chilling out with Joan of Arc. You'll also meet Rufus and his time-traveling phone booth. The game has four difficulty levels and lots of famous dead dudes. $29.95.

The Cardinal of the Kremlin, a C-64 game of intrigue and adventure, im-

merses you in a race to develop a Star Wars defense system. Espionage and misinformation, kidnapping of scientists, satellite launches and world politics all come into play. $39.95. Intracorp, Inc., 14160 SW 139th Court, Miami, FL 33186.

Loop-de-Loopz

CHATSWORTH, CA—The challenge in **Loopz** (Mindscape) is to put together random pieces of different sizes and shapes to form loops. You can rotate the pieces and move them around the playfield. When you complete a loop, it disappears, and you score points. The C-64 game features three one-player games, each with different goals and formats. Two two-player games pit challengers against each other as they race to finish their own loops or parts common to one loop. $39.95. The Software Toolworks, 19808 Nordhoff Place, Chatsworth, CA 91311.

In the Field, at Bat Or on the Court

SAN JOSE, CA—Data East (1850 Little Orchard St., San Jose, CA 95125) introduces three new games for the C-64.

In **North & South**, a strategy game, players command Yankee and Confederate troops through famous and not-so-famous Civil War skirmishes. Players control different numbers of armies and territories and travel from state to state as they confront and conquer battle challenges in an effort to win the war. $24.95.

Bo Does Baseball is a baseball simulation that utilizes daily statistics—accessed via modem from the USA Today Sports Center—from 1990 professional league play. It has multiple-player perspectives and detailed on-screen images for accurate game play. Batting and defense game tips come from Bo himself. $39.95.

The Dream Team: 3 on 3 Challenge features basketball stars Patrick Ewing, Dominique Wilkins and James Worthy in a three-on-three-style basketball



Can you defeat the monster in the vault in Castle Master?

game. Players control shot selections, from sky hooks to lay-ups to outside shots, and, with a modem, can access online player statistics from the USA Today Sports Center. $39.95.

Two New Games

HUNT VALLEY, MD—Innerprise Software (128 Cockeysville Rd., Hunt Valley, MD 21030) introduces two new games for the C-64 at $29.95 each. In **The World of Turrican**, players travel over 1300 screens and meet 50 different aliens. Three-way parallax scrolling is just one of the game's features.

Globulus is a combination of action and strategy on a three-dimensional, isometric maze.

A Sinister Castle, a Lovable Kiwi or an Action-Adventure

NORTH VANCOUVER, B.C., CANADA—Taito (267 West Esplanade, North Vancouver, B.C., Canada V7M 1A5) announces three new games for the C-64 at $29.95 each.

In the highest tower of Castle Eternity, your twin awaits rescue from the mad **Castle Master**, who wants to enslave your spirits forever. Beware of the danger that awaits you when you cross the drawbridge!

In **Kiwi Kraze**, Tiki, a brave and lovable New Zealand kiwi, sets out to save his friends from a fiendish walrus. It's your job to help Tiki run, fly, swim, leap and scuba dive through five worlds and 20 stages to save his buddies.

Operation Thunderbolt, the action-adventure sequel to Operation Wolf, incorporates improved 3-D forward scrolling, detailed graphics and two-player capability. As Commando Roy Adams, you must infiltrate a hostile African country and free 23 hostages.

SPA Winner

SAN DIEGO, CA—Winning in a big way at this year's Software Publishers Association's Excellence in Software Awards ceremony was Maxis Software's **SimCity** (see Software Gallery, *RUN*, August 1989). A finalist in seven categories, the software garnered awards for Best Simulation Program, Best Entertainment Program, Best Consumer Program and Best Curricular Program.

Although a number of C-64 products were nominated, SimCity was the only title to win.

Hazardous to Your Health?

BOSTON—Nintendo video games may lead to health problems for those who play them for extended periods of time, say doctors at Franciscan Children's Hospital in Boston. Recently, a young girl who played Super Mario Brothers for three hours had an epileptic seizure. Doctors say she seems to suffer from a rare form of photosensitive epilepsy. In another incident, a woman who played a video game non-stop for five hours experienced severe pain in the thumb from repeatedly pressing the button that operates the game. ■

MAIL RUN

Thumbs up for GEOS and applications; thumbs down for Nintendo.

GARY'S GRAY FORECAST

Having just received your June/July issue of *RUN* and after reading the "Letter From the Publisher," I can't help but think that the Commodore 8-bit is about to enter the netherworld of forgotten computers. I have no doubt about your "resolve for the market," but rather doubt your ability to continue publishing *RUN*. With advertising dollars at a premium these days, the reality of the situation is that the 64/128 market is rapidly drying up.

—GARY GRAY
ENGLEWOOD, CO

We can't agree with your gray forecast, Gary. RUN *will continue to support the Commodore 8-bit market as long as there are readers. And, with a solid core of active users, much available software, ongoing activity in users' groups and thousands of users plugged into productivity and entertainment applications at home, it will be a lo-o-o-ong time before the sun sets on our little publishing empire.*

Readers shouldn't make the mistake of comparing the 64/128 market to any abandoned-computer market (see RUNning Ruminations, August/September 1990). In terms of volume sales, there has never been a computer like the 64, which is still being marketed by Commodore and is the most popular home computer of all time.

We doubt that many users have exhausted the potential of this machine and are eager to banish their computers to the "netherworld." Take a look at some of the other letters in this department for further testimony.

—EDITORS

WHO DOES HE THINK HE IS?

Daniel Toth's letter ("Who's To Blame?," June/July 1990 Mail RUN) lambasted editor-in-chief Dennis Brisson's March 1990 editorial by saying, "Commodore 8-bit owners would not be in such dire straits if you'd stop treating the machines as toys by pushing games and GEOS at your readers."

Does Mr. Toth equate GEOS with games? With GEOS, I created a graph using geoChart, did several mass mailings with geoMerge, and I publish a monthly newsletter using geoPublish. Hardly what I'd call games!

—KAREN LANDRETH-WEAVER
CAMDEN, SC

PUTTING THE C-64 TO WORK OR PLAY

The tenor of *RUN*'s editorials and readers' comments indicates the decline of the Commodore users' base. So, now what do you do with your C-64s and 128s? I'm not going to abandon my 64; there are too many applications to take advantage of.

With a few modifications, I've used my computer as a lightmeter, salinity indicator, digital weight scale, anemometer and burglar alarm. It's also serving duty as a seismograph.

Applications like these can make our "obsolete" computers an asset for years to come.

—GEORGE A. HERO, III
BELLE CHASSE, LA

NO COMPETITION

I won't buy a Nintendo because I can't play role-playing games on them. The enclosed newspaper article is another reason.

As an aside, we recently sold our Atari 2600. It had collected quite a bit of dust since both my children received their own C-64s a year before.

—JAMES C. HASKELL
WINTON, CA

The above reader comments were prompted by a report that Nintendo game players have suffered seizures and, in another case, severe pain in the thumb. Reference the related item in this issue's News and New Products department.

—EDITORS

BETTER COMPUTING UPDATE

Your article, "101 Ways to Better Computing" (*RUN*, May 1990), was fairly good, but it contains an error. Your advice to 1571 owners, who "should never close the drive door without a disk or insert in the drive" also applies to owners of 1541 disk drives, because the pressure pad will be forced against the head, possibly depositing contaminants on it, which can ruin the head and disks.

—BERNHARDT SANDLER
VENICE, CA

CALLING ALL USERS

The Commodore Radio Users' Group of the United Kingdom is dedicated to C-64/128 owners who are also interested in amateur radio. We have over 150 members from around the world, and we offer them a library of 17 disks or radio programs. A yearly subscription to our quarterly newsletter, *Connections*, is $16. I'd be pleased to hear from other radio users or groups with similar interests. They can write to The Commodore Radio Users' Group, c/o Simon Lewis GM4PLM, 66 Camperdown Court, Helensburgh, Strathclyde, England G84 9HJ.

—SIMON LEWIS
HELENSBURGH, STRATHCLYDE
ENGLAND

The Final Horizon is a monthly newsletter and a bimonthly disk dedicated to both the C-64 and 128 computers. We invite any and all interested parties to join us. We'll be happy to send out a sample issue, with membership application, free to all who mail in a request. For more information, write to The Final Horizon, 1409 Mill St., Laramie, WY 82070.

—EARL HARVEY
LARAMIE, WY ■

This page is your stage, so stand up and say a few words. Extend praise, air grievances or offer hands-on advice and information.

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SOFTWARE GALLERY

From master spy to Navy pilot and from Batman to werewolf, October's reviews provide plenty of Halloween costume ideas!

By BETH S. JALA

BLUE ANGELS ..... B+

Acquire Acrobatic Acumen With the Air Show Angels

Boasting twin 32,000-pound thrust engines, the F/A-18 Hornet delivers all the speed and muscle needed to handle just about any mission. Piloting a craft some insist is "too much plane" for precision flying, your challenge is to qualify for the Navy's elite flight demonstration squadron—the Blue Angels!

This program offers a choice of three positions in the six-plane formation, and the opportunity to tackle a total of 30 maneuvers. Beginning with simulator training and in-flight practice, your ultimate goal is at least one error-free performance in three different flying shows. Good for several minutes of continuous action each, the shows range from a relatively simple Flat Program—each position flies just six maneuvers—to the more elaborate Low and High Airshows. Finishing with a low-error performance is your ticket to placing on a show's Top Ten Pilots listing that's maintained on disk. (No errors? Give the Navy a call!)

Unlike other flight simulation programs, Blue Angels amounts almost exclusively to a test of instrument flying savvy. For "atmosphere," you get an upper-screen view of sky, horizon and nearby planes, plus good jet engine sound effects. Most of the real action, however, is confined to your instrument cluster. Here, along with indicators for thrust, direction and elapsed time, your on-board computer also presents text cues ("slow down") and mission status updates (the name of the current maneuver) and even prompts joystick moves. Dominating the panel is a real-time flying squares display showing your craft's ideal and actual positions. Simulator mode adds a step-by-step, stop-action option and an error plot showing percent deviation from ideal during the course of a maneuver.

Given the above and a 33-page manual packed with diagrams, the real surprise is that getting to "Show Readiness" turns out to be remarkably easy. Thanks to responsive, natural-feeling controls, comprehensive in-flight instrumentation and quick restarts, you can look forward to completing your first show—i.e., not crashing or wiping out a teammate—after just an hour or so of practice. A low-error show then becomes a matter of polishing off a few rough edges on your rolls and loops.



Blue Angels is a true test of your instrument flying capability.

Offering good speed and a user-friendly, multi-menu interface, Blue Angels is nearly, but not quite, a flawless performer. Top Ten lists do not reliably display flight position and, in one High Show maneuver, the ideal position plane symbol fails to make a roll. Neither glitch seriously impacts player enjoyment, especially for those ready for something truly different in a flight simulator challenge. Expect realistic action and long-lasting, addictive fun when you team up with Blue Angels. *(Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128. C-64/$29.95.)*

—JEFF HURLBURT
HOUSTON, TX

REPORT CARD

A Superb!
An exceptional program that outshines all others.

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

C Average.
Lives up to its billing. No major hassles or disappointments here.

D Poor.
This program has some problems. There are better on the market.

E Failure.
Many problems; should be deep-sixed!

MEGA PACK ..... A

This Classic Compilation Is a Game-Lover's Delight!

Rare indeed these days is a true bargain. The emergence of Mega Pack should be cause for rejoicing among C-64 owners looking for skillfully executed arcade games at a reasonable price.

This software package consists of ten games, all of which require a joystick and represent a number of arcade game genres. For example, four programs—Northstar, Future Knight, Jack the Nipper II and Monty on the Run—fall under the climb, run and shoot category. Rebounder and Thing Bounces Back are action-filled quests, and Krakout features a ball-and-brick scenario that's similar to Arkanoid. Bulldog can be classified as a vertically scrolling outer space shoot-'em-up, while Cosmic Causeway and Trailblazer are science fiction racing contests.

The most impressive feature of this software is the games' complexity. Cosmic Causeway, for instance, has 24 levels, while you battle nine types of aliens over a landscape of 96 screens in Thing Bounces Back. ►

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The collection of games displays a great deal of originality. For example, you assume the unique role of a living tennis ball in Rebounder. Jack the Nipper II is even more unusual, with a vine-swinging baby as a fearless hero braving the dangers of a jungle.

Each of the games displays terrific graphics. The sound effects are excellent, and outstanding musical themes serve as backgrounds for many of the



Monty on the Run is just one of ten joystick-controlled games included in Mega Pack.

contests. Also, players should have few, if any, problems with either the documentation or the control systems.

Together with all of these features, the relatively low cost of Mega Pack makes it a very attractive software package. It offers much to arcade game fans who are looking for challenges that are both well-done and a bit out of the ordinary. *(Virgin Mastertronic, 18001 Cowan St., Irvine, CA 92714. C-64/$34.99.)*

—Walt Latocha
Oak Park, IL

Looney Tunes, Sesame Street and Muppets Print Kits ..... C+

Eh, What's Up, Doc? Creating with Bugs, Big Bird and Kermit

Bugs Bunny's up—on the computer screen. He's ready to join all his Warner Brothers' friends on the Looney Tunes Print Kit disk. The Print Kit program is one of three printing utilities from Hi Tech Expressions. The other two are Sesame Street Print Kit and Jim Henson's Muppets Print Kit.

All three work the same, so this review applies to the trio. The programs can turn out some cute finished products, but you'll have to wait until the printer is through to know what you've got. Unfortunately, WYSIWYG (what-you-see-is-what-you-get) doesn't apply to any of these programs.

Instead, a small box displays the layout of the selected pictures, represented by shaded blocks, and, in desktop publishing lingo, the text is "greeked"—shown as squiggled lines or dots. This layout box gives an idea of what the final page will look like.

What you actually type in is shown in readable text in a separate box. You can read the text as you type it and set its characteristics (size, typeface and special effects) in that box.

The programs have a lot to offer. Each can produce signs, posters, banners (with multiple lines of text in up to four different fonts), cards (with up to four sides filled in), stationery, bookmarks and a storybook.

About 20 borders are included with each program. Sixty of the main characters are found on each disk, offering a diversity of facial expressions, poses and activities.

Getting all this on paper can be a problem, however. Without the WYSIWYG mode found in The Print Shop and similar programs, it's difficult to envision what the final product is going to look like.

My Star NX-10 printer occasionally threw out some misplaced characters when printing. Most cards and banners came out flawlessly, however. Although no mention is made of possible interface conflicts in the documentation, the back of the box notes that the Commodore version "is not compatible with the Super Graphix Jr. interface." Since I was using Xetec's Super Graphix Gold, that might have been the culprit. After testing other interfaces, I suspect the problem may have been trying to print small pictures, something the documentation cautions could cause print errors. Check the back of the package to make sure your printer is specifically listed. If not, you might have to do some experimenting—and you still might not be successful.

The packaging also notes that "young children will require assistance." They aren't kidding. Some adults who aren't familiar with their computers might even need help.

The products have some innovative features. The quarterfold greeting cards can be made either tall or wide. In addition, there's an option for making "tent" cards to be used for place markers. Finger or stick puppets can also be printed.

These three are printing programs with a good variety of projects and a generous offering of characters. You might have to experiment with printer options. And since the on-screen preview is lacking, you may go through a few sheets of printer paper before you have your project perfected. *(Hi Tech Expressions, 584 Broadway, New York, NY 10012. C-64/$14.95 each.)*

—Lonnie Brown
Lakeland, FL

Wizardry V ..... B+

The Best Yet in This Series Beckons to Both New And Old Role-Players

Something has changed in the once abandoned Labyrinth of the Gate beneath Llylgamyn's most ancient temple. Would you believe a laughing kettle selling advice, a duck magician dealing in wands, and a nightclub with a booby-trapped ballroom? And, what's all this talk of The Loon, Evil Eyes, an Ice Ferry, multi-level pools filled with gold and the Card Lords?

As one of the temple Brotherhood complained, "Well, what do you expect when some power-crazed sorceress opens the Gate and releases awesome Elemental Forces?" Unless someone—and we all know who that is—plumbs the maze and frees the Gatekeeper, everything will be swept into an expanding maelstrom of monsters, mayhem and madness!!!

The first self-contained, stand-alone scenario since the original Wizardry might have been subtitled "A New Beginning" rather than "Heart of the Maelstrom." Series veterans can fill all six party slots with tough guys from earlier quests, and (at last!) newcomers can join in the fun with freshly created characters. To minimize sequel shock, much of level 1 amounts to a "beginner's maze." Large and well-stocked with bats, bugs and other weakies, it's perfect for whipping new characters into shape.

Wizardry V is big—an 86-page manual, maze lore booklet and three double-sided disks that hold eight sprawling stairway/elevator/chute-riddled maze levels and encompass a world of eccentric personages, wildly different locales, weird machines and monsters galore.

That the game falls short of being a sound/graphics masterpiece will come as no surprise to old Wizardry hands. Crisp, well thought-out menu/inven-

tory windows greatly simplify transactions. However, your 3-D perspective forward views of the maze contain strictly bare-bones outline drawings relieved only, upon encounters, by monster/personage picture overlays. Even more bothersome is that almost every player action is the occasion for yet another three to five seconds of disk access. Nor should you expect any map-making innovations to help handle the large, irregularly shaped mazes. With only compass coordinate checks as a guide, cumbersome cut-and-tape constructions are inevitable.

Obviously, it doesn't take 40-plus hours (so far) of pursuing mini-quests, unraveling puzzles and dueling with the forces of chaos to decide whether or not Wizardry V is entertaining. Flexible character development, piles of nifty weapons, armor and artifacts, an expanded 63-spell magic system, and exciting non-tactical combats all enhance the fun. The real secret, however, is an amazing absence of artificial restraints, an open-ended freedom to challenge a swords and sorcery realm that *really works. (Sir Tech Software, PO Box 245, Ogdensburg, NY 13669. C-64/$39.95.)*

—JEFF HURLBURT
HOUSTON, TX

SECURITY ALERT ..... B

Do You Have
What It Takes to Be
A Master Spy Extraordinaire?

If you enjoy games that cast you in the role of a master spy, that require you to travel through various mazes in search of valuables, and that pit you against the latest in high-tech snooping devices, then Security Alert is for you.

Each of five locations (Jewelry Store, Museum, Bank, Research Institute and Embassy) offers a different maze, goal and set of obstacles. Mazes are more complex and opponents more numerous and deadly depending on which of the three difficulty levels is chosen. As a result, there are 15 unique challenges. You'll be able to complete some after one or two tries; others will take a great deal longer.

The play screen is divided into six areas. The largest is a top or side view of your character, the section of the room he is in and any objects present. Not only can you toggle between views by a simple key press, but you can also rotate your character's perspective. While the three-dimensional side view is more attractive, the overhead shot is easier for maneuvering.

Other windows include the Memo Pad, which notes the time remaining, your coordinates and the clues you discover; the Map Display, for keeping track of your position in relation to the robot guards; and the Tool Box, which holds items you might need. A fifth area houses the view buttons and an Alert Level Indicator, which sounds an alarm and changes colors if you're detected by a device. In the Close-Up Window, you manipulate items that you're touching in the main window.

In all, there are seven detection devices, 20 tools and numerous combinations of detection device controls. Also, you can move in many different ways (crawling seems to be the safest).

The manual contains detailed directions, descriptions of items, diagrams and brief tutorials. The object descriptions don't include illustrations, however, which is unfortunate because some on-screen tools and treasures barely resemble what they represent.

Security Alert offers impressive sound and graphics, a workable interface and excitement and challenge. It's not the most original or varied program in the world, but it's a lot of game for the money. *(Intracorp, Inc., 14160 SW 139th Court, Miami, FL 33186. C-64/$29.95.)*

—LEN POGGIALI
SYRACUSE, NY

BATMAN: THE MOVIE ..... C–

You've Always Wanted
To Star as Batman,
Haven't You?

It was a sure bet that as soon as the Darknight Detective burst upon the celluloid screen in all his avenging glory that Data East would issue a follow-up to their first Batman computer game (The Caped Crusader; see Software Gallery, March 1990). Well, they should have taken a bit more time with this product. Perhaps then they would have incorporated features to make it less aggravating and more playable.

This game follows the plot of the mega-hit movie. Batman goes up against his arch foe, The Joker (Jack Napier), who has brought Gotham City to its knees. Gameplay has Batman hunting a pre-Joker Napier in the toxic waste plant, then careening through the city streets in the Batmobile, dodging civilian cars and police roadblocks as he heads for the Batcave.

Once there, he must use the Batcomputer to solve the mystery of the killer cosmetics that Joker has dumped on the city. This done, he attempts to thwart Joker's mass killings at the Gotham Carnival. Finally, Batman pursues Joker up the steps of the old Cathedral to their final confrontation. Sounds like an exciting game, doesn't it? Well, it should have been, but the programmers left out a few things.

The first problem is that there's apparently no way to acquire more energy or more lives. You begin with three lives, and when they're gone, you're history. There's also no Save Game mode to pick up where you left off. And, in higher levels when your last Batman "bites the dust," you have to work your way through all the lower levels again, which isn't easy! (Hint: If you lose a life in the first level, quit and reboot, or you'll never make it to the end.)

I don't need a game to be extremely easy to get to the end, but it would be nice if the gameplay had more incentives to get me through. Here, the first level is just tough enough to keep you going almost to the end, but then you'll whiz through the streets only to die and renegotiate that level again; it's enough to send you over the edge!

Why chances at more lives and a save game function were left out are beyond me. This Batman should have pulled a leaf from his Kryptonian pal's recent game and let players run through all five levels and log high scores.

As a novelty Bat-tie-in, this is probably worth it for die-hards, but if you really want a Bat-game that will challenge your intellect and offer you a chance at winning, pick up Data East's first Batman game. It beats this one by a Bat-mile. *(Data East, 1850 Little Orchard St., San Jose, CA 95125. C-64/$29.95.)*

—BOB SODARO
FAIRFIELD, CT

ALTERED BEAST ..... C–

Is It Really Worth
Awakening from the Dead For?

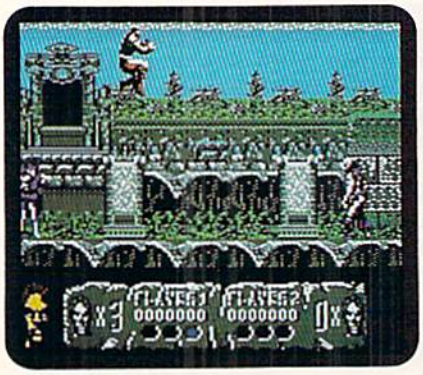
Altered Beast is interesting in one odd respect—you become a werebear, whose bad breath knocks enemies dead. Unfortunately, this "terminal halitosis" is among only a few noteworthy features in this coin-op adaptation.

Altered Beast begins with Zeus summoning you, a brave and fearless war- ►

rior, from the grave. Your mission is to rescue Zeus's daughter by defeating Neff, the evil Lord of the Underworld.

Standing in your way are Neff himself and his loathsome minions, which include crocodile worms, hammer demons and grave masters. These fiends materialize from the top, bottom and sides of the screen, and their blows can weaken you and eventually end the game.

You start each of the program's five rounds as a man who has only punches and kicks as weapons. Defeating the



Beware of evil monsters on all sides in Altered Beast.

multi-headed wolves and capturing the spirit balls they release transform you into one of four beasts—a werewolf, weredragon, werebear or weretiger. Each of these creatures has a special power; the weredragon, for example, can fry anything it touches with electricity. If you successfully complete a level, you revert back to your original human form and meet new dangers.

Although the graphics of Altered Beast are generally quite good, its sound is surprisingly mediocre. This is especially disappointing if you're familiar with Sega's C-64 version of Out Run, a program renowned for its terrific music and sound effects.

Altered Beast's control system could also stand improvement. For instance, if you're crouching and facing one side of the screen, you must rise completely before you can turn in the opposite direction; doing this takes valuable time that's needed for the hordes of adversaries who pop up.

Another shortcoming is a skimpy instruction pamphlet that doesn't adequately explain all of the program's features. In addition, the game just isn't fair—you frequently suffer unavoidable injury when a foe suddenly materializes right beneath your feet.

One strong plus is an option for simultaneous play by two individuals. But there's little else to recommend Altered Beast to those looking for some "ferocious" arcade action. *(Sega; distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/$34.95.)*

—WALT LATOCHA
OAK PARK, IL

RICK DANGEROUS ..... A–

As if the software's packaging wasn't obvious enough, the opening scene of Rick Dangerous is a dead giveaway to the inspiration for this program. A hero being chased by a massive boulder can only mean that another computer game is trying to capture the magic of the Indiana Jones movies.

The first of four adventures takes place in an ancient South American temple, which is swarming with bloodthirsty tribesmen. If you survive, it's on to an Egyptian pyramid to overcome ruthless assassins in order to recover a priceless gem. As Rick, your third mission is an attempted rescue of Allied POWs at a heavily fortified castle, and the grand finale is a one-man assault on a secret Nazi missile base.

Be warned that Rick Dangerous doesn't contain a save feature, which means that you must (as the instructions point out) "become fast enough and smart enough to fight your way through. . .without getting killed." It also means that you must memorize large sections of the game to avoid constantly falling into deadly traps.

But the program is so appealing that most players won't mind going back a number of times. There are frequent touches of humor, and the graphics, sound and animation are first-rate. And the predicaments Rick finds himself in are very clever and entertaining.

Rick Dangerous has much to offer. In many ways, it's the C-64 game that most faithfully follows in the footsteps of the legendary Indiana Jones. *(Microplay Software; distributed by Medalist International, 180 Lakefront Drive, Hunt Valley, MD 21030. C-64/$29.95.)*

—WALT LATOCHA

CURSE OF BABYLON ..... A–

Get ready, world-savers—you're needed once again! A wandering comet has accidentally opened a passageway from the underworld, releasing hordes of hideous monsters. Your mission is to close this entrance to hell and stop the horror that grips the land.

Initially armed with only a knife and flimsy shield, during your explorations you can obtain keys to locked rooms, more powerful weapons and seven magical items. The game also lets you cast six supernatural spells.

Although they sometimes tend to be rather simple, the software's graphics are colorful and appealing. They're overshadowed, however, by the program's sound, especially the background tunes.

The many features of Curse of Babylon make it both sophisticated and interesting. You face the challenges of extensive mapping and problem-solving while conducting a great deal of careful experimentation—including frequent game saves—just to discover everything the program offers. While only rudimentary arcade skills are needed for success, the game demands a great deal of thought, time and effort.

But, that's what world-savers are used to! *(Kyodai Software; distributed by Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. C-64/$24.95.)*

—WALT LATOCHA

BATTLE CHESS ..... B+

There are a lot of C-64 chess games on the market, but Battle Chess is the only one that can turn every capture into an entertaining, animated showdown.

Say, for instance, your knight is plotting to capture your opponent's queen. In Battle Chess, other pieces step aside as the knight boldly strides towards the monarch. He swings his sword at the queen, but she deftly evades the blow. She raises her hands, poised to cast a spell on the knight, but her magic is reflected by the knight's shimmering shield and is bounced back at her, turning the queen into a frog that slowly fades from view.

Of course, all this animation, as well as the accompanying sound effects, takes up a considerable amount of computer memory. Animation routines must be loaded from the disk for every move. This can be somewhat annoying, but if you want a quicker game, you can use the two-dimensional board, or simply toggle off the sound, walking and combat from the 3-D board.

The program disks aren't copy protected, but to load the program you must correctly enter a specified move from one of 20 complete chess games notated in the player's manual. The manual also contains a terrific chess tutorial. *(Interplay Productions; distributed by Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. C-64/$39.95.)*

—BOB GUERRA ■

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JOHN'S PICKS

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5. **THE NOTABLE PHANTOM** "introduces children to the world of music by turning the Commodore computer into a melody-making machine." Britannica Software.

HONORABLE MENTION

Computer Scrabble—Virgin Mastertronic.
Crosscheck—The Software Toolworks.
Baron—Britannica Software.
Crypto Cube—Britannica Software.
Pre-Reading—Minnesota Educational Computing Corporation.

A software reviewer for the past nine years, **John DiPrete** has also worked as a college tutor of essay writing and contributed papers to various academic journals.

SANDI'S PICKS

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4. **NEWSROOM** "is the best in creativity software because it merges graphics and word processing so users can produce school newspapers, flyers or signs." Springboard Software.
5. **MATH BLASTER** "is a terrific arcade-style software program that keeps children interested in math and problem solving." Davidson & Associates.

HONORABLE MENTION

Where in the USA is Carmen Sandiego?—Broderbund Software.
Create with Garfield—DLM.
Fraction Factory—Springboard Software.
Crossword Magic—Mindscape.
Music Construction Set—Electronic Arts.

Along with being a parent and a Certified Public Accountant, **Sandra Cook Jerome** has been reviewing educational software for five years.

RUN's top educational authorities recommend the best teaching and learning software titles in the Commodore market.





By BETH S. JALA

Len's Picks

1. **WHERE IN EUROPE IS CARMEN SANDIEGO?** "teaches history, geography, map reading and research skills while players ages eight to adult race around the continent in pursuit of the elusive Ms. Sandiego." Broderbund Software.
2. **TICKET TO PARIS** "has you tracking down your runaway cousin by visiting famous Parisian landmarks, meeting and conversing in French (or English) with natives, managing time and money and gathering clues (for ages eight to adult)." Blue Lion Software.
3. **TINK! TONK! COMPLETE LEARNING SET.** "Actually six separate programs for ages four through eight, each teaches different skills within the framework of an interactive story set in Mercer Mayer's magical Tink Tonk Land." Thunder Mountain Software.
4. **ASTRO-GROVER.** "With the aid of Zips, who is shot from an alien spaceship, and lovable monster Grover, three- to six-year-olds learn how to count, add and subtract while playing five varied games. Astro-Grover includes a tuneful musical score and excellent graphics." Hi Tech Expressions.
5. **FRACTION FEVER.** "Hopping along on your pogo stick, you have a limited amount of time to find the correct pictorial representation of a fraction in order to ride an elevator to higher levels. Top-notch arcade excitement helps make learning about and identifying fractions quite an adventure for players ages seven to adult." Spinnaker Software.

Honorable Mention

Agent USA—Scholastic Software.
M–SS–NG L–NKS—Sunburst Communications.
Movie Musical Madness—CBS Software.
Snoopy Writer—Random House Software.
Dance Fantasy—Fisher-Price Software.

Len Poggiali is a high school administrator and English teacher. In addition to being a software reviewer, he has co-authored *50 American Biographies* and *50 World Biographies* for Harcourt Brace Jovanovich and was a three-time Shubert Fellow in Playwriting at Carnegie-Mellon University. He says that his eight- and ten-year-old children have been using computers since they could sit without falling off a chair, and that the three have spent many enjoyable hours together playing educational games.



Sharon's Picks

1. **CARMEN SANDIEGO SERIES.** "These detective games are among the best programs for teaching social studies and for encouraging students to develop research skills." Broderbund Software.
2. **KINDERCOMP.** "What is sweeter than watching a three-year old gasp in awe as his or her name scrolls down the screen in magnificent colors? A wonderful introduction to the computer, this is also an early education program that's a lot of fun." Spinnaker Software.
3. **MATH BLASTER.** "These math games make learning those nasty math facts fun—and they work, too!" Davidson & Associates.
4. **MAVIS BEACON TEACHES TYPING.** "Simply an excellent typing tutor that is both individualized and amusing—in either standard or Dvorak." The Software Toolworks.
5. **THE PRINT SHOP.** "In computer-literate environments, this program has become part of 'kid culture.' Perhaps more than any other program, it makes clear to children that computers have 'real life' use." Broderbund Software.

Honorable Mention

Crossword Magic—Mindscape.
Bank Street School Filer and Databases—Sunburst Communications.
Dr. Seuss Fix-Up the Mix-Up Puzzler—CBS.
Stickybear Math—Optimum Resource/Weekly Reader.

Sharon Weiner has seen these programs used both at home (with her daughters) and at school. She is a freelance writer and editor of textbooks and ancillary material, and has taught English at the elementary, middle and high school levels. ►

ILLUSTRATED BY KERRY GAVIN

Walt's Picks

1. **SKY TRAVEL**. "Due to its many features and comprehensive documentation, this program is the finest software available for learning about astronomy (for ages 12 and up)." Microillusions.
2. **STICKYBEAR MATH 2**. "No other program does a better job of using outstanding graphics and sound to teach the fundamentals of multiplication and division to children ages seven and up." Optimum Resource/Weekly Reader.
3. **MAVIS BEACON TEACHES TYPING**. "For those in the primary grades through college wishing to master a most important school and office skill, this software is an excellent learning tool, providing interesting lessons and helpful reports on each user's progress." The Software Toolworks.
4. **BAGASAURUS**. "For providing enjoyment while developing vocabulary and skills like classification and sequencing in children ages six through nine, I have found no better program than Bagasaurus." Hi Tech Expressions.
5. **WHERE IN EUROPE IS CARMEN SANDIEGO?**. "As all the critical acclaim for this program indicates, Where in Europe is Carmen Sandiego? (and the rest of the Carmen Sandiego series) is the best example of software that combines lessons on geography and problem-solving in a game format (for ages seven and up)." Broderbund Software.

Honorable Mention

Alphabet Circus—DLM.
Pals Around Town—Hi Tech Expressions.
Letter-Go-Round—Hi Tech Expressions.
Rocky's Boots—The Learning Company.
Teddy Bear.rels of Fun—DLM.

Walt Latocha is a freelance writer from Oak Park, Illinois. He lives with David, his son and in-house software tester, and with Marilou, his wife, who's a high school teacher. Walt has been reviewing software for *RUN* for the past four years. ■



Table 1. List of publishers.

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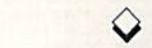
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A Notable Basic

Playing music on the 64 was never easier using these five C-128 music commands.



By CHRIS NEWMAN and KENT SULLIVAN

One of the most distinctive and powerful features of the C-64 and C-128 is the programmable SID (Sound Interface Device) chip. The SID is responsible for all the sound and music that your C-64/128 makes and has capabilities that far outdistance more expensive computers.

Using the SID on the C-128 is straightforward, because Basic 7.0 supports sound and music creation with six commands: Sound, Play, Envelope, Filter, Tempo and Volume. On the C-64, however, Basic 2.0 forces you to use a litany of Pokes and Peeks to master the magic of SID. Until now, at least. . .

SID Basic 64 brings five of the six Basic 7.0 music commands (all but Sound) to Basic 2.0 in an easy-to-use driver that's compatible with all normal Basic 2.0 programs. It also supports up to six voices (twice the normal) for true stereo music, due to the increasing popularity of adding a second SID chip to the C-64/128 (via an internal modification or a cartridge). In addition, SID Basic 64 can read Basic 7.0 programs that have music commands in them, so you won't have to retype songs that you already have for the C-128.

Starting Notes

SID Basic 64 consists of two listings. Listing 1 is a hex loader. Type it in, using *RUN*'s Checksum program, and save it to disk. When run, it will create SID.BASIC. To use SID.BASIC, enter the following three lines:

```
LOAD "SID.BASIC",8,1
NEW
SYS 49152
```

Try experimenting with each of the music commands. Once you have SID Basic 64 working, turn off the computer, reload the Checksum program and type in Listing 2, the second hex loader. Run it to create the SID Basic 64 file called TWINKLE, which requires SID.BASIC to be activated beforehand, using the loading instructions above.

TWINKLE places the melody and counterpoint in voices 1 and 2. In SID Basic 64, voices 1–3 are played through the SID chip inside your C-64/128 (on the *left side* in stereo terminology) while voices 4–6 are played through the second SID chip (on the *right side*), if you have one installed. If you do have a second SID chip, TWINKLE plays a four-voice, stereo song.

Commands

All SID Basic 64 commands work in both Program and Direct modes. Due to space limitations here, we can't go into detail on music theory or the combinations of SID Basic 64 commands, but these commands are well documented in the *Commodore 128 System Guide* and the *Commodore 128 Programmer's Reference Guide*, as well as several other sources.

It's very important to note that values set during execution of SID Basic 64 commands, unlike those set by Basic 7.0 commands, don't get reset, so you need to reload and reenable SID Basic 64 if you wish to restore the default settings. Otherwise, you probably won't get the results you're looking for.

Below is a summary of each of the five commands:

ENVELOPE

Purpose: selects the various ADSR and waveform parameters that create sounds, or "instruments."

Syntax: ENVELOPE e[,a[,d[,s[,r[,wf[,pw]]]]]]

e = envelope number: 0–9 (see Table 1 for predefined values)
a = attack rate: 0–15
d = decay rate: 0–15
s = sustain level: 0–15
r = release rate: 0–15
wf = waveform
  0 = triangle
  1 = sawtooth
  2 = pulse
  3 = noise
  4 = ring modulation
pw = pulse width: 0–4095 (valid only with waveform 2)

Notes: If you wish to use one of the predefined instruments, specify only the e parameter. For example:

```
ENVELOPE 0
```

selects the default piano instrument.

If you wish to redefine one of the instruments for your own use, you must specify all the parameters (except pulse width when you're not using the pulse waveform). For example:

```
ENVELOPE 0,7,9,4,7,0
```

redefines the default piano instrument as an oboe by giving it an attack of 7, a decay of 9, a sustain of 4, a release of 7 and a triangle waveform.

You can hear what the ten predefined instruments sound like by selecting them with the T parameter of the Play command (below) and specifying a few notes to be played. ►

RUN it right: **C-64**

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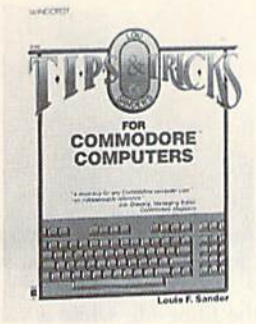
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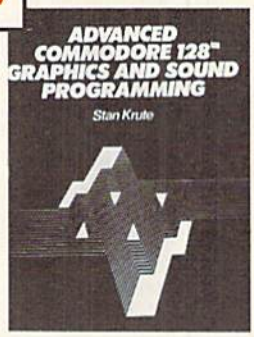
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FILTER

Purpose: controls the SID filter to alter the sounds that a voice produces.

Syntax: FILTER cf[,lp[,bp[,hp[,res[,chip]]]]]

cf = cutoff frequency: 0–2047
lp = low-pass filter: 0 (default) = off, 1 = on
bp = band-pass filter: 0 (default) = off, 1 = on
hp = high-pass filter: 0 (default) = off, 1 = on
res = resonance level: 0–15
chip = chip number: 0 = internal/left, 1 = external/right

Notes: You can have any combination of the three filters turned on at one time. The resonance is the "peaking effect" of the sound's frequency as it nears the cutoff frequency. Note that the "chip" parameter is a SID Basic 64 enhancement to support six voices; it is not part of Basic 7.0. If you don't specify a chip, the filters on both SID chips will be affected.

PLAY

Purpose: outputs a string of musical notes to the SID chip, much like Print outputs a string of characters to the screen.

Syntax: PLAY "V<n>,O<n>,T<n>,U<n>,X<n>,<[notes or elements]. . .>"

V<n> = voice number: n = 1–6 (1 is the default)
O<n> = octave number: n = 0–6 (4 is the default)
T<n> = tone envelope number: n = 0–9 (0 is the default)
U<n> = volume level: n = 0–9 (9 is the default)
X<n> = filter: n = 0 or 1 (0 is the default)
notes = valid musical notes: C,D,E,F,G,A,B
elements = modifiers to notes (all but R and M must be followed by a note letter)
W = whole note
H = half note
Q = quarter note
I = eighth note
S = sixteenth note
. = dotted note
R = rest
M = measure (wait for all voices to finish current note)
# = sharp
$ = flat

Notes:
1. SID Basic 64 expands the V parameter to accommodate up to six voices; Basic 7.0 has a range of 1–3.
2. The values for T correspond to the ten instruments defined through the Envelope command.
3. The Volume command (see below) has a range of 0–15, but the U parameter of Play scales this into ten steps, as follows:

U	Volume
0	0
1	1
2	3
3	5
4	7
5	8
6	12
7	13
8	14
9	15

Also, the U part of U<n> is optional (as it is in Basic 7.0). You can specify just the number, and Play will assume you want to change the volume.
4. An X value of 0 means turn the filter off, while a value of 1 means turn the filter on.
5. *Important:* If the Play command doesn't produce any sound, remember to make sure the volume is set to a value other than 0.

An example of the Play command is:

```
PLAY "V1 O4 T7 U8 X0"
```

which sets up voice 1 to play in octave 4 with tone envelope 7 (organ), volume 8 (equal to VOL 14), and the filter off. Another example is:

```
PLAY "V3 O3 I C V2 O5 Q#D"
```

which plays an eighth note C in the third octave using voice

Table 1. Predefined (default) envelope values.

Number	Instrument	Attack	Decay	Sustain	Release	Waveform	Width
0	Piano	0	9	0	0	2	1536
1	Accordion	12	0	12	0	1	
2	Calliope	0	0	25	0	0	
3	Drum	0	5	5	0	3	
4	Flute	9	4	4	0	0	
5	Guitar	0	9	2	1	1	
6	Harpsichord	0	9	0	0	2	512
7	Organ	0	9	9	0	2	2048
8	Trumpet	8	9	4	1	2	512
9	Xylophone	0	9	0	0	0	

3 and then plays a quarter note D-sharp in the fifth octave using voice 2.

Note that in the two examples above, we inserted spaces between the elements of the strings to improve readability; they aren't mandatory.

TEMPO

Purpose: adjusts the speed at which the music plays.

Syntax: TEMPO r

r = rate of play: 1–255 (255 is fastest, 8 is the default)

Notes: The default tempo of 8 equals M.M. 100 (100 beats per minute). Although all applicable technical notes say that Basic 7.0's default tempo is 8, it's actually 16. We decided to make SID Basic 64 follow the written specifications.

VOLUME

Purpose: adjusts the loudness at which the music plays.

Syntax: VOL l[,c]

l = volume level: 0–15 (15 is loudest and the default)
c = chip number: 0 = internal/left, 1 = external/right

Notes: Although the default volume is 15, a volume of 12 is the loudest you'll normally need; values above 12 can distort some instruments. Note that the c parameter is a SID Basic 64 enhancement to support six voices; it is not part of Basic 7.0. If you don't specify c, the volume for both SID chips will be changed.

Technical Notes

If you have a second SID chip, you might want to "spread out" a three-voice song across both the left and right channels. You can do this by copying the code for voices 1–3 and changing it to use voices 4–6. However, there's an easier way: You can tell SID Basic 64 to play a voice on the second SID chip without having to rewrite the Basic program. Just change the chip the voice is mapped to with:

POKE 49298+<voice number>(1–6),<value>

where value equals 0 for the internal SID (left side) or 1 for the external SID (right side). To spread out a three-voice song, try moving voice 2 to the second chip with POKE 49300,1. Try moving other voices and experimenting with other configurations.

SID Basic 64 assumes that if you have a second SID chip, it's mapped into memory at $DE00. If yours resides at a different location ($DF00 is the other likely candidate), you can tell SID Basic 64 by poking location 49306 with the high byte of the address. For instance, for a chip at $DF00, you'd use POKE 49306,223 (223 = $DF). The location of the internal SID chip is stored in 49305 and is 212 by default (212 = $D4). This default value works on all C-64s and C-128s.

As mentioned above, SID Basic 64 can list Basic 7.0 programs. It correctly displays all six sound and music commands and can handle most other Basic 7.0 commands by displaying the hexadecimal value of the Basic keyword (token) within brackets (for example, COLOR becomes [E7]). It does not correctly handle "dual-token functions" and will report a syntax error if it encounters one. This shouldn't be much of a problem, however, since you can easily edit out the nonmusic commands from any Basic 7.0 program you wish to play with SID Basic 64.

SID Basic 64 is compatible with other "wedge" programs that use the "error" or CHRGET techniques, but not those that redirect the IMAIN, ICRNCH, IQPLOP or IGONE vectors (locations $0304–$0309 in memory). It is compatible with the Commodore DOS wedge, but with Creative Micro Design's JiffyDOS, it tries to tokenize some characters incorrectly. For instance, JiffyDOS's /INV* would normally load the first program that begins with INV, but SID Basic 64 converts the * into its tokenized form and causes a File Not Found error. You can get around this effect by adding a leading quote to the line: /"INV*. It is important to remember to always install SID Basic 64 after any other wedges you wish to use.

We wish to thank Art Hunkins for his inspiration and help, and Dan Heeb for the information gleaned from his book *VIC-20 and Commodore 64 Toolkit: Basic.* R

Chris Newman is a student at Carnegie-Mellon University. Kent Sullivan is the general manager of Dr. Evil Laboratories, developers of the SID Symphony Stereo Cartridge.

Listing 1. SID Basic 64 program. (Available on ReRUN disk. See order card facing page 48.)

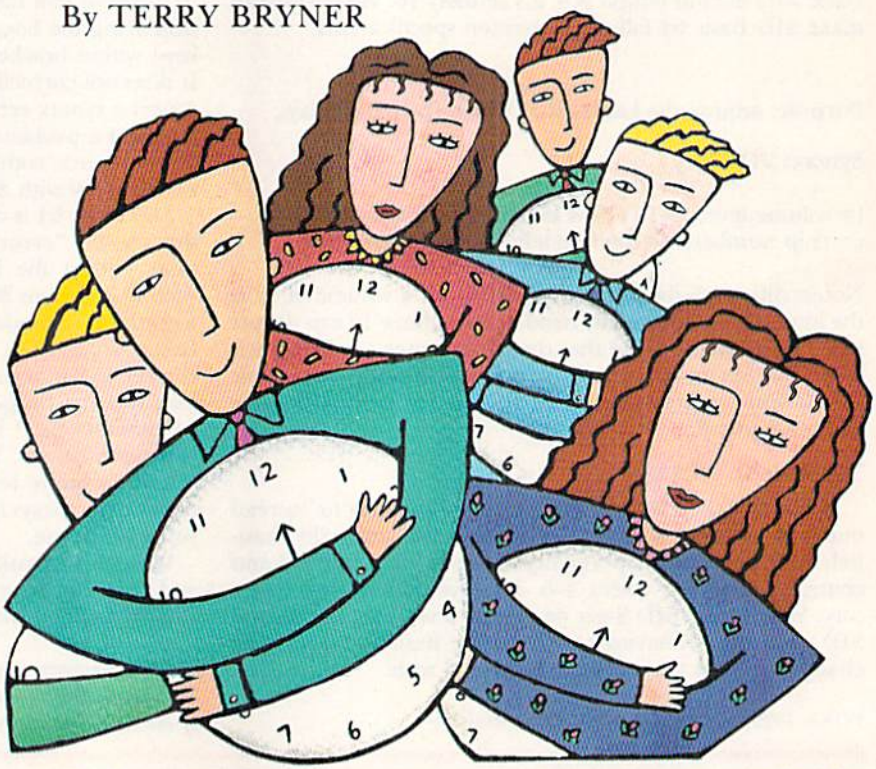
```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) SID.BAS
  IC                    :REM*16Ø
5 OPEN 8,8,8,"SID.BASIC,P,W"
                        :REM*45
6 CT=Ø:PRINT"{SHFT CLR}":REM*56
1Ø READ A$:IF A$="-1" THEN CLOS
  E8:PRINT:PRINT"ALL DONE!":EN
  D                     :REM*129
12 PRINT"{HOME}READING LINE "+S
  TR$(CT):CT=CT+1       :REM*141
15 IF LEN(A$)<62 THEN 55
                        :REM*254
2Ø B$=MID$(A$,1,2Ø)+MID$(A$,22,
  2Ø)+MID$(A$,43,2Ø)    :REM*242
25 FOR I=1 TO 3Ø        :REM*181
3Ø C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                        :REM*2Ø9
35 H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55            :REM*85
4Ø L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55            :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                        :REM*67
5Ø NEXT:GOTO 1Ø         :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
   O 7Ø                 :REM*184
6Ø IF LEN(A$)<42 THEN B$=LEFT$(
   A$,2Ø)+RIGHT$(A$,(LEN(A$)-21
   )):GOTO 7Ø           :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
   Ø)+RIGHT$(A$,LEN(A$)-42)
                        :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                        :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55            :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55            :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                        :REM*148
95 NEXT:GOTO 1Ø         :REM*16Ø
1ØØ REM HEX DATA FOR SID BASIC
   64                   :REM*116
1Ø1 DATA ØØCØ78ADFACØ8DØ4Ø3AD*F
   BCØ8DØ5Ø3ADFCCØ8DØ6*Ø3ADFDC
   Ø8DØ7Ø3ADFECØ        :REM*9
1Ø2 DATA 8DØ8Ø3ADFFCØ8DØ9Ø358*6
   ØØ9CØØØ594Ø9Ø9Ø989*Ø9ØØCØF
   Ø5Ø4Ø21ØØ9Ø41        :REM*1Ø7
1Ø3 DATA ØØ4Ø2Ø1Ø8Ø1Ø2Ø4Ø4Ø4Ø*1
   ØØ6ØØØØØØØØØØ2Ø8Ø2*ØØØØØØØ
   ØØØØØØØØØØØØ        :REM*7Ø
1Ø4 DATA ØØØFØC45BF7D83D67973*C
   77C9743474B4F54595E*646A7Ø7
   77EØØØ1Ø3Ø5Ø7        :REM*2Ø3
```

Continued on p. 53.

Time Clock

Mind the fleeting seconds, minutes and hours on your 64 or 128 with a glance at this analog on-screen clock.

By TERRY BRYNER



When you've been reading standard clocks for years, a digital clock just isn't the same, especially when it gets lost in the jumble of letters on a computer screen. Time Clock fixes this problem by putting an old-fashioned round clock, complete with a second hand, on the screen of your C-64 or C-128. The clock keeps accurate time, and you can read it at a glance while typing in Basic programs, running some of them and performing disk operations.

There are two versions of Time Clock, one for the C-64 (Listing 1) and one for the C-128 in 40-Column mode (Listing 2). Type in either, using *RUN*'s Checksum program to detect typing errors. The memory addresses for Time Clock 64 and 128 are 0801–0D63 and 0801–215A, respectively. When you're finished typing, save the program to disk before running it.

To use the clock, load and run the program, then, at the HHMMSS prompt, enter two digits each for the current hour, minute and second. When you press the return key, the clock appears in the upper-right corner of the screen, complete with moving second hand, and continues to run until you deactivate it by pressing the run-stop and restore keys simultaneously.

To load another Basic program, type NEW and press return to clear Time Clock from memory. Because the program erases itself from memory, you can work on other Basic programs while the clock remains active. You can hide the clock with POKE 53269,0 and then restore it with POKE 53269,240.

If you need to move the program to another disk, simply load it, swap disks and save it. Although written in machine language, Time Clock behaves like a normal Basic program.

The C-64 version is designed to operate in the normal, bank 0 Video mode. The C-128 version doesn't load properly after the commands GRAPHIC1: GRAPHIC0 are used to move the start of Basic, and either version displays garbage if the sprite pointers are manipulated. However, for typical extended conversations with the screen editor, the clock is a useful reminder of the fleet wings of time. R

Terry Bryner, who serves in the Submarine Force of the U.S. Navy, enjoys programming challenges and looking at new computer languages.

Running Instructions: **Type in Listing 1 (for C-64) or Listing 2 (for C-128) and save to disk. Run the former to create TIME-CLOCK.64 or the latter to create TIME-CLOCK.128. To use, load and run either TIME-CLOCK.64 or TIME-CLOCK.128.**

Listing 1. Time Clock 64 program. (Available on ReRUN disk. See order card facing page 48.)

```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) TIME-CL
  OCK.64                  :REM*211
5 OPEN 8,8,8,"TIME-CLOCK.64,P,W
  "                       :REM*17
6 CT=Ø:PRINT"{SHFT CLR}":REM*56
1Ø READ A$:IF A$="-1" THEN CLOS
  E8:PRINT:PRINT"ALL DONE!":EN
  D                       :REM*129
12 PRINT"{HOME}READING LINE "+S ►
```

RUN it right: **C-64 or C-128 (in 40-Column mode)**

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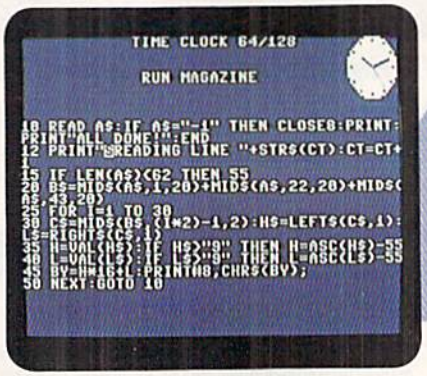
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TIME CLOCK

```
   TR$(CT):CT=CT+1       :REM*141
15 IF LEN(A$)<62 THEN 55
                         :REM*254
2Ø B$=MID$(A$,1,2Ø)+MID$(A$,22,
   2Ø)+MID$(A$,43,2Ø)    :REM*242
25 FOR I=1 TO 3Ø         :REM*181
3Ø C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                         :REM*2Ø9
35 H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55             :REM*85
4Ø L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55             :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                         :REM*67
5Ø NEXT:GOTO 1Ø          :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
   O 7Ø                  :REM*184
6Ø IF LEN(A$)<42 THEN B$=LEFT$(
   A$,2Ø)+RIGHT$(A$,(LEN(A$)-21
   )):GOTO 7Ø            :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
   Ø)+RIGHT$(A$,LEN(A$)-42)
                         :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                         :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55             :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55             :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                         :REM*148
95 NEXT:GOTO 1Ø          :REM*16Ø
1ØØ REM HEX DATA FOR TIME CLOCK
     64                  :REM*27
1Ø1 DATA Ø1Ø81DØ864ØØ99229322*3
    BA33136293B2254494D*452Ø434
    C4F434B1122ØØ        :REM*195
1Ø2 DATA 38Ø86EØØ99A33133293B*2
    2434F5Ø595249474854*2Ø31393
    93Ø22ØØ58Ø878        :REM*1Ø
1Ø3 DATA ØØ99A33133293B225255*4
    E2Ø4D4147415A494E45*2Ø2Ø2Ø2
    Ø2Ø2Ø2Ø22ØØ79        :REM*199
1Ø4 DATA Ø882ØØ99A33133293B22*4
    14C4C2Ø524947485453*2Ø52455
    3455256454411        :REM*135
1Ø5 DATA 22ØØ94Ø8C8ØØ8522Ø2Ø*2
    Ø54494D452Ø2848484D*4D53532
    9223B5424ØØBC        :REM*7Ø
1Ø6 DATA Ø8C2Ø19735363538372C*3
    136ACC528CA2854242C*312C312
    929AAC528CA28        :REM*18Ø
1Ø7 DATA 54242C322C312929ØØE4*Ø
    8DBØ19735363538362C*3136ACC
    528CA2854242C        :REM*137
1Ø8 DATA 332C312929AAC528CA28*5
    4242C342C312929ØØØC*Ø9F4Ø19
    735363538352C        :REM*143
1Ø9 DATA 3136ACC528CA2854242C*3
    52C3129929AAC528CA28*54242C3
    62C3129290Ø19        :REM*174
11Ø DATA Ø9ØDØ29735363538342C*3
    ØØØ26Ø926Ø29E2Ø3233*34353AA
    2ØØØØØØØØAØ4Ø        :REM*199
111 DATA B9AFØ999BFØ288DØF7A2*4
    A8EØ8DØ8EØADØ8EØCDØ*A2478EØ
    BDØ8EØDDØ8EØ9        :REM*247
112 DATA DØA22B8EØEDØA2328EØF*D
    ØA2ØØ8E1BDØ8E2CDØ8E*2DDØE88
    E2EDØE88E2BDØ        :REM*7Ø
113 DATA A28Ø8E1DDØ8E17DØA2FØ*8
    E15DØ8E1ØDØA2ØB8EFF*Ø7E8E88
    EFCØ7E88EFDØ7        :REM*12Ø
114 DATA E88EFEØ7A2AØAØØDADEF*Ø
    98DØØCØEE8EØ9DØØ3EE*8FØ9EE9
    1Ø9DØØ3EE92Ø9        :REM*187
115 DATA EC8EØ9DØE5CC8FØ9DØEØ*4
    CØØCØØ1FCØØØ7DFØØØB*FE8Ø1FF
    FCØ3FFFEØ5FFF        :REM*93
116 DATA DØ7FFFFØFFFFF8FFFFF8*F
    FFFF8BFFFE8FFFFF8FF*FFF8FFF
    FF87FFFFØ5FFF        :REM*185
117 DATA DØ3FFFEØ1FFFCØØBFE8Ø*Ø
    7DFØØØ1FCØØA971A2CØ*8D3ØØ38
    E31Ø3A981A2CØ        :REM*2ØØ
118 DATA 8D32Ø38E33Ø378A92EA2*C
    Ø78AC14Ø38D14Ø3AD15*Ø38E15Ø
    38C69CØ8D6ACØ        :REM*236
119 DATA 586ØAD6CCØFØØFA513DØ*3
    1AD6CCØ8D15DØA9ØØ8D*6CCØAD2
    1DØ29ØF8D6BCØ        :REM*136
12Ø DATA AD2EDØ29ØFCD6BCØDØØE*A
    D6BCØDØØ4A9ØFDØØ2A9*Ø18D2ED
    Ø2ØFFC12Ø4CC3        :REM*51
121 DATA 4C9999ØØØØØØØØØØ48*A
    D15DØ8D6CCØA9ØØ8D15*DØ684CA
    5F448AD15DØ8D        :REM*1
122 DATA 6CCØA9ØØ8D15DØ684CED*F
    5AD6DCØ8DD4CØAD6ECØ*8DD5CØA
    D7ØCØ2ØDACØAD        :REM*37
123 DATA 7ØCØ2ØDACØAD7ØCØ2ØDA*C
    ØAD6FCØ4A4A4A2ØDACØ*8DD8CØA
    DD4CØ8DD7CØAD        :REM*116
124 DATA 6FCØ29Ø78DFBC1A9Ø738*E
    DFBC1A8B9EACØØD9999*8D99996
    Ø186DD4CØ8DD4        :REM*229
125 DATA CØA9ØØ6DD5CØ8DD5CØ6Ø*Ø
    1Ø2Ø4Ø81Ø2Ø4Ø8ØADD9*C1ØAØAØ
    AØAØAØA186DØ4        :REM*129
126 DATA C38D6DCØA9ØØ6DØ5C38D*6
    ECØADD9C1ØAA8AEFCC1*BDØ6C39
    9Ø8DØBDØAC399        :REM*214
127 DATA Ø9DØBDØEC38D6FCØBD12*C
    38D7ØCØADD9C1ØAØAØA*186DFEC
    1AABD16C38DD2        :REM*226
128 DATA C18DD8C1BD2EC38DD6C1*A
    D6DCØAE6ECØ8D55C18E*56C1A23
    FA9ØØ9D9999CA        :REM*9
129 DATA EØ8Ø9ØF8ADD2C14A8DD7*C
    12Ø91CØADD3C1DØ11AD*D5C1FØØ
    6EE7ØCØ4C8AC1        :REM*24Ø
13Ø DATA CE7ØCØ4C8AC1ADD4C1FØ*Ø
    6EE6FCØ4C8AC1CE6FCØ*ADD6C11
    86DD7C18DD7C1        :REM*117
131 DATA CDD2C19ØØD2ØDAC1ADD7*C
    138EDD2C18DD7C12Ø91*CØADD9C
    1FØ1EAE6FCØAC        :REM*43
132 DATA 7ØCØ8EF9C18CFAC12ØDA*C
    12Ø91CØAEF9C1ACFAC1*8E6FCØ8
    C7ØCØCED8C1DØ        :REM*83
133 DATA 956ØØØØØØØØØØØØØØØØ*A
    DD3C1DØØDADD4C1FØØ4*EE6FCØ6
    ØCE6FCØ6ØADD5        :REM*26
134 DATA C1FØØ4EE7ØCØ6ØCE7ØCØ*6
    ØØØØØØØØØØØØØADØBDD*48ADØAD
    D48ADØ9DD48AD        :REM*56
135 DATA Ø8DD682Ø4AC28D67C268*2
    Ø4AC28D66C268291F2Ø*4AC2C9Ø
    CDØØ2A9ØØ8D65        :REM*7Ø
136 DATA C2ØAØA186D65C28D65C2*A
    D66C2A2ØØ38E9ØC9ØØ3*E8DØF88
    A186D65C28D65        :REM*21Ø
137 DATA C26ØA829ØF8D5EC2984A*4
    A4A4AA8B95FC2186D5E*C26ØØØØ
    ØØA141E2832ØØ        :REM*94
138 DATA ØØØØADFEC1ØAA2ØØ38E9*Ø
    F9ØØ3E8DØF88EFDC18A*4A8DFCC
    1AØØØ8CD3C18C        :REM*245
139 DATA D4C18CD5C1AØØ1AEFDC1*D
    ØØ48CD4C16ØEØØ1DØØB*8CD3C18
    CD4C1A9ØF4CFC        :REM*182
14Ø DATA C2EØØ2DØ138CD3C18CD4*C
    18CD5C1ADFEC138E9ØF*8DFEC16
    ØEØØ3DØØB8CD4        :REM*37
141 DATA C18CD5C1A91E4CFCC2EØ*Ø
    4DØØD8CD5C1ADFEC138*E91E8DF
    EC16ØEØØ5DØØB        :REM*132
142 DATA 8CD3C18CD5C1A92D4CFC*C
    2EØØ6DØØD8CD3C1ADFE*C138E92
    D8DFEC16ØA93C        :REM*88
143 DATA 38EDFEC18DFEC16Ø4ØØ3*3
    F3F2C2C33464633Ø1Ø1*1414140
    1Ø11411111110        :REM*215
144 DATA 1ØØFØEØDØFØFØFØEØEØD*Ø
    CØBØBØBØBØAØAØAØ9Ø8*ØØØ2Ø4Ø
    5Ø7Ø8ØAØBØØØ2        :REM*55
145 DATA Ø3Ø5Ø6Ø7Ø9ØAØØØ1Ø2Ø3*Ø
    4Ø5Ø6Ø7Ø1ØØØØ3D3D3D*AD46C3F
    Ø2ØA9ØØ8D46C3        :REM*52
146 DATA AD65C2CD49C3DØØ16ØA2*Ø
    28ED9C18DFEC18D49C3*2Ø68C22
    ØF2CØ6ØAD47C3        :REM*242
```



Time Clock lets you keep track of the time while you're working at your C-64 or 128.

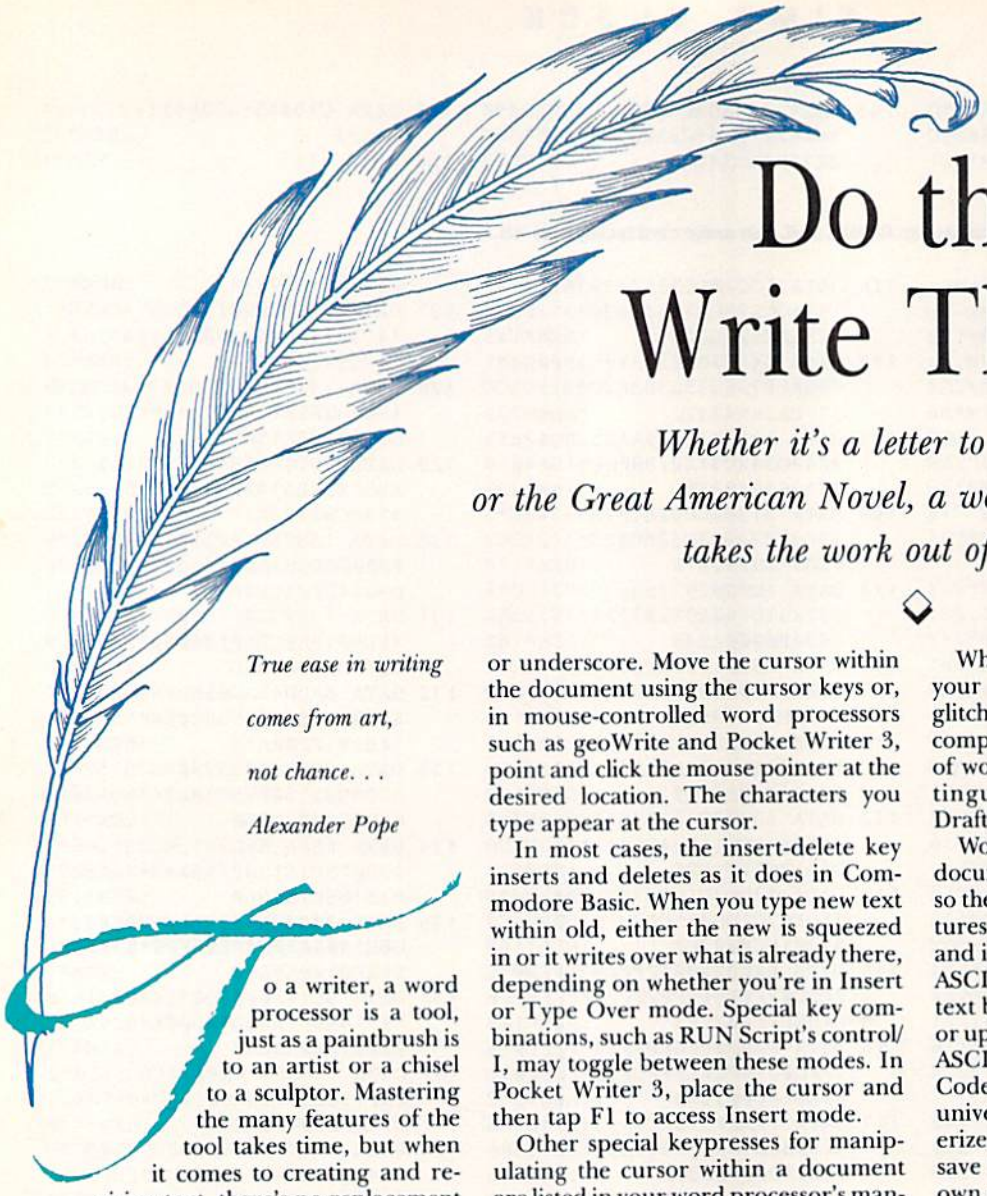
```
147 DATA F01FA900D47C3AD66C2*C
    D4AC3D0016A2018E46*C38ED9C
    18DFEC18D4AC3          :REM*221
148 DATA 4C6AC3AD67C2CD4BC3D0*0
    16A2018E47C3A200E*D9C18DF
    EC18D4BC34C6A          :REM*37
149 DATA C3544552525920425259*4
    E4552                  :REM*53
150 DATA -1                :REM*4
```

Listing 2. Time Clock 128 program. (Available on ReRUN disk. See order card facing page 48.)

```
0 REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) TIME-CL
  OCK.128                  :REM*174
5 OPEN 8,8,8,"TIME-CLOCK.128,P,
  W"                       :REM*253
6 CT=0:PRINT"{SHFT CLR}":REM*56
10 READ A$:IF A$="-1" THEN CLOS
   E8:PRINT:PRINT"ALL DONE!":EN
   D                       :REM*129
12 PRINT"{HOME}READING LINE "+S
   TR$(CT):CT=CT+1         :REM*141
15 IF LEN(A$)<62 THEN 55
                           :REM*254
20 B$=MID$(A$,1,20)+MID$(A$,22,
   20)+MID$(A$,43,20)      :REM*242
25 FOR I=1 TO 30           :REM*181
30 C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                           :REM*209
35 H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55               :REM*85
40 L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55               :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                           :REM*67
50 NEXT:GOTO 10            :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
   O 70                    :REM*184
60 IF LEN(A$)<42 THEN B$=LEFT$(
   A$,20)+RIGHT$(A$,(LEN(A$)-21
   )):GOTO 70              :REM*176
65 B$=LEFT$(A$,20)+MID$(A$,22,2
   0)+RIGHT$(A$,LEN(A$)-42)
                           :REM*140
70 FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                           :REM*140
80 H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55               :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55               :REM*84
90 BY=H*16+L:PRINT#8,CHR$(BY);
                           :REM*148
95 NEXT:GOTO 10            :REM*160
100 REM HEX DATA FOR TIME CLOCK
    128                    :REM*154
101 DATA 011C1D1C64009922932 2*3
    BA33136293B2254494D*4520434
    C4F434B1122200         :REM*162
102 DATA 381C6E0099A33133293B*2
    2434F505952494748 54*2031393
    9302200581C78          :REM*51
103 DATA 0099A33133293B225255*4
    E204D4147415A494E45*2020202
    0202020220079          :REM*199
104 DATA 1C8200 99A33133293B22*4
    14C4C2052494748 5453*2052455
    3455256454411          :REM*164
105 DATA 2200941CC8008522202 0*2
    054494D4520284848 4D*4D53532
    9223B5424 00BC         :REM*236
106 DATA 1CC2019735363538372C*3
    136ACC528CA2854242C*312C312
    929AAC528CA28          :REM*145
107 DATA 54242C322C312929 00E4*1
    CDB019735363538362C*3136ACC
    528CA2854242C          :REM*229
108 DATA 332C312929AAC528CA28*5
    4242C342C312929 00C*1DF4019
    735363538352C          :REM*232
109 DATA 3136ACC528CA2854242C*3
    52C312929AAC528CA28*54242C3
    62C312929 0019         :REM*174
110 DATA 1D0D029735363538342C*3
    000261D26029E2037 34*36353AA
    2000000000A040         :REM*188
111 DATA B99D1D99BF0F88D0F7A2*4
    A8EDE118EE0118EE211*A2478EE
    1118EE3118EDF          :REM*162
112 DATA 11A22B8EE411A2328EE5*1
    1A2008E1BD08E2CD08E*2DD0E88
    E2ED0E88E2BD0          :REM*133
113 DATA A2808E1DD08E17D0A2F0*8
    E15D08EE611A24EA021*ADDD1D8
    D0013EE7C1DD0          :REM*35
114 DATA 03EE7D1DEE7F1DD003EE*8
    01DEC7C1DD0E5CC7D1D*D0E04C0
    0130 1FC0007DF         :REM*169
115 DATA 000BFE801FFFC03FFFE0*5
    FFFD07FFFF0FFFFF8FF*FFF8FFF
    FF8BFFFE8FFFF          :REM*169
116 DATA F8FFFFF8FFFFF87FFFF0*5
    FFFD03FFFE01FFFC00B*FE8007D
    F000 1FC0078A9         :REM*217
117 DATA 1AA21378AC1403 8D1403*A
    D1503 8E1503 8C41138D*4213586
    0AD21D0290F8D          :REM*85
118 DATA 4313AD2ED029 0FCD4313*D
    00EAD4313D004A90FD0*02A9018
    D2ED020BF1420          :REM*91
119 DATA 0C164C9999004A474A47*4
    A472B32F0000000000AD*4D138D9
    413AD4E138D95          :REM*199
120 DATA 13AD5013209A13AD5013*2
    09A13AD5013209A13AD*4F134A4
    A4A209A138D98          :REM*83
121 DATA 13AD94138D9713AD4F13*2
    978DBB14A9738EDBB*14A8B9A
    A13 0D99998D99         :REM*153
122 DATA 9960186D94138D9413A9*0
    06D95138D9513600102*0408102
    0408 0AD99140A         :REM*65
123 DATA 0A0A0A0A0A186DC4158D*4
    D13A900 6DC5158D4E13*AD9914 0
    AA8AEBC14BDC6          :REM*87
124 DATA 1599DE11BDCA1599DF11*B
    DCE158D4F13BDD2158D*5013AD9
    9140A0A0A186D          :REM*54
125 DATA BE14AABDD6158D92148D*9
    814BDEE158D9614AD4D*13AE4E1
    38D15148E1614          :REM*80
126 DATA A23FA900 9D9999CAE080*9
    0F8AD92144A8D97142 0*5113AD9
    314D011AD9514          :REM*27
127 DATA F006EE5013 4C4A14CE50*1
    34C4A14AD9414F006EE*4F134C4
    A14CE4F13AD96          :REM*34
128 DATA 14186D97148D9714CD92*1
    4900D209A14AD971438*ED92148
    D97142 05113AD         :REM*2
129 DATA 9914F01EAE4F13AC5013*8
    EB9148CBA142 09A142 0*5113AEB
    914ACBA148E4F          :REM*132
130 DATA 138C5013CE9814D0956 0*0
    0000000000000000AD93*14D00DA
    D9414F004EE4F          :REM*43
131 DATA 1360CE4F1360AD9514F0*0
    4EE5013 60CE5013 6000*0000000
    000AD0BDD48AD          :REM*43
132 DATA 0ADD48AD09DD48AD08DD*6
    8200A158D2715682 00A*158D261
    568291F200A15          :REM*114
133 DATA C90CD002A9008D2515 0A*0
    A186D25158D2515AD26*15A2003
    8E90C900 3E8D0         :REM*164
134 DATA F88A186D25158D25156 0*A
    8290F8D1E15984A4A4A*4AA8B91
    F15186D1E156 0         :REM*135
135 DATA 00000A141E2832000000*A
    DBE140AA2038E90F90*03E8D0F
    88EBD148A4A8D          :REM*4
136 DATA BC14A008C93148C9414*8
    C9514A01AEBD14D04*8C94146
    0E01D0B8C93            :REM*75
137 DATA 148C9414A90F4CBC15E0*0
    2D0138C93148C94148C*9514ADB
    E1438E90F8DBE          :REM*140
138 DATA 146 0E003D0B8C94148C*9
    514A91E4CBC15E04D0*0D8C951
    4ADBE1438E91E          :REM*148
139 DATA 8DBE146 0E005D0B8C93*1
    48C9514A92D4CBC15E0*06D0D8
    C9314ADBE1438          :REM*52
140 DATA E92D8DBE146 0A93C38ED*B
    E148DBE146 0000F3F3F*2C2C334
    64633 01011414         :REM*7
141 DATA 140101141111111 01 0F*0
    E0D0F0F0F0E0E0D0C0B*0B0B0B0
    A0A0A0908 002          :REM*166
142 DATA 0405070 80A0B000203 05*0
    607090A0001 02030405*0607010
    0003D3D3DAD06          :REM*153
143 DATA 16F020A9008D0616AD25*1
    5CD0916D0016 0A2028E*99148DB
    E148D09162028          :REM*153
144 DATA 152 0B2136 0AD0716F01F*A
    9008D0716AD2615CD0A*16D0016
    0A2018E06168E          :REM*183
145 DATA 99148DBE148D0A164C2A*1
    6AD2715CD0B16D0016 0*A2018E0
    716A2008E9914          :REM*147
146 DATA 8DBE148D0B164C2A1654*4
    552525920425259 4E45*52
                           :REM*37
147 DATA -1                :REM*1 ■
```

Do the Write Thing

Whether it's a letter to loved ones or the Great American Novel, a word processing program takes the work out of writing.



True ease in writing comes from art, not chance. . .

Alexander Pope

To a writer, a word processor is a tool, just as a paintbrush is to an artist or a chisel to a sculptor. Mastering the many features of the tool takes time, but when it comes to creating and revising text, there's no replacement for a word processor's convenience and speed.

Several excellent word processors are available for Commodore computers. In this tutorial, I'll give examples of commands from four of them: *RUN*'s own RUN Script Plus, Berkeley Softworks' geoWrite, Digital Solutions' Pocket Writer 3 and Xetec's FontMaster 128.

Your word processor's manual explains how to load the program itself. The LOAD"*",8,1 command is common, but you may find exceptions, as in geoWrite, which is loaded by clicking on the program's icon within the GEOS graphics environment.

Typing and Editing

Action in a word processor takes place at the cursor, the familiar blinking block, or underscore. Move the cursor within the document using the cursor keys or, in mouse-controlled word processors such as geoWrite and Pocket Writer 3, point and click the mouse pointer at the desired location. The characters you type appear at the cursor.

In most cases, the insert-delete key inserts and deletes as it does in Commodore Basic. When you type new text within old, either the new is squeezed in or it writes over what is already there, depending on whether you're in Insert or Type Over mode. Special key combinations, such as RUN Script's control/I, may toggle between these modes. In Pocket Writer 3, place the cursor and then tap F1 to access Insert mode.

Other special keypresses for manipulating the cursor within a document are listed in your word processor's manual. For example, in RUN Script Plus, hitting the home key once positions the cursor in the top-left corner of the screen, while tapping it twice returns it to the home position, the first character in the document.

Saving and Loading

Each word processor calls for essentially the same technique to save a document to disk or to load it from the disk: Issue the Save or Load command, specify the filename you've given the document and press the return key. For example, in RUN Script Plus, press the F1 key to signal disk access, then S for save or L for load and press return. To save or load using a menu-driven word processor such as Pocket Writer 3 or geoWrite, point and click the mouse on the proper drop-down menu, then choose the save or load operation from the menu. You may also need to specify the drive number.

When using a word processor, save your text frequently. Otherwise, if a glitch occurs in the electricity or your computer system, you might lose a lot of work. Consecutive saves can be distinguished with filenames such as Draft1 and Draft2.

Word processors commonly store documents in their own unique format, so the documents can retain special features such as margin settings, boldface and italics. An option to save or load in ASCII format eases the task of moving text between different word processors or uploading to a bulletin board system. ASCII stands for American Standard Code for Information Interchange, a universal scheme for storing computerized text. Your word processor may save text as PETASCII, Commodore's own variation of ASCII that recognizes Commodore's special graphics keyboard characters. Conversion utilities are available to translate between popular word processors even if the original text file wasn't saved in ASCII.

Block Operations

Among the most valuable features of word processors are Block functions, such as cut and paste for moving a block of text. Copy, a variation on cut and paste, lets you duplicate text without removing it from the original location.

The first step in any computerized Block function is to mark the section of text to be manipulated. Place the cursor at the start of the section and invoke the Block Start command, then move the cursor to the end of the section and issue the Block End command. The area may become highlighted.

When cutting and pasting, next invoke the Cut function to remove the text from the page. To return the cut ►

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text to the page, position the cursor at the destination point and use the Paste function. With RUN Script Plus, F6 initiates the Copy command, and return marks both the end of a block and executes the cut. To paste, move the cursor to the paste point and press return.

To mark text in programs such as geoWrite and Pocket Writer 3, place the mouse pointer at the beginning of the block, then, with the left mouse button held down, move the cursor to the end of the block and release the button. Finally, choose the Cut, Copy or Paste function from the drop-down menu.

Search and Replace

When you invoke the Search command (F2 in RUN Script Plus), the word processor asks for the word to be located. The Search feature then places the cursor at the next occurrence of the word. When the Search and Replace commands (F4 in RUN Script Plus) are used, a replacement word is also requested. The word processor then substitutes the replacement for the original. Variations on search and replace automatically seek more occurrences of the search word, either one at a time or globally (all at once). The global search and replace is handy when you've consistently misspelled a given word or when you want to speed up your writing. For example, I entered only "wp" for "word processor" in this article, then changed the abbreviation to the full spelling with a global search and replace.

Formatting

Formatting is laying out your text so it pleases your eye, enhances your meaning or conforms to a convention. Some 80-column word processors, such as geoWrite 128, Pocket Writer 3 and FontMaster 128, show the text on the screen just as it will appear printed out on paper. The acronym for what-you-see-is-what-you-get is WYSIWYG, pronounced "wizzy-wig." WYSIWYG displays features such as tabs, margins, page length, boldface, italics and underlining.

Post-formatted word processors, such as RUN Script Plus, don't show the text on-screen as it will appear when printed. Embedded RUN Script commands, called "dot commands" (because they're preceded by a period), instruct the printer to produce the desired effects. For example, .lj left-justifies the text, while .rj pushes it flush to the right.

A dot command may require a numeric parameter. For example, .pl, which sets page length, must be followed by the number of lines per page, and .lm, which sets the left margin indent, must be followed by the number of spaces. Margins and page length usually have default settings for when you don't specify a preference.

You can also format through Block commands. For example, you may be able to use a drop-down menu or special key combination to set a highlighted block in bold or italic.

Spellchecking

Dictionary functions such as spellchecking and a thesaurus are relatively new to the C-64/128. A spellchecker compares words in your text to its own word list and flags any of yours it doesn't recognize. Then you opt to either skip the flagged words or alter them. You can also add new words to the dictionary (with care to ensure they're spelled right!).

Unfortunately, spellcheckers can't check grammar; for example, they can't differentiate between "there" and "their," since both occur in the dictionary. Also, due to memory restrictions, many spellcheckers have a minimum word length of three to five letters; if you mistype "the" as "eth," your spellchecker may overlook it.

To use a Spellchecking function, you may have to save your document, exit the word processor, then run the document through the spellchecking program, or you may be able to invoke the spellchecker from within the word processor. F1 then Q loads the spellchecker from within RUN Script Plus.

Printing

When your document is finished, it's time to print it out on paper. Your word processor's manual describes how to select your printer type. In RUN Script Plus, you press F1 and then O or P.

Some word processors require that you "install" the printer before running the word processor itself. This may involve copying a printer driver onto the work disk (geoWrite) or selecting the printer driver from a list included on the disk (Pocket Writer 3). With the latter, if you specify your printer type in a configure file when starting the program, the word processor automatically loads the driver at printing time.

If your word processor doesn't have a printer driver, you may have to describe your printer through a configuration module. This requires selecting between two standards, such as "Commodore compatible" and "Epson compatible," or among numerous choices, such as those for printer and interface in FontMaster 128.

Some older and simpler word processors assume that you have either a Commodore-compatible printer or one that emulates Commodore compatibility through a printer interface. In such cases, just give the command to print. Because of the generic approach, special features such as boldface and italics may not be available.

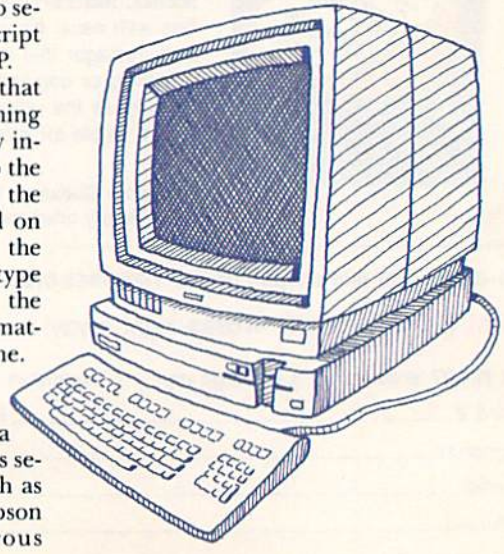
To print, make sure your printer is properly connected, has paper in place and is online, then invoke the Print command. To print with RUN Script Plus, press F1, then the P key, indicate the number of copies and the output device number (usually 4), and select either continuous or single-sheet feed. Or, if you just need a simple hardcopy, press F1, O and return. From a menu-driven word processor such as geoWrite, select print from the drop-down menu.

Sometimes, the printed page reveals a flaw not obvious on the screen. Just fix the error and print again; no more tedious retyping!

The Last Word

The word processor you choose may have features that vary from those mentioned here, and they'll be described in that particular manual. Use this article as a guide to help you understand the manual, then catch up on that correspondence or write the Great American Novel. With your word processor, the art of writing is just a few simple keystrokes away! ■

Ellen Rule is one of RUN*'s contributing editors and the magazine's Commodore Clinic columnist. She works as a psychiatric R.N. and runs a home-based business called Home Computer Resource.*





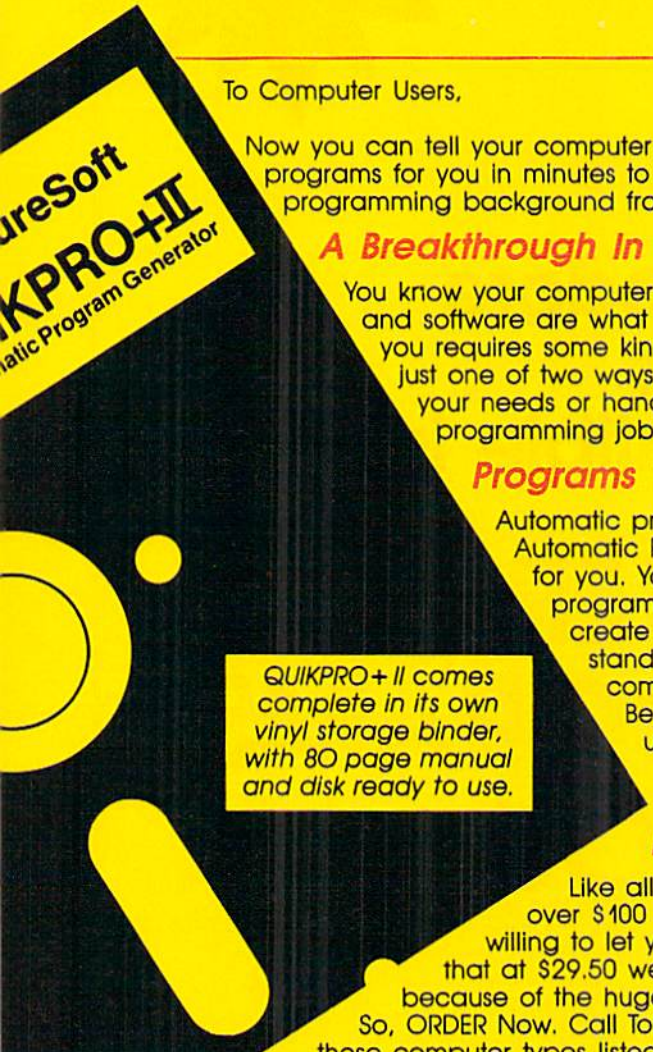
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RUN Paint Renamer

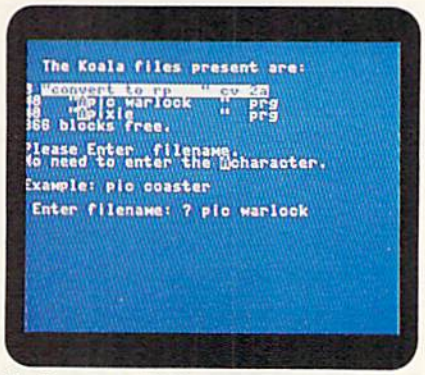
This little program automatically converts graphics files to make them compatible with RUN Paint.

By HUGH McMENAMIN

RUN Paint, *RUN*'s powerful drawing and painting program (March 1989), is easy to use and supports all the common graphics formats. However, when importing a file into RUN Paint from another graphics program, you must make the filename compatible with RUN Paint. My Convert to RUN Paint program eliminates this hassle for C-128 users by loading a graphics file into the computer, then saving it to a destination disk and automatically renaming it in the process.

Type in Listing 1, the Convert to RUN Paint program, using *RUN*'s Checksum to detect any typing errors, and save it to disk. To use the program, just load and run it; then insert the source disk, with the files to be renamed, into the drive.

Convert to RUN Paint starts by presenting a menu of file types it can rename: Koala and Doodle!. Enter the first letter of the type you want, and the program responds with a directory of those files on the disk. Now enter the name of the particular file you want to rename, leaving out the prefix or suffix specific to the graphics program that created the file—a reverse video A for Koala or DD for Doodle!. Note that you should keep the PIC in those Koala filenames that contain it; delete only the reverse A. Also, you must type in each filename, even if you want to rename all the files on the disk; the wild-card asterisk won't work.



The Convert to RUN Paint program makes it easy to change Koala and Doodle! filenames.

When you've typed the desired filename and pressed the return key, the program loads the file. Next, insert the destination disk and press return to save the file with its new name. The program terminates when the save is done. To rename another file, run it again.

A new filename consists of the filename you entered from the source disk directory with a prefix of RPM. or RPH., for RUN Paint med-res or hi-res, added on. If the filename you entered is longer than 12 characters, it's truncated so that the total won't exceed 16 characters. Also, if the filename you entered duplicates one already on the destination disk or if the destination disk is full, the program reports an error and tells you to press any key to continue.

With your files renamed, you can load them into RUN Paint using the appropriate format—med-res or hi-res—and modify them to your heart's content. R

Hugh McMenamin is a physiatrist and an amateur programmer who's contributed to RUN *often in the past.*

Listing 1. Convert to RUN Paint program.

(Available on ReRUN disk. See order card facing page 48.)

```
10 REM CONVERT FILES TO RUNPAIN
   T BY HUGH MCMENAMIN :REM*251
20 IF RGR(.)<>5 THEN 70:REM*226
30 SCNCLR:PRINT "{CTRL O}SWITCH
    MONITOR TO 40-COL. MODE."
                       :REM*116
40 PRINT "{CTRL O}PRESS A KEY..
   .                   :REM*48
50 GETKEYA$            :REM*28
60 PRINTCHR$(27);"X":SLOW:REM*4
70 GRAPHIC0:TRAP430:FORAA=1TO2:
   READL$(AA),M$(AA),N$(AA),O$(
   AA):NEXT            :REM*100
80 POKE53281,6:POKE5328Ø,Ø:PRIN
   T"{SHFT CLR}{CTRL 2}{CRSR DN
   }{12 SPACEs}CONVERT TO RUNPA
   INT":PRINTTAB(13)"BY HUGH MC
   MENAMIN":U=12       :REM*61
90 PRINT"{CRSR DN}{6 SPACEs}CHO
   OSE FOLLOWING FILE:":REM*232
100 PRINTTAB(U)"{CRSR DN}{CTRL
    9}K{CTRL Ø}OALA":PRINTTAB(U
    )"                 :REM*192
110 PRINTTAB(U)"{CTRL 9}D{CTRL
    Ø}OODLE"           :REM*53
120 PRINTTAB(U)"{CRSR DN}{CTRL
    9}Q{CTRL Ø}UIT{2 SPACEs}"
                       :REM*233
130 PRINT"{CRSR DN}{6 SPACEs}EN
    TER FIRST LETTER TO CHOOSE.
                       :REM*104
140 GETA$:IFA$=""THEN140:REM*16
150 AA=-(A$="K")-2*(A$="D")-3*(
    A$="Q")            :REM*153
160 IF AA=3 THEN 500   :REM*202
170 IFAA<1 OR AA>3THEN140
                       :REM*59
180 PRINT "{SHFT CLR}{2 CRSR DN
    s}{2 SPACEs}THE ";L$(AA);"
    FILES PRESENT ARE:{CRSR DN}
    "                  :REM*198
190 GOSUB280:GOSUB420:BANK1:BLO
    AD""+F$,B1:POKE34576,PEEK(3
    4576)AND15:BANK15  :REM*192
200 PRINT"{SHFT CLR}{3 CRSR DNs ►
```

RUN it right: **C-128 (in 40-Column mode)**

```
    }INSERT STORAGE DISK AND PR
    ESS RETURN              :REM*97
21Ø GETA$:IFA$<>CHR$(13)THEN21Ø
                            :REM*68
22Ø GOSUB45Ø:IFAA=2THEN25Ø
                            :REM*77
23Ø PRINT"{SHFT CLR}{3 CRSR DNs
    } SAVING RPM."+FK$:BSAVE"RP
    M."+LEFT$(FK$,12),B1,P24576
    TOP34577:IFDSTHEN43Ø:REM*23
24Ø PRINT"{SHFT CLR}{3 CRSR DNs
    } YOU HAVE CHANGED "+L$(AA)
    +" FILE ":PRINT" TO RUNPAIN
    T FILE {CTRL 9}RPM."+FK$:SL
    EEP5:RUN                :REM*71
25Ø PRINT"{SHFT CLR}{3 CRSR DNs
    } SAVING RPH."+FK$:BSAVE"RP
    H."+LEFT$(FK$,12),B1,P23552
    TOP32576:IFDSTHEN43Ø
                            :REM*243
26Ø PRINT"{SHFT CLR}{3 CRSR DNs
    } YOU HAVE CHANGED "+L$(AA)
    +" FILE ":PRINT" TO RUNPAIN
    T FILE {CTRL 9}RPH."+FK$:SL
    EEP5:RUN                :REM*191
27Ø PRINT"{SHFT CLR}{3 CRSR DNs
    } SORRY{3 CRSR DNs}":DX$=LE
    FT$(DS$,LEN(DS$)-6):PRINT"
    THE ERROR IS: ";MID$(DX$,4)
    :SLEEP2:RUN             :REM*16Ø
28Ø DIRECTORY""+M$(AA):IFDSTHEN
    43Ø:SELECT FILES FOR CHANGE
                            :REM*14Ø
29Ø F$="":FK$="":PRINT"{CRSR DN
    }PLEASE ENTER "L$" FILENAME
    ."                      :REM*37
3ØØ PRINT"NO NEED TO ENTER THE
    "N$(AA)"CHARACTER.":PRINT"{
    CRSR DN}EXAMPLE: "+O$(AA)
                            :REM*93
31Ø GOSUB38Ø                :REM*146
32Ø ONAAGOTO34Ø,36Ø,5ØØ     :REM*83
33Ø IFFK$=""THENRETURN      :REM*47
34Ø FK$=FK$+"{14 SPACEs}":F$="{
    COMD 1}"+LEFT$(FK$,14):RETU
    RN                      :REM*28
35Ø FK$=FK$+"{15 SPACEs}":F$=LE
    FT$(FK$,13)+"PIC":RETURN
                            :REM*86
36Ø GOSUB45Ø:F$="DD"+FK$:RETURN
                            :REM*1Ø7
37Ø PRINTSPC(7)"{CTRL 9}PRESS A
    NY KEY...{CTRL Ø}":RETURN
                            :REM*68
38Ø INPUT"{CRSR DN} ENTER FILEN
    AME: ";FK$              :REM*17Ø
39Ø GOSUB42Ø:RETURN         :REM*79
4ØØ GETKY$:IF KY$="" THEN4ØØ
                            :REM*46
41Ø RETURN                  :REM*42
42Ø OPEN15,8,15:INPUT#15,E,E$,T
    ,S:CLOSE15:IFE$="OK"THEN RE
    TURN                    :REM*13
43Ø PRINTSPC(5)"{CRSR DN}{CTRL
    9}ERROR:{CTRL Ø}"DS$:GOSUB4
    4Ø:RUN                  :REM*Ø
44Ø PRINTSPC(5)"{CRSR DN}{CTRL
    9}PRESS ANY KEY...{CTRL Ø}"
    :GOSUB4ØØ:PRINT"{SHFT CLR}"
    ;:RETURN                :REM*64
45Ø FORY=LEN(FK$)TO4STEP-1
                            :REM*37
46Ø IFMID$(FK$,Y,1)=" "THENNEXT
                            :REM*2Ø8
47Ø FK$=LEFT$(FK$,Y):RETURN
                            :REM*83
48Ø DATA"KOALA","{COMD 1}*","{C
    TRL 9}{SHFT A}{CTRL Ø}","PI
    C COASTER               :REM*159
49Ø DATA"DOODLE","DD*","{CTRL 9
    }DD{CTRL Ø}","MIDDLE EARTH"
                            :REM*48
5ØØ END                     :REM*118
                                ■
```


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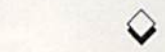
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Sprite Magician

Display some mystifying programming tricks with these amazing sprite routines.



By SCOTT WEISGARBER

Sprite Magician (Listing 1) is a complete sprite movement and animation controller for the C-64. Using its 11 SYS commands, you can position a sprite anywhere, define interrupt-driven movement at any speed in any direction, create borders that confine individual sprites to certain areas, make sprites wrap around or bounce when they hit a border or the screen edge, and set up automatic animation. All the commands include a parameter for specifying the sprite you want the command to affect. Acceptable values are 1–8, for the eight C-64 sprites.

A good way to get acquainted with Sprite Magician is to run and examine the demo program in Listing 2. It uses almost all of Sprite Magician's features.

Type in both listings, using *RUN*'s Checksum program to detect any typing errors. Then be sure to save them to disk before running them.

START-UP

Run Listing 1, which creates the machine language program SPRITE.ML. After loading Sprite Magician, activate it by entering the command SYS 52825. You'll see the screen turn black and the logo appear. *Note: This command not only activates the program, but clears the values of other variables, so use it with caution.*

To disable Sprite Magician, enter SYS 52831, which changes the IRQ back to the default hardware vector. To reactivate the program after disabling it, enter SYS 52828, which changes the IRQ back to Sprite Magician without resetting any pointers.

To reset all the pointers—for borders, movement settings, bouncing, and so on—without bothering the operating system, disable Sprite Magician, enter SYS 51466, and then reactivate the program. SYS 51478 resets only the borders.

Because of Sprite Magician's animation feature, you can't poke directly to the regular VIC-II sprite block pointers (addresses 2040–2047). You must go to the new addresses of 53140–53147. For example, instead of entering POKE 2040,192, you'd enter POKE 53140,192.

Advanced programmers should note that changing video banks also relocates the regular 2040–2047 sprite block pointers. To tell Sprite Magician what the new pointer locations should be, enter SYS 52788, followed by the new location (SYS 52788,4096 to change the new pointers to 4096, for example.)

THE COMMANDS

Position

SYS 52834,sprite number,X,Y

X and Y are the screen coordinates where you want the sprite positioned.

Move

SYS 52837,sprite number,direction,X speed,Y speed

Direction values range from 1 to 8, as shown in the following diagram.

```
        1
    8       2
7               3
    6       4
        5
```

The X speed is horizontal, the Y is vertical, and 1 to 149 pixels per second is the acceptable range for both. As an example of the Move command, SYS 52837,1,2,10,5 sends sprite 1 toward the upper right with a horizontal speed of ten pixels per second and a vertical speed of five pixels per second.

Borders

Using borders, you can box individual sprites into certain sections of the screen—useful, say, when writing an arcade game where a creature gets trapped in a cage. When Sprite Magician is initialized, borders for all eight sprites are set at the actual screen border. The following four commands are used to define borders.

Top Border

SYS 52840,sprite number,Y

The Y value is the highest coordinate on the screen that the sprite may occupy. Accepted values are 1–255.

Bottom Border

SYS 52843,sprite number,Y

Here, Y is the lowest coordinate on the screen that the sprite may occupy. Accepted values are, again, 1–255.

Left Border

SYS 52846,sprite number,X

The X value is the leftmost coordinate the sprite may occupy. Accepted values are 1–319.

Right Border

SYS 52849,sprite number,X

Here, X is the rightmost coordinate the sprite may occupy. Accepted values are, again, 1–319.

Wraparound

SYS 52852,sprite number,on/off

The Wraparound command makes a sprite reappear at the opposite border and continue moving in the same direction. Type 1 to turn wraparound on, 0 to turn it off.

Bouncing

SYS 52855,sprite number,on/off ►

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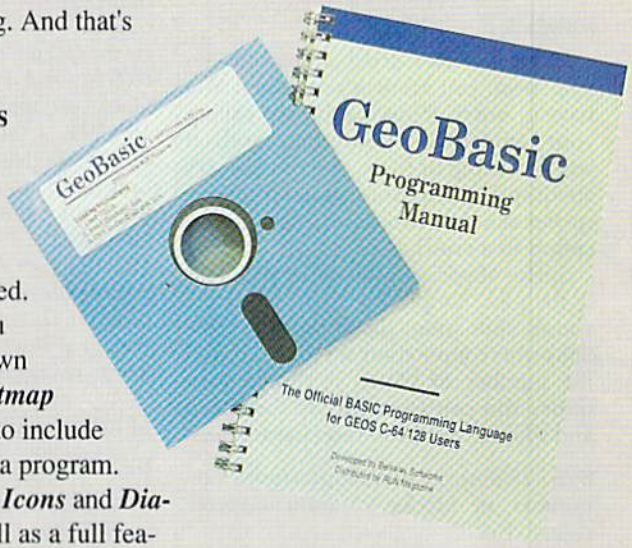
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GeoBasic

The Bouncing command makes a sprite bounce off its border and move in the opposite direction. Type 1 to turn bouncing on, 0 to turn it off.

Wraparound dominates if both it and bouncing are activated for a sprite.

Animation

If you've ever tried animation on your own, you know it's a bother. You have to worry about continually calling your animation subroutine, and, if you're writing in Basic, you must worry about speed. Also, animation for several sprites at a time can slow program execution to a crawl.

Sprite Magician puts these problems in the past. Simply specify which sprite you're animating, the sprite block (0–255) where animation should start and the number of blocks it should continue. You can even specify the speed and whether or not to reset parameters.

SYS 52858,sprite number,starting block, number of blocks to animate,speed, reset

Acceptable values for the starting block (the number you'd normally poke into 2040–2047) are 0–255. Speed equals 60 divided by the number of blocks per second to be animated.

The reset parameter is optional. Normally, at the end of an animation sequence, the sequence is repeated in reverse. For example, the command SYS 52858,1,192,3,10 would initiate the block sequence 192,193,194,193,192, 193,194. . .and so forth. However, with Sprite Magician, you can reset to the first value after each sequence. Continuing our example, instead of 192,193, 194,193,192, you'd have 192,193,194, 192,193,194. A value of 1 for the reset parameter sets the flag to reset each time. If this parameter is left out, or you give it a value of 0, the sequence keeps reversing.

Motion Freezer

SYS 52861,sprite number,on/off

A value of 0 for the on/off parameter stops a sprite's motion; 1 starts it again.

Show Sprite

SYS 52864,sprite number,on/off

A value of 1 for the on/off parameter turns a sprite on and makes it visible; 0 makes it vanish.

Program Notes

Sprite Magician resides in memory locations 51456–52965 and uses 52966–53247 for miscellaneous tables. *Keep other code out of these areas.*

I tried to write Sprite Magician so it would work with other routines that change the IRQ vector. However, I can't guarantee it will work with any particular routine, so I advise you to activate Sprite Magician *after* another routine.

Because Sprite Magician does so much 60 times each second, I feared it might slow the C-64 down. However, after running several tests, I'm happy to say that the computer still zips right along. Ⓡ

Scott Weisgarber wrote this program while a junior in high school.

Listing 1. Sprite Magician program. (Available on ReRUN disk. See order card facing page 48.)

```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) SPRITE.
  ML                    :REM*34
5 OPEN 8,8,8,"SPRITE.ML,P,W"
                        :REM*59
6 CT=Ø:PRINT"{SHFT CLR}":REM*56
1Ø READ A$:IF A$="-1" THEN CLOS
  E8:PRINT:PRINT"ALL DONE!":EN
  D                     :REM*129
12 PRINT"{HOME}READING LINE "+S
  TR$(CT):CT=CT+1       :REM*141
15 IF LEN(A$)<62 THEN 55
                        :REM*254
2Ø B$=MID$(A$,1,2Ø)+MID$(A$,22,
  2Ø)+MID$(A$,43,2Ø)    :REM*242
25 FOR I=1 TO 3Ø        :REM*181
3Ø C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                        :REM*2Ø9
35 H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55             :REM*85
4Ø L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55             :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                        :REM*67
5Ø NEXT:GOTO 1Ø         :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
  O 7Ø                  :REM*184
6Ø IF LEN(A$)<42 THEN B$=LEFT$(
  A$,2Ø)+RIGHT$(A$,(LEN(A$)-21
  )):GOTO 7Ø            :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
  Ø)+RIGHT$(A$,LEN(A$)-42)
                        :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                        :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55             :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55             :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                        :REM*148
95 NEXT:GOTO 1Ø         :REM*16Ø
1ØØ REM HEX DATA FOR SPRITE MAG
  ICIAN 64              :REM*42
1Ø1 DATA ØØC92ØØAC92Ø3CC92Ø55*C
  96ØA2ØØA9ØØ9D34CFE8*EØCØDØF
  8A2ØØA9189D5C         :REM*2ØØ
1Ø2 DATA CFA9329D4CCFA9E59D54*C
  FA94Ø9D6CCFA9ØØ9D64*CFA9Ø19
  D74CFE8EØØ8DØ         :REM*2Ø2
1Ø3 DATA DD6Ø78AD14Ø38DE6CFAD*1
  5Ø38DE7CFA9A38D14Ø3*A9C98D1
  5Ø3586ØADEØCE         :REM*68
1Ø4 DATA DØ43A2ØØA9ØØ8D21DØ8D*2
  ØDØA9932ØD2FFAØ3C8C*FBØØEEF
  BØØDØFB88DØF8         :REM*96
1Ø5 DATA A9132ØD2FFBDE1CE2ØD2*F
  FAØØØB98ECEFØØ62ØD2*FFC8DØF
  5E8A9ØØ8DFBØØ         :REM*25
1Ø6 DATA EEFBØØDØFBEØØ4DØD9A9*Ø
  18DEØCE6ØØ84898488A*48A2ØØB
  D34CF298ØFØØ3         :REM*153
1Ø7 DATA 4CA2CABD34CF29Ø1FØ31*B
  D44CF29FØ4A4A4A4A18*7DD4CF9
  DD4CFC9ØA9ØØ8         :REM*15Ø
1Ø8 DATA E9ØA9DD4CFDEC4CFBD44*C
  F29ØF8DE4CFBDC4CF38*EDE4CF9
  DC4CF4C22CABD         :REM*13Ø
1Ø9 DATA 34CF29Ø4FØ2EBD44CF29*F
  Ø4A4A4A4A187DD4CF9D*D4CFC9Ø
  A9ØØ8E9ØA9DD4         :REM*41
11Ø DATA CFFEC4CFBD44CF29ØF8D*E
  4CFBDC4CF186DE4CF9D*C4CFBD3
  4CF29Ø2FØ35BD         :REM*237
111 DATA 3CCF29FØ4A4A4A4A187D*C
  CCFC9ØA9DCCCF9ØØDE9*ØA9DCCC
  FFEB4CFDØØ3FE         :REM*153
112 DATA BCCFBD3CCF29ØF187DB4*C
  F9DB4CF9ØØ6FEBCCF4C*A2CABD3
  4CF29Ø8FØ3DBD         :REM*118
113 DATA 3CCF29FØ4A4A4A4A187D*C
  CCFC9ØA9DCCCF9Ø12E9*ØA9DCCC
  FDEB4CFBDB4CF         :REM*121
114 DATA C9FFDØØ3DEBCCFBD3CCF*2
  9ØF8DE4CFBDB4CF38ED*E4CF9DB
  4CFBØØ3DEBCCF         :REM*219
115 DATA 38BDB4CFFD5CCF8DE4CF*B
  DBCCFFD64CFØDE4CF9Ø*Ø34CF2C
  ABD7CCFDØ19BD         :REM*165
116 DATA 84CFDØ23A9ØØ9D3CCFBD*5
  CCF9DB4CFBD64CF9DBC*CF4C42C
  BBD6CCF9DB4CF         :REM*116
117 DATA BD74CF9DBCCF4C42CBBD*3
  4CF49ØA9D34CF4CC9CA*38BD6CC
  FFDB4CF8DE4CF         :REM*22
118 DATA BD74CFFDBCCFØDE4CF9Ø*Ø
  34C42CBBD7CCFDØ19BD*84CFDØ2
  3A9ØØ9D3CCFBD         :REM*243
119 DATA 6CCF9DB4CFBD74CF9DBC*C
  F4C42CBBD5CCF9DB4CF*BD64CF9
  DBCCF4C42CBBD         :REM*223
12Ø DATA 34CF49ØA9D34CF4C19CB*3
  8BDC4CFFD4CCF9ØØ34C*7ACBBD7
  CCFDØ13BD84CF         :REM*12
121 DATA DØ17A9ØØ9D44CFBD4CCF*9
  DC4CF4CB2CBBD54CF9D*C4CF4CB
  2CBBD34CF49Ø5         :REM*24Ø
122 DATA 9D34CF4C5DCB38BD54CF*F
```

```
    DC4CF9ØØ34CB2CBBD7C*CFDØ13B
    D84CFDØ17A9ØØ          :REM*253
123 DATA 9D44CFBD54CF9DC4CF4C*B
    2CBBD4CCF9DC4CF4CB2*CBBD34C
    F49Ø59D34CF4C          :REM*142
124 DATA 95CBBD9CCFFØ35DEA4CF*D
    Ø3ØBDACCF9DA4CFBDEC*CF29Ø1F
    ØØ6FE94CF4CD2          :REM*2ØØ
125 DATA CBDE94CFDE8CCFDØ15BD*9
    CCF9D8CCFBDECCF29Ø2*DØ1ØBDE
    CCF49Ø19DECCF          :REM*22
126 DATA E8EØØ8FØØC4CABC9BDF4*C
    F9D94CF4CECCBAØØØA2*ØØA9Ø18
    CE5CF8DE4CFBD          :REM*39
127 DATA B4CF99ØØDØBDC4CF99Ø1*D
    ØBDBCCFFØØ9ADE4CFØD*E5CF8DE
    5CFADE4CFØA8D          :REM*115
128 DATA E4CFBD94CF9DF8Ø7E8C8*C
    8EØØ8DØD2ADE5CF8D1Ø*DØ68AA6
    8A868286CE6CF          :REM*41
129 DATA 2ØF1B7EØØ9BØØ3CA8A6Ø*A
    2ØE4C8BE32ØFDAE2Ø8A*AD2Ø9BB
    C38AD65ØØE958          :REM*147
13Ø DATA 8DE5CFAD64ØØE9Ø1ØDE5*C
    FBØDF6Ø782Ø46CC8DE4*CF2Ø55C
    CAEE4CFAD65ØØ          :REM*235
131 DATA 9DB4CFAD64ØØ9DBCCF2Ø*F
    1B78AAEE4CF9DC4CFA9*ØØ9DCCC
    F9DD4CF586Ø78          :REM*93
132 DATA 2Ø46CC8DE5CF2Ø46CCAC*E
    5CFBD86CE9934CF2ØF1*B78AC99
    6BØ962ØDØCC9D          :REM*151
133 DATA 3CCF2ØF1B78AC996BØ88*2
    ØDØCC9D44CF586ØA2ØØ*C9ØA9ØØ
    738E9ØAE84CD2          :REM*2
134 DATA CC8DE4CF8EA5ØØADE4CF*Ø
    AØAØAØAØDA5ØØAEE5CF*6Ø782Ø4
    6CC8DE4CF2ØF1          :REM*167
135 DATA B78AAEE4CF9D4CCF586Ø*7
    82Ø46CC8DE4CF2ØF1B7*8AAEE4C
    F9D54CF586Ø78          :REM*76
136 DATA 2Ø46CC8DE4CF2Ø55CCAE*E
    4CFAD64ØØ9D64CFAD65*ØØ9D5CC
    F586Ø782Ø46CC          :REM*181
137 DATA 8DE4CF2Ø55CCAEE4CFAD*6
    4ØØ9D74CFAD65ØØ9D6C*CF586Ø7
    82Ø46CC8DE4CF          :REM*246
138 DATA 2ØF1B78AAEE4CF9D7CCF*5
    86Ø782Ø46CC8DE4CF2Ø*F1B78AA
    EE4CF9D84CF58          :REM*34
139 DATA 6Ø782Ø46CC8DE4CF2ØF1*B
    78AAEE4CF9D94CF9DF4*CF2Ø79Ø
    ØDØØ16Ø2ØF1B7          :REM*215
14Ø DATA CA8AAEE4CF9D9CCF9D8C*C
    F2ØF1B78AAEE4CF9DAC*CF9DA4C
    F2Ø79ØØFØ152Ø          :REM*43
141 DATA 46CC1869Ø1FØØDAEE4CF*F
    E9CCFFE8CCFA9Ø3DØØ2*A9Ø1AEE
    4CF9DECCF586Ø          :REM*217
142 DATA 782Ø46CC8DE4CF2ØF1B7*8
    ADØØDAEE4CFBD34CFØ9*8Ø9D34C
    F586ØAEE4CFBD          :REM*49
143 DATA 34CF297F9D34CF586Ø78*2
    Ø46CC8DE4CF2ØF1B78A*FØØE2Ø2
    5CEAD15DØØDE4          :REM*162
144 DATA CF8D15DØ586Ø2Ø25CEA9*F
    F38EDE4CF8DE4CFAD15*DØ2DE4C
    F8D15DØ586ØA9          :REM*2ØØ
145 DATA Ø1ACE4CFFØØ4ØA88DØFC*8
    DE4CF6Ø2ØFDAE2Ø8AAD*2Ø9BBCA
    D65ØØ8D2ECCAD          :REM*184
146 DATA 64ØØ8D2FCC6Ø78ADE6CF*8
    D14Ø3ADE7CF8D15Ø358*6Ø4CØØC
    94CØ3C94C4ACE          :REM*65
147 DATA 4C72CC4C9FCC4CF1CC4C*Ø
    4CD4C17CD4C32CD4C4D*CD4C6ØC
    D4C73CD4CCCCD          :REM*7Ø
148 DATA 4CF3CD4C34CEØ1Ø3Ø2Ø6*Ø
    4ØCØ8Ø9ØEØDBØCØCØCØ*CØCØCØC
    ØCØCØCØCØCØCØ          :REM*76
149 DATA CØCØCØCØAEØDDD2Ø2ØD3*5
    Ø52495445CD41535445*522Ø2Ø2
    ØDDØDDDD3434F          :REM*131
15Ø DATA 54542Ø2ØD74549534741*5
    2424552DDØDADCØCØCØ*CØCØCØC
    ØCØCØCØCØCØCØ          :REM*2Ø6
151 DATA CØCØCØCØBDØDØØ97989B*Ø
    5                      :REM*22Ø
152 DATA -1                :REM*1Ø
```

Listing 2. Demo program. (Available on ReRUN disk. See order card facing page 48.)

```
1Ø REM SPRITE MAGICIAN DEMO
                           :REM*88
2Ø IF PEEK(51472)<>2Ø7 THEN LOA
   D "SPRITE.ML",8,1       :REM*6Ø
3Ø IN=52825 :REM MAIN INITIALIZ
   ATION                   :REM*187
4Ø RE=52828 :REM RE-ENABLE
                           :REM*119
5Ø DI=52831 :REM DISABLE:REM*53
6Ø PO=52834 :REM POSITION
                           :REM*167
7Ø MO=52837 :REM MOVE      :REM*1Ø5
8Ø TB=5284Ø :REM TOP BORDER
                           :REM*32
9Ø BB=52843 :REM BOTTOM BORDER
                           :REM*145
1ØØ LB=52846 :REM LEFT BORDER
                           :REM*1Ø3
11Ø RB=52849 :REM RIGHT BORDER
                           :REM*71
12Ø WR=52852 :REM WRAPAROUND
                           :REM*241
13Ø BO=52855 :REM BOUNCING
                           :REM*42
14Ø AN=52858 :REM ANIMATION
                           :REM*55
15Ø FR=52861 :REM FREEZE MOTION
                           :REM*155
16Ø SH=52864 :REM SHOW SPRITE
                           :REM*121
17Ø V=53248:POKE 5328Ø,Ø:POKE 5
   3281,Ø:SYS IN           :REM*71
18Ø HO$="{SHFT CLR}{22 CRSR DNs
   }"                      :REM*115
19Ø FOR T=12288 TO 12288+191:RE
   AD A:POKE T,A:NEXT      :REM*34
2ØØ REM SET UP SPECIAL POINTERS
                           :REM*59
21Ø POKE V+28,255 :REM SET ALL
   SPRITES TO MULTICOLOR
                           :REM*226
22Ø POKE V+37,14:POKE V+38,1 :R
   EM SET MULTICOLORS      :REM*189
23Ø POKE V+39,8            :REM*168
24Ø REM SET BLOCK LOCATIONS
                           :REM*232
25Ø FOR T=1 TO 8:SYS AN,T,192:N
   EXT                     :REM*188
26Ø PRINT HO$"{CTRL 3}YOU CAN P
   OSITION YOUR SPRITES ANYWHE
   RE"                     :REM*63
27Ø GOSUB 72Ø :REM SET THE POSI
   TIONS                   :REM*1Ø5
28Ø REM TURN SPRITES ON:REM*232
29Ø FOR T=1 TO 8:SYS SH,T,1: FO
   R LOOP=1 TO 3ØØ:NEXT LOOP,T
                           :REM*239
3ØØ FOR LOOP=1 TO 3ØØØ:NEXT
                           :REM*136
31Ø REM BEGIN MOVEMENT :REM*249
32Ø PRINT HO$"YOU CAN MAKE THEM
    MOVE IN ANY DIRECTION"
                           :REM*7Ø
33Ø FOR T=1 TO 8:SYS MO,T,T,T*5
   ,T*5: FOR LOOP=1 TO 3ØØ:NEX
   T LOOP,T                :REM*51
34Ø FOR LOOP=1 TO 2ØØØ:NEXT
                           :REM*235
35Ø REM SET WRAPAROUND     :REM*5
36Ø FOR T=1 TO 8:SYS WR,T,1:NEX
   T                       :REM*2Ø8
37Ø REM NOW START THEM MOVING A
   GAIN.                   :REM*165
38Ø PRINT HO$"INSTEAD OF STOPPI
   NG WHEN THEY HIT THE{3 SPAC
   Es}BORDERS, YOU CAN";
                           :REM*187
39Ø PRINT" HAVE THEM WRAPAROUND
   "                       :REM*145
4ØØ FOR T=1 TO 8:SYS MO,T,T,T*5
   ,T*5:FOR LOOP=1 TO 5ØØ:NEXT
    LOOP,T                 :REM*189
41Ø FOR LOOP=1 TO 35ØØ:NEXT
                           :REM*1Ø5
42Ø REM FREEZE             :REM*43
43Ø PRINT HO$"YOU CAN FREEZE TH
   EM AT ANY TIME"         :REM*12
44Ø FOR T=1 TO 8:SYS FR,T,Ø:FOR
    LOOP=1 TO 4ØØ:NEXT LOOP,T
                           :REM*92
45Ø FOR LOOP=1 TO 23ØØ:NEXT
                           :REM*118
46Ø PRINT HO$"INSTEAD OF WRAPAR
   OUND, YOU CAN HAVE THEMBOUN
   CE INSTEAD"             :REM*14Ø
47Ø REM BOUNCING ON, WRAPAROUND
    & FREEZE OFF           :REM*6Ø
48Ø FOR T=1 TO 8:SYS BO,T,1:SYS
    WR,T,Ø:SYS FR,T,1:FOR LOOP
   =1 TO 5ØØ:NEXT LOOP,T
                           :REM*24Ø
49Ø FOR LOOP=1 TO 45ØØ:NEXT
                           :REM*128
5ØØ REM SET BORDERS        :REM*233
51Ø PRINT HO$"YOU CAN CREATE 'B
   ORDERS' OR WALLS THAT{2 SPA
   CEs}WILL CONFINE THE SPRITE
   S"                      :REM*1Ø9
52Ø FOR T=1 TO 4:SYS BB,T,8Ø:NE
   XT                      :REM*37
53Ø FOR T=5 TO 8:SYS TB,T,12Ø:N ►
```

```
    EXT                          :REM*85
54Ø SYS RB,1,14Ø:SYS RB,2,14Ø:S
    YS RB,5,14Ø:SYS RB,6,14Ø
                                 :REM*199
55Ø SYS LB,3,18Ø:SYS LB,4,18Ø:S
    YS LB,7,18Ø:SYS LB,8,18Ø
                                 :REM*73
56Ø FOR T=39 TO 46 STEP 2:POKE
    V+T,48-T:POKE V+T+1,48-T:NE
    XT                           :REM*3Ø
57Ø FOR LOOP=1 TO 45ØØ:NEXT
                                 :REM*2Ø8
58Ø SYS 51478: REM RESET BORDER
    S                            :REM*83
59Ø FOR T=1 TO 8:SYS FR,T,Ø:NEX
    T{3 SPACEs}: REM FREEZE MOT
    ION                          :REM*2Ø7
6ØØ GOSUB 72Ø : REM RE-POSITION
     SPRITES                     :REM*196
61Ø PRINT HO$"AUTOMATIC ANIMATI
    ON IS ALWAYS GREAT" :REM*54
62Ø REM BEGIN ANIMATION:REM*236
63Ø FOR T=1 TO 8:SYS AN,T,192,3
    ,2+T*2:FOR LOOP=1 TO 5ØØ:NE
    XT LOOP,T                    :REM*2Ø
64Ø FOR LOOP=1 TO 4ØØØ:NEXT
                                 :REM*35
65Ø PRINT HO$"BEST OF ALL, THES
    E MODES CAN BE MIXED!!"
                                 :REM*213
66Ø FOR T=1 TO 7 STEP 3:SYS BB,
    T,111:SYSRB,T,16Ø:NEXT
                                 :REM*4
67Ø FOR T=1 TO 8:SYS FR,T,1:NEX
    T{2 SPACEs}: REM RESTART MO
    TION                         :REM*146
68Ø FOR T=1 TO 8:SYS MO,T,2,1Ø,
    1Ø:NEXT                      :REM*2Ø4
69Ø FOR T=2 TO 6 STEP2:SYS AN,T
    ,192,1,Ø:NEXT :REM TURN OFF
     ANIMATION FOR 2,4,6
                                 :REM*2Ø2
7ØØ FOR T=2 TO 8 STEP 3:SYS WR,
    T,1:SYS BO,T,Ø:NEXT: REM SE
    T BOUNCE & WRAP.             :REM*Ø
71Ø END                          :REM*69
72Ø REM SET POSITIONS            :REM*5Ø
73Ø FOR T=1 TO 4:SYS PO,T,75+T*
    36,44+T*36:NEXT              :REM*3
74Ø FOR T=5 TO 8:SYS PO,T,75+(T
    -4)*36,44+(9-T)*36:NEXT
                                 :REM*186
75Ø RETURN                       :REM*127
76Ø REM SPRITE Ø                 :REM*32
77Ø DATA Ø,16,Ø,Ø,16,Ø,Ø,1ØØ,Ø,
    1,169,Ø,1,169,Ø,6            :REM*65
78Ø DATA 17Ø,64,6,186,64,26,186
    ,144,26,254,144,1Ø7,255,164
    ,26,254                      :REM*219
79Ø DATA 144,26,186,144,6,186,6
    4,6,17Ø,64,1,169,Ø,1,169,Ø
                                 :REM*224
8ØØ DATA Ø,1ØØ,Ø,Ø,16,Ø,Ø,16,Ø,
    Ø,Ø,Ø,Ø,Ø,Ø,255              :REM*223
81Ø REM SPRITE 1                 :REM*1Ø6
82Ø DATA Ø,Ø,Ø,Ø,85,Ø,1,1Ø5,64,
    1,17Ø,64,5,17Ø,8Ø,22:REM*15
83Ø DATA 174,148,26,255,164,91,
    255,229,26,255,164,22,186,1
    48,5,17Ø                     :REM*53
84Ø DATA 8Ø,1,17Ø,64,1,1Ø5,64,Ø
    ,85,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*212
85Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,
    Ø,Ø,Ø,Ø,Ø                    :REM*2Ø3
86Ø REM SPRITE 2                 :REM*172
87Ø DATA Ø,Ø,Ø,21,85,84,85,85,8
    5,9Ø,17Ø,165,9Ø,17Ø,165,91
                                 :REM*113
88Ø DATA 255,229,91,255,229,91,
    255,229,91,255,229,9Ø,17Ø,1
    65,9Ø,17Ø                    :REM*197
89Ø DATA 165,85,85,85,21,85,84,
    Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*35
9ØØ DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,
    Ø,Ø,Ø,Ø,Ø                    :REM*185
```

■

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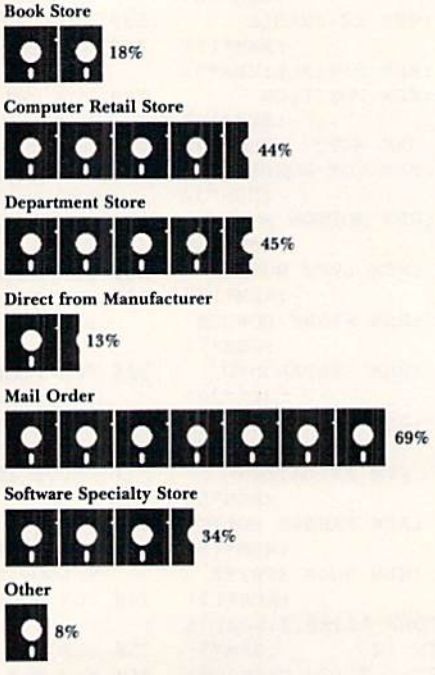
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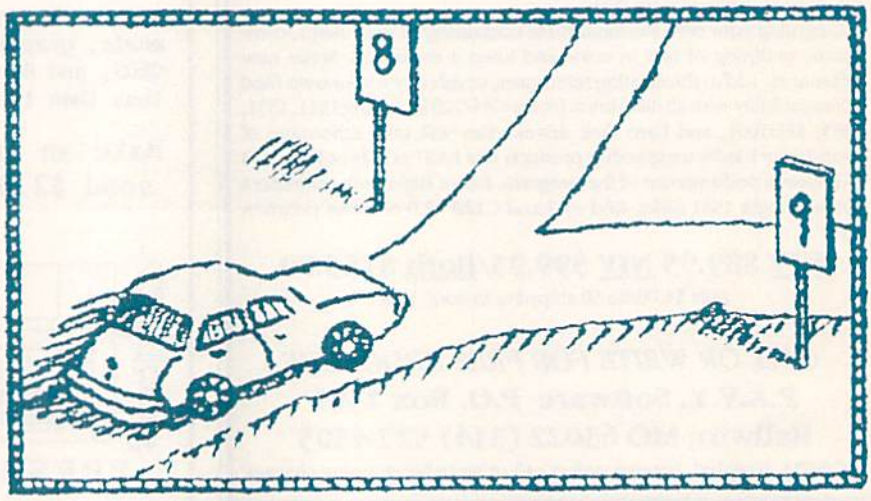
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128 Mode

Imagine switching disk drive device numbers at the touch of two keys!

By MARK JORDAN



A COMMODORE DISK DRIVE'S device number is something most users change only once: when they buy a second drive. And it's simply because each drive connected to a system needs a different number. Otherwise, the computer becomes confused.

Commodore drives offer two methods to change drive numbers, via either hardware or software. Most users go with the hardware method, but there are good reasons for learning how to make the change via software: to get around the 128D's inflexible internal drive set, to get programs that run only on device #8 to run on second drives (especially 1581s) without having to flip switches, and to allow for more efficient two-drive usage.

The value of learning the first reason was driven home to me recently when my 128D's internal drive broke down. This rendered much of my software useless, because the internal drive defaults to device 8. I couldn't change the second drive to 8 because the drive in a 128D is always 8. So for me, a software solution was the only solution.

Before explaining how to do that, let's discuss device numbers. Any peripheral needs a device number. Whenever you open a file, you must specify this number so the 128 knows where to route the data. Commodore allows up to 31 devices to be attached and addressed (with numbers 0–30) but numbers 0–7 are reserved for other peripherals. That leaves numbers 8–30 for disk drives, which ought to be plenty. I can't imagine needing 23 drives hooked up to one computer.

The software change is described in Appendix A of the 1571 drive manual and can be done with one line:

```
OPEN15,8,15,"U0>"+CHR$(9):CLOSE15
```

The line is simple, but cryptic. We use OPEN to access the peripheral needed. The first number is the channel number, which could be any number from 1 to 255. Because the third number must be 15, the first number can also be 15, making it easier to remember.

The 8 between the two 15s indicates that we are "talking" to device 8. I'm assuming that you want to change device 8 to another number. If you wanted a different device number, 9 for instance, then a 9 would go here.

The second 15 is the secondary address, an important number because 15 is reserved for sending commands to the drive unit itself.

The "U0>" command tells the drive to get ready for further directions. The +CHR$(9) is the instruction telling the drive what number to change device 8 to. CLOSE15 simply closes the channel.

The program line works fine if all you're doing is changing device 8 to device 9, but almost any time you change one device number, you'll be changing another. What you want to do in most cases is simply exchange the device numbers of two drives; that is, you'll want to make 8 become 9 and vice versa.

The problem in exchanging the two is that they might temporarily end up with the same number, and then you couldn't complete the transaction, because both drives would respond. Take a look:

```
OPEN15,8,15,"U0>"+CHR$(9)
```

So far, no good: As soon as this line executes, you're going to have two device 9s, and they aren't going to like it. If you then try changing the original 9 to an 8, both drives will want to respond.

The trick is to first change one of the two to a third number, like this:

```
OPEN15,8,15,"U0>"+CHR$(20):CLOSE15
```

This is fine, because you wouldn't have a drive with device 20 in use.

Now let's change drive 9 over to 8:

```
OPEN15,9,15,"U0>"+CHR$(8):CLOSE15
```

Now the second drive is 8, and the first is 20. Let's finish by changing the first drive to 9.

```
OPEN15,20,15,"U0>"+CHR$(9):CLOSE15
```

Everything is now reversed, and whenever you use a default drive command (such as Directory or Run), the second drive will whir while the first drive sits silent. And that's how you can make use of a 128D with a broken internal drive.

As mentioned, there are other advantages to software switches. Since many 5¼-inch programs work only on device 8, transferring them to a 1581 disk doesn't do much good unless you don't mind constantly turning your drive around and flipping switches. It's easier to do a software switch: Just number the above lines consecutively to ►

RUN it right: **C-128; 1571, 1581**

ILLUSTRATED BY MARCEL DUROCHER

form a program, save it as a file on the 1581, and boot it before running the other program.

Software switches can also make you a more efficient computer user. I've included a short machine language program, Device Toggler (Listing 1), that switches devices 8 and 9 when you press shift/restore. This can be a big timesaver while programming, because you can keep two disks in place and grab data from either drive without having to type in those extra U commands that Basic requires.

To use the routine, first type and save it, then place whatever disk you want it on in the drive and run it. A binary version saves on that disk with the name DEVICE.SWITCH. Now, any time you want to use it, BLoad DEVICE.SWITCH, then enter SYS 2912. Be aware, however, that some software will overwrite the interrupts involved.

I'm sure there are many other uses for changing device numbers. I'll leave them for you to discover. R

Mark Jordan, a high school English teacher by professsion, has been programming Commodore computers since 1983.

Listing 1. Device Toggler program. (Available on ReRUN disk. See order card facing page 48.)

```
10 FORT=0TO120:READA$:POKE2816+
   T,DEC(A$):NEXT          :REM*81
20 BSAVE"DEVICE.SWITCH",B0,P281
   6 TO P2937              :REM*34
30 REM LINES 30 - 100 DEMO THE
   EFFECT                  :REM*203
40 SYS2912                 :REM*144
50 KEY1,"DI{SHFT R}"+CHR$(13)
                           :REM*41
60 KEY1,"DI{SHFT R} U9"+CHR$(13
   )                       :REM*19
70 PRINTCHR$(14)"{SHFT CLR}{SHF
   T P}RESS {SHFT S}{SHFT H}{SH
   FT I}{SHFT F}{SHFT T}-{SHFT
   R}UN/{SHFT S}TOP TO FLIP-FLO
   P DRIVES"               :REM*74
80 PRINT"{SHFT P}RESS {SHFT F}1
    TO SEE DEVICE 8'S DIRECTORY
   "                       :REM*50
90 PRINT"OR {SHFT F}3 FOR DEVIC
   E 9'S"                  :REM*188
99 :                       :REM*157
1000 DATA 4C,10,0B,55,30,3E,0C,
     55,30,3E,09,55,30,3E,08,EA
                           :REM*247
1010 DATA A9,0F,A2,09,A0,0F,20,
     BA,FF,A9,04,A2,03,A0,0B,20
                           :REM*21
1020 DATA BD,FF,20,C0,FF,A9,0F,
     20,C3,FF,A9,0F,A2,08,A0,0F
                           :REM*185
1030 DATA 20,BA,FF,A9,04,A2,07,
     A0,0B,20,BD,FF,20,C0,FF,A9
                           :REM*45
1040 DATA 0F,20,C3,FF,A9,0F,A2,
     0C,A0,0F,20,BA,FF,A9,04,A2
                           :REM*79
1050 DATA 0B,A0,0B,20,BD,FF,20,
     C0,FF,A9,0F,20,C3,FF,60,EA
                           :REM*124
1060 DATA 78,A9,6D,8D,18,03,A9,
     0B,8D,19,03,58,60,A5,D3,C9
                           :REM*167
1070 DATA 01,D0,03,20,10,0B,4C,
     40,FA                 :REM*236 ■
```

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ProTips

Readers share their tips for use with Fleet System, PaperClip, Word Writer, and other productivity software.

AwardWare: If you have Xetec's Super Graphix Interface and are frustrated trying to load Hi Tech Expressions' AwardWare, then read on. The interface suffers from a timing problem, which results in erratic behavior when used with some Commodore programs. Here's the fix: Before loading AwardWare, type these commands:

```
OPEN4,4,15,"!"<return>
CLOSE4<return>
```

—Gail Pratt
Reed City, MI

Fleet System 4 (version 4.32): After typing a format command or a string of format commands, press return. Otherwise, you'll get a syntax error when attempting to output to the printer.

—Richard L. West
Spring Valley, CA

PaperClip Publisher: When making a work disk, format it, and copy files PCP1, PCP2, the fonts you want to use and your print driver.

—Jerry Hadley
Oxford, AL

PaperClip III: Here's a tip that helps me bypass a problem I've experienced in 80-Column mode. When using the external file link (checkmark ex:filename), the program would lock up after printing the last of several specified files. The solution is to follow the last checkmark ex:command with a non-existent filename. That way, the File Not Found message is generated, and the program can't lock up.

—Michael Habermann
Baltimore, MD

PrintMaster: Using a joystick or Suncom's IconTroller in port 2 bypasses the need to use cursor and return keys for menu selection and verification. Selecting with a joystick is faster, and the firebutton substitutes for any return key commands. Also, when on any screen where text is being entered, pressing the clear-home key erases only the line you are working on, not the entire text screen.

—Pedro Bell
Chicago, IL

RUN Script 128: You can use this word processor's Copy Block function (F6) to move a block of text to the C-128's other bank. Here's how:

First, copy the block you want to move with F6 (F5, the Move Block function, doesn't work in this case). When you get the Select Insert Point prompt in the command line at the top of the screen, press the Commodore and control keys at the same time. You should now have the Aborted message in the command line. Next, press F1 followed by a shifted Z to get into the other bank, move the cursor where you want your text to be, press F6 twice followed by return, and your text block will reappear!

—John D. MacDonald
Sarasota, FL

Super Snapshot (version 5): This utility cartridge has an undocumented feature on the Sub System menu. Just press the M key, and you'll immediately go to the machine language monitor. This bypasses first having to select the Monitor menu and then the ML monitor (called Code Inspector). This shortcut might also work on other versions of Super Snapshot.

—Henning Vahlenkamp
Matawan, NJ

Word Writer 4: Any good word processor makes a dandy datafile. I use mine for my genealogy records because it does not restrict me to fixed-dimensioned fields. Nor does it compel me to record a certain number of fields for each subject, because the amount of data varies so much. By using the Search function, I can quickly find any item that's in the file.

—Robert M. Mayo
Baton Rouge, LA

Word Writer 5: There are times when I want to insert a blank line exactly where a checkmark line is. Unfortunately, it can't be done. However, a simple way I've found is to move or copy an existing blank line (one with a hard return only) onto the checkmark line. Just drop one or more hard returns directly onto the checkmark, and you have the blank lines right where you want them.

—Fred C. Eckmann
Las Vegas, NV

Word Writer 128: The Okidata 180 printer prints superscripts, subscripts and underlined text. Boldface text will only print in the Utility mode, although it will appear on the monitor. Italics also appear on the monitor but will not print to hardcopy. Be sure to select the desired pitch (10, 12 or 17 cpi) on the printer before printing.

When loading the printer file, choose the Okidata 120, because it's most compatible with the unlisted Okidata 180. The capabilities described above are available by entering the following codes in the Set Printer Codes option of the Print pull-down menu:

1. 27,67,1,,27,68,0 (underline)
2. 27,84,,27,73 (boldface)
3. 0,,0 (italic)
4. 27,76,,27,77 (subscript)
5. 27,74,,27,75 (superscript)

6–10. 0,,0 (open)

—Glen Young
Renton, WA ■

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By LOUIS F. SANDER

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If you're having trouble getting onto the rooftops, find a ladder. (It looks like a long pole with dashes going through it). Approach it from the right or left until Batman's nose is barely touching it. Then push up or down to climb.

Make use of the Grenade when you reach the room that says, "Oops, no pin!" A wall will be blown away, revealing another room.

When punching thugs, food items appear on the screen. Defeat the thugs one at a time, immediately taking the food each leaves. That way, you'll get two or three food items instead of one. The chips and candy apples give you some of your health back, while pieces of candy, slices of bread, bananas and soda give you full strength.

—MIKE MAGDAMIT
PORT ORCHARD, WA

BATTLETECH: If you want to beat this game, you need lots of money. So, when you first start out, put all your money into one of the stocks. When you get more, put it into a second stock. If you need money, sell some of the first stock, but hold on to the second. If you leave your stock alone, it will grow faster and faster. By the time you get to the starport, you'll have a lot of stock—over six million credits in some cases.

To beat the game, you must first find all the Crescent Hawk agents. The first one, Rex, is in the big black building at the back of the starport. The first time you go in, he won't be there until the meeting starts.

The second agent is in the 'mech-it lube in the starport. The other two are in the two other cities: one in the hospital and one in the jail.

When you suspect a character is an agent, select Inspect Character and choose him. If he says he is hiding something, repeat the inspection.

After you find all the agents, go back to your barracks in the Citadel and view the holodisk. Then find the inventor's hut, which is at 36.40, 47.60 on the map in your book. The cave is at 41.20, 50.80. Good luck!

—TODD SINCLAIR
SUISUN, CA

DOUBLE DRAGON II: Are you always running out of time on level 3? If you are, try punching your enemies rather than kicking them. Connecting with a punch will vanquish your foe more quickly than if you kick him.

When punching the big enemies, wait until they're about an inch away from your man, then press the firebutton twice. You'll hit them twice instead of once, with powerful effects. Be very quick when you use this method, or your opponent may catch you.

—CHRIS ELLSWORTH
CHULA VISTA, CA

SPORTING NEWS BASEBALL: When playing the computer, you can avoid giving up home runs by keeping the ball low in the strike zone. You won't get many strikeouts, but you'll get a lot of infield groundouts. Shutouts and no-hitters will become commonplace.

When hitting, wait for the pitcher to start his windup. Position the cross-hair on the outside or inside part of the plate, and hit the pitch out in front. When using this tactic, avoid low pitches—hitting them typically results in a ground out. Usually, I get at least 15 hits and ten runs in a game.

—DAYLE K. TURNER
FLAGSTAFF, AZ

THE THREE STOOGES: If you choose the trivia (question mark) at the beginning of the stage, write down the question and whatever answer you made. Also write down the correct answer, so you'll know it the next time you're asked.

—MICHAEL MAZZONI
BOCA RATON, FL

ZAK MCKRACKEN: You need the flagpole in Peru. To distract the policeman, light the bale of hay with the lighter. When he goes to check what's happening, take the flagpole off the wall; then take it to England and stick it in the stone slab.

To make the tram work on Mars, sweep the mound of dirt beside it. This will uncover some solar panels.

Never take off in the spaceship from Mars, because it takes a very long time to get to Earth. You're better off starting over, then waiting for it to come back.

When the Indians do their dance, remember the order in which they bend over. This is the order in which you must push the buttons on the big door on Mars.

To open the pyramid door on Mars, use the giant bobby pin found at Bob E. Pin's hair salon. To get it, use the wirecutters on the sign. Buy the wirecutters at the Pawn Shop.

Empty Sushi into the sink in Zak's apartment, and you'll be left with a fishbowl. You can use the fishbowl as a space helmet on Mars. To find how much air you have left in your helmet, just enter "READ HELMET".

—ALEXA LANG BARRY
RINDGE, NH ■

To submit your own C-64 or C-128 game tips for consideration, send them to Gold Mine, PO Box 101011, Pittsburgh, PA 15237. Put your name, complete address and Social Security number on every sheet of paper you send, and please use 8½-by-11-inch paper. Also be sure to state which Commodore computer your tip is for. Neatness and clarity count. RUN *pays $5 per submission upon publication.*

To order a book of over 1200 Gold Mine tips on games for Commodore computers, call TAB Books at 800-822-8158; (in Pennsylvania, call 717-794-2191). Ask for Book #3323.

From p. 27.

```
105 DATA 08A0C0E0F102040814*0
    90B0020405070102040102040
    0070E0070E00          :REM*215
106 DATA 00001010104DE00000F*0
    F000000000300000000*0000000
    000000402001          :REM*4
107 DATA 00000000000000000000*0
    00000000000000000000*0000000
    00005748514           :REM*180
108 DATA 535855544F56ACC553C4*7
    8C5C3C4B9C45636543 0*5635543
    056345430 5633        :REM*38
109 DATA 5430563254305631543 0*3
    9192CC1D9C152C2534F*554EC45
    64FCC46494C54         :REM*198
110 DATA 45D2504C41D954454D50*C
    F454E56454C4F50C500*8CC28FC
    2D3C2A2C3CFC4         :REM*237
111 DATA DCC4207CA5A200A00484*0
    FBD0002C9808B04FC920*F04B850
    8C922F06C24F          :REM*244
112 DATA 7041C9309004C93C9039*8
    471A000840B88867ACA*C8E8BD0
    00238F900C1F0         :REM*209
113 DATA F5C980D04EA50BC9029 0*1
    6C9059002690369 0148*A9FEA47
    1C899FB018471         :REM*53
114 DATA 68D00269DAA471E8C899*F
    B01B9FB01F03838E93A*F004C94
    9D004850FD093         :REM*61
115 DATA 38E955D08E8508BD0002*F
    0DDC508F0D9C899FB01*E8D0F0A
    67AE60BC8B9FF         :REM*190
116 DATA C010FAB900C1D096BD00*0
    210BC99FD01A9018 57B*A9FF857
    A601040DC9FFF0        :REM*205
117 DATA 4924 0F3045C9DAF021C9*D
    BF01DC9FEF007C9CCB0*384C24A
    7C8B15FC9039 0        :REM*108
118 DATA 2EC9069006C90AD026E9*0
    42CE9D9AA8449A0FFCA*F008C8B
    900C110FA3F5          :REM*233
119 DATA C8B900C13005204 7ABD0*F
    54CEFA64CF3A68449A8*A95B204
    7AB984A4A4A4A         :REM*98
120 DATA 2044C2982044C2A95D4C*E
    FA629 0F18693 0C93A90*0269064
    C47AB2073 008         :REM*96
121 DATA C9DA902FC9FEF004C9DC*B
    027282069C24CAEA738*E9DAC90
    2900C2073 038         :REM*39
122 DATA E901C9099002E904 0AA8*B
    921C148B920C1484C73*00284CE
    7A74C08AF209E         :REM*112
123 DATA B7E010B03AA0FF8CA3C0*A
    91885032079 00F00F86*042 0F1B
    7E002B023E88E         :REM*194
124 DATA A3C0A604A0004EA3C090*0
    EB999C085048A999DC0*19A1C09
    103C603C8C002         :REM*38
125 DATA 90E6604C48B2A2008EA6*C
    08EA7C0CA8EA8C08EA3*C08EA4C
    02079 0C92CF0         :REM*162
126 DATA 212 8AAD20F7B7A515C9*0
    8B0D88DA5C0A5142907*8DA4C0A
    514A2040A2EA5         :REM*95
127 DATA C0CA1 0F9A91 085032079*0
    0F0422 0F1B7E002B0B3*A503 0DA
    6C08DA6C0E000         :REM*2
128 DATA F008A503 0DA7C08DA7C0*A
    503 0A1 0D92079 00F01D*20F1B7E
    01 0B08E8EA8C0        :REM*243
129 DATA 2079 00F00E20F1B7E002*9
    0034C48B2E88EA3C0A2*0086 03B
    D99C085044EA3         :REM*126
130 DATA C09036ADA4C03 00AA015*9
    103C8ADA5C091 03ADA6*C049FF3
    DA1C00DA7C09D         :REM*230
131 DATA A1C0A0181D9DC091 03AD*A
    8C0300D0A0A0A0A9D9B*C01D9FC
    08891 03E8E001        :REM*142
132 DATA F0BB60ACB4C0D00BA9E0*8
    522A9C085232008C420*9EAD20A
    3B68DF9C0A000         :REM*238
133 DATA 8CACC08CABC0AE14 03AD*1
    503E092D004C9C6F036*788DAAC
    08EA9C0A9928D         :REM*211
134 DATA 1403A9C68D1503 98A205*9
    DC6C0CA10FA583 019A0*8084 03A
    904 18CA300 54A       :REM*209
135 DATA 6603900F88DB1C0A5038D*B
    0C09071ADF9C0F095CE*F9C0B12
    2C920F063C941         :REM*72
136 DATA 9007C948B0034CE7C5A2*0
    4DDCCC0F0C7CA10F8C9*2EF05EC
    923F05 0C924F0        :REM*207
137 DATA 4FC94DD00520 6EC5303 9*C
    952D0034C1AC6A204DD*D1C0F04
    4CA10F820B1C4         :REM*36
138 DATA BD71C08D9DC08D9EC048*A
    2008603AE99C08604 0D*A1C0A01
    8910 3AE9AC086        :REM*120
139 DATA 0468 DA2C0910 3A000E6*2
    2D089E623D085A9012C*A9FF8DA
    BC0D0ECEEACC0         :REM*135
140 DATA B0E78A0AAABDD7C048BD*D
    6C048E622D002E623AD*F9C0F02
    5CEF9C0B122C9         :REM*205
141 DATA 20F0EC38E9 30C90AB022*A
    A60CAE006B01B8EADC0*90B5E00
    7B0128EAEC090         :REM*68
142 DATA AC68686020 9EB78AF004*8
    DAFC0604C48B2209EB7*E00AB0F
    6860320 59C50A        :REM*91
143 DATA 0A0A0A8504BD27C029 0F*0
    5049D27C02059C5850 4*BD27C02
    9F005049D27C0         :REM*24
144 DATA 2059C50A0A0A0A8504BD*3
    1C029 0F05049D31C020*59C5850
    4BD31C029F005         :REM*255
145 DATA 049D31C020 59C5C905B0*A
    9AABD7BC0A6039D3BC0*2079 00F
    0192 0FDAE208A        :REM*82
146 DATA AD20F7B7A515C910B08C*A
    6039D45C0A5149D4FC0*6020790
    0D00368686020         :REM*12
147 DATA F1B78AA603C9109 0ED4C*4
    8B2A205BDC6C0D0FBCA*10F860B
    D3BC0ACADC099         :REM*227
148 DATA B4C0B98DC0850 3B993C0*A
    8B999C0850 4A002BD4F*C0910 3B
    D45C0C8910 3A0        :REM*190
149 DATA 05BD27C0910 3C8BD31C0*9
    1034C79C4E002B0BAAC*ADC0B98
    7C048A9900850 3       :REM*255
150 DATA B993C0A8B999C0850 468*4
    849FF399FC0999FC068*E000F00
    6199FC0999FC0         :REM*129
151 DATA B99FC0199BC0A01791 03*4
    C79C44838E941A8B980*C0AAA90
    638EDAEC0A88A         :REM*143
152 DATA 186DABC01003C8A90BC9*0
    C900388A900AABD59C0*8503BD6
    5C0883 0094A66        :REM*75
153 DATA 034C11C6A900488DB3C0*A
    538DB2C0AEADC0BDC6*C0D0FBA
    DB1C0850448AD         :REM*252
154 DATA B0C0853CEACC03 01046*0
    4660318653A86865 04*48984C3
    8C6AEADC09DBA         :REM*237
155 DATA C0689DC0C0A9008DACC0*8
    DABC068D006FEC6C04C*79C4BD8
    DC0853BD93C0          :REM*159
156 DATA A8B999C0850 4A000ADB2*C
    0910 3C8ADB3C091 03A0*04BDB4C
    009 0191 039DC6       :REM*186
157 DATA C04C79C4A205BDC6C0F0*3
    5BDBAC038EDAFC09DBA*C0B029B
    DC0C0E9009DC0         :REM*170
158 DATA C0B01FDEC6C0F01ABD8D*C
    0850 5BD93C0A8B999C0*850 6A00
    4BDC6C0910 5A9        :REM*81
159 DATA 009DC6C0CA10C36CA9C0
                          :REM*131
160 DATA -1               :REM*18
```

Listing 2. Two-voice TWINKLE program. (Available on ReRUN disk. See order card facing page 48.)

```
0 REM THIS LIST 2 CREATES (AND
  SHOULD NOT BE CALLED) TWINKLE
                          :REM*182
5 OPEN 8,8,8,"TWINKLE,P,W"
                          :REM*96
6 CT=0:PRINT"{SHFT CLR}":REM*56
10 READ A$:IF A$="-1" THEN CLOS
  E8:PRINT:PRINT"ALL DONE!":EN
  D                       :REM*129
12 PRINT"{HOME}READING LINE "+S
  TR$(CT):CT=CT+1         :REM*141
15 IF LEN(A$)<62 THEN 55
                          :REM*254
20 B$=MID$(A$,1,20)+MID$(A$,22,
  20)+MID$(A$,43,20)      :REM*242
25 FOR I=1 TO 30          :REM*181
30 C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                          :REM*209
35 H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55               :REM*85
40 L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55               :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                          :REM*67
50 NEXT:GOTO 10           :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
  O 70                    :REM*184
60 IF LEN(A$)<42 THEN B$=LEFT$(
  A$,20)+RIGHT$(A$,(LEN(A$)-21 ►
```

```
   )):GOTO 7Ø              :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
   Ø)+RIGHT$(A$,LEN(A$)-42)
                           :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                           :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55               :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55               :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                           :REM*148
95 NEXT:GOTO 1Ø            :REM*16Ø
1ØØ REM HEX DATA FOR SAMPLE MUS
    IC PROGRAM             :REM*27
1Ø1 DATA Ø1Ø817Ø8ØAØØ97353332*3
    83Ø2C3Ø3A9735333238*312C3ØØ
    Ø3EØ814ØØ9922          :REM*149
1Ø2 DATA 9311119A2Ø2Ø2Ø2Ø2Ø2Ø*2
    Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø4558*4345525
    Ø54532Ø46524F          :REM*94
1Ø3 DATA 4D22ØØ6CØ81EØØ992211*2
    Ø2Ø2Ø27564152494154*494F4E5
    32Ø4F4E2Ø412Ø          :REM*151
1Ø4 DATA 4652454E43482Ø464F4C*4
    B2Ø534F4E472722ØØ96*Ø828ØØ9
    92211Ø2Ø2Ø2Ø           :REM*93
1Ø5 DATA 2Ø2Ø2Ø42592Ø574F4C46*4
    7414E472Ø414D414445*5553204
    D4F5A41525422          :REM*2Ø3
1Ø6 DATA ØØBBØ832ØØ992211112Ø*2
    Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
    Ø564152494154          :REM*123
1Ø7 DATA 494F4E2Ø564922ØØE5Ø8*3
    CØØ99221120202020202Ø*2Ø2Ø2Ø2
    Ø415252414E47          :REM*64
1Ø8 DATA 45442Ø42592Ø43485249*5
    32Ø4E45574D414E22ØØ*EEØ846Ø
    ØFEØA2Ø3ØØØFC          :REM*28
1Ø9 DATA Ø85ØØØ812Ø49B2312ØA4*2
    Ø32ØØ1ØØ95AØØFEØ422*56312Ø5
    43Ø2Ø56322Ø54          :REM*1Ø6
11Ø DATA 3Ø22ØØ24Ø95FØØFEØ422*5
    6342Ø543Ø2Ø56352Ø54*3Ø22ØØ4
    3Ø964ØØDB363A          :REM*154
111 DATA FEØ4225631 2Ø532Ø4F33*2
    Ø432Ø56322Ø492Ø4F35*2Ø4322Ø
    Ø58Ø969ØØFEØ4          :REM*2Ø
112 DATA 2256342Ø4F342Ø452Ø56*3
    52Ø4722ØØ68Ø96EØØ8D*31323Ø3
    A823A8934323Ø          :REM*77
113 DATA ØØ7FØ977ØØ8F2Ø2A2A2Ø*4
    D41494E2Ø5448454D45*2Ø2A2AØ
    Ø9BØ978ØØFEØ4          :REM*89
114 DATA 2256312Ø532Ø4F322Ø42*2
    Ø4F332Ø432Ø4F322Ø42*22ØØB2Ø
    982ØØFEØ4224F          :REM*87
115 DATA 332Ø432Ø56322Ø492Ø4F*3
    52Ø4322ØØC7Ø987ØØFE*Ø422563
    42Ø4F342Ø452Ø          :REM*114
116 DATA 56352Ø4722ØØE3Ø98CØØ*F
    EØ42256312Ø532Ø4F32*2Ø422Ø4
    F332Ø432Ø4F32          :REM*145
117 DATA 2Ø4222ØØFAØ996ØØFEØ4*2
    24F332Ø432Ø56322Ø49*2Ø4F352
    Ø4722ØØØCØA9B          :REM*2
118 DATA ØØFEØ42256342Ø432Ø56*3
    52Ø4522ØØ28ØAAØØØFE*Ø422563
    12Ø532Ø4F322Ø          :REM*5
119 DATA 422Ø4F332Ø432Ø4F322Ø*4
    222ØØ3FØAAAØØFEØ422*4F332Ø4
    32Ø5632 2Ø492Ø         :REM*217
12Ø DATA 4F352Ø4722ØØ51ØAAFØØ*F
    EØ42256342Ø432Ø5635*2Ø4522Ø
    Ø67ØAB4ØØFEØ4          :REM*17Ø
121 DATA 2256312Ø532Ø4F332Ø44*2
    Ø452Ø4322ØØ7EØABEØØ*DB373AF
    EØ42246 2Ø5632         :REM*25
122 DATA 2Ø492Ø4F352Ø4122ØØ9Ø*Ø
    AC3ØØFEØ42256342Ø47*2Ø56352
    Ø4322ØØA6ØAC8          :REM*74
123 DATA ØØFEØ4225631 2Ø532Ø4F*3
    32Ø452Ø462Ø4522ØØBD*ØAD2ØØD
    B383AFEØ42246          :REM*171
124 DATA 2Ø56322Ø492Ø4F352Ø41*2
    2ØØCFØAD7ØØFEØ42256*342Ø462
    Ø56352Ø4322ØØ          :REM*34
125 DATA E5ØADCØØFEØ422563 12Ø*5
    32Ø4F332Ø472Ø412Ø42*22ØØFFØ
    AE6ØØDB393AFE          :REM*87
126 DATA Ø4224F342Ø432Ø56322Ø*4
    92Ø4F352Ø4722ØØ11ØB*EBØØFEØ
    422563 42Ø462Ø         :REM*229
127 DATA 56352Ø4322ØØ2DØBFØØØ*F
    EØ42256312Ø532Ø4F33*2Ø422Ø4
    F342Ø432Ø4F33          :REM*47
128 DATA 2Ø4222ØØ48ØBFAØØDB31*3
    Ø3AFEØ4224F342Ø432Ø*56322Ø4
    92Ø4F352Ø4722          :REM*42
129 DATA ØØ5AØBFFØØFEØ4225634*2
    Ø452Ø56352Ø4322ØØ7Ø*ØBØ4Ø1F
    EØ42256312Ø53          :REM*129
13Ø DATA 2Ø4F342Ø442Ø452Ø4322*Ø
    Ø88ØBØEØ1DB31313AFE*Ø422442
    Ø56322Ø492Ø4F          :REM*144
131 DATA 352Ø4622ØØ9DØB13Ø1FE*Ø
    42256342Ø452Ø56352Ø*4F342Ø4
    122ØØB4ØB18Ø1          :REM*141
132 DATA FEØ4225631 2Ø532Ø4F34*2
    Ø23432Ø442Ø4322ØØCF*ØB22Ø1D
    B31323AFEØ422          :REM*241
133 DATA 4F332Ø422Ø56322Ø492Ø*4
    F352Ø4622ØØE4ØB27Ø1*FEØ4225
    6342Ø442Ø5635          :REM*Ø
134 DATA 2Ø4F342Ø4722ØØFAØB2C*Ø
    1FEØ42256312Ø532Ø4F*332Ø412
    Ø422Ø4722ØØ15          :REM*55
135 DATA ØC36Ø1DB31333AFEØ422*4
    F342Ø432Ø56322Ø492Ø*4F352Ø4
    522ØØ2AØC3BØ1          :REM*1Ø5
136 DATA FEØ42256342Ø442Ø5635*2
    Ø4F342Ø4722ØØ46ØC4Ø*Ø1FEØ42
    256312Ø532Ø4F          :REM*169
137 DATA 332Ø422Ø4F342Ø432Ø4F*3
    32Ø4222ØØ5EØC4AØ1DB*31343AF
    EØ42241 2Ø5632         :REM*48
138 DATA 2Ø492Ø4F352Ø4522ØØ73*Ø
    C4FØ1FEØ42256342Ø43*2Ø56352
    Ø4F342Ø4122ØØ          :REM*61
139 DATA 8AØC54Ø1FEØ422563 12Ø*5
    32Ø4F332Ø23472Ø412Ø*4722ØØ9
    EØC5EØ1FEØ422          :REM*7Ø
14Ø DATA 462Ø56322Ø492Ø4F352Ø*4
    422ØØB3ØC63Ø1FEØ422*56342Ø4
    F342Ø412Ø5635          :REM*51
141 DATA 2Ø4622ØØC9ØC68Ø1FEØ4*2
    256312Ø532Ø4F332Ø45*2Ø462Ø4
    422ØØDDØC72Ø1          :REM*174
142 DATA FEØ422472Ø56322Ø492Ø*4
    F342Ø4222ØØEFØC77Ø1*FEØ4225
    6342Ø462Ø5635          :REM*235
143 DATA 2Ø4422ØØØ9ØD7CØ1FEØ4*2
    256312Ø532Ø4F332Ø23*462Ø472
    Ø4F322Ø4722ØØ          :REM*123
144 DATA 2ØØD86Ø1FEØ4224F332Ø*4
    32Ø56322Ø512Ø4F352Ø*4322ØØ3
    5ØD8BØ1FEØ422          :REM*131
145 DATA 56342Ø4F342Ø472Ø5635*2
    Ø4522ØØ4FØD9ØØ1FEØ4*2256312
    Ø532Ø4F322Ø47          :REM*183
146 DATA 2Ø452Ø472Ø512Ø4322ØØ*5
    5ØD9AØ18EØØ63ØDA4Ø1*812Ø49B
    2312ØA42Ø32ØØ          :REM*159
147 DATA 7FØDAEØ1DB363AFEØ422*5
    6312Ø532Ø4F332Ø472Ø*5632Ø5
    12Ø4722ØØ94ØD          :REM*1Ø2
148 DATA B3Ø1FEØ42256342Ø452Ø*5
    6352Ø4F322Ø4722ØØAC*ØDB8Ø1F
    EØ42256312Ø53          :REM*174
149 DATA 2Ø4F332Ø2346 2Ø472Ø23*4
    622ØØBDØDC2Ø1FEØ422*472Ø563
    22Ø512Ø4722ØØ          :REM*35
15Ø DATA D2ØDC7Ø1FEØ42256342Ø*4
    52Ø56352Ø4F322Ø4722*ØØEAØDC
    CØ1FEØ4225631          :REM*229
151 DATA 2Ø532Ø4F332Ø23462Ø47*2
    Ø2346 22ØØFBØDD6Ø1FE*Ø422472
    Ø56322Ø512Ø46          :REM*123
152 DATA 22ØØ1ØØEDBØ1FEØ42256*3
    42Ø442Ø5635 2Ø4F322Ø*4722ØØ2
    8ØEEØØ1FEØ422          :REM*58
153 DATA 56312Ø532Ø4F332Ø2346*2
    Ø472Ø23462 2ØØ39ØEEA*Ø1FEØ42
```

EXCERPTS FROM
"VARIATIONS ON A FRENCH FOLK SONG"
BY WOLFGANG AMADEUS MOZART

VARIATION VI
ARRANGED BY CHRIS NEWMAN

Relax with some classical music after you've typed in the SID Basic 64 program.

```
    2472Ø56322Ø51          :REM*59
154 DATA 2Ø4622ØØ4EØEEFØ1FEØ4*2
    256342Ø442Ø5635Ø4F*322Ø472
    2ØØ64ØEF4Ø1FE          :REM*233
155 DATA Ø4225631Ø532Ø4F332Ø*4
    12Ø422Ø4722ØØ7BØEFE*Ø1FEØ42
    24F342Ø432Ø56          :REM*24
156 DATA 322Ø512Ø4F332Ø4522ØØ*9
    ØØEØ3Ø2FEØ42256342Ø*432Ø563
    52Ø4F322Ø4722          :REM*2Ø3
157 DATA ØØA9ØEØ8Ø2FEØ4225631*2
    Ø532Ø4F332Ø422Ø4F34*2Ø432Ø4
    422ØØBDØE12Ø2          :REM*73
158 DATA FEØ422452Ø5632Ø512Ø*4
    F332Ø4522ØØD2ØE17Ø2*FEØ4225
    6342Ø432Ø5635          :REM*1Ø6
159 DATA 2Ø4F322Ø4722ØØE9ØE1C*Ø
    2FEØ4225631Ø532Ø4F*342Ø442
    Ø452Ø23462ØØ          :REM*162
16Ø DATA ØØØF26Ø2DB373AFEØ422*4
    72Ø5632Ø512Ø4F332Ø*4422ØØ1
    5ØF2BØ2FEØ422          :REM*21Ø
161 DATA 5634Ø4F322Ø422Ø5635*2
    Ø4722ØØ2DØF3ØØ2FEØ4*2256312
    Ø532Ø4F342Ø23          :REM*19Ø
162 DATA 462Ø472Ø234622ØØ44ØF*3
    AØ2DB383AFEØ422472Ø*5632Ø5
    12Ø4F332Ø4422          :REM*114
163 DATA ØØ59ØF3FØ2FEØ4225634*2
    Ø4F322Ø422Ø56352Ø47*22ØØ71Ø
    F44Ø2FEØ42256          :REM*16Ø
164 DATA 312Ø532Ø4F342Ø23462Ø*4
    72Ø234622ØØ88ØF4EØ2*DB393AF
    EØ42247Ø5632           :REM*187
165 DATA 2Ø512Ø4F332Ø4722ØØ9D*Ø
    F53Ø2FEØ4225634Ø45*2Ø56352
    Ø4F322Ø4722ØØ          :REM*146
166 DATA B5ØF58Ø2FEØ42256312Ø*5
    32Ø4F342Ø2346Ø472Ø*234622Ø
    ØCDØF62Ø2DB31          :REM*245
167 DATA 3Ø3AFEØ422472Ø5632Ø*5
    12Ø4F332Ø4722ØØE2ØF*67Ø2FEØ
    4225634Ø452Ø           :REM*135
168 DATA 5635Ø4F322Ø4722ØØFA*Ø
    F6CØ2FEØ42256312Ø53*2Ø4F342
    Ø23462Ø472Ø23          :REM*14Ø
169 DATA 4622ØØ121Ø76Ø2DB3131*3
    AFEØ422472Ø5632Ø51*2Ø4F332
    Ø4622ØØ271Ø7B          :REM*35
17Ø DATA Ø2FEØ42256342Ø442Ø56*3
    52Ø4F322Ø4722ØØ3F1Ø*8ØØ2FEØ
    42256312Ø532Ø          :REM*132
171 DATA 4F342Ø2346Ø472Ø2346*2
    2ØØ571Ø8AØ2DB31333A*FEØ4224
    72Ø5632Ø512Ø           :REM*15Ø
172 DATA 4F332Ø4622ØØ6C1Ø8FØ2*F
    EØ42256342Ø442Ø5635*2Ø4F322
    Ø4722ØØ821Ø94          :REM*139
173 DATA Ø2FEØ42256312Ø532Ø4F*3
    42Ø412Ø422Ø4722ØØ9D*1Ø9EØ2D
    B31343AFEØ422          :REM*222
174 DATA 4F352Ø432Ø5632Ø512Ø*4
    F332Ø4522ØØB21ØA3Ø2*FEØ4225
    6342Ø432Ø5635          :REM*248
175 DATA 2Ø4F322Ø4722ØØCB1ØA8*Ø
    2FEØ42256312Ø532Ø4F*342Ø422
    Ø4F352Ø432Ø44          :REM*191
176 DATA 22ØØE21ØB2Ø2FEØ4224F*3
    52Ø452Ø5632Ø512Ø4F*332Ø452
    2ØØF71ØB7Ø2FE          :REM*121
177 DATA Ø42256342Ø432Ø5632Ø*4
    F322Ø4722ØØE11BCØ2*FEØ4225
    6312Ø532Ø4F35          :REM*163
178 DATA 2Ø442Ø452Ø234622ØØ22*1
    1C6Ø2FEØ422472Ø5632*2Ø512Ø4
    F332Ø4422ØØ37          :REM*242
179 DATA 11CBØ2FEØ42256342Ø4F*3
    22Ø422Ø5635Ø4722ØØ*5D11DØØ
    2FEØ42256312Ø          :REM*177
18Ø DATA 532Ø4F352Ø412Ø372Ø46*2
    Ø362Ø472Ø452Ø352Ø46*2Ø342Ø4
    42Ø4522ØØ7E11          :REM*113
181 DATA DAØ2DB363AFEØ4224F33*2
    Ø432Ø5632Ø492Ø4F35*2Ø43223
    A8D3132Ø3A82           :REM*56
182 DATA ØØØØØØ            :REM*79
183 DATA -1                :REM*37 ■
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8 bitters do it in bytes !

GEOWATCH

Broaden your GEOS horizons with 1581 Boot Disk Maker, geoFile, GEOS laser printing, and more.

By TIM WALSH

Q *Jim Collette's 1581 Boot Disk Maker, found on* RUN's *GEOS Companion disk, is supposed to make a bootable 1581 version of either a C-64 or C-128 GEOS master disk. All the program does for me is format the 3½-inch disk in the 1581, and then my entire system locks up. What's wrong?*

—MARY SCHELLE
SWEENY, TX

A Run the GEOS Configure 2.0 program again to make a new copy of the Configure file. If your copy of GEOS was once configured with an REU as a third disk drive while you were using the Configure 2.0 file, you must always make certain that your REU is plugged into the expansion port. Unplugging the REU might not seem to affect any other GEOS operation, but it must be in place in order for the 1581 Boot Disk Maker to work. Also, use a brand name, high-quality 3½-disk with your 1581, rather than a generic disk. This will ensure that a reliable boot disk is produced.

Q *I use geoFile 128. All my business contact files contain three-digit category fields. After creating a search data form, geoFile goes through the motions of sorting a file based on the contents of the category field, but the file isn't sorted. Any suggestions would be appreciated.*

—DALE RENTSCHLER
CINCINNATI, OH

A John Wegwood, the programmer of geoFile programs for Berkeley Softworks, provided the answer to your question. He stated that the search data form must be cleared before a new sort can occur. Pressing Commodore/Z clears the old form. You can then create a new sort form that will sort the file correctly every time.

Q *When using GEOS 2.0 on my 64C, why can't I drag the GEOS, GEOS Boot and GEOS Kernal icons from the deskTop to the border for copying to a work disk? Can I use a 1541 disk copying utility to copy the GEOS boot disk, then delete the files that I don't need?*

—R. C. MIESSLER
LAFAYETTE, IN

A First, why do you want to copy GEOS, Boot and Kernal icons? GEOS comes with a backup copy of your original GEOS boot disk, so there is no need to use the GEOS boot disk for anything except to boot GEOS. It should *never* be used as a work disk. If you have a 1581, use the GEOS Companion's 1581 Boot Disk Maker, mentioned above, to make a bootable 3½-inch copy of your GEOS boot disk.

Using a non-GEOS utility to make archival backups of your boot disk is not recommended. GEOS contains copy protection that prevents most utilities from successfully creating a working copy of the disk.

GEOTIPS

Laser Printing and GEOS

You can print laser-quality geoWrite and geoPublish documents. All you need is access to an Apple LaserWriter II printer and an RS-232 parallel printer interface, such as the Omnitronix Deluxe. Simply set the printer's six DIP switches to the following settings: 1, 2, 5 and 6 down; 3 and 4 up. You'll be certain to impress MS-DOS and Macintosh users with the output from your Commodore 8-bit!

—KEVIN J. FITZGERALD
CATAAUQUA, PA

Attention, geoBasic Users!

Technical support is available via QuantumLink: GEOS programmer extraordinaire, Bill Coleman, is monitoring the geoBasic area there. He will be answering questions and placing geoBasic files for downloading.

Dedicated Disks

I always keep handy a 1571-formatted disk that contains files exclusively for uploading to my REU. So, when I'm creating, for example, a newsletter, I have the applications and fonts I need right there.

After activating GEOS, I copy the contents of the 1571-formatted disk into RAM, using the Disk Copy option to save time. I keep page 2 of my RAM disk blank, so that my working files can collect there for ready access. Try this process; I'm certain you'll find it handy.

—DANIEL E. HARRIS
ST. LOUIS, MO

File View Options

Using the deskTop's File View option sure makes life easier. Instead of wading through pages of icons, locate your files according to date or, better yet, according to type. For instance, if you want to scan a disk for a particular font file, list the disk's contents by specifying Font Files. Listing by date displays the most recently accessed files at the top and older files at the bottom.

—DANIEL E. HARRIS
ST. LOUIS, MO

geoPaint and Validate

I encountered the following problem while using geoPaint (version 2.0) with my C-64 and a single disk drive. After I had created a full-size paint document and attempted to move a copy to a backup disk, I noticed that it required up to four or five disk swaps, when the process should normally be done with one or two swaps. When I pulled up the File Info box, I discovered only about 1K of disk memory space indicated; a full-size document should occupy 20 to 30K of disk space.

My solution to the problem was to validate the disk that contained the document. Note that validation of a GEOS disk must always be done within the GEOS environment.

—JOEL HOLLOWAY
PETAL, MS ■

In addition to being RUN's *technical manager and Magic columnist, Tim Walsh is a long-standing GEOS enthusiast.*

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COMMODORE CLINIC

Answers to readers' questions about troubleshooting your monitor and saving data with the computer off.

By ELLEN RULE

Q *My C-64 worked fine when I purchased it, but now I'm unable to obtain characters on my screen (TV or 1802 monitor). I've checked the connections. Can you help with this?*

—JACQUELINE TAYLOR
WASHINGTON, DC

A It sounds as if either your power supply has failed, or you have a problem with your 64's video output circuits. You can continue your troubleshooting at little expense by trying a friend's power supply with your system. If you still can't get a picture, your C-64 needs a trip to your local Commodore service technician.

Q *How do I recover the 1581's directory after the "short" New command?*

—YURI ARTOV
DES MOINES, IA

A The "short" New command, which is the same as the New and Header commands but without the ID information, rewrites only a small portion of the disk, leaving much of the disk structure intact. You can recover in part after the short New command by using a disk editor such as the Sector Editor program on the 1581 demo disk.

When the short New command is given to a 1581 disk, a new block availability map (BAM) is created in track 40, sectors 1 and 2. In addition, the first block of the directory (track 40, sector 3), where the first eight file entries are kept, is blanked. Files beyond the first eight can be recovered by changing the track and sector link in the first block of the directory (the first two bytes of track 40, sector 3) to point to the second block (track 40, sector 4) using the hexadecimal values $28 and $04.

When you return to Basic and list the directory, the files beyond the first eight will be listed. You must validate the disk to reallocate the blocks these files occupy to protect the recovered files from being overwritten. Recovering the first eight files, on the other hand, is an iffy proposition at best. You'll have to manually rebuild the directory and find the first block of each of the eight files. If the disk was heavily used, with frequent writing, scratching and rewriting of files, this could be a real challenge!

Q *I received literature from Creative Micro Designs that described their product, RAMLink, as being able to provide a means of saving the contents of the REU when the computer is turned off. I'd like to know if RAMLink uses batteries to accomplish this. If not, is there a way to modify a 1764 REU with a battery to hold the data in the REU while the computer is off?*

—DANIEL J. ROBERTS
APO, NY

A The RAM in the Commodore REU is dynamic RAM, so you will lose data when you shut down your computer. However, data can be maintained via battery. CMD's (PO Box 646, East Longmeadow, MA 01028) RAMLink (which, according to the company, will be available by the time you read this) offers a battery backup option that saves the contents of both the REU and RAMLink itself.

You may also want to consider the Brown Box, a battery-backed memory cartridge that's available in 64K, 128K and 256K configurations. This unit can be used simultaneously with the REU via a cartridge port expander. It's available from Brown Boxes, Inc., 26 Concord Rd., Bedford, MA 01730.

Q *When using the C-128's built-in machine language monitor, is there a way to list the disassembly on a printer?*

—DAVID EDWARDS
MIDDLETOWN, NY

A You can obtain a listing by redirecting the output from the screen to your printer. From Basic, type OPEN4,4:CMD4 and enter the monitor using the Monitor command or the F8 key. Load your program with L"program name",<device#>. To disassemble, type in D<starting address> <ending address>; then exit to Basic by typing in X. To bring the computer's output back to the screen, enter PRINT#4:CLOSE4.

Q *I have had new disks stop loading for no apparent reason. These disks are not even a year old, nor are they used all the time. What causes this, and is there anything I can do to get them to load again? Validating hasn't worked.*

—CORY JOHNSON
WASILLA, AK

A If none of your disks work, you may have a hardware problem in your computer, cabling or disk drive. On the other hand, if your newest disks work, but older disks cause the drive to exert more and more effort to load data, then your drive has probably moved out of alignment. A qualified technician can adjust this for you.

Poor quality disks could be experiencing data drop, although I have used many generic brand disks without this problem. Some disk copiers have a scan option that tells you the number, type and frequency of disk errors, and will copy whatever data that can be recovered to a new disk; you might be able to retrieve some of your disk contents this way.

Disks need to be stored safely, away from the magnetic fields found near computer monitors and TVs, older phones, motors, and of course, magnets. Because validating didn't help, it's possible that the magnetic encoding on your disks has been destroyed. To reduce loss from this kind of damage, keep a set of backups in a place that's safe from magnetic impulses. ■

Do you have a problem or question about your Commodore computer system, software or programming? Just send your questions to Commodore Clinic, RUN Magazine, 80 Elm St., Peterborough, NH 03458. Queries are answered only through this column, and, due to the volume of mail, only questions likely to appeal to the majority of our readers can be published.

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RUN's Checksum & Program Typing Hints

TYPE IN *RUN*'S CHECKSUM, which serves for both the C-64 and for the C-128 in either 40- or 80-Column mode, and save it to disk before running it. When typing in a program from *RUN*, first load and run *RUN*'s latest version of the Checksum program, which contains a new feature explained below. The screen will display a SYS number (49152 for the C-64; 3328 for the C-128) that deactivates and reactivates the Checksum. Always disable *RUN*'s Checksum before attempting to run another program. Note: You can abbreviate Basic keywords; spaces affect the checksum only when within quotes; and the order of characters affects the checksum.

When you press return after typing in a program line, a one-, two-, or three-digit number from 0 to 255 appears in the home position. If this number matches the checksum value in the program listing, the line as you typed it is correct. If the number that appears doesn't match the checksum value, compare the line with the magazine listing to find your error. Then move the cursor back up to the line and make your corrections. Now, after you press return, the correct checksum value should appear. Continue entering the listing until all the lines have been correctly typed. Then deactivate *RUN*'s Checksum, using the appropriate SYS number, and save the finished program.

We sometimes get letters and phone calls from new readers who have typed in the Checksum program for the first time. They are confused by the "Out of Data Error in Line 30" message that appears when they try to run the Checksum program. Understandably, they compare line 30 of the listing with line 30 as they typed it in, and cannot find anything wrong. The message unintentionally misleads them into thinking the error is in line 30, whereas the typing mistake is actually somewhere in one of the Data statements in lines 190–350.

So, we've added a new feature to the Checksum program that alerts readers to the number of the Data statement line in the Checksum program where an error has actually been made. **Note that this feature works *only* on the Checksum program itself, and not on any other program listing in *RUN*.**

After you've entered and saved the Checksum program to disk, run it. If you've made any errors in any of the Data statements, the program will give you a specific line number. Find the mistake, correct it, press return, save the program and run it again. Repeat this procedure until the Checksum program runs flawlessly.

Control Characters Demystified

All the graphics and control characters in the listings in *RUN* have been translated into understandable key combinations. They are the instructions you see inside the curly braces. For example, {SHIFT L} means you hold down the shift key while you press the L key once. You do *not* type in the curly braces. What appears on the screen will look quite different from what is designated inside the braces. Here are some more examples:

{22 SPACES}—press the space bar 22 times.

{SHIFT CLR}—hold down the shift key and press the clr-home key once.

{2 CRSR DNs}—press the cursor-down key twice.

{CTRL 1}—hold down the control key and press the 1 key.

{COMD T}—hold down the Commodore logo key and press the T key.

{5 LB.s}—press the British pound key (£, *not* #) five times.

Refer to the following paragraphs for any other Error messages you get from running any program listing in *RUN*.

Other Error Messages

Having heard from many users over the years about their difficulties with typing in listings, we've identified a few recurring problems that plague many people but are easy to fix. So read on and see if your problem is one of these.

- You get an "Out of Data in Line xxx" message. This means that a program line was reading from Data statements and reached the end of the data before it was done reading. There are two possible problems.

One might be with the program line that reads the data, usually a For-Next loop. Make sure you have the proper values for the loop, because if, for example, the listing has a loop of 0 to 150, and you've typed 0 to 160, you'll get the Out of Data message. If the loop is correct, then the problem lies in the Data statements themselves. One possibility is that you omitted a whole line of data. That's easy enough to find and correct. It's more likely that you've skipped one or more individual data items or typed in a period instead of a comma, which causes two data values to be read as one number. Check your typing carefully against the listing. Using *RUN*'s Checksum program when you type in listings from the magazine should help in this case.

- You get an "Illegal Quantity Error in Line xxx" message. This means you've read a number from a Data statement and tried to poke it into a memory address. The error occurs because the number is larger than 255 (the largest value a memory address can contain), which means that somewhere in your Data statements you've made an error by typing in a number larger than 255. Again, this is easy to check for and correct. First look in your Data statements for a number larger than 255. You might have added an extra digit, or perhaps you ran two numbers together (23456 instead of 234,56).
- You get a "Syntax Error in Line xxx" message. This could be almost anything. What it tells you is that there is something wrong in the indicated line. Usually you've misspelled a Basic keyword or omitted some required character. List the line and examine it carefully.
- You get an "Error in Data" message. This occurs in programs that add up all the data as read, and, when finished, compares that sum with what it should be if the data were typed in correctly. If it isn't the same, it means an error somewhere in typing the Data statements. Go back and check the data carefully. Correct the mistake(s), save the new version and try again.
- Finally, we urge everyone who intends to type in one of our listings to use *RUN*'s Checksum program, which will help you avoid every mistake we've mentioned above, except that it won't detect the omission of a line. R

Listing. *RUN*'s Checksum program. This program is available on *RUN*'s BBS for users to download.

```
10 REM RUN'S CHECKSUM 64/128 - BOB KODADEK
20 MO=128:SA=3328:IF PEEK(40960)THEN MO=64:SA=49152
30 I=0:CK=0:CH=0:LN=190
40 FOR K=0 TO 16
50 FOR J=1 TO 10:READ B:IF B>255 THEN GOTO 170
60 CH=CH+B:POKE SA+I,B:I=I+1:NEXT
70 READ LC
80 IF LC<>CH THEN GOTO 170
90 CH=0:LN=LN+10
100 NEXT K
110 POKESA+110,240:POKESA+111,38:POKESA+140,234
120 PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
130 PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128 THEN 1
    60
140 POKESA+13,124:POKESA+15,165:POKESA+25,124:POKESA+2
    6,165
150 POKESA+39,20:POKESA+41,21:POKESA+123,205:POKESA+12
    4,189
160 POKESA+4,INT(SA/256):SYS SA:NEW
170 PRINT"YOU HAVE A DATA ERROR IN LINE ";LN;"!":END
180 REM DO NOT CHANGE THESE DATA STATEMENTS!
190 DATA 120,162,24,160,13,173,4,3,201,24,884
200 DATA 208,4,162,13,160,67,142,4,3,140,903
210 DATA 5,3,88,96,32,13,67,152,72,169,697
220 DATA 0,141,0,255,133,176,133,180,166,22,1206
230 DATA 164,23,134,167,132,168,170,189,0,2,1149
240 DATA 240,58,201,48,144,7,201,58,176,3,1136
250 DATA 232,208,240,189,0,2,240,42,201,32,1386
260 DATA 208,4,164,180,240,31,201,34,208,6,1276
270 DATA 165,180,73,1,133,180,230,176,164,176,1478
280 DATA 165,167,24,125,0,2,133,167,165,168,1116
290 DATA 105,0,133,168,136,208,239,232,208,209,1638
300 DATA 169,42,32,210,255,165,167,69,168,170,1447
310 DATA 169,0,32,50,142,169,32,32,210,255,1091
320 DATA 32,210,255,169,13,32,210,255,104,168,1448
330 DATA 96,104,170,24,32,240,255,104,168,96,1289
340 DATA 56,32,240,255,138,72,152,72,24,162,1203
350 DATA 0,160,0,32,240,255,169,42,208,198,1304
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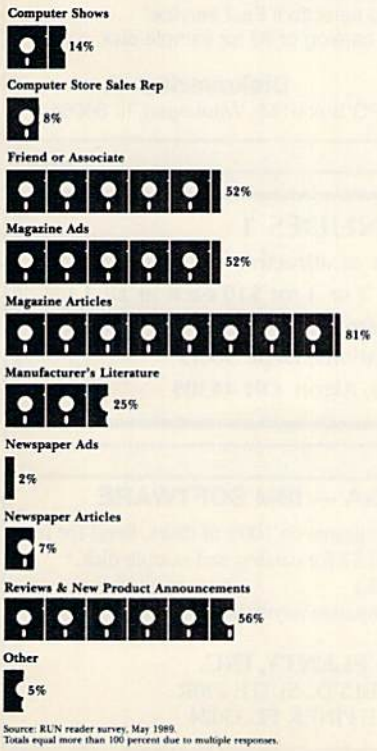
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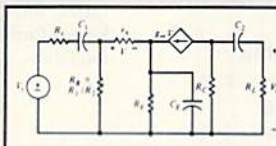
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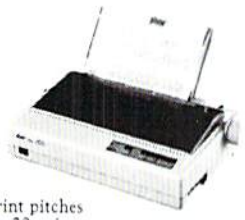
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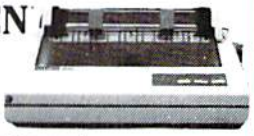


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