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First off, both the 64 and 128 programs come with Busy Bee Speller. In version 1, the speller is a stand-alone program that can't be accessed from within the word processor. That puts you back in the SpeedScript and GEOS category, saving your text, exiting the program, loading the spelling checker, and then saving the corrected text.

In version 2, however, the spelling checker boots with The Write Stuff and can be used from within the program. The great thing about this spelling checker is that it doesn't just flag suspected words from its dictionary and force you to look them up. For good spellers, BB Speller has a quick 17,000word dictionary that finds most common words for fast typo checking. If you're a poor speller, an additional 61,000 words kick in. You can select an option that will automatically correct your spelling. There's none of that timeconsuming business of trying to look up a word when you don't know how to spell it in the first place. In addition, you can add 15,000 words of your own and delete those that you don't need.

The Write Stuff offers a multitude of features that let you get as complicated as you want. By progressing through the features in stages, complexity isn't forced upon you. A Menu Maker lets you create custom disk menus, edit program names beyond the usual 16 characters, and add comments. Thus, instead of trying to remember an exact program name to load, you can search through a menu of meaningful filenames, complete with brief descriptions. Children and poor typists will like the fact that they can use the cursor to load files.

Like SpeedScript, The Write Stuff saves text as program (PRG) files in screen code, but you can save text as sequential (SEQ) files with the press of a key. If you have files from SpeedScript, Easy Script, PaperClip, Fleet System, or other word processors and want to convert them for use with TWS, the program offers automatic file translation for ten different word processors. I loaded Fleet System USR files and successfully converted them, including the embedded format commands. With the press of a key, you can opt for word-wrap or you can see an edge effect, the term for the white space that surrounds your text on the printed page.

The Write Stuff has many more features as well. To compare different versions of a file at the same time, you can opt for a split screen. TWS rivals GEOS and other graphics-based word processors by letting you print in double columns for simple desktop publish-

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ing. You can also add soft hyphens if you want words to get as close as possible to the right-hand margin but don't want to use justification.

The Write Stuff also supports the Super Graphix printer interface, RAM expanders, sorting by columns, file security, and alternate fonts such as Gazette programs Ultrafont+ (September 1986) or Excelfont 80 (June 1988). Writers and students should like its handy outliner. About the only feature this program doesn't have is a thesaurus.

One additional feature that comes only with the 64 version is Busy Bee Talker. BB Talker uses SAM (Software Automatic Mouth) from Tronix Software to read aloud anything you've written with BB Writer. This is a great feature for reading stories to children or for letting them create their own and having SAM read their stories to them.

## The GEOS Substitute

If your old word processor seems outdated and if you'd like to upgrade to a newer one that can print different fonts and has graphics capabilities but you don't want to invest in GEOS, then take a look at Word Writer 6. This Timeworks program for the 64 and 128 in 40 -column mode offers both plain and fancy word processing capabilities. You can print text in different size fonts and even insert small graphics.

Don't expect to rush through this word processor and become an expert the first time you try it. Word Writer can do much, but it's complicated and
takes time and effort to get up and running. It's not for children or the occasional user.

The 166 -page manual says Word Writer is "a complete writing environment for memos, manuscripts, and everything in between." That may be true, but learning to use it takes some effort. It was like trying to install GEOS and making all those disks the first time out.

First off, you can't just boot up the disk and start typing. You have to make a backup disk containing all the files and fonts you think you'll need. That takes up a lot of space, so you can't store many documents on a disk. When the disk is full, you have no choice but to make another backup disk.

The manual does have a section for getting started quickly, and the program comes with a cheat sheet to help you become familiar with the commands. When you run the program, several help screens are available to acquaint you with various features.

Although the program supports a variety of printers, nothing is truly automatic. It took me an hour to get a sample text file printed correctly with a Super Graphix interface and Star SG-10 printer since that combination wasn't on the automatic-setup list.

## The Final Word

When it comes to commercial word processors, this die-hard GEOS fan finds that she can crank them up and type faster with them than she can with geoWrite. I don't have to wait for the screen to redraw because I'm not using a graphics-based processor. I don't drop icons accidentally or have to reset them, trying to get proper margins, paragraph indents, and tabs on the exact spot. Also, what I see in the preview for both the 64 and the 128 is exactly what l'll get on the printed page.

I have to give up most of the fancy fonts I use with GEOS, and I'm confined to 12-point type unless I load external fonts. But that's not truly a problem. I find I do most of my work with standard typefaces and ASCII files anyway. Because I'm usually in a hurry and don't want to wait for all the disk saves and loads or for the screen to redraw, I often find I don't need the graphics or fancy fonts of geoWrite. I'm not saying goodbye to geoWrite; I'm just admitting that commercial word processors do make my life easier.

## Dorothy Hemme teaches high school in Sugar Land, Texas. Like any good teacher, this GEOS fan keeps an open mind to computing alternatives.

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[^0]
## GEOWIZARD

You have to expect something special from a program that bills itself as "the ultimate GEOS utility." But when you run this AUTOEXEC program, all you see is an innocuous dialog box telling you that geoWizard has been installed in your RAM. (You need at least 512 K . Smaller RAM units can be used only at the expense of the RAM disk.)

That's about it. Life goes on as usual, and you might even forget that geoWizard's there. But when you press both buttons on the mouse (or a key combination if you use a joystick), geoWizard pops out of nowhere and shows its stuff. Whatever you're doingworking on a document or moving files around the desk-Top-freezes, and a new command window opens at the top of the screen. This new menu offers a number of functions at the touch of a key combination. At this point, geoWizard is ready to go.

Press the Commodore key and the $P$ key simultaneously to dump a screen to your printer. Such a screen dump is glaringly absent from the GEOS system. The routine will print both 40and 80 -column screens. On the geoWizard disk is a desk accessory that can increase the capabilities of the screen dump, allowing you to dump the image to a photo scrap or a geoPaint file. Pretty snazzy, but that's only the beginning of geoWizard's capabilities.

You can use another key combination to rescue you from those annoying system error dialog boxes. When you lock everything up, as long as the pointer is still moving on the screen (in oth-
er words, if GEOS can still read your input device), geoWizard is alive and kicking, ready to transport you back to the deskTop with your RAM disk intact. There's also a command to do a system reboot, which starts you over from scratch. Use this to recover from the most hopeless crashes.

All of this is great, but geoWizard has more amazing tricks up its disk sleeve. When you press the Commodore key and either $L$ (for Load) or D (for Desk accessory), something extraordinary occurs. After presenting you with a file selection box (a much more efficient one than GEOS usually uses), geoWizard opens another program for you, right smack in the middle of whatever you're doing. The options allow you to run a desk accessory, an application, or an AUTOEXEC file without closing another application first. It's a lot like multitasking, and it can really speed things up.
Let me illustrate. If you're in the middle of a geoPublish session and you discover that you need to do some graphics work in geoPaint, you activate geoWizard. Press Commodore-L to load an application, select geoPaint from any active drive, and you're off. When you leave geoPaint, you'll be returned to where you left off in geoPublish. This powerful feature alone is worth the program's modest price.

As if that weren't enough, the geoWizard disk includes MiniDesk, a desk accessory that works some rather fine magic of its own. MiniDesk provides a scaled-down version of the deskTop, listing files by name instead of by icon and offering several es-
sential file-handling functions: copy, scratch, and rename. You can access any drive using MiniDesk, including drive C. While in geoPublish, for instance, you might discover that you've forgotten to place a text file on your work disk. No need to quit geoPublish when MiniDesk is around. The needed file can be retrieved from any drive and copied onto your work disk in seconds. If you're short of disk space, MiniDesk will let you clear nonessential files without leaving the comfort of your application.

All of these amazing feats don't come free. There are some compatibility problems because geoWizard breaks a few GEOS rules to work its wonders. There aren't many problems, however, and most of them are detailed in the documentation that comes on disk as a geoWrite document. If you use a utility that's on the disk to relocate the geoWizard code during boot-up, you can even avoid some of these problems.

Generally speaking, geoWizard may conflict with third-party programs that may also break rules by rewriting vectors or areas of memory that GEOS normally leaves vacant. One example is GateWay. There is some incompatibility, since GateWay's Switcher and geoWizard's multitasking fight over memory space. Such problems are rare, which is a tribute to Jim Collette's skills as a programmer.

In fact, the entire package is one of the finest pieces of user-written software l've ever seen. The program is as bug-free and userproof as you can imagine. It cheerfully shows up whenever you call it and tidies up screen modes and disks be-
fore it leaves. The documentation is clear and complete, including honest information about possible pitfalls and a technical description of how the magic is done. Try it, and geoWizard, the ultimate utility for GEOS, will quickly become an indispensable part of your GEOS environment. You won't know how you got along without it.
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## GEOVIDEO

On the wall by my computer desk is a scrap of paper, torn from a notebook that has long since hit the circular file. On that piece of paper is a collection of scrib-bles-SYS commands, phone numbers, three-line programs, directory commands, and so on-that l've accumulated over the years. I keep telling myself that I'm going to print a nice, clean copy one of these days and throw away the messy version-but I know I never will.

That scrap of paper with its messy scrawl is one of the most valuable reference tools I have. It makes no difference that it looks like something blown into my yard from the dumpster across the street. It gives me information that I need.

In other words, it's not the package; it's the content. Keep that in mind when you look at geoVideo. This isn't software for your 64; it's a videotape tutorial for GEOS. It was put together by a group of people whose expertise is GEOS, not video.

## II thought my wife was just forgetting things.



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You might smile and say, "Yeah, but hey, they know what they're talking about," and you'd be right. Sort of.

This onscreen duo does know its subject, but the video has some problems. There are occasional cuts that clip off part of what's being said, and the poor image of the computer screen makes it difficult to see what's being described at times. There's the fact that the cursor has been redefined and doesn't remotely resemble the pointer novice users might expect to see on their own screens, but these blemishes are minor.

The real problems come from the fact that, even though these folks are obviously experts at GEOS, they don't impart that expertise in a logical sense. Instead, they ramble through a description of each application using the menus as a general guide, throwing in occasional tidbits of vaguely related information when the idea strikes them. To be fair, they do cover most of what you need to know about GEOS, but unless you're familiar with the program to begin with, you'll never be able to piece it together from geoVideo.

Which brings up another problem. Far too often the person explaining the program uses a keyboard shortcut to accomplish a task. Since the video shows only the monitor screen, the viewer can't see what is being demonstrated! Keyboard shortcuts are defined eventually, but not before they're used extensively and mysteriously. Of course, many GEOS users would know these shortcuts already and wouldn't be confused. Then again, those users wouldn't need geoVideo in the first place. The folks who do
need a video like this are the ones who gave up on GEOS the minute they saw a manual more than eight pages long. They need accurate, easy-to-follow instructions and information.

OK, OK, now I hear some people accusing me of nitpicking. Who cares if the cursor is shaped like the letter $K$ instead of its usual pointer? And didn't I say that the video quality isn't all that important? Any user who watches geoVideo will get some information from it. It's very interesting to watch expert users put a powerful software package like this through its paces. And the quality of the screen image and commentary does occasionally shine, especially in the geoPaint tutorial. Even a jaded GEOS junkie like me can glean some pointers from other experts.

GEOS is a rich, powerful operating environment with a lot of possibilities. New users watching geoVideo will certainly get a feel for the immense capabilities of the system along with a healthy dose of information that they can use. But right away, we run into another problem. The information isn't always accurate.

Early in the video, it's stated that the geoRAM device is inserted into the user port; actually, it goes in the cartridge port. The Search and Title Page functions in geoWrite are obviously new to the expert trying to explain them, since she doesn't get them right. The strange effects of colors bleeding into each other, inherent in the Commodore high-resolution screen, seem to baffle the presenter as much as they would a new user. The Update function is erroneously declared to be unnecessary for
geoRAM users.
The list of inaccuracies goes on and on, and that's a problem-a big problem. The makers of this video should at the very least have planned exactly what they were going to say about each feature before they switched on the camera. Also, they should have researched the items that they were fuzzy about.

So what's the verdict? Is geoVideo worth the 20 bucks? That depends. Is it a complete tutorial? Pretty much. Is it accurate? Fairly. Is it interesting? For any GEOS nut, sure. Is it instructive? It's really too disjointed and assumes too much for most novices. If you're an intermediate user who'd like to see how that darn graphics importer really works or if you break out in hives when confronted with a hefty manual, geoVideo is worth a look-see.

I certainly compliment the makers on a good effort, but unfortunately, they have given us what amounts to a first draft that's still plagued with errors. What geoVideo needs is a good final edit.
STEVE VANDER ARK

## geoVideo- $\$ 20$

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## SID MASTER

"You know, looking at this program is about as exciting as looking at a belt sander," David Minnick said to his coreviewer wife, Robin.
"OK, but a belt sander is a handy thing to have around if you're building a bookcase," Robin replied.

SID Master is a modestlooking program-no fancy frills. Its manual has a sub-
dued, two-tone cover, basic Courier-style print, and com-puter-generated diagrams. Yet, like a belt sander that makes a tedious woodworking job easier, SID Master is a powerful addition that should be welcome in any programmer's toolkit.

Indy Software has recently lowered SID Master's price, and the manual alone is worth the modest cost. This is an excellent handbook for understanding sound, sound production, and the Commodore SID chip. Appendices in the manual contain listings of the SID registers, tables of decay and release times, and tables of frequency settings and sustain loudness levels. This information is available in Commodore's Programmer's Reference Guide, but it's nice to have it here in a manual dedicated to sound.
Let's take a look at some of the material covered in the manual. I think you'll agree that it's a great reference book.

The first chapter provides an overview of the program and is mandatory reading. Subsequent chapters expand on the properties of the SID chip, how it works, and how you can control it.

Chapter 2 deals with parameters applying directly to the SID chip's three independently controlled voices. Each parameter is defined and explained, followed by an example for experimentation. Parameters include frequency, pulse width, waveform, ring modulation, syncronization, and the envelope generator, which covers attack, sustain, decay, and release.

Filter parameters are covered in chapter 3. The filter is used to remove high, low, or middle frequencies of the waveform.

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REVIEWS
Chapter 4 explains the digital/analog meter that is displayed on SID Master's screen. The meter displays continuous output of the SID chip's four read-only registers. This chapter explains how the registers can be used to generate sound effects in conjunction with software links, parameters that control software in SID Master itself. Chapter 5 covers the creation of complex sounds with these software links.

Chapter 6 is the one most of us have been looking for. This is where you learn how to incorporate sound effects in BASIC programs. This chapter provides the background and mathematics necessary to enable you to take the sounds that you've created with SID Master and put them where you want them - in your own software.

The mathematics used to convert parameter values into bytes are presented in a BASIC program that does the work for you. In no time at all, we came up with a simple program using two sounds we created and the numbers in the manual for producing two other effects. Our short demonstration depicts an annoying noise, an aggravated assault upon the source of that sound, then enthusiastic applause, followed by authoritative retribution.

A defective power transformer near our house had been making an annoying ponging sound, so we used SID Master to develop a similar sound on the 64. Then we worked on applause. We modified a siren whose parameters were listed in the manual. Then we took the numbers listed for a gunshot effect. After converting these numbers to the appropriate POKEs and adding some PRINT statements, we came up with a short program. Imagine that you are running this program, listening to the sounds and reading the text that appears on your monitor.

Sound: PONG! PONG! PONG!
Text: Will someone please shut that thing up?
Text: Just a minute, honey. I have an idea.
Sound: Gunshot.
Text: Good shot!
Sound: Applause.
Text: Jolly good!
Sound: Siren.
Text: Uh oh!!!
OK, so we're not Jim Butterfield or even Arlan Levitan-but it worked, and so does SID Master.

Other programs let you play around with sound, helping you learn about
waveforms, pulse widths, and sound envelopes. SID Master takes you a step further by helping you to use the sounds that you create. As its name implies, it helps you master the SID chip.

Normally, when you try to program sound, you have to experiment, trying out different routines, poking in various values and settings. This process lets you alter only a few parameters at a time, checking the results one by one. SID Master lets you manipulate all of them at once. This makes creating and adjusting sound effects quicker and easier. All that remains is adding the numbers to your own programs. (SID Master is geared toward BASIC programming, but it wouldn't take many more steps to convert the numbers into hex to use SID Master with assembly language.)

There is an art to using SID Master efficiently. There are nuances to many of the steps. Certain delay times work better than others. You may find that you prefer some filters with certain kinds of waveforms over others, and getting just the right sound takes some fine-tuning. But that's the fun. Our favorite tools are those that are complex in ability yet simple to operate. They accomplish easily in seconds what would take us hours to do by hand. Their beauty and elegance lie in their ability to liberate us from time-consuming tasks. Just as a circular saw, a drill, and a belt sander are basic power tools of carpentry, a sprite editor, an assembler, and now SID Master are basic power tools of programming.
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Circle Reader Service Number 343

## CORRECTION

In the August issue, we published a review of S.E.C. Check Register 128. The version that was sent to our reviewer apparently was an early edition of the program. A spokesman from Sparks Electronics informs us that the current version has been upgraded and improved. New features have been added and earlier problems have been addressed. The price for the new version is $\$ 24.95$ plus $\$ 3.00$ shipping and handling, and the new address is Sparks Electronics, 5316 South Ninth Street, St. Joseph, Missouri 64504.

## C"www.commodore.ca

## Messiah Is Coming

Messiah III: Nemesis (about \$59) is a vast role-playing game for the 64/128 that should be available for Christmas. The game has more than one meg of code stuffed on three double-sided disks. Artists and programmers at Mad Man Software ( 7610 West Fifth Street, Suite 200, Lakewood, Colorado) have spent more than two years completing this project.


Messiah III features more than 300 scenes, 50 maps, and intelligent monsters.

Note that Messiah III is R-rated. It has violence, nudity, and adult situations. It's also a tough game to complete, designed for high-school intellectuals and up who have role-playing experience. Mad Man Software's Artificial Monster Intelligence System makes each monster fight in its own unique style. The Mad Man programmers claim that these are the smartest monsters that you've ever faced in a role-playing game.

## CQ Computer Hams

Here's a useful product for 64/128 owners who are also ham radio operators. They can connect their computers to VHF hand-held or HF SSB transceivers and communicate via packet radio. MFJ Enterprises (P.O. Box 494, Mississippi State, Mississippi 39762; 800-6475869) announces a fast, easy, and inexpensive way for hams to join the packet action.

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The MFJ-1271 also sports remote packet operation, mailboxlike message forwarding, and Net/ROM emulation, plus much more. It works with MFJ's Digicom/64 public domain software.

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## Big Bucks

Everyone loves cash, and the bigger, the better. With this in mind, Banner Band (533 North Wolf Road, Wheeling, Illinois 60090; 800-333-0549) has created Banner Cash (\$14.95). Banner Cash is computer paper that looks like

## ONLY ON DISK

Here's the bonus program that you'll find only on Gazette Disk.

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By Kathleen Hobby
Evansville, $\mathbb{N}$
Use this handy block access program to read and edit the contents of any block on any 1541 or 1571 disk.

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a giant ten-dollar bill. Retail store owners can use Banner Cash to print sale banners. It also makes great birthday greetings. There are 245 Banner Cash dollars on each roll of paper.

In addition to Banner Cash, Banner Band also has Lacey Flowers, computer paper with a floral motif woven into a pink lace background.

Each roll is 45 feet long with no cross perforations. It comes in a selffeeding tray and is covered with a protective outer sleeve.

## The Lay of the Land

How would you like to view the topography of your hometown in 3-D? Digiscape Software (P.O. Box 113058, Carrollton, Texas 75001 ) has released a product that will let you see the topography not only of your area but of the entire United States-excluding Alaska and Hawaii-and parts of Canada.

Digital Landscape (\$58) contains more than 400,000 elevations taken at regular intervals across the continent. The distance between intervals is approximately three miles, depending on selected latitude. The 3-D renderings on each of the 15 data disks may be rotated 360 degrees in 1-degree increments of azimuth and tilted up to 89 degrees in declination.

## Commodore 8-bit computers will survive longer in Germany than anywhere else.

## VIEW FROM GERMANY

Here is Europe calling again, with an extensive report from the Commodore scene in Germany. Since we don't yet have a German correspondent, I'll try to describe the Commodore situation from my viewpoint north of the border in Sweden.

I base my evaluation on what I gather from reading German computer magazines and the bulletin of Germany's popular GEOS Users Club (GUC), to which I belong.

Germany has always been the center of Commodore activity in Europe. Maybe Commodore fans in Britain will dispute my opinion, but no other European country has produced as much hardware and professional software for the 64 and 128 as has Germany. Also, almost all Commodore machines sold in Europe during the past few years have been assembled at Commodore factories in Germany..

It's only when it comes to games that the British Isles have been more productive than Germany, thanks in part to their close contacts with the large U.S. market. Also, most Germans aren't proficient in languages other than their own, making them dependent on domestic software or titles that have been translated.

One good example of this is GEOS, a software package that has reached high sales and a very high level of usage in Germany. This is mainly because the importer has taken the time to translate the entire GEOS line, software and manuals, into German.

The driving agent behind GEOS and Commodore activity in Germany is Markt \& Technik. This company produces a large range of quality software and books, imports GEOS prod-
ucts, and publishes a Commodore magazine called 64'er.

Even with the worldwide decline of the 8 -bit machines, this monthly magazine still goes strong. Every issue is packed with articles, hardware and software reviews, construction projects, repair instructions, and type-in programs for the 64/128.

One new phenomenon in Germany is the GUC. With over 2000 members, a monthly bulletin, a large public domain library, and its own quality GEOS software, this club has quickly become a power on the Commodore scene. Unfortunately, this climb to the top hasn't been without clashes and controversies with the established market dominators, mainly Markt \& Technik.

For fans elsewhere, GEOS products are available from the GUC at reasonable prices. How about GEOS on an EPROM? It boots instantly when you turn on the computer. TopDesk is an entirely new desktop that displays the contents of up to four drives at the same time. RamPrint is a printer routine that uses an REU as a printer buffer, leaving the computer free for other tasks while the printer trundles along. There's even more in the club's GEOS pipeline. If you're interested in learning about this group, drop a line to GEOS Users Club, Jurgen Heinisch, Xantener Strasse 40, D-4270 Dorsten 19 Rhade, Germany. He'll send you information about GUC membership.

There are still a lot of German mail-order firms catering to Commodore users. You can see many of their advertisements if you skim through the pages of computer magazines. There are word processors, database programs, CAD programs, paint programs, assemblers, terminal software, desktop publishing
programs, and games-all in the German language.

Perhaps true to their heritage, the Germans seem to specialize in hardware. Peripherals of all imaginable and some unimaginable kinds are available. Another quick look through computer magazines reveals advertisements for video digitizers, scanners (among them Handyscanner, which recently turned up on the U.S. market [COMPUTE, December 1990]), Prestel decoders, printer ribbon reinkers, MIDI interfaces, realtime clocks, satellite pay-TV decoders, printer interfaces, RS-232 interfaces, drive turbos, EPROM burners and cards, memory expansion units, cartridges, user port expanders, and more.

The list is long. The products are all for use with the 64 or 128 , and they're all of domestic origin. Imported products such as Hard Drive and RAMLink from Creative Micro Design are available, but at much higher prices.

Regretfully, I don't have figures regarding the number of computers in Germany, but Amigas are taking over the market there as well as everywhere else in Europe. The rate of 8 -bit decline, however, seems to be slower than it is in the U.S.

One reason for this is the recent merger of East and West Germany. That merger released a flood of computerdeprived East Germans onto the market. Their somewhat limited cash resources make used 64 s and 128 s perfect first computers. These new buyers should also help keep demand strong for software and add-on hardware.

I believe that Germany is a very fortunate country in this aspect and that the Commodore 8 -bit computers will survive longer in that country than anywhere else.

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## Bug-Swatter

Several readers wrote to complain about F/X Plot 128 (June 1992). The problem occurs when line 920 directs the program to a nonexistent line 170. The mistake was a renumbering error on our part. Line 920 should read as follows.

## 920 ON GK GOTO 930, 1450, 110 , 990

## Typewriter Emulator

Has anyone ever come up with a program that would convert a 64 and a printer into a typewriter? This would be nice for filling in blanks on printed forms.
STEPHEN LUISSER
NORTHAMPTON, PA
Here's a program that might work if your printer doesn't have a buffer.

## 10 OPEN 4,4,7 <br> 20 GET A\$: IF A\$ = " " THEN 20 30 PRINT\#\$,A\$;: GOTO 20

Most printers with buffers, however, save characters sent to them until they receive a carriage return. In this case, you'd be typing blindly until you hit Return, and then al letters would print at once.

If this program doesn't work as you'd like it to, try changing line 20.

## 20 INPUT A\$

As you type, you'll see characters on the screen; press Return and the line will print. It's not exactly like a typewriter; you may have problems moving the printhead the proper number of spaces when filling in blanks.

## Double-Spacing

Is there some way I can get a program listing to print doublespaced? It would be a break for my poor old eyes when it comes to debugging, but I
hate to fiddle with my printer's DIP switches.
G.W. BLACK

ATLANTA, GA

Here's a way you can do it with a program command. Load your program into memory, but when you enter the commands to produce a printout of the listing, use a file number greater than 127. Here's an example. Enter the first line and press Return to start the listing. Enter the second line to close the file.

OPEN200,4:CMD200:LIST
PRINT\#200:CLOSE200

## Programs Within Programs

I have trouble loading programs from within another program. For example, I'll make a menu, it loads a program, and then there's an error. I used the clear command at the end of the menu, and that didn't work. Please help!
MICHAEL V. MAY
MT. PERRY, OH
Using BASIC for loading either another BASIC or machine code file is called chaining. To chain, your program must enter a LOAD command with the ,8 or ,8,1 extension just as if you'd entered it in direct mode. Within BASIC, however, the interpreter has a pointer that tells the 64 where to continue processing the program after a command has been executed. The pointer is reset to the start of the program when a $\angle O A D$ is executed. This is actually a help when one BASIC program is loaded from another, since the new program overwrites the old and you want the new one to start running at the first line. When you want to load a machine language program, however, you run into a problem if you simply enter something like the code in the next two lines.

10 LOAD "MACHINE CODE",8,1 20 REM THE REST OF THE BASIC PROGRAM FROM HERE

This results in an endless loop as the pointer is reset and the file named MACHINE CODE is loaded over and over again.

The solution is to set a flag that tells your program that it has already completed the loading and to continue running. Here's how the program above should look.

## 10 IF FL=0 THEN FL=255:LOAD <br> "MACHINE CODE",8,1 <br> 20 REM THE REST OF THE BASIC PROGRAM GOES HERE

The flag, in this case, is held in the variable FL. When the program is first run, all possible numeric variables have a default value of 0 . When we test whether or not FL is 0 initially, the condition is true. Because it's true, the line continues to process by setting FL to a value of 255 and loading the machine code file. (Any number other than 0 will work except in the case of a bad memory register, a rare event.) Now, when the pointer is reset and the condition is tested again, it's no longer true and processing continues on the next line.

## Null Modems

I want to transfer some documents that I wrote on my 64 to my IBM computer. I know that I can upload them to a BBS and then download them to my IBM, but isn't there some way I can hook the two computers together without going through a third one by telephone?
WAYNE PALMER
CHICAGO, IL
Last month in a similar question we mentioned that some conversion is necessary to make the Commodore files
compatible with the character set of the receiving IBM computer. The 64 uses a nonstandard set of characters called PET-ASCII or PETSCII and the IBM uses the standard ASCII character set. (For more information about PETSCII, see the reply below to Frank Chang.)

For the 64, there are several conversion programs that will let you convert PETSCII to ASCII or ASCII to PETSCII. Some commercial word processors include a conversion program. Convert, for example, is one that comes with Word Writer. Check your local Commodore user group, bulletin board system, or national online services for a public domain conversion program.

The serial port on the back of the 64 is almost, but not quite, a standard RS-232 port; the only difference is the Commodore's voltage level. You can convert it by plugging in an RS-232 adapter, which is available from various suppliers.

Next, you'll need something called a null modem cable. This is just a simple cable that fools computers into thinking that they're linked by modem over a telephone line. A couple of the cable's wires are crossed so that an input line on one side is an output line on the other. One end plugs into the RS-232 adapter on the 64, and the other end plugs into the IBM's serial port. Null modem cables are available from several manufacturers, including The Grapevine Group, 3 Chestnut Street, Suffern, New York 10901; (800) 292-7445.

Finally, each computer will have to be running its own terminal software. The software must be set up to recognize a modem plugged into the serial port. Of course, there won't really be any modem attached, only the null modem
cable. Have the IBM request a download and then have the 64 upload the file. Also, be sure that the terminal programs are set for the same sending rates and other telecommunications parameters.

## Commodore's ASCII

Just what is PET ASCII?
FRANK CHANG
RIDGEWOOD, NY
ASCII stands for the American Standard Code for Information Interchange. As the name suggests, it's a standard way of assigning computer character sets to specific values, 65 for the letter A, 66 for the letter B, and so on. It's often used with word processors when saving text to disk and for transmitting text from one computer to another.

Commodore devised its own number-to-character system when it released its original PET series of computers, hence the PET ASCII or PETSCII name. It is similar to ASCII, but there are differences. The most obvious difference is that uppercase letters in PETSCII print in lowercase in ASCII, and vice versa.

The 8 -bit Commodore machines derive their character set from a time when ASCII wasn't the de facto standard that it is today and the big players took no pride in being compatible. Consequently, from the point of view of more modern machines, including the Amiga, the 8 -bit Commodores not only confuse upperand lowercase, but they neglect entirely such characters as the brace and underscore.

There's no problem when you are swapping sequential files with someone who owns another 8 -bit Commodore, and modems do a good job of translating when you call a BBS that's running on an IBM. The problem becomes apparent when you download an AS-

CII sequential file from an IBM and try to read it with a Commodore word processor or sequential file reader. If you get a file whose upperand lowercase letters appear to be reversed, that's usually the reason. There are conversion programs available that translate the characters, enabling word processors to handle the text correctly.

Word processors such as SpeedScript add more complexity to the situation by using their own special codes. Instead of writing sequential files in ASCII or PETSCII, SpeedScript saves text as program files using Commodore screen codes.
If you're sending a SpeedScript file to someone who needs a PETSCII or true ASCII sequential file, you can overcome this problem by printing your SpeedScript file to disk rather than saving it by pressing f8 as you normally would. To print a file to disk, press Shift-Ctrl-P simultaneously. You'll be asked if you want to print to screen, disk, or printer. Select D for disk, and you'll have a PETSCII sequential file on disk.

SpeedScript can also print files as true ASCII. On the first line of your document, press Ctrl-£ and then press A . This will print a lowercase reversed A on your screen. This code will change your SpeedScript file to true ASCII when you print to disk. You can easily test for this by printing your file to the screen instead of to a disk. All the up-per- and lowercase letters will be reversed.

Converting documents to true ASCII can be useful when you want to send a SpeedScript document via modem to someone who has an IBM. The IBM user can then load your text into an ASCIIbased word processor without additional converting.

## Comments about <br> running a <br> program from within a program, null modems, ASCII, and PETSCII

# BEGINNER BASIC 

> Here's a look at some of the unique keys found only on 64 and 128 keyboards.

## MORE KEYS, PLEASE

Last month we learned about some keys unique to the 64 . Let's examine some more.

When the 64 is first turned on, the keyboard defaults to what is known as the uppercase/graphic character set mode. Normally, anything you type is in uppercase. However, most keys can generate graphic characters by holding the Shift or Commodore key while pressing them.

Each keyboard character has a unique CHR\$ code, which you can see by entering PRINT ASĆ(" $X$ '), where $X$ is the character itself. For instance, the ASCII code for J is 74. The codes for the symbols produced when holding down the Shift or Commodore key with J are 202 and 181, respectively. Conversely, to print any character onscreen, enter PRINT CHR $\$(X)$ and then press Return, where $X$ is the character's ASCII code. (Note that you don't need the quotation marks in this case.)

As you may have discovered by now, graphic characters can be used to enhance the appearance of your BASIC program screens. Here's a short example:

10 PRINTCHR\$(147): REM CLEAR SCREEN
20 POKE 53280, 5: POKE 53281, 1 : REM SET BORDER AND BACKGROUND COLORS
30 POKE 646, 5: SET CURSOR COLOR
$40 \mathrm{~V}=8$ : $\mathrm{H}=15$ : GOSUB 1000
50 PRINTCHR\$(213)
$60 \mathrm{~V}=8$ : FOR $\mathrm{H}=16$ TO 22: GOSUB 1000
70 PRINTCHR\$(192): NEXT
$80 \mathrm{~V}=8$ : $\mathrm{H}=23$ : GOSUB 1000
90 PRINTCHR\$(201)
100 FOR V=9 TO 11: $\mathrm{H}=15$ :
GOSUB 1000
110 PRINTCHR\$(194): NEXT
120 FOR V=9 TO 11: $\mathrm{H}=23$ :

```
    GOSUB 1000
130 PRINTCHR$(194): NEXT
140 V=12: H=15: GOSUB }100
150 PRINTCHR$(202)
160 V=12: FOR H=16 TO 22:
    GOSUB }100
170 PRINTCHR$(192): NEXT
180 V=12: H=23: GOSUB }100
190 PRINTCHR$(203)
200 V=10: H=17: GOSUB }100
210 PRINT"TITLE"
999 GOTO 999
1000 POKE 214, V: PRINT: POKE
    211, H: RETURN
1001 REM VERTICAL AND HORI-
    ZONTAL CURSOR POSITIONS
```

The numbers 214 and 211 in line 1000 are the memory registers that control cursor position. Admittedly, this technique creates a longer program, but I prefer it because it's precise and much easier to type in. Most programs can be shortened by printing the graphic characters themselves, but typing in such a program can be tedious.

The keyboard can be switched to the uppercase/ lowercase character set by pressing the Commodore and Shift keys simultaneously. This allows the use of upperand lowercase in text, but unfortunately, it prohibits printing graphic characters on the same screen. Switching between character sets can be accomplished with PRINT CHR\$(14) (uppercase/lowercase) or PRINT CHR\$(142) (uppercase/graphic).

Some of the other keys peculiar to the 64 are the $\mathrm{Cl} /$ / Home, Inst/Del, Run/Stop, Ctrl, Commodore, and Restore keys. Let's look at each.

The CIr/Home key, as I'm sure you have by now discovered, has a dual purpose: Unshifted, it brings the cursor home-to the upper left corner of the screen; shifted, it clears the screen completely. CIr and Home CHR\$ codes are 147 and 19, respectively.

The Inst/Del key is used to
insert and delete characters. However, when entering BASIC programs, it's easy to be caught in what's known as the quote mode. This is where every inserted keystroke produces an arcane graphic symbol. The easiest way to escape this mode is to press a shifted Return.

The CHR\$ codes for Inst and Del are 148 and 20, respectively. These are useful to know when looking for specific characters to be entered.

The Run/Stop key is usually used (unshifted) to stop a BASIC program. Shifted, it's used to start loading a program from tape. The CHR\$ code for Stop is 3 . Sensing a shifted Run/Stop key requires peeking at memory locations 197 and 653, as mentioned last month.

The Ctrl key's most useful function is to slow down a BASIC program listing. Use it with a number key to select one of eight cursor colors. As with other keys, it can be programmed to do other things. In SpeedScript 3.2, for instance, the Ctrl key is used with the E to erase words, sentences, and paragraphs.

The Commodore key's main two default functions are switching between keyboard character sets (with the Shift key) and selecting eight additional cursor colors (with the number keys).

The Shift, Ctrl, and Commodore keys don't have ASCII codes. To prove it, try PRINT ASC( " $X$ '), where $X$ is one of those keys. They can be sensed, however, as pointed out last month, by peeking at memory register 653.

Finally, we come to the Restore key. This is probably the most abused key on the 64. It's used with the Run/Stop key to restore the computer to its standard condition. It's designed to be struck, rather than just pressed.


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## DIRECTORIES

Programming to read a disk directory isn't trivial. You must go through a careful sequence of steps.

There are two approaches: read a fake BASIC program or read disk data in binary. Fake BASIC is invoked by opening with a filename such as $\$ 0$ and using secondary address 0 . That's the option we'll take; it's simpler and more flexible.

You know that LOAD "\$0",8 will load a directory and LIST will display it. The LOAD command brings in a fake BASIC program, complete with pseudo line numbers, showing the size of each file. Instead of LOAD, we may open the file and use GET to pull in directory bytes one at a time. But we must know how to unscramble this programlike structure.

In a BASIC program-even the fake one used for directo-ries-the first two bytes are the load address in binary. Then come the program lines.

Each line consists of a twobyte link, followed by a twobyte binary line number; these four bytes are followed by a string of characters terminated with a binary 0 character. When we read the directory, we check the link for 0 , which will signal the end of the file. We save the line number, since it represents the file size in blocks, and scan through the remaining text. This text is not all filename; there may be leading spaces, quotation marks, and file type designations such as PRG or SEQ.

After putting the machine language code into memory, the BASIC program opens the file. Note that it uses a secondary address of 0 . If desired, we can use pattern matching in the filename; for example, OPEN 1,8,0,"\$0: $B^{* "}$ would deliver only those filenames that begin with the letter $B$.

The job of reading the direc-
tory is done in the machine language program. First, it connects to the file; then it throws away the first two load bytes.

```
2000 LDX \#\$01
JSR \$FFC6
JSR \$FFE4
JSR \$FFE4
```

Next, the program starts its main loop, which reads each directory line. The first two link bytes are tested for 0 , then discarded.

200B JSR \$FFE4
STA \$2100
JSR \$FFE4
ORA \$2100
BEQ \$2057
The next two bytes are the pseudo line number that represent the file size. We bring this in and store the two bytes. You'll often want to make use of this file size value; this program stores it but doesn't use it.

## 2019 JSR \$FFE4

STA \$2101
JSR \$FFE4
STA \$2102
The remainder of the line contains text. We'll read this into memory, watching for the binary 0 that signals the end of the line.

| LDX | $\# \$ 00$ |
| ---: | :--- |
| 2027 STX | $\$ 2100$ |
| JSR | $\$ F F E 4$ |
| LDX | $\$ 2100$ |
| STA | $\$ 2200, X$ |
| TAY |  |
| BEQ | $\$ 2039$ |
| INX |  |
| BNE | $\$ 2027$ |

After receiving the line, we'll deliver it to the screen. It hasn't been neatly parsed for spaces or quotation marks, so it might look a little ragged. But you'll be able to see how the directory is read.

Before printing the line, we'll disconnect momentarily from the input channel.

| 2039 JSR | $\$ F F C C$ |
| ---: | :--- |
| LDX | $\# \$ 00$ |
| 203E | LDA |
| JSR | $\$ 200, X$ |
| INX |  |
| CPX | $\$ 2100$ |
| BCC | $\$ 203 E$ |

A final return is printed, and then the program reconnects the input stream and goes back to do another line.

204A LDA \#SOD JSR SFFD2
; reconnect to the input stream
LDX
\#\$01
JSR \$FFC6
JMP \$200B
When we're ready to quit, we just unhook the input channel and return to BASIC.

## 2057 JSR \$FFCC RTS

Here's the program in BASIC
100 DATA 162,1,32,198, 255,32, 228, 255, 32,228,255
110 DATA 32,228,255,141,0,33, $32,228,255,13,0,33,240,62$
120 DATA $32,228,255,141,1,33$, 32,228,255,141,2,33,162,0
130 DATA 142,0,33,32,228, 255, $174,0,33,157,0,34,168$, 240,3,232,208,238
140 DATA 32,204,255,162,0,189, $0,34,32,210,255$,
232,236,0,33,144,244
150 DATA 169,13,32,210,255,162, 1,32,198,255,76,11, 32,32,204,255,96
200 FOR J=8192 TO 8282
210 READ X
$220 \mathrm{~T}=\mathrm{T}+\mathrm{X}$
230 POKE J, X
240 NEXT J
250 IF T<>11245 THEN STOP
300 OPEN 1,8,0," $\$ 0$ "
310 SYS 8192
320 CLOSE 1

## MY DREAM

The other night I awoke from a strange dream in which l'd been a computer program-a simulation. The authors of the program were monitoring the program and had just decided to terminate it, since it had outlived its usefulness. At that moment I woke up.
"Whew!" I sighed silently, noticing the comforting dark profile of my wife sleeping next to me. "That sure was weird!"
"What was weird?" came a small voice from inside my head.

I looked around the silent bedroom. No one else was there-just my wife and I. Who could have spoken?
"We're still watching you," came the reply.
"Who are you?" I whispered, casting a nervous glance at my sleeping wife.
"No one special. We're just monitoring your program. It's about to be terminated, you know."

Now I was deeply frightened. What was going on? Was I awake or not? Was this just another dream within my first dream?
"You're not really there," । whispered. No reply.

It was working. I continued, "You're just the product of a feverish mind. I've been sick recently, and you're just the residue of my fever."

Still no reply.
I glanced at the clock radio on the bedside table-3:00 a.m. I figured it was OK for me to settle down again and try to get some sleep. I closed my eyes again.
"We're still here."
I bolted out of bed. I sprinted for the bathroom door. Once inside, I shut the door and turned on the light. Staring back at me from the bathroom mirror was an extremely scared-looking face. I rushed to the toilet. No dream had ev-
er survived this test!
A few moments later, calmed and relieved, I switched off the bathroom light and returned to bed. I pulled the covers way up and fell almost instantly to sleep.
The voice returned. "If you don't believe me," it said, "watch this." I then saw a replay of parts of my life that I hadn't thought about in years. "It's all in the database," the voice said. "We know everything about you because we created you. And we created everything around you. But it's all about to end."
"But I'm alive!" I silently screamed. "How can you terminate me if l'm alive?"
"You only think you're alive," said the voice. "We programmed that feeling into you to make the simulation more interesting."
"But what about my wife here beside me?" I said quietly, gently nudging her sleeping form. Jeez, she sure seemed relaxed! She didn't have to be that relaxed, not with this drama being played out only inches away.
"Just part of the program," said the voice.
"And my kids?"
"Also the program."
"And this house? And our poor kitty who lived with us for 20 years before she wandered away last November? And a lady named Margaret who raised my brothers and sister and me ? And the mean kid on the playground in the sixth grade who pushed me down the hill in front of my friends? And my three-legged dog?" (। was running out of memories.)
"The program."
Then I had an idea. "If all this is part of a program," I reasoned, "how come I have my own computer? In fact, how come I have a bunch of computers? Are they all part of the program, too?" I smirked in the darkness.
"You got it," said the voice. (Did I detect in that voice a faint trace of yet another smirk, mirroring my own?)
"OK," I whispered in despair. "You win. I am a program. My whole life is a program. My whole reality is a program. So when are you going to terminate me? Right here? Right now?"
"We're thinking about it," said the voice. "But you're turning out to have some unexpected uses. We'll let you know."
"When?" I thought. "When? When? When?"

I finally dozed off to sleep.
The next morning my wife asked me how l'd slept-the way she'd done for the last 23 years-and I just looked at her. How was I to tell her that I now had the notion that she was just a simulation, that I was just a simulation, and that our world was just someone's computer program?

Every day I look around and touch objects, sniff them, hold them, taste them, enjoy them. Are they real? Or are they just bits and bytes, subroutines and macros, tiny little pieces of the program of my life?

Is today the day l'll be terminated? Or tomorrow? Or not at all? Was it really just a dream?

I speculate about the future. Will technology ever become so advanced that we'll be able to embed parts of our consciousness into our virtual media and create virtual selves-little Fred programs, leading blissful lives on a com-puter-simulated landscape, interacting with fellow simulated beings all living in a virtual world?

Will these beings think they're real, too? Will they think they're alive? What happens when it comes time to terminate them and try something new?

Do we tell them before we pull the plug?

If computer
simulations mimic
reality, how
can we be sure that life itself isn't
just a subroutine in some vast
complex simulation?

## Here are some new geoPaint utilities that artists will want to add to their palette of tools.

## DWEEZILS AND DRIVERS

Dave Ferguson is an accomplished GEOS programmer who has written several excellent utility programs for geoPaint. He's made them available on his Dweezil Disks, and I'm sure geoArtists will want to add them to their palette of tools. Here's a rundown of what the Dweezil Disks have to offer. In case you're curious, Dweezil is Ferguson's dog, and the disks are available from Quincy Softworks, 9479 East Whitmore Avenue, Hughson, California; 953269745. Write for a flier.

I love NewTools and its new toolbox. When activated from the menu in geoPaint, NewTools presents you with a large pointer that you use to designate a rectangular section of the bitmap. When you select a region, the cursor jumps automatically to the new toolbox (the regular toolbox is deactivated when NewTools works its magic).

From this toolbox you can perform a wide variety of strange but wonderful options. For example, one icon will slant your selected area upward at a 45-degree angle. Another will curve it-something I've always wished I could do to text in geoPublish!

NewTools also has a feature to put the finished results in boldface, adding pixels to the image. This is often necessary since some angle options tend to stretch the pixels apart. NewTools2, which operates in 64 or 128 mode, 40 or 80 columns, can be found on Ferguson's Dweezil Disk 1.

While geoPaint supports color, it's less of a hassle to work in monochrome. Besides, most users don't have a color printer anyway. When you're working in monochrome mode, patterns take on a new
importance. With the paintbrush tool set for various widths and patterns, you can create with a slew of shadings and simulated tints and hues.

UltiPatt and PattDA are two desk accessories that give you complete control over the patterns used in geoPaint. Each accessory includes a large selection of pattern sets that include some excellent gray scales. With UltiPatt, the sets are built right into the program; with PattDA, you load them from the disk in alternative patterns.

If you can't find a pattern you want from the 50 or so sets that are provided, you can use UltiPatt to create new ones. You can combine existing patterns, layering patterns on top of each other, or even use the program's random function to create new ones with the click of a button. UltiPatt and PattDA can be found on Dweezil Disk 2.

Marker is one more little Dweezil disk utility that comes in handy with geoPaint. It's a desk accessory that replaces geoPaint's ineffectual ruler tool. Marker not only reads the offset position in inches and pixels but also leaves a singlepixel mark when you press the M key. You'll find Marker on Dweezil Disk 1.

You won't want to miss geoStamp or its big brother, BigStamp, if for no other reason than that they are so darn much fun. The difference between the two programs is the size of the stamps they produce. BigStamp makes a stamp four times as large as geoStamp's. Where do the stamps come from? Well, a number of collections are included with the disk, and there are a few on QuantumLink. And with the included utilities you can copy stampsized chunks of a geoPaint bitmap into a collection or edit stamp images of your own.

The programs include a lot of well-thought-out commands, such as a key stroke to move the stamp one stamp width exactly in any direction, making borders a cinch. GeoStamp isn't on a Dweezil disk but is available separately from Quincy Softworks.

As long as we're on the subject of geoPaint programs, let me mention a few that are in Q-Link's library. A handy utility called Mirror Mirror lets you flip a geoPaint page side to side, resulting in a mirror image of your page. To download it easily from Q-Link, request MIRROR, uploaded by Red Storm.

Printing a geoPaint document is fairly straightforward, but there are print utilities that offer you some options. If you'd like a poster of your geoPaint or any GEOS page, try PosterPrint, a printer driver for Epson FX-80-compatible printers. PosterPrint enlarges the printout, turning one page into four. PosterPrint is available on Q-Link. Its filename is POSPRI3.0.SDA, and it was uploaded by Irv Cobb.

Another print utility called Rotate Pages will take sections of a geoPaint page (perhaps converted from geoPublish via Paint Pages) and print them sideways. With a little planning you can create landscapeprinted booklets using this program. You can find Rotate Pages on Q-Link as ROTPAGES, uploaded by Student 4th.

If you want to get a grayscale printout of a color geoPaint document, there are printer drivers on Q-Link that will do that for you. There are Epson versions for the 9-pin (EPSON9PINCOLOR) and 24-pin (EPSON24PINCOLOR and EPSON24PINGREY). Okimate 20 users should look for OKIMATE20GREY. All of these were uploaded by GeoRep GHW, the wizard of the printer drivers.

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# PROGRAMMER'S PAGE 

Randy Thompson

## DID YOU HEAR THAT?

Vince Tagle of Granada Hills, California, really outdid himself when he answered my challenge to produce some wild sounds for the 64 and 128. My challenge ran in my April column, and within a few weeks of the article's publication, Vince fired off a letter listing some very strange-sounding programs. Here are just a few of the sounds (noises?) that Vince sent in. A couple of them supply some interesting visual effects, as well.
The SID chip gives the 64 the power to produce a world of eartitly and unearthly sounds. Check these out.

## PROGRAM 1

JX 1g FOR I=49152 TO 49258 : READ D:C=C+D:POKE I , D: NEXT
KX 110 IF $C<>16497$ THEN PRI NT "ERROR IN DATA ST ATEMENTS": STOP
CP 120 SYS 49152
DA 130 POKE 54278,240: POKE \{SPACE\} $54276,129:$ POK E 54273,34: POKE 5427 2,75
GK 140 FOR $\mathrm{I}=1$ TO 15: POKE 5 4296 , I:FOR J=1 TO 50 : NEXT:NEXT
MP 150 FOR I $=15$ TO 1 STEP 1:POKE 54296,I:FOR J $=1$ TO $2 \emptyset \sigma: N E X T: N E X T$
SR 160 FOR $I=1$ TO $600+I N T(R$ ND (1) *1øの日) : NEXT
KR 170 GOTO 130
XB 180 DATA $120,169,35,162$, $192,141,20,3,142,21$, $3,169,1,141,18,208,1$ 33,251,133,254
XH 190 DATA $173,17,208,41,1$ $27,141,17,208,169,12$ 9,141,26,208,88,96,1 $73,25,208,141$
JB 200 DATA $25,268,48,7,173$ , 13, 220,88,76,49,234 ,166,251,232,232,232 , 232,232,232
CM 210 DATA $232,232,142,18$, $208,134,251,228,254$, $208,4,230,251,230,25$ 4,166,253
JX 220 DATA\{2 SPACES $\} 232,13$ 8, 41, 15, 170, 134, 253, $189,91,192,141,22,20$ $8,76,188,254,200,201$
QR 230 DATA $202,203,204,205$ $, 206,207,207,206,205$ ,204,203,202,201,200

## PROGRAM 2

EX 100 FOR $I=49152$ TO 49191 : READ D:POKE I, D:NEX T:SYS 49152
HF $11 \sigma$ DATA $120,169,26,162$,

192,141,20,3
KG $12 \emptyset$ DATA $142,21,3,88,96$, 120,169,234,162
EF 130 DATA $49,141,21,3,142$ ,29,3,88,96,32
SR 140 DATA $135,234,174,141$ ,2,224,1,240,246
HP 150 DATA $76,49,234,0$

## PROGRAM 3

BP 100 FOR $I=49152$ TO 49228 : READ D: C=C + D: POKE I , D: NEXT
GS 110 IF C<>9456 THEN PRIN T "ERROR IN DATA STA TEMENTS": STOP
CP 120 SYS 49152
PX 130 DATA $120,169,43,162$, 192,141,20,3,142,21
RF 140 DATA $3,162,25,169,0$, 157,255,211,202,208
GP 150 DATA $250,169,63,141$, 5,212,169,240,141,6
XF 160 DATA $212,169,17,141$, 4,212,169,15,141,24
JD 170 DATA $212,88,96,166,2$ 83,224,64,249,18,169
SJ 180 DATA $17,141,4,212,16$ 5,211,105,14,141,1
XJ 190 DATA $212,141,8,212,7$ $6,49,234,169,16,141$
DD 200 DATA $4,212,76,49,234$ ,23,212
KB 308 PRINT"\{DOWN\}PRESS AN Y KEY."

## PROGRAM 4

CC 100 FOR $\mathrm{I}=49152$ TO 49230 : READ D: $\mathrm{C}=\mathrm{C}+\mathrm{D}$ : POKE I ,D: NEXT
CH 110 IF C<>11843 THEN PRI NT "ERROR IN DATA ST ATEMENTS": STOP
CP 120 SYS 49152
MG 130 DATA $169,11,162,192$, $141,6,3,142,7,3$
EB 140 DATA $96,16,36,36,15$, 48,32,201,255,240
GP 150 DATA $28,133,251,134$, 252,132,254,166,253, 224
QB 160 DATA $5,240,7,169,5,1$ 33,253,32,210,255
DG 170 DATA $165,251,166,252$ ,164,254,76,36,167,1 33
PQ 180 DATA $251,134,252,132$ ,254,166,253,224,154 ,240
DJ 190 DATA $7,169,154,133,2$ $53,32,210,255,165,25$ 1
PP 200 DATA $166,252,164,254$ ,76,243,166,208,14

## PROGRAM 5

RS 100 FOR I=49152 TO 49266 :READ D:C=C+D:POKE I ,D:NEXT
EG 110 IF $C<>13471$ THEN PRI NT "ERROR IN DATA ST ATEMENTS":STOP
HK 12ø POKE 16383,0:SYS 491 52
RJ 130 DATA $120,169,31,162$,
$192,141,20,3,142,21$
BE 140 DATA $3,169,6,141,18$, 208,173,17,208,41
KX 150 dATA $127,141,17,208$, $169,129,141,26,208,8$ 8
AE 160 DATA $96,173,25,268,1$ $41,25,208,48,7,173$
GS 170 DATA $13,220,88,76,49$ ,234,230,254,165,254
QP 180 DATA $41,3,208,21,166$ , 251,232,138,41,15
KR 190 DATA $133,251,170,189$ ,78,192,141,17,208,1 89,94,192
JC 200 DATA $141,22,208,76,1$ 88,254,24,25
AE 210 DATA $26,27,28,29,30$, 31,31,30,29,28
FG $22 \emptyset$ DATA $27,26,25,24,203$ ,204,205,206,207,206
GG 230 DATA $205,204,203,202$ ,201,200,200,201,202 $, 203,0,0,0,0,0$

## PROGRAM 6

BM 10 FOR $\mathrm{I}=54272$ TO 54295: POKE $I, ~ \varnothing: N E X T$
HE 20 POKE 54296,15: POKE 54 277,8: POKE 54278,255: POKE 54276,23:POKE 54 287,40
GB 30 FOR $Z=1$ TO 6
EB 40 FOR Fl=255 TO Ø STEP \{SPACE\}-6: POKE 54273, Fl:NEXT FI
EM 50 EOR El= $\varnothing$ TO 255 STEP \{SPACE\}20: POKE 54273, F1:NEXT E1
SX 60 NEXT $Z$
CE 70 POKE 54278,15: POKE 54 296,0

## PROGRAM 7

BM 10 FOR $\mathrm{I}=54272$ TO 54295: POKE $1,0:$ NEXT
MX 20 POKE 54296,15: POKE 54 277,8: POKE 54278,255: POKE 54276,23:El=10
SM 30 FOR $Z=1$ TO 24:F2=30: P OKE 54273,F1
RA 40 FOR $Y=1$ TO 10: POKE 54 287,F2:F2=F2*1.01:NEX T Y
JC 50 Fl=El $+8:$ NEXT Z
RE 60 POKE 54278,15: POKE 54 296,0

Send more sounds, folks! Our address is listed below.
"Programmer's Page" is interested in your programming tips and tricks. Mail them to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We pay $\$ 25-\$ 50$ for each tip that we publish.

## SPEEDSPELLER 128

By Christopher Chojnacki
When SpeedScript 128 made its debut in October 1987, those of us who had been using SpeedScript for the 64 could hardly wait to try it out. This new version took advantage of most of the 128's abilities, but it still lacked two features that most word processors would call standard equipment: a spelling checker and a word counter.
True, programs exist that will take a SpeedScript file and either count its words or check its spelling, but they require an interruption of the creative process. You have to save your file, exit SpeedScript, load and run the spelling checker or word counter, save the corrected file, load SpeedScript again, and finally load the file once more. Now, there's a better way.

## Getting Started

SpeedSpeller 128 is a two-part patch to SpeedScript 128 that adds a highperformance integrated spelling checker, a command line for viewing and changing the parameters of the spelling checker, a word counter, and a viewing mode that can double the number of onscreen lines.

The first part, SpeedSpeller 128, is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader; see "Typing Aids" elsewhere in this section. When you've finished typing it in, be sure to save the program.

The second part of the program is written in machine language. Enter it with MLX, our machine language entry program; see "Typing Aids" again. When MLX prompts, respond with the following values.

## Starting address: 1300 <br> Ending address: 1BEF

When you've finished typing, save this program with the filename ESC.PATCH.ML on the same disk as the first program. When SpeedSpeller 128 runs, it looks for and runs this file.

## Running the Program

After you've saved both programs, reboot your 128 and run SpeedSpeller 128. You'll be presented with options
to install the patch to SpeedScript 128, change the device number for the dictionary files, or change the minimum word length to check for errors.

The first time you run SpeedSpeller, choose the first option by pressing the A key. At this point the patch's subroutine package loads into memory, and you're asked for the SpeedScript 128 filename and the device number of the drive where it's located. If you're using only one drive, be sure that the disk containing your version of SpeedScript 128 is in that drive before choosing a device number. After the patch is installed, you'll be asked for a filename to save your new version of SpeedScript 128.

Since SpeedSpeller supports numerous drives, you'll also be asked what device number you want for dictionary disks and the minimum word length to check for spell ing errors. These values are then saved to disk in a file called ESC. Since this also contains subroutines used by the patch, ESC should be on the same disk as your new version of SpeedScript 128. Other options on the SpeedSpeller 128 main menu allow you to display and/or change the default values that you've already saved in the ESC file. When you're satisfied that everything is the way that you want it, you can load and run your new version of SpeedScript 128 just as you would your old one.

## Changes

Although this new version of SpeedScript 128 doesn't look any different from the old one, there are some changes. For one thing, functions Control-A to change a letter's case and Control-X to transpose two letters no longer exist. They were removed to make room for the patch. Also, some functions have been switched back to the keys they were assigned to in the original version of SpeedScript. Specifically, Insert mode is now toggled using Control-I (or the Tab key), the Run/Stop key now inserts 5 spaces, and the Shift-Run/Stop combination inserts 255 spaces. The Esc key now gives you four new functions.

## Integration

The Esc key, when used alone or together with the Shift, Alt, Control, or

Commodore ( $\mathrm{C}=$ ) keys, allows you to check the spelling of the file you have in memory, change your default values for the spelling checker, count the number of words in the file in memory, or toggle the length of the screen between 25 and 50 lines.

The first time that you use any of these new functions, it will be necessary to hold down any key being used with the Esc key for a few seconds while the patch loads in the subroutines from the disk. After that, all of the new functions will be ready to use instantly. Loading the subroutine package in separately from SpeedScript 128 itself makes it possible to upgrade or alter these new functions at some future time without having to alter SpeedScript 128 again in the process.

## Check Your Spelling

To check the file you're working on for spelling errors, move the cursor to where you want the process to begin and press the Esc key. Your file is scanned from the cursor position to the end of the file for words that are at least as long as the value you set as your minimum word length.

Subdictionaries for each letter of the alphabet are then loaded into memory as necessary and used to check your file. If you don't have a subdictionary on your disk, you can load one from another disk or create one as you go along. If a word being checked doesn't appear in a subdictionary, the file scrolls to a point six words prior to the word in question. The word is displayed in reverse video at the top of the screen, and you're presented with a list of options.

Your first option is to add this word to your subdictionary by pressing the A key. Do this only if you know the word is spelled correctly. Your second option, to edit the word, is selected by pressing the E key. Type the word exactly as you want it to appear in your file, using capital letters where necessary. Finally, if you don't want to edit the word or add it to your subdictionary, you can skip the word by pressing the S key.

## Be Aware

There are a few things to remember in


The first is that SpeedSpeller 128 automatically cancels Insert mode. Similarly, the search and replace buffers are cleared anytime you use SpeedSpeller 128's Edit option. The next thing to remember is that words are not case sensitive. Therefore, capital, Capital, and CAPITAL all appear the same and are all checked using the same word in the C subdictionary. Also, contractions are viewed as two words. So couldn't, for example, will appear to be misspelled as couldn. You can abort the checking process at any time by pressing the Restore key and then pressing the N key when asked if you want to exit SpeedScript 128.

The chart below summarizes the changes that have been made.

## Key

Combination
Esc
Alt-Esc
Control-Esc
$C=-E s c$
Shift-Esc
Run/Stop
Shift-Run/Stop
Control-I
Tab
Restore

## Function

Check spelling
View/change default values
View/change default values
Toggle between 25 and 50 lines Word-count Insert 5 spaces Insert 255 spaces
Toggle Insert mode Toggle Insert mode Cancel spellchecking

## File Management

Whenever SpeedSpeller 128 updates a subdictionary, it saves a temporary version of the new dictionary, verifies it, erases the old one, and then renames the temporary one. This is done to ensure that you don't accidentally lose or otherwise damage a subdictionary while updating it. For this reason, it's necessary to always have enough room left on a disk to have an extra copy of your largest subdictionary. Also, it's best not to save any documents with a single character as a filename, just to be sure that you don't inadvertently destroy a subdictionary.

Subdictionaries can be loaded into SpeedScript 128 and edited if you accidentally add a misspelled word. The file format is simple. The first letter of the file is the name of the file in reverse video. This is made by pressing the $£$
key while holding down the Control key and then pressing the letter that you want when asked to press a format key. Each word is then stored without the first letter and with the last letter in reverse video. No spaces separate the words, and no space or return is at the end of the file. For example, if the $Z$ subdictionary contained the words zany, zebra, and zipper, it would look like this.

## Zan【ebraipper

A subdictionary stored in this manner uses less space and can be loaded into memory faster.

## Default Values

You can view at any time the default values for your subdictionary drive number and the minimum word length to check for spelling errors. Press the Esc key and either Alt or Control. To change these values, keep the Alt or Control key pressed down, release the Esc key, and press either the D key to cycle through device numbers $8-15$ or the $W$ key to cycle through word lengths of four to seven characters. These values remain in effect until you change them or turn off your computer.

## Counting Words

Pressing the Esc key while holding down the Shift key counts all of the words in the file in memory in three seconds or less. There are a few things to consider, however, when using this function. The first is that contractions and hyphenated words are counted as multiple words. For example, couldn't is considered two words. Also, numbers are not counted as words.

## Doubling Your Fun

Finally, we come to the last of SpeedSpeller 128's new features. By pressing the Esc key while holding down the Commodore ( $\mathrm{C}=$ ) key, you can toggle between SpeedScript 128's normal display of 25 lines and 50 lines of onscreen text.

This is possible by using what's known as Interlace Display mode. Unfortunately, not everyone will be able to use this feature. You'll need a good RGB monitor with a vertical-hold control. To reduce any flickering, try reducing the brightness of your monitor or us-
ing text and background color combinations that have a lower contrast.

If you exit and then reenter SpeedScript 128 while in this mode, you'll have to toggle this feature once to reset your display. Additionally, SpeedScript 128 will seem a little sluggish when using this mode because the program has to handle twice as much information every time it updates the screen. Also, because the computer's operating system doesn't recognize this mode, only the upper half of the screen will be used anytime you display a disk directory or print a file to the screen.

## A Final Word

The type of disk drive that you use can either help or hinder a spelling checker's performance. The way that words are stored in a subdictionary is also a factor. SpeedCheck 128, the spelling checker on COMPUTE's SpeedScript disk, stores words in its dictionary in a random order. This means the entire subdictionary has to be checked from the beginning until it either finds the word it's looking for or runs out of words in the subdictionary. This process can be very fast or very slow.

SpeedSpeller 128, on the other hand, stores the words in its subdictionaries in alphabetical order and then uses what is known as a binary search to look for words. This method involves dividing each subdictionary in half and deciding in which half the word being checked should be found. This halving continues until either the word is located or the half is too small to be divided again. This process is very fast. The time required to check the spelling of a word will generally remain the same regardless of the word's location in the subdictionary, the size of the dictionary, or whether or not the word is in the dictionary.

Speaking of size, depending on how much memory your version of SpeedScript 128 uses, each subdictionary can contain approximately 7000 words. This means that an entire dictionary can contain about 182,000 words. In addition, because of the way SpeedSpeller 128 handles the loading and saving of subdictionaries, you don't have to keep all of your subdictionaries

## SPEEDSPELLER 128

AD $\emptyset$ POKE48，128：CLR：FAST：IFPEE K（238）＜＞79THENPRINTCHR\＄（2 7）＂X＂
QF 1 PRINTCHRS（27）＂R\｛7\}
\｛2 HOME \} \{CLR\}"CHRS (11)CHR \＄（142）：BA＝PEEK（186）
CB 2 DEFFNMA $(X)=\operatorname{PEEK}(174)+256 *$ PEEK（175）
PK 3 PRINTSPC（12）＂\｛17 SPACES $\}$ \｛A\}*******************\{S\}

JK 4 PRINTSPC（12）＂\｛5 SPACES \} $\{A\} * * * * * * * * * * *\{X\}$ SPEEDSP ELLER\｛2 SPACES $\} 128$ \｛Z\}*** ＊＊＊＊＊＊＊＊＊〔S ${ }^{(1)}$
HB 5 PRINTSPC（12）＂\｛A\}****\{X\} P ATCH INSTALLATION AND MAI NTENANCE PROGRAM 〈Z\}***〔S ${ }^{\prime \prime}$
 ＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊ ＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊\｛X\}"
JM 7 WINDOW12，7，66，22：PRINT＂ \｛3\}\{CLR\}":WINDOW13,8,65,2 1
CE 8 PRINT＂\｛CLR\}A) INSTALL PAT CH TO SPEEDSCRIPT 128＂
JA 9 PRINT＂\｛DOWN\}B) CHANGE DEV ICE \＃FOR DICTIONARY＂
EM 10 PRINT＂\｛DOWN\}C) CHANGE MI NIMUM WORD－LENGTH＂
DG 11 PRINT＂\｛DOWN\}CHOOSE AN OP TION＂
KQ 12 GETRS：IF（（RS＜＂A＂）OR（RS＞＂ C＂））THEN12：ELSEIFRS＝＂B＂T HEN33：ELSEIFRS＝＂C＂THEN4 $\varnothing$
HK 13 BLOAD＂ESC．PATCH．ML＂，U（BA ），Bl，P4864：EA＝FNMA（ $\varnothing$ ）
MD 14 PRINT＂\｛CLR\}NAME OF SPEED SCRIPT 128 VERSION TO CO NVERT：＂：NS＝＂＂：INPUTN\＄
BP 15 IF LEN（NS）＜l OR LEN（NS）＞ 16 THEN14
MF 16 INPUT＂\｛DOWN\}DEVICE \# TO \｛SPACE\}LOAD VERSION FROM （8 TO 15）＂；DV
HH 17 IF DV＜8 OR DV＞15 THENPRI NT＂\｛UP\}"CHRS(27)"D\{2 UP\} ＂：GOTO16
EC 18 BLOAD（NS），U（DV），B1，P7169 ：EB＝FNMA（ $\varnothing$ ）
HK 19 READS，F，KC：IFS $=\emptyset$ THEN 22
PC 20 CK＝$\varnothing$ ：BANKl：FORX＝STOE：REA DN：CK $=\mathrm{CK}+\mathrm{N}:$ POKEX， $\mathrm{N}:$ NEXT： BANK
HR 21 IFCK＜＞KCTHENPRINT＂\｛DOWN\} ERROR IN DATA FOR LOCATI ON（S）＂S＂TO＂F：END：ELSE19
GG 22 PRINT＂\｛DOWN\}NAME FOR NEW SPEEDSCRIPT 128 VERSON： ＂：N\＄＝＂＂：INPUTNS
CR 23 IF LEN（NS）＜1 OR LEN（NS）＞ 16 THENPRINT＂\｛UP\}"CHRS (2 7）＂D\｛3 UP\}": GOTO22
SK 24 INPUT＂\｛DOWN\}DEVICE \# TO \｛SPACE\}SAVE NEW VERSION
\｛SPACE\}TO (8 TO 15)";DV
JC 25 IF DV＜8 OR DV＞15 THENPRI NT＂\｛UP\}"CHR\$(27)"D\{2 UP\} ＂：GOTO24
BD 26 BSAVE（NS），U（DV），Bl，P7169 TO $P(E B):$ IFDS $<>$ OTHEN52
EC 27 INPUT＂\｛DOWN\}DEVICE \# TO \｛SPACE\}LOAD DICTIONARY F ROM（8 TO 15）＂；DD
RF 28 IF DD＜8 OR DD＞15 THENPRI NT＂\｛UP\}"CHRS(27)"D\{2 UP\} ＂：GOTO27
SK 29 BANKl：POKE5150，DD：BANKø
RJ 30 INPUT＂\｛DOWN\}MINIMUM WORD －LENGTH（4 TO 7）＂；WL
CH 31 IE WL＜4 OR WL＞7 THENPRIN T＂\｛UP\}"CHRS (27)"D\{2 UP\}" ：GOTO 30
CK 32 BANK1：POKE5175，WL：BANKø： GOTO 47
AG 33 INPUT＂\｛CLR\}DEVICE \# TO L OAD＇ESC＇SUBROUTINE FRO M（8 TO 15）＂；DV
RB 34 IF DV＜8 OR DV＞15 THEN33
RX 35 BLOAD＂ESC＂，U（DV），Bl，P486 4： $\mathrm{EA}=\mathrm{FNMA}(\varnothing): \mathrm{BANK}$ ： $\mathrm{DD}=\mathrm{PE}$ EK（5150）：BANKø
MJ 36 PRINT＂\｛DOWN\}DICTIONARY C URRENTLY LOADED FROM DEV ICE \＃＂DD
SE 37 INPUT＂\｛DOWN\}NEW DEVICE \# TO LOAD DICTIONARY FROM （8 TO 15）＂；DD
EK 38 IE DD＜8 OR DD＞15 THENPRI NT＂\｛UP\}"CHRS (27)"D\{2 UP\} ＂：GOTO37
GF 39 BANKl：POKE5150，DD：BANK $:$ GOTO 47
GG $4 \varnothing$ INPUT＂\｛CLR\}DEVICE \# TO L OAD＇ESC＇SUBROUTINE FRO M（8 TO 15）＂；DV
DQ 41 IF DV＜8 OR DV＞15 THEN40
AH 42 BLOAD＂ESC＂，U（DV），B1，P486 4：EA＝FNMA（ $\varnothing$ ）：BANKl：WL＝PE EK（5175）：BANK
RM 43 PRINT＂\｛DOWN\}CURRENT MINI MUM WORD－LENGTH：＂WL
PD 44 INPUT＂\｛DOWN\}NEW MINIMUM \｛SPACE\}WORD-LENGTH (4 TO 7）＂；WL
HH 45 IF WL＜4 OR WL＞7 THENPRIN T＂\｛UP\}"CHRS (27)"D\{2 UR\}" ：GOTO 44
JG 46 BANKl：POKE5175，WL：BANKø
ER 47 SCRATCH＂ESC＂，U（DV）：IFDS＞ 1THEN52
HS 48 BSAVE＂ESC＂，U（DV），B1，P486 4 TO $\overline{(E A)}:$ IFDS＜＞ØTHEN52
EX 49 SCRATCH＂ESC＂，U（DV）：IFDS＞ 1THEN52
QA 50 RENAME＂ESC＂，U（DV）TO＂ESC＂ ，U（DV）：FEDS $\langle>$ ØTHEN52
RM 51 BANK0：POKE7167，0：PRINT＂ \｛2 HOME $\}$ \｛CLR\} \{DOWN\}ALL F INISHED！＂：BANK15：POKE48， 4：CLR：SLOW：END
AK 52 BANKø：POKE7167，$\varnothing:$ PRINT＂ \｛DOWN\}ERROR: "DS\$:BANK15
：POKE48，4：CLR：SLOW：END
DS 53 DATA $7280,7281,281,254,2$ 7
FP 54 DATA $7283,7284,281,254,2$ 7
AK 55 DATA $8181,8181,3,3$
KR 56 DATA $8187,8187,255,255$
XD 57 DATA $8221,8222,219,177,4$ 2
DJ 58 DATA $8245,8246,208,172,3$ 6
RJ 59 DATA $8265,8266,136,99,37$
AF 60 DATA $9833,9833,80,80$
FM 61 DATA $10109,10109,79,79$
CB 62 DATA $10334,10335,206,166$ ，40
SM 63 DATA $10930,10993,8169$
JM 64 DATA $173,255,27,201,204$ ， 240，36，169
FP 65 DATA $3,162,224,160,42,32$ ，189，255
HD 66 DATA $169,0,170,32,104,25$ 5，173，3
BG 67 DATA $40,170,168,32,186,2$ 55，169， 8
EE 68 DATA $32,213,255,144,3,76$ ，69，48
HS 69 DATA $32,204,255,108,0,19$ ，69，83
QD 70 DATA $67,234,160,0,185,70$ ，53，240
BX 71 DATA $6,32,210,255,200,20$ 8，245，96
CH 72 DATA $12350,12350,228,228$
GA 73 DATA $\emptyset, \varnothing, \varnothing$

## ESC．PATCH．ML

$1300: 58 \quad 14 \quad 53 \quad 10 \quad 05 \quad 05 \quad 04 \quad 53$ 5A 1308：10 05 ØC 0C 0512 20 31 9B $1310: 32 \quad 38 \quad 3 \mathrm{~A} \quad 20$ gø 53 30 $3 \mathrm{~A} \quad 8 \mathrm{E}$ 1318：20 52 30 3A 20 3D 20 53 16
 1328：44 ØF 03 15 ØD 05 日E 1492
1330：2E 2E 2E 日0 43 Ø8 05 日3 06 1338：ØB $\quad 09$ बE $\quad 97 \quad 20 \quad 27 \quad 20 \quad 27$ 5D $1340: 20 \quad 57 \quad \emptyset \mathrm{~F} \quad 12 \quad 04 \quad 13 \quad 2 \mathrm{E} \quad 2 \mathrm{E} \quad 46$ 1348：2E ØØ 55 ØE ØB ØE ØF 17 D6 1350：0E $20 \quad 57$ 日F 12 Ø4 20 2D 6F 1358：2の $\begin{array}{lllllllll}130 & 2 \emptyset & 2 \theta & 41 & 04 & 04 & 2 C & E 2\end{array}$ 1360：20 $45 \quad \emptyset 4 \quad 99 \quad 14 \quad 20 \quad 0 \mathrm{~F} \quad 12$ 4A 1368：20 53 0B 09 10 $\quad 3 \mathrm{~F}$ Øの $\quad 44 \quad 27$ 1370： 0 E ØE $\quad 05$ 20 $43.08 \quad 95 \quad 93$ 8B 1378：ØB $\quad 99$ ØE 07 Ø0 53 Ø1 16 FD 1380： $05 \quad 20 \quad 55 \quad 10 \quad 04 \quad 01 \quad 14 \quad 05 \quad 2 \mathrm{E}$ 1388：Ø4 20 20 5315 Ø2 $2 \mathrm{DD} 44 \quad 09 \mathrm{CA}$
 1398：20 $28 \quad 59 \quad 2 \mathrm{~F} \quad 4 \mathrm{E} \quad 29 \quad 3 \mathrm{~F} \quad$ Øの $\quad 8 \mathrm{C}$ 13A0：29 $20 \quad 44 \quad 15$ 12 09 ØE 0715 13A8：20 53 15 02 2D $44 \quad 99 \quad 03066$ 13BØ：14 Ø9 ØF ØE Ø1 12 19 20 88 13B8：$\varnothing \emptyset 4 \mathrm{C}$ ØF Ø1 $\emptyset 4 \quad \emptyset \emptyset \quad 53 \quad \emptyset 1 \quad \mathrm{AB}$ $13 C 0: 16 \quad 65$ Øの $\begin{array}{lllllll}13 A & 2 \emptyset & 54 & 12 & 19 & 66\end{array}$
 13D0：59 $2 \mathrm{~F} \quad 4 \mathrm{E} \quad 29 \quad 3 \mathrm{~F} \quad$ Ø0 43 日F 4 BB
 13E0：05 日C ØC Ø9 日E 07 3A 20 BF 13E8： $0 \emptyset \quad 45 \quad 12 \quad 12 \quad$ 日F $12 \begin{array}{llllll}12 & 20 & 28 & E C\end{array}$

13F8：15 0E $140512 \quad 20 \quad 3132$ A5 140日：38 3A 2 日 Ø日 2057 日F 1265 1408：04 $13 \quad 60 \quad 4312050114$ E5 1410：65 $26 \quad 41 \quad 004405 \quad 16 \quad 9956$ 1418： $03 \quad 65 \quad 20 \quad 23$ 3A $60 \quad 68203 B$ 1420：20 20 4D 09 6E 69 日D 15 5E
 1430：05 6E 0714 08 3A 06 04 AD
 1440： $08 \quad 03190712 \quad 301300 \quad 38$ 1448：20 $20 \quad 21 \quad 0018 \quad 80 \quad 206010$ 1450：19 $68 \quad 32 \quad 30$ DE 1B DE 1B 8C 1458：A5 D3 48 A9 CC 8D EF 1B A3 1460：20 CB 1E 2052 1D $68 \mathrm{~F} \emptyset 1 A$ 1468：15 4A B $\emptyset \quad$ ØF 4 A B $\emptyset \quad 694 \mathrm{~A} 26$ 1470：B0 03 4C B1 1A 4C B1 1A D5 1478：4C 28 1B $4 \mathrm{C} 81144 \mathrm{C} \quad 12 \mathrm{FE}$ 1480：15 20 CB 1E A9 E1 AØ 13 FE 1488：20 18 1E A5 2948 A5 2A．C4 1490：48 А9 øø $8564856585 \quad 29$ 1498：29 A9 6485 2A 20 AC 16 D9
 14A8：E6 6488 C8 9818652914 14B6：85 29 A5 2A 696085 2A BD 14B8：A5 2938 ED 1835 A5 2A EE 14C6：ED 193598 D8 6885 2A 73 14C8：68 8529 A2 13 A5 65 C9 99 14D6： 01 D $\varnothing 66$ A5 64 D $\varnothing 65$ A2 DB 14D8：20 8E $9914 \begin{array}{lllll} & 78 & 20 & 3 D & 1 D \\ E 2\end{array}$ 14E0：A9 00 8D 00 FF 38 A5 FE BA 14E8：A2 96382075 8C 2044 Fl 14Fø：8E AØ Øø B9 $00 \quad 01 \mathrm{~F} \emptyset \quad 0610$ 14F8：20 ØC 1D C8 D6 F5 A9 ØE 24 1500：8D 60 FF 201 C 1D 58 A9 A2 1508：04 A 0142018 1E EE 15 日D 1510：35 60 A9 ø0 8D $1635 \quad 2071$ 1518：CB 1E A9 02 Aø 132018 AE 1520：1E A9 1F Aø 13 2ø 18 IE 19 1528：AE $101286 \mathrm{~B} \emptyset \mathrm{AE} 1112 \mathrm{CC}$ 1530：E8 86 B1 A9 00 A8 990017 1538： 日B C8 D $^{\text {C }}$ FA AD 1335 8D 95 1540：40 GB AD $14 \quad 35$ 8D 41 日B B1 1548：A5 2985 3F A5 2 A $8540 \quad 55$ 1550：E6 29 D 0 62 E6 2A 201 F B1 1558：21 A5 $29 \begin{array}{lllllll} & 85 & 41 & \text { A5 } & 2 \text { A } & 85 & 74\end{array}$ 1560：42 20 AC 16 C0 90 D 0153 1568：C8 $98 \quad 18 \quad 65 \quad 29 \quad 85 \quad 29$ A5 CD 1570：2A 69 ø0 85 2A CC 371469 1578：30 67 AD 00 ØC A8 99 日8 68 1580：ØB A5 2938 ED 18 35 A5 22 1588：2A ED 1935 90 D3 A0 01 CF
 1598：D0 F6 20 CB 1E A9 6F Aø Cø 15A $0: 13 \quad 20181 E \quad 209219601 F$ 15A8： 0940 F 0 E2 8D 3E 13 A9 E8
 15B8：CB 1 E A9 $92 \mathrm{~A} \varnothing 13 \quad 2 \varnothing \quad 18 \quad 4 \mathrm{~F}$ 15C0：1E A9 34 A0 $13 \begin{array}{lllll}18 & 18 & 1 E & 5 C\end{array}$ 15C8：20 $54 \begin{array}{lllllll}18 & \text { A9 } & \text { Øø } & 2 \varnothing & 6 \mathrm{~F} & 18 & 2 \mathrm{D}\end{array}$ 15D $: 90$ ØD $2 \varnothing$ EE 1820 3F 1851 15D8：FØ DD $2 \varnothing 79$ AA D $\varnothing$ BB 86 A 15Eの：45 8446 A5 418529 A5 9 A 15E8：42 85 2A 26 AC 16 Cø 001 Cl 15Fø：D $\emptyset 61$ C8 CC 371410 3D 11 15F8：98 $18 \quad 65$ 1600：69 øø 85 2A A5 2938 ED 64 1608：18 35 A5 2A ED 193590 B3 1610：DA AD FD $\mathrm{OB}_{\mathrm{B}} \mathrm{FO} 9420 \mathrm{CB}$ 6B 1618：1E A9 02 Ag 132018 1E 6 E 1620：A9 7D Aø 13 20 18 1E 2083

1628：3F 18 D 05 20 7718 Bø 24 1630：F6 A9 00 F0 DF AD 3E 1396 1638：29 BF CD 00 ØC D $\emptyset$ B9 $2 \varnothing$ D9 1640：B5 19 8A．D0 05 AD $0 \varnothing$ ØB D5 1648：D $\emptyset$ AF 8D FF $\mathrm{BB}_{\mathrm{B}}$ A5 $29 \quad 48 \quad 04$ 1650：A5 2A 48201 F 21201 F Cl 1658：21 20 1F 21 2ø 1F 2120 F2 1660：1F 2120 1F 21 A5 29 8D D9 1668：13 35 A5 2A 8D $1435 \quad 68 \quad 52$ 1670：85 $2 \mathrm{2A} 68$ 85 2920 C9 16 C2 1678：20 52 1D 20 C9 16 20 CB Al
 1688：20 E5 16 A9 56 Aø 132017 1690：18 1E 20 ब் 4 17 20152 1D 8F 1698：20 CB 1E A9 62 Aø 1320 FE 16A0：18 1E A9 34 Aø $13 \begin{array}{llllll}13 & 18 & 82\end{array}$ 16A8：1E 18 90 99 Aø 00 A9 2917 16B0：A2 112074 FE 30 ØE 29 BE 16B8：3F Fø ØA C9 1B $10 \quad 06 \quad 99$ 5D 16C0：00 वC C8 D6 E9 8C 00 0B A2 16C8：60 Aの Ø0 A9 29 A2 6120 DD 16D6：74 FE 4980 A2 29 8E B9 E8 16D8：02 A2 Ø1 2077 FE C8 CC EA 16E0：00 0B D0 E7 60 A0 00 A9 97 16E8：29 A2 012074 FF 9900 4B
 16F8：EE A9 0099 Ø0 ØD AØ ØD 23 170日： 26 18 1E 60 A9 00 8D FE 75 1708：ØB AC øø ØB $88 \quad 98 \quad 18 \quad 65$ D3 1710：45 $85 \quad 43$ A5 $46 \quad 690085 \quad 62$ 1718：44 A5 $43 \quad 38$ E9 FE A5 4498 1720：E9 FE B $\emptyset \quad 67 \mathrm{EE} \mathrm{FE}$ ØB A9 BC 1728：5C Dø 62 A9 61 Aの $13 \quad 2067$ 1730：18 1E $2 \varnothing$ E4 FE D $\varnothing$ FB $2 \varnothing$ 9F 1738：E4 FE Fø FB C9 $53 \mathrm{D} \emptyset 01 \mathrm{~F} 4$ 1740：60 C9 $45 \mathrm{D} \varnothing 4 \mathrm{~A} 2 \emptyset \mathrm{CB}$ 1E 4F 1748：A9 D6 Aø 13 20 18 1E A9 8D 1750：12 $20 \quad 83 \quad 27$ 8D B5 35 A8 C8 1758：F6 F5 88 B9 463599 B6 1A 1760：35 C 0 Ø0 D 0 F5 AD 00 बB D7 1768：8D 9635 A5 2985 9E A5 46 1778：2A 85 9F 28 8A 31 AD B5 35 1778：35 8D Øø ØB 18 2E B5 356 F 1780：A5 $29 \quad 38$ ED B5 $3585 \quad 2968$ 1788：A5 2A E9 0085 2A 60 C9 Bø 1790：41 Dø 9F A9 Ø1 8D FD ØB 67 1798：A9 3F 8D g0 FF AE FF ØB E2 17A0：E8 D 028 A5 4585 FE A5 BA 17A8：46 85 FF Aの $01 \mathrm{B9}$ Ø0 0 C 6ø 17B0：91 FE C8 CC Øの ØB D 0 F5 11 17B8：88 $9980 \quad 91$ FE A5 $43 \quad 8531$ 17C0：45 A5 448546 A9 0E 8D 5E 17C8：00 FF 60 A5 4538 E5 26 5A 17D6：85 B4 A5 46 E5 27 85 B5 94 17D8：AC Øø ØB 8898186526 5D 17E0：85 9E A5 2769 ø0 85 9F 96 17E8：A5 B5 AA $1865 \quad 2785 \quad 5152$ 17F6：A5 2685 50 18 8A 65 9F 86 17F8：85 25 A5 9E $85 \quad 24$ E8 A4 65 1800：B4 Dø $04 \mathrm{~F} 日$ 日B AØ FF Bl DA 1808：5ø $912488 \mathrm{C} \varnothing \mathrm{FF}$ D $\varnothing$ E7 71 1810：C6 51 C6 25 CA Dø EE A5 40 1818：26 85 FE A5 2785 FE Ag E6 1820：01 B9 00 日C 91 FE C8 CC E6 1828： 00 ØB D 0 F5 $88 \quad 9980 \quad 918 \mathrm{~F}$ 1830：FE A5 $43 \quad 85 \quad 45$ A5 4485 D8 1838：46 A9 $6 E$ 8D 00 FF $60 \quad 2071$ 1840：E4 FF D 0 FB 20 E4 FE FØ 42 1848：FB C9 59 Fø 66 C9 4E Dø E7 1850：F3 C9 5960 A9 61 A2 $3 E$ E2

1858：A0 1320 BD FF A9 00 A2 C6 1860：ø0 2068 FF A9 ø0 AE 1E 6E
 1878：Bø A4 B1 20 D5 FE 60 AD 77 1878：3E $13 \quad 69808 D$ 3E 13 8D CE 1880：18 $13 \quad 20$ CD 18 Bø $45 \quad 2090$
 1890：20 D8 FF 20 EE 18 BØ 3476 1898：20 $5418 \quad 2 \varnothing$ EE 18 Bø 2 2C 58 18A0：A9 61206 F 1820 EE 1818 18A8：B $\emptyset \quad 22$ AD 3E $13 \quad 29$ 7F 8D 1D 18B6： $1813 \quad 2 \varnothing$ CD 18 B $\emptyset 15$ AD ED 18B8：18 13 8D 1C 13 AD 3 E 13 gC 18C0：8D 1E 13 A9 06 A2 19 A6 C9 18C8：13 2ø D3 1860 A9 Ø4 A2 DA 18D0：15 Aø 1320 BD FF A2 00 4B 18D8：20 68 FF A9 9 E AE 1E 1451 18E0：A8 20 BA FF 20 C 6 EF 20 E8 18E8：E7 FF 20 EE 1860 A9 6095 18F0：20 BD FE A9 0 F AE 1E 14 BE 18F8：A8 20 BA FF 20 C0 FF A2 83 1900：0F 20 C6 FF 90 24 A9 01 04 1908：8D 00 FF Aø FF C8 B9 7D 1F 1910：48 99 03 ØD 10 F7 498071 1918：8D Øø ØD 99 Ø3 ØD A9 2C 18 1920：99 94 ØD A9 बE 8D 00 FF Ø3 1928：Dø 12 Aø б0 2ø CF FF 9935 1930：00 9D C8 C9 6D D6 F5 A9 9C 1938：00 99 ø0 ØD 20 CC FF 20 F5 1940：E7 FF AD 00 ØD C9 31101 E 1948： 02186020 CB 1E A9 E9 A3 1950：AØ 132018 1E Aø 02 C8 5D 1958：B9 Øø ØD C9 4130 F8 98 FA 1960：AA C8 B9 00 ØD C9 2C Dø ØA 1968：F8 A9 9099 Ø0 0D 8A A0 05 1970：$\varnothing \mathrm{D} 2 \emptyset 18$ 1E A9 AØ AØ 13 3A 1978：20 18 1E A9 B9 AE FD $\mathrm{g}^{18}$ AE 1980：Fの Ø2 A9 BE Aø 13201876 1988：1E A9 C3 Ag 132018 1E 1E 1990：38 60 EE 15 35 A5 3F 85 6A 1998：29 A5 4085 2A AD 40 ØB BC 19Aø：8D 13 35 AD 41 ØB 8D 1445 19A8：35 A9 Ø0 8D 9635 8D B5 13
 19B8：47 A5 B1 8548 A5 45856 F 19C0：49 A5 46 85 4A A9 3F 8D 27 19C8：$\varnothing \varnothing$ FF $2 \varnothing 18$ 1A E $\emptyset 06$ D $\emptyset$ A5 19D6：28 A 01 Bl FE AA 29 1F 8E 19D8：D9 96 ØC 3623 D $\varnothing 69$ C8 B3 19Eの：8A 30 ØF CC Ø日 ØB D $\varnothing$ EB CC 19E8：A5 FE 8549 A5 FE 85 4A 75 19FØ：D $\emptyset$ D8 CC $\emptyset \emptyset$ ØB D $\emptyset$ ØE A2 B5 19F8： 00 A9 ØE 8D Øø FF 60 C8 B9 1Aø0：Bl FE 10 FB C8 $88 \quad 98 \quad 1840$ 1Aø8： 65 FE 85478526 A5 EF E3 1A16：69 ø0 $854885 \quad 27$ D 0 B2 4 AB 1A18：A5 $47 \quad 18 \quad 654985 \quad 26$ A5 9 C 1A20：48 65 4A $85 \quad 27 \quad 66 \quad 2766$ FA 1A28：26 A2 01 A5 26 C5 47 Dø 3A 1A30：13 A5 27 C5 48 D6 0D C5 FD 1A38：46 D $\emptyset 68$ A5 26 C5 45 D $\varnothing$ C2 1A40： 02 A2 FF 60 A5 2685 FE F3 1A48：A5 2785 FE A 060 B 1 FE 31 1A56：36 24 C6 FE C6 2788 B1 14 1A58： $\mathrm{FE} \quad 10 \mathrm{FB} 98 \quad 1865 \mathrm{FE} 85 \mathrm{E} 2$ 1A60：FE $85 \quad 26$ A5 FF 69 g0 85 BF 1A68：FE 8527 A5 FE 38 E5 4527 1A70：A5 FF E5 $46 \mathrm{~B} \varnothing \mathrm{Cl}$ A2 60 6A 1A78：60 AD Ø3 ØD C9 20 DØ 30 1A 1A80：20 CB 1E A9 ØB $^{1}$ Aø $14 \quad 20 \quad 39$

1A88:18 1E A9 89 A0 132018 C7 1A90:1E 20 3F 18 D6 1A AD $3 E C D$ 1A98:13 49 C0 Aø 0091 B 0 A5 18 lAAg:B@ 18690185 AE AA A5 52 lAA8:B1 $69 \quad 0685$ AF A8 C4 AF Cl 1AB0:60 26 CB 1E A9 02 Aø $13 \quad 22$ 1AB8:20 18 1E A9 AD AØ 132097 1AC0:18 1E A9 14 Ag 142018 AC 1AC8:1E AD 1E 14 AA C9 0A 30 3D lAD6:0B A9 3120 gC 1D 8A 18 lF 1AD8: $69 \quad 26$ D $0 \quad 07493020$ øC 2D lAEØ:1D A9 2020 ØC 1D A9 1F 5B lAE8:A $\begin{array}{llllllll}14 & 29 & 18 & 1 E & A D & 37 & 14 & 22\end{array}$ lAE0:49 3020 ØC 1D EE 15359 E 1AE8:A5 D3 F0 2B 20 E4 FF Fg 4B 1Bøø:F7 29 1F C9 64 Dø ØE AE 2B 1B68:1E 14 E8 8A $0908 \quad 29$ 0F El 1B10:8D 1E 14 D 0 9C C9 17 D 02 F 1B18:DF AE 37 14 E8 8A 090499

 1B28:78 AD 4E 14 8D 4F 1449 2C 1B30:40 8D 4E 14 AD $45148 D 2 D$ 1B38:49 14 4910 8D 4514 AD 99 1B40:50 14 |  | $8 D$ | 52 | 14 | 49 | $2 B$ | $8 D$ |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | 1B48:50 14 AD $51 \quad 14$ 8D 531488 1B50:49 38 8D $51 \quad 14 \mathrm{CD} 2 \mathrm{~F} \quad 6 \mathrm{~A} \quad 40$ 1B58:Fの 26 A $9 \quad 00$ BE 3814 C8 6C 1B60:B9 3814 C8 2067 1D C0 A8 1B68:16 D6 F1 A9 FF Ag 10 A2 FB 1B70:1E $20 \quad 07$ 1D 88 Dø FA AD 9B 1B78:50 $14 \begin{array}{llllllll}14 & 4 A & 90 & 63 & 20 & 79 & \text { El } & 9 B\end{array}$ 1B80:AD $5414 \mathrm{AE} C \mathrm{CF} 218 \mathrm{D}$ CF FD 1B88:21 8E 5414 AD 5514 AE 58 1B90:DØ 218 8D Dø 218 BE 551438 1B98:AD 5614 AE El 21 8D El 39 1BAG:21 8E $56 \quad 14 \mathrm{AD} \quad 57 \quad 14 \mathrm{AE}$ B8 1BA8:E2 21 8D E2 218 EE 57147 E 1BB $0: A D 50148 D$ B $\quad 1 D$ AD 51 D3 1BB8:14 8D $2 \mathrm{~F} \quad$ ØA $8 \mathrm{BD} 32 \quad 26$ 8D E1 1BC0:52 26 8D 8526 8D 932769 1BC8:AD $4 \mathrm{E} \quad 14 \begin{array}{lllllll} & 14 & 33 & 26 & A D & 13 & 65\end{array}$ 1BD6:35 8529 AD 143585 2A AD 1BD8:20 2E $26 \quad 20 \quad 52$ 1E AD E6 BE 1BE0:21 GA GA GA GA gD D2 2157 1BE8:A2 1A $20071 D \quad 58 \quad 60 \quad 0076$

Christopher Chojnacki is a hotel security officer in Port Huron, Michigan. He plans to upgrade his 128 system with the addition of a RAMDrive, a color printer, and a mouse.

## LA BASIC

## By Farid Ahmad

One of the shortcomings of 64 BASIC is that it doesn't allow the use of labels. A label is a subroutine that is assigned a descriptive name rather than a line number or address. To run the subroutine, you simply call the label by its name. Such a feature makes a program easy to write and even easier to modify.
La BASIC adds this facility to BASIC. It allows the use of labels with GOTO, GOSUB, and RESTORE. In addition, it pro-
vides two new commands for easy cursor positioning and color control.

## Getting Started

La BASIC is written entirely in machine language. To enter it, use MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

## Starting address: COOO <br> Ending address: C337

Be sure to save a copy of La BASIC before you exit MLX.

## Labels

A label consists of a REM statement in the following format.

## REM=label

The equal sign (=) distinguishes a label in La BASIC from an ordinary REM statement. Note that there is no space between the REM and the equal sign. A space after the equal sign will be treated as a part of the label. Labels may be up to 27 characters in length and may use any character except quotation marks. Labels may also include BASIC keywords.

The actual BASIC subroutine would immediately follow. The keyword RETURN would mark the end of the routine. Here's a very simple example.

## 500 REM=PAUSE <br> 510 FOR P=1T03000: NEXT 520 RETURN

Whenever you'd like for the program to pause for a few seconds, you could call the PAUSE label with La BASIC's commands.

## La BASIC Commands

The following commands are available in La BASIC.

## SYS 49152, 0

This command has no parameters. It must be used at the beginning of a program before any labels are used. It searches through the entire program for labels and sets up a table of them, their line numbers, and their addresses in a separate area of memory. By de-
fault, the memory under Kernal ROM is used, but it can be changed as described later.

## SYS 49152, 1, label

This is the GOTO command. It transfers program control to the line that contains the label. The label parameter may be any legal BASIC string, character variable, or a combination of these. For example, suppose a program contains a label such as REM=DRAW TITLE. This could be called with any of the following statements.

## SYS 49152, 1,"DRAW TITLE" <br> T\$="DRAW TITLE": SYS 49152, 1, T\$ <br> A\$="DRAW": SYS 49152, 1, AS+" TITLE"

## SYS 49152, 2, label

This is the GOSUB command. It works like the normal GOSUB, except that control is transferred to the subroutine that starts with the specified label. The subroutine should end with a RETURN statement as usual. The label can be specified as shown previously.

## SYS 49152, 5, label

This is a selective RESTORE. After this command is executed, the DATA pointer will be set to the line containing the label. The label can be specified as with the previous command.

The remaining two commands don't use labels. However, they make programming easier.

## SYS 49152, 3(row, column, color

Note that there is no closing parenthesis. This command will clear the screen, position the cursor at the specified row and column, and set the text color. The row may be from 0 to 24, and the column from 0 to 39 . Values outside this range produce an ILLEGAL QUANTITY ERROR.

## SYS 49152, 4(row, column, color

This command is similar to the previous one, except that the screen isn't cleared before positioning the cursor.

The color parameter may be used in two ways. If you want to change the printing color without changing the text already onscreen, use any Commodore color number from 0 to 15 . For example, SYS 49152, 4(0, 0, 1 will

If you want the color change to af－ fect the text that is already on the screen，add 100 to the color number． SYS 49152，4（0，0， 101 will change the color of all the onscreen text to white and make white the printing color．

In both of the above commands，the color parameter is optional．If you don＇t wish to change the text color，leave out this parameter as well as the preced－ ing comma．

## Error Messages

La BASIC may generate the following error messages．

LABEL USED TWICE IN LINES：11，12

## LABEL TOO LONG

This error occurs when an attempt is made to define or call a label longer than 27 characters．

## LABEL NOT FOUND

## MISSING LABEL

This error occurs if a null string is spec－ ified as the label in the GOTO， GOSUB，or RESTORE statement．

OUT OF LABEL MEMORY
Label memory may be increased as de－ scribed below．

## Label Storage

By default，the labels are stored under Kernal ROM．To use some other mem－ ory area，use the following statements with appropriate line numbers at the be－ ginning of the program（before the SYS 49152， 0 command）．

## 5 POKE 49967，BO／256：POKE 49968，BO－ INT（BO／256）＊BO <br> 10 TP＝TP－32：POKE 49969，TP／256：POKE 49970，TP－INT（TP／256）＊BO

In this case BO equals the bottom of the storage area，and TP equals the top of the storage area．

Each label requires 32 bytes of stor－ age，so you can have 32 labels per 1 K of memory．Thus，if the default memo－ ry area is used，up to 256 labels may be defined．

The advantage of storing labels in a separate area of memory is that La BA－ SIC doesn＇t have to look through the en－ tire BASIC program each time a label
is used．This can speed things up con－ siderably．The speed gain will be espe－ cially significant in long programs that contain many subroutines and REM statements．As long as the REM state－ ments are placed between two subrou－ tines，they won＇t slow BASIC down and your programs will run faster．

## Command Summary

## SYS 49152， 0 Set up table of labels <br> SYS 49152，1，GOTO label <br> label <br> SYS 49152，2， <br> GOSUB label

label
SYS 49152， 3
（row，column，
color
SYS 49152， 4
（row，column，
color
SYS 49152，5， label

Clear screen，posi－ tion cursor，set color Position cursor，set color

RESTORE to line con－ taining label

## LA BASIC

Cøø日：20 FD AE 2の 9E B7 Eの． 01 7F


 Cø20：4C 8B E3 4C 60 C1 4C F3 82 C028：Cl 4C F8 Cl 4C D6 Cl 4C 66 C630：4C C2 A5 2B 85 63 A5 2C 9F $\mathrm{C} 038: 85 \quad \emptyset 4 \mathrm{AD} 2 \mathrm{~F}$ C3 $85 \mathrm{FD} A \mathrm{AD} \quad 94$ Cø4の：30 C3 $85 \mathrm{FE} A 9$ Øø Aø Ø1 FA C048：91 FD A9 $\emptyset 6$ 8D 35 C3 Ag B $\emptyset$ C650： 00 Bl $0385 \quad 65$ C8 B1 93 A8 C658：85 96 C8 B1 93 8D 33 C3 CA C660：C8 Bl 63 8D 34 C 3 C 8 Bl DF C $\emptyset 68: 83 \mathrm{C} 9 \mathrm{FF} \mathrm{F}$ Ø 03 4C 4C Cl 82 $\mathrm{C} 076: \mathrm{C} 8 \mathrm{Bl}$ 日3 C9 3D $\mathrm{F} \emptyset \quad 934 \mathrm{C} \quad \mathrm{BF}$ C078：4C C1 A2 $\emptyset \emptyset \mathrm{A} \emptyset \quad \emptyset 6 \mathrm{~B} 1 \quad \emptyset 368$
 Cø88：E8 Eの 1C D E E AE 33 C 3 BB Cø90：AD $34 \quad$ C3 86 C998：98 C2 4C CC Cø A9 Ø0 9D B7 CØAØ：ØF C3 $2 \emptyset 8 \mathrm{~F}$ Cl CØ ØØ $\mathrm{F} \emptyset 99$ CØA8：34 AØ Ø2 Bl FB $85 \quad 95$ C8 $9 \varnothing$ $\mathrm{C} \emptyset \mathrm{B} 0: \mathrm{B} 1 \mathrm{FB} 85.66$ A9 37850151 CØB8：58 A9 F1 AØ C2 20 IE AB 97 CØCØ：A6 05 A5 $06 \quad 20$ CD $B D$ A9 49 CøC8：2C $2 \emptyset$ D2 FE AE 33 C 3 AD 3 A CØD $: 34$ C3 20 CD BD A9 8D 20 日E CøD8：D2 FF 6C 92 Ø3 AD $35 \mathrm{C} 3 \quad 6 \mathrm{E}$
 CØE8：AB 4C 65 A4 A CøF Ø：Ø3 E9 Ø1 91 FD C8 A5 $\emptyset 4$ ØA CØF8：E9 Ø0 91 FD C8 AD 33 C3 A8 C100：91 FD C8 AD 34 C3 91 FD 91 C108：C8 18 A5 $03 \quad 69 \quad 02 \quad 85 \quad 03 ~ 3 C$ C11の：A5 $\quad 04 \quad 69 \quad$ Ø日 $85 \quad 84$ A2 $\quad$ Ø日 16 C118：BD ØF C3 C9 ØØ $\mathrm{F} \emptyset \quad 9791 \mathrm{~B} 6$ C120：FD C8 E8 4C 18 Cl 91 ED 9F

C128：18 A5 FD 692085 FD A5 36 C130：FE 69 00 85 FE A5 FE CD 40 C138：32 C3 FØ $04 \mathrm{~B} \varnothing 09$ 9ø ØC FA C140：A5 FD CD 31 C3 9065 A9 F 6 C148：01 8D 35 C3 A9 øø Aø ø1 22 C150：91 FD A5 658503 A5 66 AA
 C160：20 $74 \mathrm{C} 2 \quad 20 \quad 8 \mathrm{~F}$ C1 C0 0171 C168：D 0 1B A 906 Bl FB 85 7A 32 C170：C8 Bl FB 85 7B C8 B1 FB FA C178：85 39 C8 B1 FB 85 3A A9 55 C180：37 85015860 A9 AC A0 4A C188：C2 20 1E AB 4C 65 A4 AD E2 C190：2F C3 85 FB AD 30 C3 8548 C198：FC 78 A9 $3485 \quad 61 \mathrm{~A} 0 \quad 01 \mathrm{~A} 3$ ClAø：B1 FB FØ 2A AØ 04 A2 $\quad 0017$ C1A8：B1 FB FØ 1A DD ØF C3 DØ 47 C1B0：85 C8 E8 4C A8 Cl 18 A5 EC ClB8：FB 692085 FB A5 FC 69 CA C1C0： 0685 FC 4 C 9 E C1 BD 0 E 96
 ClD0：A9 $37 \quad 85 \quad 815860$ A9 0352 C1D8：20 FB A3 2074 C2 A5 7B 57 ClE0：48 A5 7A 48 A5 3A 48 A5 12 C1E8：39 48 A9 8D $48 \quad 20 \quad 63 \mathrm{Cl} 74$ C1Eø：4C AE A7 A9 9320 D2 FF 98 ClF8：A9 2820 FF AE 20 9E B7 4A C200：86 ø2 20 FD AE 26 9E B7 18 C208：8A A8 A6 62 E 019 B 1937 F5 C210：C0 $28 \mathrm{~B} \emptyset 331820 \mathrm{~F} 0 \mathrm{FE} 6 \mathrm{C}$ C218：A 00 B1 7A C9 2C Dø 0D 79 C220：20 FD AE 20 9E B7 Eø 6366 C228：B $0048 \mathrm{EE} 86 \quad 926038$ 8A CD C230：E9 64 A0 60 8D $86 \quad 6299 \mathrm{FB}$ C238： 00 D8 99 ø日 D9 99 ø0 DA 37 C240：99 00 DB C8 Dø F1 60 A2 4C
 C250：8F C1 C 0 ＠1 F 0 03 4C 85 E7 C258：C1 A 00 Bl FB 8541 C8 43 C260：B1 FB 8542 C8 Bl FB 85 1D C268：3F C8 Bl FB 8540 A9 37 6D C270：85 $01 \quad 5860 \quad 20$ FD AE 2080 C278：9E AD 20 A3 B6 AA FØ 22 5B C280：C9 1C $\mathrm{B} \varnothing 14 \quad 85 \quad 82 \mathrm{~A} \varnothing \quad 06 \mathrm{BE}$ C288：B1 2299 日F C3 C8 C4 0260 C290：Dø F6 A9 ø日 99 0F C3 6062 C298：A9 BD Aø C2 $2 \varnothing$ 1E AB 4C BE C2Aø：65 A4 A9 CD Aø C2 28 1E 82 $\begin{array}{lllllllll}C 2 A 8: A B & 4 C & 65 & A & 12 & 4 C & 41 & 42 & 94\end{array}$ $C 2 B 0: 45 \quad 4 \mathrm{C} \quad 20 \quad 4 \mathrm{E} 4 \mathrm{~F} \quad 54 \begin{array}{llllll}50 & 46 & 27\end{array}$ C2B8：4F 55 4E $44 \quad 60 \quad 12 \quad 4 \mathrm{C} 416 \mathrm{~B}$ C2C0：42 $454 \mathrm{C} \quad 2 \emptyset \quad 544 \mathrm{~F} 4 \mathrm{~F} \quad 2 \emptyset \mathrm{E} 2$ C2C8：4C $4 \mathrm{~F} \quad 4 \mathrm{E} \quad 47 \quad 06 \quad 124 \mathrm{D} \quad 49 \mathrm{~B} 2$ C2D $0: 53 \begin{array}{lllllllll}53 & 49 & 4 \mathrm{E} & 47 & 28 & 4 \mathrm{C} & 41 & 77\end{array}$
 C2Eの：20 $4 \mathrm{~F} \quad 46 \quad 204 \mathrm{C} 41424546$ C2E8：4C $2 \emptyset 4 \mathrm{D} 454 \mathrm{D} 4 \mathrm{~F} 525940$ C2F0： $0012 \begin{array}{llllllll}12 & 4 \mathrm{C} & 41 & 42 & 45 & 4 \mathrm{C} & 20 & 78\end{array}$ C2F8：55 $53 \begin{array}{llllllll}55 & 44 & 20 & 54 & 57 & 49 & 35\end{array}$ C30日：43 45 2ø 49 4E 204 C 49 E7 C308：4E $45 \quad 53 \quad 20 \quad 3 \mathrm{~A} \quad 20 \quad 00$ ø0 C6


 C328： 00 00 000000000000 AF


Farid Ahmad，the author of Sprint III （June 1992），lives in Islamabad，Paki－ stan．

## SPEEDSPELL

By Daniel Lightner

SpeedSpell Utility Program (SUP) and SpeedSpell are a pair of programs for the 64 that can check SpeedScript documents for spelling errors. SUP is used to create and edit SpeedSpell dictionary disks, and SpeedSpell checks the spelling. If you already have COMPUTE's SpeedCheck, SpeedSpell can utilize your SpeedCheck dictionary. Both SUP and SpeedSpell are written in machine language. To enter them, you'll have to use MLX, our machine language entry program; see "Typing Aids" elsewhere in this section. When entering SUP with MLX, respond with the following values at the prompts.

Starting address: 0801
Ending address: 11C0
When entering SpeedSpell, respond with these MLX values.

## Starting address: 0801 <br> Ending address: 1518

Be sure to save copies of these programs after you've finished typing.

## The Utility

Load and run SUP as you would any BASIC program. When the menu appears, choose option 1 to create a new dictionary disk. You'll have the option to format the disk. Before you answer the prompt, be sure that you place a new disk into drive 8. Never use a disk that contains any important files. Choose Y to format and N to abort. SUP prompts you to place the target disk in the disk drive and press the space bar to begin formatting.

SUP formats the disk and puts end-of-file markers on certain sectors. The program puts a unique ID of SS on its dictionary disks, so try to avoid using this ID on SpeedScript or SpeedSpell disks.

After a disk has been formatted, you won't need to use this option again with that disk. Using option 1 on a valid dictionary disk will destroy any information that it may contain.

SUP sets up 104 storage areas, with each area containing six blocks. Each letter of the alphabet has four ar-
eas assigned to it, and each area can hold up to 1535 characters and one end-of-file marker. Each of those four areas is designed to hold words whose second letter falls within a certain range of characters. For example, the first area assigned to the letter $A$ would hold words that begin with $A$ and whose second letter falls within the range $A-H$. The next area assigned to A would contain words whose second letters fall within the range $1-N$. The next area would be for letters $O-T$, and the last area would be for $U-Z$.

Following this group, the next four areas would be assigned to the letter $B$, then $C$, and so on. This system reserves space for 6140 characters for each letter. Words are stored in these areas back to back, minus the first character, with bit 7 of the last character set. By storing words in this fashion, SpeedSpell can check a text file much faster than the original SpeedCheck.

A newly created dictionary contains no words. It must be compiled by entering words one at a time, using option 2, or from SpeedSpell during an actual spell-checking session. With option 2, just type the word that you wish to enter and press Return. If the word already exists in the dictionary, it will be ignored.

Option 3 lets you delete any misspelled words that may be in your dictionary. Just follow the same steps used in option 2.

Option 4 lets you look at an area of words. Choose this option, and you'll be prompted for the first letter of the word. Next, you'll have to enter a number from 1 to 4 , depending on the word's second letter. The ranges will be listed so you can easily decide which range is correct. When the listing starts, you can freeze it by holding down the space bar. It restarts when you release it.

If you have a SpeedCheck dictionary, use option 5 to add its words to the SpeedSpell dictionary. It's better to do this before you put any words in your SpeedSpell dictionary because SUP won't check for duplicate words while adding the SpeedCheck listing. You'll be prompted as to which disks to place into the drive.

Use option 6 when you wish to exit SUP.

## SpeedSpell

Once you have a working dictionary, use SpeedSpell to check the spelling of your SpeedScript documents. Load and run SpeedSpell as you would a BASIC program. When the menu appears, choose the L option to load a SpeedScript document for checking.

After your file loads, SpeedSpell races through the document, setting flags to determine which words will be searched for in the dictionary. SpeedSpell uses a specially formatted dictionary disk so that it can rapidly find certain words. After SpeedSpell has set its flags, it'll prompt you to insert the dictionary disk in drive 8 and press the space bar. SpeedSpell checks for the SS ID to be sure that it's a dictionary disk. Be sure that the other disks you use have a different ID.

Next, SpeedSpell starts loading certain sectors from the disk and checking the document for the words found in those sectors. SpeedSpell only checks words more than four characters long. This process can take several minutes if the dictionary is large. The dictionary can store 24 disk blocks of words for each letter of the alphabet. After the document has been checked, you can start editing words. Use the G option to get the first misspelled word. If no words are found, SpeedSpell responds with an End of file! bar and the Inst/Del key to correct the spelling. This is a good time to have a paper dictionary handy. Press Return to place the corrected word in the document.

If a word is correct but not in your dictionary or if the word has been edited, you can add the word to the dictionary by selecting the P option. SpeedSpell checks the dictionary automatically for the word before it enters it. It will not save duplicate words.

Function key $\mathrm{f7}$ can be used to recall the last misspelled word. It will recall the word even if it has been edited and entered into the dictionary.

Finally, when the last word has been fixed, select the S option to save the file to disk. Remember to swap disks. SpeedSpell looks at the ID to be sure that you've removed the dictionary disk.

SpeedSpell marks the misspellings by adding a value of 128 to each charactectwWirserffrifidaore.ca
or stage 2 commands，try not to put them in bunches of more than four． SpeedSpell will mistake them for mis－ spelled words and subtract a value of 128 from them，leaving them as use－ less letters in the document．

Choose Q to quit SpeedSpell．Be sure to make backup copies of all your important SpeedScript disks， SpeedSpell，SUP，and especially your dictionary．

## SUP

ब801： $9 \mathrm{~B} \quad 98 \quad 78 \quad 17$ 9E $32 \quad 34 \quad 30 \quad 6 \mathrm{E}$ 0809：37 $00 \quad 00 \quad 00 \quad 20 \quad 20 \quad 20 \quad 20 \quad 96$
 6819：3C 6899 F8 60 B9 FD 68 F6 0821：99 $33 \quad 0388$ D6 F1 A0 99 4C 0829：B9 øC 9899 FF 0388 D 9 Al 9831： $\mathrm{F7}$ A9 D7 85 2D A9 $13 \quad 85$ B6 Ø839：2E 4 C 60 61 日A 60 62 D7 11 9841：13 3710 B9 6E 9999 E8 F9 0849：07 C8 D6 F7 EE 62 61 EE 19 ஏ851：$\varnothing 5$ Ø1 C6 F9 D $\varnothing$ ED A2 6323 ஏ859：28 $34 \quad 03 \mathrm{Fg} 33 \mathrm{C9} 97 \mathrm{D} 995$ 9861：16 A2 $61 \quad 20 \quad 34 \quad 93 \mathrm{D} \varnothing$ gA Ag 0869：A2 $042061440318 \quad 69 \quad 9765$
 Ø879：A8 A5 A7 85 A9 A5 FE 85 FB 9881：F7 A5 FF 85 F8 $206 \mathrm{C} \quad 0373$ Ø889：A5 F8 85 FF A5 F7 85 FE 72 Ø891：E8 $26 \quad 34 \quad 63$ D6 1E A2 $\quad 08 \quad 21$ 9899：20 $34 \quad 03$ A 06284 A8 85 2A 98A1：A6 18 A5 FC 65 A6 85 F7 58 98A9：A5 FD 65 A7 85 F8 20 6C EF Ø8B1：$\varnothing 3$ 4C 1301 E8 $20 \quad 34 \quad 93 \mathrm{FB}$ Ø8B9：D $\varnothing 1 \mathrm{C}$ A $96384 \mathrm{A8} \mathrm{E} 82036$ Ø8C1：34 $93 \mathrm{~F} \emptyset \quad 98 \mathrm{~A} 2$ ø8 $20 \quad 34 \mathrm{~F} 4$ Ø8C9： 03 4C 5C 01 A2 ØF $20 \quad 34 \mathrm{CF}$ Ø8D1： 03 E6 A7 4C 5C 91 E8 20 AF 08D9：34 03 D6 日A E8 $20 \quad 3403$ B2 Ø8E1：18 $69 \quad 94$ A8 Dø D6 E8 $20 \quad 37$ Ø8E9：34 $63 \mathrm{D} \varnothing$ ØA A2 62 2ø 3421 68F1： $031869 \quad 96$ D 18 ED A2 68 A2 68F9：20 $34 \quad 03$ Dø E6 A9 0085 F7 6901：A7 A4 FB F0 ØC 06 FA 2A 37 Ø909：26 A7 C6 FB CA D $\emptyset$ F2 A8 D8 6911：60 48 B1 FE 85 FA A9 98 FE 0919：85 FB 68 A4． FE D $\varnothing 02 \mathrm{C} 64 \mathrm{~A}$ 6921：FF C6 FE C $\varnothing$ E7 D $\emptyset$ DE A4 B5 9929：FF Cø 67 Dø D8 A9 3785 BA Ø931： 61584 C gD 98 A4 A8 Fø 49 9939：22 A5 F7 38 E5 A8 B $\varnothing 03$ 7E 9941：C6 F8 $38 \quad 85$ E7 A5 FC E5 8A 6949：A8 B6 62 C6 FD 85 FC Bl 3A Ø951：F7 8891 FC 98 D 0 F8 C4 42 6959：A9 F6 6A B1 F7 C6 FD C6 76 6961：F8 C6 A9 10 EC 6078 E6 98
 6971：C8 07 9E $32 \quad 30 \quad 36 \quad 31$ E3 41 Ø979：92 ø9 A9 2ø 8D B2 92 C1 6C 9981：8D 18 D9 98 EF 8D $28 \quad 93 \quad 25$ Ø989：70 AB $2 \varnothing 1121$ D 020 C7 28
 Ø999：80 1F 00 A9 45 AA 3811 A4 Ø9A1：85 FC C $\varnothing 59 \quad 93$ Ø0 Fø A8 66 ø9A9：54 B8 1E Cø 3 A D3 61 5E 66

99B1：31 Fø $17 \mathrm{C9} 32 \mathrm{Fg} 24 \mathrm{C} 9 \mathrm{~F}$ 99B9：33 $15 \begin{array}{llllllll}67 & 34 & \mathrm{~F} & 27 & \text { C9 } & 35 & \mathrm{C} 7\end{array}$ Ø9Cl：Eg 2E C9 36 F0 354 C 49 B 2 09C9：AE B9 9C B7 B8 $80 \quad 42 \mathrm{Cl}$ BE ब9Dl：$\varnothing 6 \quad$ ØA $77 \quad 98 \quad 814299 \quad 99 \quad 33$ 99D9：A5 76 AA $0 C 9742$ A9 92 日C 99E1：8D BF $\quad 99$ AE $\quad$ ØE 4 C 2D $85 \quad 38$ 09E9：59 E2 FC 34 4A DB BC ØC 8B Ø9F1：Eの 88 ØE 6034 ØC 4 E Fø DD 09F9：67 C9 $5958 \mathrm{~EB} 9 \mathrm{E} 66 \quad 05 \mathrm{8E}$ ØAø1：80 A9 13 A2 73 D9 44 80 58 ØAø9：$\emptyset \mathrm{F}$ A7 8940 1C BA C8 7192 ØA11： 01 A9 0 F 2B $5640 \quad 94$ ø0 81 ØA19：5A ØC Bø 9C 8A F3 øø 86 E7 ØA21：7A 86
 ØA31：9B $\quad 9318 \quad 56 \quad 3013 \mathrm{~A} \varnothing 145 \mathrm{~F}$ ØA 39：67 26 Ø0 47 DC 00 EC C7 87 ØA41：25 60 E2 $21 \mathrm{~F} \emptyset 15$ A7 12 AB ØA49：Aの $\mathrm{FD} \quad 40 \quad 009580 \quad 0 \mathrm{~A} \quad 99 \mathrm{BD}$ ØA51：68 68 9C $73 \quad \emptyset 0 \quad 22$ AB Aø $\quad \mathrm{FE}$ ØA59：D1 F2 E1 66 D3 720788 B4 ØA61：80 98 6368 EC 43 1D 80 F1 ØA69：Fø 63 D8 El 08 E6 F6 5F F4 ØA71：71 $94 \mathrm{~B} \emptyset 602066$ 日D $78 \quad 88$ ØA79：4A ØD C9 $\quad 6590$ B8 4D A7 29 ØA81： 6960 AC 35 Ø3 B9 9E 1269 ØA89：A8 AD E4 68 C9 $9990 \quad$ ØB $1 F$ ØA91：48 ØF $90 \quad 06$ C8 C9 15 90 28 GA99：01 C8 8C 60 FC B7 C3 A3 E9 ØAA1：A5 EØ 9D C3 8F $80 \quad 00$ D $\emptyset$ FF gAA9： $03 \quad 20 \quad 89$ 日E 2D 9B 01 C3 F6 ØAB1：3B $2 \mathrm{~A} \quad 62 \quad 5 \emptyset 9 \mathrm{~B}$ E1 EC 33 A4

 ØAC9：A2 1E 8036 DD CB F0 1842 ØAD1：8A DC $\quad 03$ 1A 76 B 0 E8 EC 99 gAD9：40 4D E6 4D 41 Cl 1E C 0 21 ØAE1：$\emptyset A$ ØA EE 13 AD C3 20 7C C5 ØAE9：48 81 ØF 92 1C ØA C5 1029 ØAF1： 01604 C B3 E7 EE 80 AD ØD ØAF9：BF EA $\quad 01$ FØ F 43732 C9 8A ØB01：C5 72 6E 0A D6 E8 $28 \quad 2 \mathrm{~F}$ AE ØB09：38 24 AA C5 FB $8213 \quad 49 \quad 4 \mathrm{~F}$
 ØB19：14 $94 \begin{array}{lllllll} & \text { A } & 50 & 45 & 20 & \text { BE } & \text { F8 } \\ 74\end{array}$
 ØВ $29: \emptyset 6 \quad 21 \quad 38 \quad 76 \quad 03$ ØC B4 FD A8 ØB31：E6 B5 $2 \emptyset \quad 5 \mathrm{~A}$ 5A 3 F 9ø 90 C 4 ØB 39：D4 0A $20 \quad 72$ 日9 20 2D Eの 6B
 ØB49：D $\varnothing$ E9 4C D8 38 A5 FB ED 97 ØB51：34 63 CE 6A $6 \varnothing$ FC E9 4A D4 ØB59：ØD Aø Ø1 40 5D $8 \emptyset$ F7 $8 \emptyset \quad 9 \mathrm{~F}$ ØB61：Cø B2 10 B7 81 C3 6A 5C 8D
 ØВ $71: 45 \quad 18 \quad 80$ C2 E3 C9 4 A C2 0 A ＠B79：ø0 E9 ØA 76 FD ØD FB A9 78

 ØB91： 20 AE $\quad 58 \quad 42 \quad 81$ E7 40 F9 B8日B99：A2 EB C6 $45 \quad 64 \quad 21 \quad 62$ 2E 63 ØBA1： 40 CD 41 B2 $\mathrm{F} \emptyset \quad$ ØF 18 2D BF ØBA9：A2 Dø EC $9 \emptyset \emptyset 4$ FØ 0320 F5 बBB1：F6 9B 4D 86 D6 62 19 5 5E 67 ØBB9： 05 84 D $\emptyset$ Ø8 A9 AA E1 63 CC ØBC1：30 1018 1A 28 Ø1 F1 4C 9E QBC9： $3 \mathrm{E} \quad 47$ ED $\mathrm{F} \emptyset \quad \mathrm{B} 4 \quad 2 \mathrm{~F}$ FF 9696
 ØBD9：ØC C9 $\quad 30$ D $\varnothing \quad 094 \mathrm{C}$ BB 1581

ØBE1：C5 8D E1 01 A9 81 A5 EF 29
 ØBF1：81 gC $34 \quad 05$ D6 A9 1D 7A 84 ØBF9： $03 \quad 60 \quad 2 \mathrm{C} \quad 61 \quad \mathrm{~B} 9 \mathrm{E} \varnothing \mathrm{B} \emptyset$ 3A 2 C ØCø1：60 BF C9 ØD DA 4D ØD A2 ØC ØC09：FA 9A 4 C ØD 68 AE AF $78 \quad 72$ ØC 11：øC $68 \quad 9 \mathrm{C} 78 \quad 24 \quad 04 \quad 88 \quad 97 \mathrm{AD}$ øC19：AE C6 62 A9 C4 1D 92 ØB DE ØC21：48 FB 144 AB 48 CC Bø 026 C ØC29：EC AC $\quad \emptyset 0$ AD C5 5414 C9 2 F
 ØC 39：ø8 Aø 11 C9 1F $9 \varnothing$ Ø2 AØ 1C ØC41：10 8C C4 0284 F7 8D 8D E9 ØC49：$\varnothing 6$ D8 C8 68 80 ØD 68 FD 41 ØC51：9Ø 89 FD A5 FE EE AØ FE 22 ØC59：60 18 A5 FB 690085 FB 6 E ØC61：A5 FC 69 Ø1 85 FC E8 4D 08 ØC 69： 0120 CF FF 917237 ØD D5
 बC79：8C 62 A9 6585 FD 4C 4 B E5 ØC81：øC 20 Ø8 ØE 8E A3 29 EE CE 6C89：54 $28 \quad 25$ 6D $3 \mathrm{E} \quad 28$ 19 1E 34 बC91：56 62 AD 1D $62 \quad 69$ 19 $11 \begin{array}{llll} & 54\end{array}$ ØC99：DØ A9 9820 B1 E3 49 6F A6 ஏCA1： 85 B9 28937 D C8 7689 Al ØCA9：A8 $91 \quad 87 \quad \emptyset 3 \quad 66 \quad 20$ AE C $\varnothing 6 \mathrm{D}$ ØCB1： 3 C B9 FC ØF 75 21 बF 3 BB 78 øСВ9：21 $15 \quad 41$ 3E 21 C5 $35 \quad 84 \quad$ C2 ＠CCl：14 1C 018 C 16 ø0 ØA D3 6C ØCC9：$\varnothing 2 \quad 80 \quad 3 \mathrm{~B} \quad 87 \quad 17 \quad 00 \quad 47$ 6A 94 ØCD1： 31 9ø F5 C9 35 Bø F1 6658 ØCD9：C7 311180608547 CC BD ØCE1：86 43 4ø 4 B 1E 6 F ØØ Fl 6 B

 ØCF9：D4 $82 \quad 37$ C3 01 F6 11 ØC 52 6D61：AA 6 D 8018 日E 4720 5F 8A
 ØD11：FF D $\emptyset$ FB E8 E $\emptyset 50$ D 0 F4 4 C ØD19：C2 31 8A 59 Ø0 3E ØD EE C9 ØD21：9E AD C6 62 C9 32 Dø F3 9B
 9D31：85 D3 A9 1785 D6 20 6C DD ØD39：E5 AD F8 8C 83 A8 B9 8955 ØD41：50 10 $\quad 00 \quad 06$ 9E $42 \mathrm{C} \varnothing \quad 03$ 6A ØD49： 99 Ø0 86 F9 C9 日A 5947 C8
 ØD59：40 9ø E9 C9 5B Bø E5 C5 Cø 9D61：1F 14 FG DE F2 76 20 C4 92
 ØD71：88 B9 $\quad$ DC $\quad 0218 \quad 69808 \mathrm{BE}$ EC ØD79：A9 ØD 4C E8 3E Øø A2 C9 C4 9D81：27 $42 \begin{array}{llllllll} & 38 & \mathrm{E} 9 & 40 & 99 & 35 & 63 & 3 B\end{array}$ ØD89：EE 04 3E 60 AC 4019 CØ 43 ØD91：$\varnothing 1$ Bø A6 91 91 Bø A9 $20 \quad 99$ ØD99：45 A9 9D 50 4D 14 Fl $40 \quad 58$
 ØDA9：20 DC B1 DC 718 8C 69 C7 67 ØDB1：60 A9 01 A2 $57 \mathrm{~A} \varnothing 91 \mathrm{FF} 11$ ØDB9：80 ØF AØ A1 06804 C C 091 $\emptyset D C 1: F F$ EF A3 $8 \mathrm{E} 71 \mathrm{~A} 2 \square 08 \mathrm{E} 9$ $\emptyset D C 9: B \emptyset \quad 28$ A2 $\quad \emptyset 9 \quad 8 \mathrm{E} 4 \mathrm{~B} A \emptyset \quad \mathrm{~B} \emptyset \quad \mathrm{BE}$ ØDD1：21 88 DD 96 AD 42 ØE FD 4B ØDD9：6A ØE 90 ØF 8D B4 62 AD Aø ØDE1：88 17 FD 69 日E 8D B3 62 6C ØDE 9：C8 D6 E3 98 CA FØ $11 \mathrm{C9}$ A8
 ØDF9： $0230 \quad 65$ AD B2 02 FØ $05 \quad 21$ ØEø1：29 7E 2074 ØE CA 10 C4 5D


のE11： 031027 8C E0 Cl 43 AC A1 ØE19：88 99 FB $62 \quad 75 \quad 2 \varnothing$ FØ $64 \quad 91$ ØE 21：C8 8C B $\emptyset \quad 62$ AC B1 02 1B 46 ØE 29：A7 C8 86 Al B8 $83 \quad 6560 \quad 35$ ØE $31: 9 \mathrm{E}$ 8B B1 10 EA 62 2C E7 D7 ØE 39：4C $9682 \quad 6633 \quad 32 \quad 00$ B6 $\mathrm{E} \emptyset$ 0E41：90 B9 A9 1320 D2 FF C8 8F ØE49：Cø 21 D $\varnothing$ E5 42 6E 9E $2 \emptyset$ B $\varnothing$ ØE51：D6 F9 AC C9 B9 8F 49 2C 51 0E59：00 A9 2C 41 1A A9 53 8D 25 ØE61：37 6575 日F 38 AD 0512 A6 のE69：E9 $40 \quad 8 \mathrm{D} \quad 35$ Ø3 28 C3 4616 ØE71：10 8D 36 E6 A7 992585 5F QE79：A8 B9 CA $7565 \quad 20$ B9 CE F3 ØE81：13 8D 822120 F8 0A D6 BC QE89：B1 EB 48 日E 96 8D 46 4C A6
 ØE99：CD C5 02 E3 CD C6 02 B 0 CA ØEAl：19 A2 36 D4 31 B1 F2 91 CE ØEA9：FB 2611 EB 07 ØE 1B 08 5B ØEBl：B1 4D 57 F7 $\emptyset E \quad 5 B 4 C$ 1A F4 ØEB9：$\sigma F$ EE $592 \emptyset 79$ ØA AD $8 \emptyset 16$
 ØEC9：8D C8 02 EE Aø AD C7 02 5B ØED1：C9 1A F0 63 4C B6 $0 E 6061$ ØED9：2の F3 ø0 73 2B 0085 9D 3C ØEE1：8B 08 A $\varnothing$ A8 30 BA 0493 DB ØEE9：A2 35 A 06320 BD 0178 5B ØEF1：52 A2 43 Øø 09 C 0 FF AØ 34
 ØF 日1：14 11 Aの 901520 E4 80 FD ØF09：14 Ø1 90 1E C9 80 Bø 1A 31 ØF11：C8 C2 $\begin{array}{llllllll}35 & 88 & 84 & 21 & 2 \varnothing & \text { B7 } & 14\end{array}$ ØF19：FF C9 Ø0 DØ Ø9 2ø 1F ØC C9 ØE21：20 EØ ØF 4C Al ØF A9 FE CA ØF 29：91 FD A2 øø 20 C6 FE A9 A9 ØF $31: \emptyset 2 \quad 2 \emptyset$ C3 FF 4 C 65 ØB A5 84 פF39：FE C9 C5 5E C2 1B A5 ED B3 ØF41：C9 FF F6 61 D4 04 FE 4269 9F49：60 A9 D6 85 FD A9 138577 ØF51：FE 6060 BC El 0E 8C 8C CB ØF59：1C 96484 F 4 F 53475 E 5 C बF61：2の $4 \mathrm{E} \quad 17 \begin{array}{lllllll}53 & 50 & 28 & 5 \mathrm{~A} & 61 & 14\end{array}$ 9F69：41 8C 42 48 A3 50 Ø8 6389
 ØF79：4F Cø 2854341050 ØE 4A
 ØF89：41 g1 C6 46 4F 52 4D 2448 ØE91：36 $28 \quad 59$ 2F 4E GD $23 \begin{array}{lllll}55 & 33\end{array}$ ØF99：31 ØB 37 D8 55098083 DA ØFAl：2g 42 2D 50 20 32 20 3045 ØFA9： $86 \quad \emptyset B \quad 2 D \quad 5549 \quad 2 B \quad 4 \mathrm{E} \quad 30 \quad 8 \mathrm{C}$ ØFB1：3A $\quad \varnothing$ EF 2A 3A 2A 2C 7C DC ØFB9：9E 40 1C 45 AA 36 3C 54 日A ØFCl：8A 4A 06 1D 1902 1C 48 DA ØFC9：B8 8C $40 \quad 25$ 8E FB 901 C 42 ØFD1：54 41524745 DD 47 9A F3 ØFD9：92 1F DØ Eø 2ø 1C 12 Ø1 C8 बFEl：34 $68 \quad 82 \quad 644143 \quad 45 \quad 96$ FC ØFE9：93 $75 \quad 29 \quad 306 F$ 3C 5A 03 7B
 gFF9：39 32 EC $7 E 434 \mathrm{~F} 4 \mathrm{D} 74$ 2D 1001：99 61 A2 505542 D7 D8 C3 1009：43 6416 20 004449 4E 9A 1011：54 $85 \quad 254 \mathrm{C} 5450 \quad 65$ F8 ØD 1019：16 $50 \quad 52494748 \quad 54 \quad 538 \mathrm{E}$ 1021：2ø 65 A7 $5345 \quad 52 \quad 56$ C4 Al 1029：1D ØD 日D 93 B3 9A $1315 \quad 39$ 1031：80 9491 CF 55 C6 541165 1039：BD Cl 4C 4C $20 \quad 55$ 5C A6 AC

1041：4C $4 \mathrm{~A} \quad 59 \quad 20 \quad 50 \quad 524 \mathrm{~F} \quad 47 \mathrm{~F} 8$ 1649：52 41 4D 日D B9 71 EF 28 F8 1051： 0 E 5A ØD F9 B8 31 E7 63 8E 1059：43 52 45 $41 \begin{array}{llllll}53 & \text { A7 } & 4 \mathrm{E} & 91 & \mathrm{D} 3\end{array}$ 1061：DA 53 4B D2 B8 F0 32 Cl 6A 1069：BA A3 63 C4 33 A7 6344 CB 1071：45 8B $54 \begin{array}{lllllll}45 & 89 & 6 C & 20 & \text { A4 } & \text { D8 }\end{array}$ 1079：0E 80 F1 71 El 34 F3 B1 8F 1081：56 $4945 \quad 57$ E9 $9843 \begin{array}{lllll}54 & 87\end{array}$ 1ø89：49 4F $4 \mathrm{E} \quad 41525960 \quad 38 \mathrm{~F} \varnothing$ 1091：C9 8535 日F C9 414444 AF $\begin{array}{llllllll}1099: 1 E & 19 & \emptyset \emptyset & C 3 & 46 & 49 & 4 C & 45 \\ 80\end{array}$ 16A1：53 $9762 \quad 66 \quad 3268$ 1D 2887
 1ロB1：49 54 ØD Eø 7E 3091 E2 F5 10B9：91 50 El 41 Bø 11 2D 2D 58 1øC1：2D 60 CB 00 øの 04 日8 ØC 36 10C9：10 $14 \begin{array}{lllllll}18 & 1 C & 20 & 24 & 28 & 2 C & C 9\end{array}$ 1øD1：30 $34 \begin{array}{llllllll} & 38 & 3 C & 40 & 44 & 48 & 4 \mathrm{C} & \text { D1 }\end{array}$ 10D9：50 54 58 5C 606436 F8 02 1øE1：00 01 01 02 02 02 0 D 03 B7 10E9： $03 \quad 0404084 \mathrm{D} \varnothing 00 \quad 05 \quad 05 \mathrm{E} 2$ 10F1：06 06

 1109：0D ØD ØE ØE ØE ØD ØF ØF 69 1111：10 10 10 Dø 00111112 C6 1119：12 $121213131314 \begin{array}{lllll}14 & 14 & 81\end{array}$ 1121：15 15 15 E7 $81 \begin{array}{llllll}16 & 16 & 17 & \text { D7 }\end{array}$ 1129：17 $17 \begin{array}{llllllll}18 & 18 & 18 & 19 & 19 & 19 & 91\end{array}$ 1131：1A 1A 1A 1B 1B 1B 1C 1C 75 1139：1C 1D 1D 1D IE IE 1E IF EA 1141：1F 1F $20 \quad 3 \mathrm{C}$ F8 8D 1C 8 F 48 1149：86 ØE ØF $83 \quad 39$ ØC $32 \quad 12$ BC 1151：8A 87 日C $89 \quad 02$ 日8 0 日E $01 \quad 02$ 1159：07 ØD 00 06 øC 12 05 ØB 60 1161：11 04 0A $1078 \quad 3 \mathrm{~A} C 2$ C2 10 E
 1171：4F $52 \begin{array}{llllllll} & 44 & 3 F & 20 & 41 & 42 & 43 & 1 A\end{array}$ 1179：44 $45 \quad 46 \quad 47 \quad 48 \quad 494 \mathrm{AA} 4 \mathrm{~B} \quad 93$ 1181：4C 4D 4E 4F $50 \quad 515253$ 9B 1189：54 55 56 575859 5A 6 D 55 1191：9A $20205055 \quad 5420 \quad 53 \mathrm{Al}$ －1199：50 45454443484543 2B 11A1：64 $78 \quad 024449534 B \quad 20$ E6 11A9：49 $4 \mathrm{E} \quad 20445249 \begin{array}{llllll}56 & 45 & \text { F5 }\end{array}$ 11B1： $0 D \quad 01$ E8 $02 \quad 99 \quad 0 F \quad 15$ 1B Al 11B9：65 00 Ø0 EA $80 \quad 00000041$

## SPEEDSPELL

Ø8ø1： $\mathrm{BB}_{\mathrm{B}} \quad 68 \quad 76 \quad 179 \mathrm{E} \quad 32 \quad 34 \quad 306 \mathrm{E}$
 9811：20 $2 \varnothing 20 \quad 20$ 20 Aø C4 B9 66 9819：3C 9899 F8 60 B9 FD 98 F6 0821：99 $33 \quad 0388$ D 0 F1 Aø 99 4C 0829：B9 ØC 08 99 FF $63 \quad 88$ D® A1 ஏ831：F7 A9 7885 2D A9 1885 D4 0839：2E 4C $60 \quad 61$ ØE $60 \quad 65 \quad 78$ F7 0841：18 8E 13 B9 6E 9999 E8 B2 0849：87 C8 D 0 F7 EE 02 01 EE 19 0851：05 61 C6 F9 D 6 ED A2 0323 Ø859：2の $34 \quad$ ø3 $\mathrm{F} \varnothing \quad 33$ C9 $97 \mathrm{D} \varnothing 95$
 ஏ869：A2 $04206340318 \quad 69 \quad 07 \quad 65$
 ஏ879：A8 A5 A7 85 A9 A5 FE 85 FB 0881：F7 A5 FF 85 F8 20 6C 6373 0889：A5 F8 85 FF A5 F7 85 FE 72 0891：E8 $20 \quad 34 \quad 03 \mathrm{D} \varnothing$ IE A2 $\quad 08 \quad 21$ Ø899：2ø $34 \quad \emptyset 3$ Aø $\quad 0284$ A8 85 2A

Ø8A1：A6 18 A5 FC 65 A6 85 F7 58 08A9：A5 FD 65 A7 85 F8 2ø 6C EF 98B1： 63 4C $13 \quad 01$ E8 $20 \quad 34 \quad 63 \mathrm{FB}$ Ø8B9：D $\emptyset 1 C$ Ag 9384 A8 E8 $2 \varnothing 36$ 08C1：34 03 F 6 ø8 A2 08 20 34 F 4 ஏ8C9： 03 4C 5C ø1 A2 0 F 2034 CF 98D1： 03 E6 A7 4C 5C 01 E8 $2 \varnothing$ AF Ø8D9：34 Ø3 Dø ØA E8 $2 \emptyset \quad 34 \quad \emptyset 3$ B2 ø8E1：18 $69 \quad 04$ A8 D6 D6 E8 $2 \emptyset 37$ ஏ8E9：34 63 D6 日A A2 02 20 3421 ø8F1： $0318 \quad 69 \quad 06$ D 0 ED A2 08 A2 Ø8F9：2Ø $34 \quad 63$ Dø E6 A9 9685 F7 9901：A7 A4 FB FØ øC 66 EA 2A 37 6909：26 A7 C6 FB CA D6 F2 A8 D8 9911：60 48 Bl FE 85 FA A9 08 FE Ø919：85 FB 68 A4 FE D6 02 C6 4A Ø921：FF C6 FE C $\emptyset$ E7 Dø DE A4 B5 9929：FF Cø 07 D $\emptyset$ D8 A9 3785 BA 9931： 6158 4C ØD Ø8 A4 A8 FØ 49 ஏ939：22 A5 F7 38 E5 A8 B6 63 7E 9941：C6 F8 38 85 E7 A5 FC E5 8A Ø949：A8 B $\emptyset \quad 02$ C6 FD 85 FC Bl 3A ø951：F7 88 91 EC 98 Dø F8 C4 42 6959：A9 F6 ØA B1 F7 C6 FD C6 76 $0961:$ F8 C6 A9 10 EC 6078 E6 98 9969： $61 \quad 4 \mathrm{C} \quad 16 \quad 08 \quad 60 \quad \emptyset 0 \quad$ ØB $\quad 08 \quad 73$ Ø971：C8 $\quad 07$ 9E $32 \quad 30 \quad 36 \quad 31$ E3 41 0979：54 øE D8 78 A5 $61 \quad 29$ FE 5E 9981：85 Ø1 58 8A D7 67 CE 98 5D 6989：64 ØE E9 24 8D B2 6839 E1 6991：C1 8D $18 \quad 63$ A9 EF 8D 28 6B 9999： 63 A5 252017161068 D6 99A1：D6 8D øø A8 8D D $\varnothing 93$ BD A1
 99B1：D® A8 190320 EB 9 D 77 EB
 ब9C1：85 FB A9 1585 FC Eø 7D 7B 99C9： $0 \varnothing \quad 0086 \quad 63$ D2 C1 404041 69D1： 24 86 6161 2D 8D E7 67 CE 69D9：C1 F9 $42 \mathrm{~A} \emptyset \mathrm{D} \varnothing \mathrm{lB} 50 \mathrm{Fg} 22$ 69El：1B C9 47 Fg 28 C9 4C Fø DD Ø9E9：1E $60 \quad 7288 \quad 62 \quad 35$ C9 45 B7 99F1：FØ 3D C9 88 F 033 C 951 C 6 69F9：Fg 26 4C 7B Dl 85 ØE 1828 ØA01：A1 96 1D 99 CA $2437 \quad$ ØF EF ØA $99: 4 \mathrm{~B}$ A3 F 6 4B 8D D4 9276 B2 6A11：7D 99 8D D5 8A 371183 日C GA19：1C 4C E2 FC 2095 ØE 4C 3A ØA $21: 75$ IA 5 E $21 \quad 20 \quad 65 \quad 206 \mathrm{C} \quad 16$ 6A29：13 4C 78 Ø8 D9 $41 \quad 65$ 8D D4 6A31：8D 0F D5 9F 8D 3B CE 64 7F ØA $39: 18$ C2 $0 \emptyset$ ØE CE $1 F 61$ Øの Aø ØA $41: 8 \mathrm{~B} \quad 6 \mathrm{6a} 8 \mathrm{EF} 53 \quad 02 \quad 45$ IE A7 63
 6A51： 29 7F 29 3F 64 3B 3646 AC 6A59：ED 8C 2A 日C 18 79 1C 69 D5 ØA61：80 $60 \quad 29 \quad 14$ EF $65 \quad 82$ A2 6 F 6A69：7D 03 5A 1A 10 D5 7C 63 BD ØA71：24 $26 \quad 20$ ØE $10 \quad 04$ DA 41 8D 6A79：B9 99142 F FE 40 A 8 1E AE ØA81： 30 F4 9118 B7 06 AC $35 \mathrm{~F} \varnothing$ ØA89：ஏ3 B9 6017 A8 82831475 ØA91：C9 9990 ØB $48 \quad 62$ ØF 9088 ØA99：$\varnothing 6$ C8 C9 $1590 \quad 01$ C8 8C 14 ØAA1：E3 A9 1D 1E 2385 E9 8520 ØAA9：B9 $4 \mathrm{~F} \quad 18$ AA $\emptyset 8 \quad 406$ A 86 B8 ØABl：EC $4 \mathrm{~F} \quad 23 \quad 0063 \mathrm{AD}$ BF 8 E 54 ØAB9：78 ØD FØ 3E CE 9C 97 AC F2 ØAC1：$\varnothing 78813$ A2 F9 2C $442 \mathrm{~F} 4 \varnothing$
ØAC9：DD 2B $25 \mathrm{~F} \emptyset \quad 18 \quad 5 \mathrm{~A} \quad 2 \mathrm{C} 8 \emptyset \quad 4 \mathrm{E}$

6ADl：B6 50 6A Bø E8 EC 404167 gAD9：E6 4D 4181904 C D8 Ag FC ØAE1：1A 40 AD C3 8092 11 1A 8F ØAE9： 0 F EA 99 A4 29 C 00047 3F ØAFl：FC CD 50 9C Fø 30 ØA 5078 6AF9：11 $12 \begin{array}{lllllll}12 & 45 & 38 & 79 & 2 \mathrm{E} & \mathrm{C} 5 & 4 \mathrm{~A}\end{array}$
 0B69：C8 12 AØ AF Aø F5 A9 F5 3D ØB11：ØD 201414 ØA AC Cø 54 7B 65 0B19：81 14 C 0 B9 E3 17 A6 9103 9B21：16 5A 93 FD A6 B4 18 1C 6D 0B29：20 D5 $50 \quad 0578$ 0A 20 F6 42 0B31：68 0A 25 CD 01 0A E6 FD 7B ØB39：A5 FD C9 06828 F 22 ø8 D9 ØB41：DF 0110 ØA E5 3920108 EE ØB49：60 B $\emptyset \quad \mathrm{FB}$ C $0 \quad 7 \mathrm{C} 17 \mathrm{9A} \quad 90 \quad \mathrm{BC}$ ØB51：6A 8F 35 C9 D1 64 D8 8D 71日B59：73 $77 \quad 6968$ D7 9D 9C 8896 0B61：25 $68 \quad 011020$ g0 8C 3E 9D 6B69：D7 62 FA 0065 8D D8 02 5D ØB71：60 B $\emptyset 88$ Ø0 ØF C7 1F 44 ØF 0B79：00 07 3C $80 \quad 7 \mathrm{D}$ 日B 95 C8 EC ØB81：80 20 B7 EA 98 D 6 F9 A2 9 F ØB89：70 2F C6 32 日B 117601 1E
 0B99：85 EC 8624 F 06320 AF 44 ØBAl：ØB A8 794100 E6 C5 1D EE ØBA9： 0BB1：18 34 9E 0062 4C F6 6A ED
 ØBCl：1E 8B ØD 9F 48 ØD 6818 BB ØBC9：E2 C9 30 D 0994 C AD 28 D3 ØBD1：ØE 8D E1 68 GD 46 A5 FF El ØBD9：99 AC 6340 E2 AB D1 16 CB ØBE1：60 80 Ø8 E＠Fの 3A 68 1C B4 ØBE9：14 1D E $\emptyset \quad 4 \mathrm{D} \quad 0798 \quad 61$ C9 A8 ØBE1：ØD 28 ØC 0196 gC A2 FA 4 F ØBF9：9A 4C 57 98 AE C5 63406 F
 ØC09：A9 BF F6 日E C9 65 B4 FB AC ØC11：8A 2E B4 CC B $\emptyset 6276$ E6 BE ØC19：AD C5 5514 C9 1290 ØE 2B ØC21：A0 12 C9 19 90 98 Aø 11 CF ØC29：C9 1F $90 \quad 62$ Aø 10 8C C4 43 ØC31： 04 F7 $9 \mathrm{~F} \quad 38$ 1A $3692 \quad 9796$ ØC39：18 $38 \quad 06$ FB 66 C7 40 C4 80 ØC41：14 1B $64 \quad 22 \quad 18 \quad 46 \quad 22$ gA F4 ØC49：14 $88 \quad 88 \quad 4303122 \quad 38 \quad 7256$ ØC51：78 日E C4 33 80 BD F9 94 E7 ØC59： 02 E9 79 BE 02 A5 $\mathrm{F} \emptyset \quad 0292$ $\begin{array}{lllllllll}\text { ØC61：} & \text { FB } & \mathrm{F} 3 & 38 & 20 & 12 & 97 & 18 & 95 \\ \mathrm{EF}\end{array}$ ØC69：FC C2 50 2ø 0 A 6491 øC 4C
 ØC79：C4 80 $00 \quad 03 \quad 35$ A9 $0585 \quad 24$ ØC81：FD 4C 28 40 F7 F9 6D 1389 ØC 89：4A 29 EF $85 \quad 52$ E2 DC 83 C2 ØC91：92 E1 A9 A3 C3 FF AD 63 B7
 ØCA1：Fの FØ DF 99 日B CØ 0363 C8 ØCA9：4C $25 \quad 8 \mathrm{~F} \quad 61 \quad 82 \quad 5 \mathrm{C} \quad 40 \quad 28 \quad 61$ ØCB1：FF D $\emptyset$ FB E8 E $\emptyset 50$ D $\varnothing$ F4 EA øCB9： 698 F 2B 60142087 ØC E1 ØCC1：EE E 68280 C6 3932 D $\varnothing 32$ øCC9：F3 B1 27 Ø0 85 D3 A9 $17 \begin{array}{llllll}13\end{array}$ ØCD1：85 D6 4C 6C E5 C5 5D 00 B3 ØCD9：C4 4 C Cl 01 Fl $83 \begin{array}{lllllllll}76 & 01 & 3 B\end{array}$ ØCE1： $63 \quad 17 \mathrm{~A} 9 \quad 51 \quad 38 \quad 204 \mathrm{~A} \quad 36$ A7 ØCE9：B4 65 4B 18 54 C4 06 ØCE1：44 86 Ø2 90 A7 $9 E \quad 4 \mathrm{~F} \quad 9064$ ØCF9：1C 日A $^{\circ} \quad 01 \quad 62 \quad 504084 \quad 3 \mathrm{~F}$ AE

ØD01：EE F8 54 3B F8 38 F1 C9 65 ØDø9：11 Fø ED C9 13 Fg E9 C9 3C ØD11：1D F6 B5 DC 22 F＠ 87 7C DA ØD19：2C F＠DD CC A4 60 D1 04 5C ØD21：69 $28 \quad 67$ D1 CC 4 E CA $3 \mathrm{C} \quad 69$ ØD29：47 F6 $6 \mathrm{C} \quad 73$ 5D 6130 8E 3 B ØD31：F9 C9 E8 6F C9 ØD Fø 39 6C øD39： $44 \quad 87 \quad 25$ 9A A1 13 C9 40 D2 ØD41：9ø E5 C9 DB Bø E1 C9 5B $1 \varnothing$ 0D49：92 E7 10 08 22 11 E9 28 7A ØD51：BC $\quad 92$ C4 C2 CD $0 \mathrm{E} \quad 5 \mathrm{~F} \quad 21 \quad 95$ ØD59： 65 ØF $14 \mathrm{~F} 0 \mathrm{Cl} 7946 \quad 20 \mathrm{~EB}$ ØD61：85 ØD 4C 35 ØD 75 4C Øø 35 ØD69：Fg 54 5E 4A 46 CE 80 1C gC 6D71： 6918 AA AD Cl $2 \mathrm{~F} \quad 7 \mathrm{~F} \quad 6414$ ØD79：8A 9D81：58 3F 4C A8 6D 5C $99 \quad 95$ 4E ØD89：5F $81 \quad 604 \mathrm{E} \quad 46 \quad 81 \mathrm{C} \emptyset \quad 915 \mathrm{~F}$ ØD91：B $\emptyset$ ØB C9 48 D8 A9 $20 \quad 2254$ 0D99：A9 9D A8 $54 \quad 38$ 9A F7 E9 50 ØDAl：ø1 2A $57809151 \mathrm{D} \quad 30$ 5D ØDA9： $86 \quad 07 \quad 88 \quad 01 \quad 28 \quad 10$ B $\emptyset \quad 65$ D1 $\begin{array}{lllllllll}\text { ØDB1：} 4 \mathrm{D} & 61 & 41 & 4 \mathrm{C} & \mathrm{EF} & 8 B & 32 & \text { 日C } & \text { D5 }\end{array}$ ØDB9：15 8B $72 \begin{array}{lllllll} & 6 \mathrm{C} & 87 & 12 & 1 \mathrm{C} & 98 & 1 \mathrm{~B}\end{array}$ ØDC1：A2 B2 AØ 5C 21 Ø0 17 日F F9 ØDC9：D $\varnothing$ ØA CA D 04 C C $\varnothing \mathrm{FF}$ 6A 95 ØDD1：1F 8E 8D A2 008 E 834581 ØDD9：A2 99 8E $59 \mathrm{~A} \emptyset \mathrm{~B} \emptyset \quad 6 \mathrm{~A} 41$ ØC ØDE1：DD 3410 AD 72 FD 5B $0 E 25$ ØDE9：90 0F 8D B4 92 AD 40 BC 11 ØDE1：FD 5A gE 8D B3 02 C8 D6 44 ØDE9：E3 98 CA FØ 11 C9 B $\emptyset \quad 00$ A5 9E01：7A 8D 96 ø8 2C B5 9230 7D ØE Ø9： 05 AD B2 $62 \mathrm{E} \varnothing \quad 65 \quad 29$ 7E F6 बE11：20 65 ØE CA 10 C4 $60 \quad 01$ 5A 0E19：00 0A 00 64 00 E8 0310 B7 0E21：27 8C EO EO 21 AC 4499 FD 6E29：FB 815820 F6 84 C8 8C 66 ØE31：B $\emptyset \quad 02 \mathrm{AC}$ B1 $028 \mathrm{C} \quad 6 \mathrm{~B} \quad 4 \mathrm{E} \quad 3 \mathrm{E}$ ØE 39：12 Dø Øø Ø1 E2 9E Ø1 0238 ØE41：2B 3C 6A E4 FE C9 26 Dø D5 ØE49：F9 $60 \quad 65 \quad 57 \quad 63$ D6 7129 F7 ØE51：A9 ØE AØ CE 06 FØ EB 5A BC GE59：8D $73 \quad 80 \quad 16$ 8D $23 \begin{array}{llllllll}25 & 85 & 53\end{array}$ 0E61：FC 7E 72 FB A9 FB AC E5 26 ØE69：AE A3 2420 D8 FF 5A 57 1F ØE71：CC $\begin{array}{llllllll} \\ \text { ®E } & 37 & 95 & 68 & \text { C1 } & 46 & 87 & 16\end{array}$ ØE79：B3 CE 46 ØB 3 C 1B 1B 44 A5 ØE 81： 20 B1 046 F 85 B9 $2 \varnothing 9378$ ØE89：A5 14 B9 BE 1420 A8 2D 48 ØE91：DF Øø 20 AE FF A2 4 E б6 $\mathrm{B9}$ ØE99：AØ 06 C6 60464186 DE 92 ØEA1： 80 CF FE 62 Øø A2 06 20 C2 ØЕA9：C6 9025 5E ØC 4C B6 $2 \varnothing$ F6 ØEB1：B4 ØC $62 \quad 36 \quad 02$ 9D A2 08 AE ØEB9：A9 68 A 0120 BA FE 8E 4B ØEC1： 97 A2 35 Aø 0320 BD FF CE ØEC9：16 DC A2 FF Aø FE 20 D5 97 ØED1：FF 8E BD 02 8C BE $43 \quad 3988$ ØED9：1D ØB 69 1D 0234 BC 6195 ØEE1：D6 Fø 38 ø0 ØB 54 C8 C 0 A8 ØEE9：68 DØ F6 7B 97 E1 11 ØC 77 ØEF1：93 $19 \begin{array}{lllllll}94 & 45 & 87 & 80 & 8 D & 79 & \text { D7 }\end{array}$ ØEF9：80 DB 2A 7B 6E C5 73 6E 2A日Eø1：E3 8D 31 g0 BE AD C6 92 DE øEø9：D9 CC 3D 9ø DC D9 FB Bø EE ØE11：D7 A9 01 AC $53 \quad 699989$ EB ØF19：4C D 6 ＠F B2 FD CF 78 F6 B5 ØF21：33 15 7C F6 E3 A1 D9 BF 36 बF29：85 ØF 4C CC 13 1F DA $817 \emptyset$

ØF31： 03 D4 8D 9B 10 20 7A 0E 75 ØF39：20 D9 ØE 66 2B øC F3 AD 25 0F41：AA 15 C9 53 DØ EC 04 2E D8 ØF49：34 $7718 \quad 48$ D $\emptyset \quad$ D3 AD C7 DF ØF51：90 A8 38 B9 5118 E9 4083 0F59：8D 85 C3 80 9A 8060 A8 60 0F61：B9 6B ED $1060 \quad 0578 \quad 02 \mathrm{FF}$ 0F69：B9 6F 18 8D 54 A9 456252
 ØF79： $0 \mathrm{~A} ~ 20 ~ 7 \mathrm{~F}$ 5B 1080 6E AD 57 ØF81：5C 56 CD 9226 EE AD 36 C4 ØF89：Eの 86 CB 62 9の E6 CD CD DC ØF91：$\varnothing 2$ Bø E1 A2 $\varnothing \varnothing$ 9ø CB $\quad 62$ 1F ØF99：8D 64 DD B1 FB C9 FE Fø 66 ØFA1： $42 \mathrm{Fl} 44 \mathrm{C} 8 \quad 93 \mathrm{~F} 2 \mathrm{C} 8 \mathrm{8C}$ B8
 0 FBl：99 CC 0318 A5 FB 6D C9 73 ØFB9：37 FC FB A5 FC CB A4 $\emptyset \varnothing$ EC ØFCl：18 5F AD CA 03 B6 27 C0 28 ØFC9：10 B9 CB 63 D9 CD $6516 \quad 2 \mathrm{E}$ ØFD1：88 11 C 6 A2 014 C 6 E 10 E 6 ØFD9：E6 BD 3127 4D $85 \quad 58$ 8B 2D ØEE1：EE 5C 1585 AD C7 0019 2F ØFE9：68 F6 501720 C9 04 D6 F4 ØFF1： 08204 EE C8 62 EE CC 7951 0FF9：11 104037854 C 8C 88 1F 1001：40 68 1C A $4 \quad 75$ 4C $67 \quad 7449$ 1009：05 30 AC E3 F3 4C 4A 1001 1011：20 $71 \quad 12$ 4C $69 \quad 99$ E3 CC A8 1019： 60 ØD 88 C2 62 C8 61 C4 43 1ø21：$\varnothing 260$ Bø 59 6D 55 D1 g2 6C 1029：4C 74 9D $40 \quad 13 \mathrm{C} 6 \quad 96 \quad$ D5 $\mathrm{B5}$ 1031：11 99 EF 786600 CF 8C 25 1039：57 $4183808087 \quad 98 \quad 60 \quad 50$ 1041： 06 F0 EB 4C 191177 5E 3A 1049：AE $53 \quad 00 \quad 47 \quad 00624340$ 5A 1051：AC 00 EC A6 59 Ø0 $80 \quad 30$ CB 1059：58 Øø 62 11 日A ØB 00 C2 42 1061：CF 1780 A8 94 B $6 \quad 63$ EE A1 1069：D6 62 E8 EE 61 ED 18 7C ED 1071：$\varnothing 0 \quad 11 \quad 99 \quad 2 \varnothing 18 \quad 62$ C4 5A A5 1079：8D D3 96 3C 80 D8 3817 DA 1081：14 60 81 4D 80 1D DB 0 A 03 1089：F2 66 DC $30 \quad 0 \varnothing \quad 02$ A2 0191
 1099：4E C3 2B $46 \quad 36$ A $0 \quad 80 \quad 91 \quad 62$ 10A1：FD 6D 26 Ag Fø 18 D5 6927 1øA9：17 41 ØC 01 ØC 02 Ø0 FC 9C 10B1：A3 11 D $\varnothing$ B $\emptyset 375 A \quad 99$ D $\emptyset 13$ 10B9：51 38 A5 FD E9 日E A4 A6 96 1のC1：$\varnothing \varnothing$ FE $66 \quad 11 \mathrm{FE}$ A5 FE C9 D4 10C9：25 90 ØD 40 Fの 18 g0 FD 2C 10D1：C3 $7087 \mathrm{CA} 794 \mathrm{E} \quad 46$ ØE 1 D 10D9：D $\emptyset$ F6 60 F9 9C Fl FB 1181 10E1：49 CD 00 9ø BA 2D 87 A2 5 E 10E9：1C Aø 90 F6 4C 0569 ØA 15 10E1：20 $20 \quad 78$ Ø4 A9 0A 9978 9A 10F9：D8 6A ØE B1 F1 A9 2ø 41 9D 1101：04 07 A9 0 EE 9998 DB C8 AC 1109：Cø 28 Dø Fl C8 E9 8A 3E 10 1111：A9 25 FA 93 D7 60 9D 7C D8 1119：00 1D ØB 70 ØC 38 70 0C 19 1121：38 $15 \begin{array}{lllllll}15 & 64 & \text { D3 } & 1 C & 6 D & 37 & 95\end{array}$ 1129：1C 42 4C 7F 12 A2 9077 FD 1131：A7 38 E9 40 9D $35 \quad 83$ E8 27 1139：8E E4 70 ØA Øø EC F3 0127 1141：4F $80 \quad 19$ DB $28 \quad 13$ EE 48 BE 1149：DE 3686 ØB 8D 61 D6 A3 2D 1151：90 63 4C A9 12 A8 B6 C9 0 日 1159： 0590 B9 C9 1E B 0 B5 9 D 22

1161： $0 \mathrm{~F} 8120 \quad 40 \quad 05$ 3B $58 \quad 69$ A2 1169：10 9269 1D 92 0D 07 00 0E 1171：07 CE 65 38 ø0 Fの 18 2D 10 1179：70 2C 3 E 8D $8460 \quad 38$ 8D 23 1181：16 E9 $01 \quad 28 \quad 93 \quad 28$ E9 $60 \quad 58$ 1189：09 6314 60 AD D6 4D 99 E5 1191：40 F8 65 ø8 BC C6 C4 D2 78 1199：日B 43 D3 日E 43 AD D4 5 C 44 11A1： 8430 AD D5 $6631204 \mathrm{~A} ~ 67$ 11A9：13 4C $37 \quad 11$ 日F $3 \mathrm{C} \quad 97 \quad 62$ 3A 11B1：00 019010 C9 24 日C C9 E7 11B9：27 Fø 99 C9 1B $90 \quad 05$ C9 58 11C1：41 B $0 \quad 01 \quad 60 \quad 18 \quad 6980 \quad 91 \mathrm{CF}$ 11C9：30 C8 4C 4C 13 AD CE A1 13 11D1：ØC DE AØ DØ AD AD D1 34 CE 11D9：C8 67 AD CF 83 CB 9 F 267 F 11E1：A9 ØC B4 90 14 AA 52 8A F5 11E9：4F 99 D $\emptyset$ F5 AD BC 8D 91 7C 11F1： 04 A9 618 DCl 8 C AE 6E 85 11F9：4A E $\varnothing$ AE CA E 60 D 6 F8 9D 1201：A5 3085 FD A5 3185 FE 90 1209：A9 9A E8 0C C5 9D A2 0777 1211：B1 71 A9 1D 20 D2 EF E8 A6 1219：EC 16 5C D $\varnothing$ ED AC C1 1087 1221：20 EF ØC EC 29 Fの 049047 1229：5B B $\varnothing$ IA EE ØC B9 35 Ø3 ØE 1231：91 34 DA 68 CC F2 AD FA 95 1239：C9 61 F0 7743 CD 02 A5 13 1241：ED 8F 7E A5 FE 68 C8 4864 1249：80 $88 \quad 04$ A8 CA 01 CD 6A 3B 1251：56 D $\varnothing$ Fø E8 CD 4752 D 082 1259：E9 20 F8 D6 07 AC CE C4 F3 1261：A7 C2 B1 FD $9987 \quad 94$ C8 DB 1269：Cの 18 D $\emptyset$ F6 4C DB 13 Aø 16 1271：91 AD BD AB 13 FB AD BE 96 1279：ø2 85 FC 88 B1 FB C8 91 C8 1281：FB $2 \emptyset$ D8 $\mathrm{OB}^{2}$ A5 FB C5 FD 1E
 1291：20 E6 ØB Eの EØ $5732 \quad 04$ BC 1299：AD CA 92 CD 50 A2 D 04 C 5 F 12A1：27 14 A9 00 8D D $0 \quad 02 \mathrm{E} 2 \mathrm{2A}$ 12A9：0A 201113 C8 CC 6A D 114 D
 12B9：C9 20 F0 9920 EC 12 EE 41 12C1：34 $\quad 93 \quad 4 \mathrm{C} \quad 7 \mathrm{E} \quad 14 \quad 4 \mathrm{C}$ 5E $12 \quad \mathrm{D} 4$ 12C9：20 65 DA $8 \mathrm{D} \quad 012012 \mathrm{E} 9324$ 12D1：96 E $\quad 44 \quad 204 \mathrm{~F} \quad 46 \quad 2046$ 1E 12D9：81 øB $2 \varnothing \quad 21 \quad 66$ BA $6 \mathrm{E} \quad \emptyset 692$ 12E1：C1 $4 \mathrm{D} \quad 24 \quad 9 \mathrm{~A} \quad 3 \mathrm{~F} \quad 2 \sigma \quad 23 \quad 36 \quad 5 \mathrm{~F}$ 12E9：31 $31 \begin{array}{llllllll}18 & 97 & 03 & 58 & \text { C } 4 & 31 & \text { A7 }\end{array}$ 12F1：36 $32 \begin{array}{lllllll}55 & 31 & 6 B & B 6 & 55 & 13 & 57\end{array}$ 12F9：00 $07 \quad 2042$ 2D $50 \quad 20$ ED E 0 1301：30 $13688 \quad 2 \mathrm{D} 549$ 2B 9 A 81 1309：A8 ØF $80 \quad 50 \mathrm{C} 9 \mathrm{~F} \quad 50 \quad 00$ 0F 1311：59 00 1D 224953 4B 20 F7 1319：1C 68 BC $\quad$ बB $2 \varnothing 124143 \mathrm{BE}$ $\begin{array}{lllllllll}1321: 45 & 96 & 93 & 14 & \text { A } 4 & 73 & 99 & \text { AC } & 16\end{array}$ 1329：Fg 9A 62592064414 E B3 1331：49 E1 $87 \quad 5063$ बE 4E 3990
 1341：51 B7 F1 63 D1 D4 CD 7060 1349：53 77 E1 2069 4E $54 \quad 99 \mathrm{FB}$ 1351：6C $54 \quad 40 \quad 15 \quad 10612 \mathrm{C} 48$ C2 1359：72． $49 \quad 47 \quad 48 \quad 54$ ED $72 \quad 45$ FC 1361：53 $45 \quad 525633$ CE OD OD 32 1369：93 9A 60 D5 9491 1E D7 68 1371：Eの 86 1379：C3 4F 4D $5055 \quad 54$ ED D 6 AC 1381：55 42 4C 8B E 61 F2 B6 CD 1389：0D 9A 91 E7 03 00 F5 2D BE

1391：0D 1C 132020 A8 AC 2F D5 1399：3C 12 CF 9 AA $14 \begin{array}{llllll}14 & 78 & 2 B & 6 B\end{array}$ 13A1：40 CD 42 4E 55 E4 A 4 C2 2 13A9：CC $\begin{array}{lllllll}\text { E } & 24 & \text { CC } & 4 \mathrm{~F} & 41 & 2 \mathrm{~F} & 99 \\ 68\end{array}$ 13B1： 4 E E3 $43 \begin{array}{lllllll} & 52 & 49 & 50 & \mathrm{~F} 4 & \mathrm{C} 4 & \mathrm{BF}\end{array}$ 13B9：4F $43 \quad 55 \quad 4 \mathrm{D} \quad 45 \quad 4 \mathrm{E} \quad 54 \quad 12$ F5 13C1：CE 51 E1 D3 C3 91 D3 41 6A 13C9：56 27 Ø6 17 C6 49 4C $45 \quad 50$ 13D1：9B $25 \quad 15$ D 6 3E 25 19 2 AA Al 13D9：28 C9 $4 \mathrm{E} \quad 20$ C4 $49 \begin{array}{llll}43 & 54 & 74\end{array}$ 13E1： 49 4F $4 \mathrm{E} \quad 415259$ F7 73 B9 13E9：8E 0 A C5 1 C 1F 9 E 44 1D 9 E 63 13F1： 62 49 $53 \begin{array}{lllllll}13 & 83 & 3 E & \text { C7 } & 7 C & 35\end{array}$ 13F9：3E C7 45 B2 10 D4 4845 AE 1401：20 CE 45 58 80 5F D7 88 D4 1409：18 80 0D $1112 \quad 128$ CE ID FB 1411：96 D1 BB 742 2D 20 C5 $58 \quad 85$ 1419：49 54 20 D3 El 844544 2A 1421：53 $50 \quad 45$ 4C 4 C 日D 9A C4 65
 1431：13 $8 \mathrm{BF} \quad 84 \quad$ ØA $\quad$ ØF 828 8D $\quad 0095$ 1439：2D 2D 2 D 9B 0064 Ø8 0 C CE 1441：10 $14 \begin{array}{llllllll}18 & 1 \mathrm{C} & 20 & 24 & 28 & \text { 2C } & 49\end{array}$ 1449：30 $34 \begin{array}{lllllll} & 38 & 3 C & 40 & 44 & 48 & 4 C \\ 51\end{array}$ 1451：50 54585 C 60643083 FE
 1461： $03 \quad 63 \quad 0404040 \mathrm{D} \quad 05 \quad 65 \mathrm{EF}$ 1469：06 $66 \quad 06 \mathrm{D} \emptyset \quad 60 \quad 67 \quad 97 \quad 68 \quad 16$

 1481：ØD ØD ØE ØE ØE Dø Øठ ØF D8 1489： $0 \mathrm{~F} \quad 101010$ 日D 111112121 1491：12 $12 \begin{array}{llllllll}13 & 13 & 13 & 14 & 14 & 14 & \mathrm{FF}\end{array}$ 1499：15 $15 \begin{array}{lllllll}15 & 78 & \text { IE } & 16 & 16 & 17 & \text { C7 }\end{array}$ $\begin{array}{lllllllll}14 A 1: 17 & 17 & 18 & 18 & 18 & 19 & 19 & 19 & 16\end{array}$ $14 A 9: 1 A \quad 1 A \quad 1 A \quad 1 B \quad 1 B 1 B \quad 1 C \quad 1 C$ F3 14Bl：1C 1D 1D 1D IE IE IE IF 69 14B9：1F 1F $2 \emptyset$ C $\emptyset 83$ DF C8 Fl 68 14Cl：68 E8 $\mathrm{F} \emptyset \quad 30 \quad 98$ C3 $20 \quad 23 \mathrm{~B} \emptyset$ 14C9：A1 78 C8 $9088 \quad 92$ Ø8 8 ØE 6 D 14D1： $01 \quad 97$ ØD 00 Ø6 ØC $12 \quad 05 \quad 67$ 14D9：$ఠ \mathrm{~B} \quad 11 \quad \emptyset 4 \quad$ ØA 10 A7 23 DC 2 F 14E1：51 $1088740 \quad 03 \begin{array}{llllll}10 & 84 & 77 & 10\end{array}$ $\begin{array}{lllllllll}14 E 9: 4 F & 52 & 44 & 3 F & 20 & 41 & 42 & 43 & 98\end{array}$ $\begin{array}{llllllll}14 F 1: 44 & 45 & 46 & 47 & 48 & 49 & 4 \mathrm{~A} & 4 \mathrm{~B} \\ 12\end{array}$ 14F9：4C 4D 4E 4F 505152531 A 1501：54 $55 \begin{array}{llllllll}56 & 57 & 58 & 59 & 5 A & 01 & C 8\end{array}$ 1509：42 $84 \quad 17 \quad 09 \quad 0 \mathrm{~F} \quad 15 \mathrm{lB} \quad 28 \quad 14$


Daniel Lightner is a frequent contribu－ tor who seldom misspells words now．

## DYNAMIC MEMORY

## By Frank Gordon

It＇s possible to watch the 64 in action by redirecting the interrupt vector at 788 and 789 to a routine that prints selected are－ as of memory to the screen．Dynamic Memory is such a program，and it does it 60 times per second．

Dynamic Memory displays selected ar－ eas of memory at the top of the screen in a nine－line display．Line 1 displays the BA－ SIC pointers from 43 to 56 ．Lines 2 and 3 display the top 80 bytes of the stack．

Lines 4 and 5 display the 80 bytes of the input buffer，and lines 6－9 display the first 160 bytes of BASIC memory．

By examining these，you can see how BASIC pointers change，how the stack op－ erates when you list and run a program， and how line numbers are stored in the stack＇s last two bytes．You can also see how the input buffer shortens programs by tokenizing keywords and how the screen editor inserts and deletes lines in memory．

## Typing It In

Dynamic Memory is written entirely in BASIC．To help avoid typing errors， use The Automatic Proofreader；see ＂Typing Aids＂elsewhere in this sec－ tion．Be sure to save a copy of the pro－ gram when you＇ve finished typing it in．

## Using Dynamic Memory

Load and run Dynamic Memory as you would any BASIC program，but then en－ ter SYS 900 to activate the screen． Press $\mathrm{Clr} /$ Home and cursor down be－ low the memory display．To deactivate， press Run／Stop－Restore．

## Screen Codes

The display may appear strange be－ cause it consists primarily of screen codes．Text may be easier to compre－ hend if you switch to upper－and low－ ercase mode by simultaneously press－ ing the Commodore key and the Shift key．

On the first line，in the upper left cor－ ner，you＇ll see a line that begins with the letters $a h$ ．These letters represent the values of memory locations 43 and 44，the BASIC program pointer． Screen codes $a$ and $h$ equal 1 and 8 in low－byte／high－byte format．

If you place your cursor on a line of code and press Return，the line will ap－ pear in the input buffer，which is line 4 on the screen．The original code will ap－ pear shortened because it has been to－ kenized．For example，list line 135 on a clear part of the screen．It should ap－ pear as the following．

## 135 FOR J＝ 900 TO 969：READK：POKEJ，K ：NEXT

Now place your cursor on this line and press Return．The line will appear in the buffer（line 4）as follows．

## （2J2900 969 ：K：W J，K： $\mathbf{G}$＠D＠：POKEJ．K： NEXT＠＠＠＠

The line number 135 is stored in the last two bytes of the stack as＠．All 64 tokens are equal to 128 or greater． In the line above，the BASIC keywords are represented as follows．

| Token | Value | Screen code |
| :---: | :---: | :---: |
| FOR | 129 |  |
| ＝ | 178 | 2 |
| TO | 164 | ［5］ |
| READ | 135 | g |
| POKE | 151 | w |
| NEXT | 130 | b |

## Modifying Dynamic Memory

You may wish to modify Dynamic Mem－ ory to examine other pointers and mem－ ory areas．If so，load the program and enter the following changes．

## 25 REM INDEX INTO BUFFER AJ <br> 30 DATA 165，11，141，0，4 <br> 35 REM LINE NUMBER \＆ADDRESS <br> 40 DATA $162,5,181,57,157,2,4$ <br> 50 DATA 202，16，248 <br> 60 REM STACK POINTER <br> 65 DATA 186，142，9，4 $r h$ hb $F Q$ QF

135 FOR J＝900 TO 978：READK：POKEJ，K： NEXT

Now when you run the program，the first line shows the values for the input buffer index $(11, \$ b)$ ，the current and previous line numbers and the address of the current BASIC statement（57－ $62, \$ 39-\$ 3 E)$ ，and the value of the stack pointer．Many variations are pos－ sible with this display．

You can see a listing of screen codes in a number of Commodore pub－ lications，including Mapping the Com－ modore 64 and 64C（Appendix G）by Sheldon Leemon from COMPUTE Books．You can also see them by run－ ning the following short program．

5 REM PRINT SCREEN CODES
10 FOR X＝0TO255
20 POKE 1024＋X，X：NEXT
30 PRINT＇$\{3$ DOWN $\}$

## DYNAMIC MEMORY

MM 5 REM COPYRIGHT 1992 －COMP UTE PUBLICATIONS INTL LTD －ALL RIGHTS RESERVED
QS 10 REM－REDIRECT INTERRUPT

VECTOR TO INSERTED PROG RAM
AH 15 DATA $120,169,145,141,26$ ， 3，169，3
RX 20 DATA $141,21,3,88,96$
HM 25 REM SHOW BASIC POINTERS
\｛SPACE\}43-56 ON 1ST LINE OF SCREEN
QG 30 DATA $162,13,181,43$
EP 40 DATA $157,0,4,2 \varnothing 2,16,248$
SH 70 REM SHOW LAST 80 STACK B YTES ON 2ND \＆3RD SCREEN LINES
EF 75 DATA $162,79,189,176,1,15$ 7，40，4
MM 80 DATA $202,208,247$
XK 85 REM SHOW INPUT BUEFER ON $4 \mathrm{TH} \& 5 \mathrm{TH}$ LINE OF SCREE N
FB 90 DATA $162,79,189, \varnothing, 2,157$ ， 120，4
HH 95 DATA $262,16,247$
CF 190 REM SHOW 1 ST 160 BASIC \｛SPACE\}PROGRAM BYTES ON LINES 6，7，8 \＆ 9 OF SCR EEN
MP 165 DATA $162,55,189,1,8,157$ ，200，4
EC 110 DATA $202,16,247$
PS 115 DATA $162,103,189,57,8,1$ 57，0， 5
AD 120 DATA $202,16,247$
XA 125 REM BACK TO REGULAR INT ERRUPT ROUTINE
RC 136 DATA $76,49,234$
XH 135 FORJ＝9øøTO969：READK：POK EJ，K：NEXT

Frank Gordon is the author of Graphos （April 1992）．He lives in Orono，Maine．

## SCAN 64

By Daniel Lightner
Here＇s a short utility program that lets you view the entire contents of your 64＇s mem－ ory．It＇s similar to Dynamic Memory，also published in this section，but it doesn＇t re－ spond to immediate input．

## Entering the Program

Scan 64 is written entirely in machine language．To enter it，use MLX，our ma－ chine language entry program；see ＂Typing Aids＂elsewhere in this sec－ tion．When MLX responds，reply with the following．

Starting address：COOO
Ending address：COEF
When you＇ve finished typing in Scan 64，be sure to save a copy to disk be－

## fore exiting MLX．

## Using the Program

Scan 64 is easy to use．Load it with the ，8，1 extension，type NEW，and then press Return．To activate the program， enter SYS 49152．At the top of the screen，Scan 64 displays the range of addresses being displayed，followed by the contents of the first 512 bytes of memory．（Note the ah in bytes 43 and 44，as mentioned in connection with Dy－ namic Memory．）

To scan forward in memory，press the right cursor key．To scan back－ ward，hold down the Shift key while pressing the same cursor key．To exit the program，press Return．

You can see the contents of Scan 64 itself，by scanning locations 49152 － 49663．You can easily spot the words MEMORY LOCATIONS on lines 7 and 8．If you can＇t，press the Commodore key and the Shift key simultaneously to enter upper－and lowercase mode．If you load other programs before you load Scan 64，you can also see their contents，depending on their starting addresses in memory．

## SCAN 64

Cø00：A9 Ø0 85 FB 85 FC Aの Øø 28 C008：A9 9A 20 D2 FF A9 932024 C010：D2 FF B9 D7 C $\varnothing 20$ D2 FF DB C018：C8 C 12 D 0 F5 A5 FC A6 64 C $620: F B 20$ CD BD A9 20 20 D2 1E Cø28：FE A9 2D $2 \varnothing$ D2 FF A9 $2 \varnothing$ C5 C030：20 D2 FF 18 A5 FB 69 FF E7 C038：AA A5 EC $69 \quad 0120$ CD BD 90 Cø4』：A2 Ø2 2ø AF Cø $2 \emptyset$ C9 Cø 6D Cø48：18 A5 FD 692085 FD A5 4E Cø50：FE 69 Øø $85 \mathrm{FE} 2 \emptyset \mathrm{BA} \mathrm{C}$ © 2 C058：E0 10 D6 E9 A5 FB 48 A5 5A C060：FC 48 A2 0620 AF C0 A9 Bl C668：7C 85 FD A9 $0485 \mathrm{FE} 28 \quad 38$ C070：C9 C 0 20 BA C0 18 A5 FD 66 C678：69 $28 \quad 85$ FD A5 FE 690045 Cø80：85 FE E® 10 Dø E9 $68 \quad 85 \quad 26$ C 088 ：FC $6885 \mathrm{FB} 2 \varnothing \mathrm{E} 4 \mathrm{FF}$ C9 71 C090：1D F0 69 C9 9D F0 88 C9 25 C098：ØD D0 E1 60 4C 06 C 038 4D C0A0：A5 FB E9 0085 FB A5 FC 95 CØA8：E9 $0485 \mathrm{FC} 4 \mathrm{C} \quad 06 \mathrm{C} 0$ A9 46 CøB0：D 95 FB A9 C7 95 FC A2 4B C $0 \mathrm{~B} 8: \varnothing 66018$ A5 $\mathrm{FB} 6920 \quad 85 \mathrm{FA}$ $C \emptyset C 0: F B \quad A 5$ FC 69 Øロ 85 FC E8 D8 C0C8：60 A 600 Bl FB 91 FD C8 A8
 C0D8：4D 45 4D $4 \mathrm{~F} 5259 \begin{array}{llllllll}50 & 4 C\end{array}$ C OE 0： $4 \mathrm{~F} \quad 43 \quad 41 \quad 54 \quad 49 \quad 4 \mathrm{~F} \quad 4 \mathrm{E} \quad 53 \mathrm{BF}$


Daniel Lightner is a frequent contribu－ tor who lives in Sidney，Montana．

## MINDBOGGLE

## By John Cameron

If you want a challenging yet entertaining game that will help you whittle away a few hours, look no further. Mindboggle is just what you've been looking for.
Mindboggle (not to be confused with Mind Boggle, May 1984) is a strategy game for up to four players. Your memory will be pushed to the limit as you search through a game board of almost 200 blocks to locate identical pairs hidden within. As if this wouldn't be hard enough, you must also contend with three other human or computer players, who'll do everything in their power to lower your score while searching for the matches themselves. Special blocks placed randomly throughout the board may be either helpful or harmful to you. If used to your advantage, they may mean the difference between the joy of victory and the agony of defeat.

## Getting Starred

Mindboggle consists of two programs. The first is written in BASIC. To avoid typing errors, enter it using The Automatic Proofreader; see "Typing Aids" elsewhere in this section. When you've finished typing, be sure to save a copy of the program before exiting Proofreader. The second program is written in machine language and must be typed in using MLX, our machine language entry program; see "Typing Aids" again. Enter the following values when MLX prompts.

Starting address: C800
Ending address: CB77
When you've finished typing, save the program to the same disk as the BASIC portion of the game. Save it with the filename BOGGLE.ML before exiting MLX.

## Game Options

Load and run the BASIC portion of the game. It automatically loads the machine language routines. Since Mindboggle is a multiplayer game, it plays with one joystick plugged into either port or two joysticks. When the title screen appears, you'll be asked for the number of players. Move either joystick to alter the value, and then press the
fire button. The initial number of players is zero. If this value is selected, all four player positions will be controlled by the computer.
If human players are competing, the game will ask them to type in their names. The final question asked is the skill level. There are eight levels available, ranging from Simple to Difficult. In the easier levels, fewer pairs have to be found, and a larger number of special blocks are scattered throughout the game board. In the difficult levels, the board consists almost entirely of pairs, with only a few special blocks.

Once these options are entered, the game pauses momentarily to randomly place the matching blocks. The length of this pause depends on the skill level chosen. Higher levels require more time to position the increased number of pairs.

## Playing the Game

When the game begins, you are presented with a view of 171 blocks, turned so that only their backs are showing. The players' names are arranged below them, with the current player's name highlighted in white. Scores are shown under the names, and the number of pairs remaining to be found is printed at the bottom of the screen. A cursor in the shape of an open rectangle appears at the top of the screen. Its color corresponds to the color in which the current player's score is displayed. This helps in determining whose turn it is.

Move this cursor to a block that you wish to open. Press the fire button to reveal one of five possible designs. When a block is uncovered, the player must then find its twin, located somewhere else on the board. If the second block doesn't match the first, then both are turned back over. If the two match, that player earns 100 points, and both blocks are covered by a marker in that player's color. Among the special blocks found in the game is one that looks like a closed hand. If it's encountered before or after uncovering a patterned block, then all blocks which match that pattern are revealed. This can be advantageous when a pattern has more than one twin, thus earning the player a greater number of points in a single move.

If one player uncovers several hand blocks in a row, play continues until that player locates a different block design. If any succession of hands ends with a happy face block or if this block is revealed upon a player's first move, then that player is awarded 250 bonus points instantly. Stop blocks are rare, and they resemble a stop sign with a diagonal line crossed through it. Come across one of these at any time, and you lose your turn.
Perhaps the most interesting block is the masked thief block. This gray block lets you steal 50 points from any opponent by changing the opponent's colored marker to your own color. If no opponent markers are available, then select a closed block as the target instead. Should a closed block be revealed instead, it will remain open if it's not a pattern block. The game continues until every pair is revealed. This doesn't necessarily mean that every block is opened. There may be some special blocks hidden even after the last set of twins has been located. At this point, the game goes to a special wrap-up screen, where the final scores and statistics are displayed. The winner is the individual with the highest score. If two players have the same score, the winner is the one with the greater number of markers. So try to keep as many blocks as you can. With the game over, hit the fire button to play again. You will be returned to the title screen and given the option to keep the same players for a second game or to change them. Likewise, the skill level may then be altered for a more or less challenging game, depending on your preferences.

## Computer Opponents

One of the most attractive features of Mindboggle is the ability to pit your wits against the computer. Though it may sometimes seem like the machine has the advantage, it actually tackles the game much in the same manner that we do. It uses a probability function to calculate its chances of finding a hidden pattern and its match. Like a human being, it's more apt to locate a block that has been revealed several times when there are few blocks remaining. Its memory capability increases, however, at higher skill levels.

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## Game Tips

In the higher levels, where special blocks are less frequent, greater emphasis should be placed on memorizing the locations of patterns, especially those that have been revealed numerous times. If you find it necessary to use a pad and pencil to jot down notes, write quickly, for nonmatching patterns don't stay open long.

In the lower levels, the strategy is different. It's often better to search for happy faces than the patterns themselves. Not only do you earn a higher score with them, but you also are protected from having your points stolen. When going against a computer opponent, it's safest to have markers around the middle of the board, rather than the sides. So if you steal a marker, concentrate in the center, as the computer will be less likely to change it back.

## MINDBOGGLE

AP $\emptyset$ REM COPYRIGHT 1992 - COMP UTE PUBLICATIONS INTL LTD - ALL RIGHTS RESERVED

KF 1 IFA= 0 THENPORE $53265,11: A=1$ :LOAD"BOGGLE.ML", 8,1
KM 2 POKE 56578,63 : POKE 56576,19 6: POKE 53272, 18: POKE 648,19 6:GOSUB96: POKE 788,52
RA 3 PRINT"\{CLR\}"CHR\$ (14)CHR\$( 8) : POKE 5328 , $0:$ POKE 53281 , Ø: GOSUB112
PF 4 IFHS $>$ FHTHENFH $=\mathrm{HS}$
JD 5 PRINT" \{HOME \} \{DOWN \} "TAB (11 )"\{CYN\}HIGH SCORE: \{WHT\}" $;: A S=S T R S(\mathrm{FH}): Z=7:$ GOSUB $2 \varnothing$ 4: PRINTC\$
GJ 6 PRINTTAB (14)" $\{3$ DOWN $\}$ \{BLU\} STUVWXYZ $+\{-\}-\uparrow^{\prime \prime}$ : PRIN $\operatorname{TTAB}(\overline{14)}$ "\{*\}\{SHIFT-SPACE\} \{K\}\{I\}\{T\}\{@\}\{G\}\{+\}\{M\}\{E\} \{Z\}\{S\}"
FQ 7 PRINTTAB (12)" $\{3$ DOWN \} \{GRN\}COPYRIGHT @ 1992": PR INTTAB (12) "\{DOWN\} \{YEL\}COM PUTE MAGAZINE"
HD 8 PRINTTAB (8)" $\{3$ DOWN $\}\{R E D\}$ WRITTEN BY $\{2$ SPACES $\}$ JOHN \{SPACE \}CAMERON \{4 DOWN\}": P OKE53265,27
FD 9 IFFH $=\emptyset$ THEN 16
HF $1 \varnothing$ GOSUB $205: A \$(\varnothing)=" Y E S ": A \$($ 1) $=$ "NO ": YN= $=$

XX 11 PRINTLEFTS (DW\$, 22) TAB (8) "\{WHT\}USE THE SAME PLAYE RS: \{CYN\}"AS (YN)
MC 12 GOSUB82:A=YN - (JR=8ANDYN < $1)+(\mathrm{JL}=4 \mathrm{ANDYN}>\emptyset):$ IFFB $=\emptyset \mathrm{T}$ HENYN=A: GOTO15
SR 13 IFA=YNTHEN12
PP 14 YN=A: GOTOI1

EB 15 IFYN $=\emptyset$ THEN 32
GM 16 GOSUB $2 \varnothing 5$ : PL= $\varnothing$
HQ 17 PRINTLEFTS (DW\$, 22) TAB (1 $\varnothing$ )"\{WHT\}NUMBER OF PLAYERS : \{CYN \}"; PL
KF 18 GOSUB82: P=PL-(JR=8ANDPL $<$ $4)+(\mathrm{JL}=4 \mathrm{ANDPL}>\varnothing): \mathrm{IFFB}=\varnothing_{\mathrm{T}}$ HENPL=P:GOTO21
PD 19 IFP=PLTHEN18
JC $2 \emptyset$ PL=P:GOTO17
XQ 21 IFPL=ØTHEN32
AR 22 FORK=1TOPL:GOSUB205:INS= "":CT=
DS 23 PRINTLEET (DW ( 22) TAB (4) " $\{W H T\} E N T E R$ NAME OF PLAY ER"K"\{LEFT\}: "; :GOSUB25
HD 24 PL $\$(K)=$ LEFT $\$$ (IN $\$+$ "
\{7 SPACES ${ }^{\prime \prime}$, 8): NEXT:GOTO 32
BQ 25 PRINT" \{CYN\}*";
CG 26 GETAS:IFAS $=\pi$ "THEN 26
KD 27 IFA $=$ CHR (13) ANDCT $>$ GTHEN PRINT"\{LEFT\} ": RETURN
DK 28 IFA $=$ CHR $(2 \emptyset)$ ANDCT $>$ GTHEN CT=CT-1: INS=LEFT \$ (IN\$,CT ): PRINT"\{LEFT\}"CHR\$(20); : GOTO25
PA 29 IF (AS<"A"ANDAS<>" ")ORA\$ >"Z"THEN26
GE $30 \mathrm{CT}=\mathrm{CT}+1:$ IFCT $>8 \mathrm{THENCT}=8: \mathrm{G}$ OTO 26
AQ 31 PRINT" $\{W H T\}\{L E F T\} " A S ;: I N$ \$=IN\$+A\$: GOTO 25
BQ 32 GOSUB2Ø5:SK=ø
AA 33 PRINTLEFT\$ (DW\$, 22) TAB (5) " $\{$ WHT $\}$ ENTER SKILL LEVEL: \{CYN\}";SK\$(SK)
KD 34 GOSUB82: S=SK- (JR=8ANDSKく $7)+(\mathrm{JL}=4 \mathrm{ANDSK}>\emptyset):$ IFFB $=\emptyset \mathrm{T}$ HENSK=S:GOTO 37
DD 35 IFS $=$ SKTHEN 34
AF 36 SK=S:GOTO 33
SJ 37 GOSUB2ø5:PRINTLEFT \$(DW\$, 22) TAB (14)" \{CYN\}PLEASE \{2 SPACES\}WAIT"
DR 38 IFPL $\angle 4$ THENFORK $=\mathrm{PL}+1 \mathrm{TO} 4: \mathrm{P}$ $\mathrm{L} \$(\mathrm{~K})=\mathrm{CP} \$:$ NEXT
RE 39 SC (1) $=\emptyset: \operatorname{SC}(2)=\emptyset: \operatorname{SC}(3)=\emptyset$ : SC (4) $=\varnothing$
AD 40 FORK $=\emptyset T O 18:$ FORL $=\emptyset T O 8: D I($ $K, L)=\varnothing: B L S(K, L)=" ": N E X T:$ NEXT
GE 41 LM $=15+1 \sigma * S K: F O R K=1 T O L M$
PA $42 \mathrm{~A}=\mathrm{FNRN}(18): \mathrm{B}=\mathrm{FNRN}(8):$ IFB L\$ $(\mathrm{A}, \mathrm{B})<>$ ""THEN42
RQ $43 \mathrm{BL}(\mathrm{A}, \mathrm{B})=\mathrm{PC}(\operatorname{FNRN}(3), \emptyset)+$ PCS (FNRN (3), 1) +RS+PC\$ (FN RN (3) , 2) $+\mathrm{PC} \$$ (FNRN (3) , 3)
QB 44 AS $=\mathrm{BL} S(\mathrm{~A}, \mathrm{~B})$
CC $45 \mathrm{C}=\mathrm{FNRN}(18): \mathrm{D}=\mathrm{FNRN}(8):$ IFB L\$ (C, D) <>""THEN45
AA $46 \mathrm{BL}(\mathrm{C}, \mathrm{D})=\mathrm{A} \$: \mathrm{MT}(\mathrm{C}, \mathrm{D}, \varnothing)=\mathrm{A}:$ $\operatorname{MT}(C, D, 1)=B: \operatorname{MT}(A, B, \theta)=C:$ $\operatorname{MT}(A, B, 1)=D$
QS $47 \mathrm{MT}(\mathrm{A}, \mathrm{B}, 2)=\varnothing: \mathrm{MT}(\mathrm{C}, \mathrm{D}, 2)=\varnothing$ : NEXT
FD 48 FORK= 6 TO18: $F O R L=\varnothing T O 8$
PM 49 IFBLS $(\mathrm{K}, \mathrm{L})=$ ""THENGOSUB51
$: M T(K, L, \sigma)=-1: M T(K, L, 2)=$ $\sigma$
KS 50 NEXT:NEXT:GOTO56
CM 51 C=FNRN (3) +1 : ONCGOSUB 52 , 5 3,54,55: RETURN
DX 52 BL $(\mathrm{K}, \mathrm{L})=\mathrm{FI}$ : RETURN
MH 53 BL $(\mathrm{K}, \mathrm{L})=$ HPS: RETURN
QQ 54 BL $(\mathrm{K}, \mathrm{L})=$ SS $\$$ : RETURN
QE $55 \mathrm{BL}(\mathrm{K}, \mathrm{L})=\mathrm{TH} \$:$ RETURN
JE 56 PRINT"\{CLR\}\{2\}!"B1\$"\#"; : FORK=1TO18: PRINT"S"SPC (3 8) "\%"; : NEXT

PC 57 PRINT"\$"Bl\$"\%\$\{4\}"PL\$(1)
" $\{2$ SPACES $\}$ "PL $\$(2)$ "
$\{2$ SPACES $\}$ "PL\$(3)"
\{2 SPACES \}"PLS (4)"\{2\}\%";
GF 58 PRINT"\$"B2\$"\%\$"SPC (38) "\% \&"Bl\$"'\{HOME\}"
DR 59 FORK=2TO19STEP2:FORL=1TO 19STEP2: PRINTLEFT \$ (DW\$, K ) SPC (L)VB\$
EJ 60 PRINTLEFT\$ (DW\$,K)SPC (38L) $V B \$: N E X T: N E X T: Q Q=F R E(\emptyset$ )
PG 61 PRINTLEFT (DW\$, 23)"
\{RIGHT\}";:FORK=1TO4:AS=S TRS (SC (K))
GF $62 \mathrm{Z}=7$ :GOSUB 294 : B\$=" " $+\mathrm{C} \$+$ " ": PRINTCLS (K) B\$; : IFK<4T HENPRINT" ${ }^{\prime 2}$ SPACES $\}^{\prime \prime}$;
XJ 63 NEXT
SQ 64 PRINTLEFT\$ (DWS, 25) TAB (1 $\varnothing$ )"\{CYN\}PAIRS REMAINING: \{SPACE\} \{WHT\}";
XG 65 AS=STRS (LM): $Z=3:$ GOSUB $2 \oslash 4$ :PRINTC\$" $\{$ HOME $\}$ "; : HI = -1 : $M X=O X: M Y=C Y$
QB 66 IFLM<1THEN143
$\mathrm{HR} 67 \mathrm{CP}=\mathrm{CP}+1: \mathrm{IFCP}>4 \mathrm{THENCP}=1$
HS 68 GOSUB86:LP=CP
QP 69 GOSUB87: IFPL $\$(C P)=C P \$ T H E$ N164
AR 78 GOSUB82
MJ 71 DX=OX-(JR=8ANDOX<18) + (JL $=4$ ANDOX $>\sigma$ ) : $C X=D X$
$\mathrm{XA} 72 \mathrm{DY}=\mathrm{CY}-(\mathrm{JD}=2 \mathrm{ANDCY}<8)+(\mathrm{JU}=$ LANDCY> $\varnothing$ )
GG 73 GX=GX - (GXANDI): IFDX>14TH ENCX $=\mathrm{CX}-16: \mathrm{GX}=\mathrm{GXOR} 1$
RE 74 OX=DX:CY=DY:IFFB=ØTHENGO SUB87:GOTO76
EP 75 GOTO69
BA 76 A $\$=B L S(O X, C Y)$ : IFDI (OX,CY ) $>$ ØANDAS<>FBSTHEN69
PR $77 \mathrm{~B} \$=$ "\{WHT $\}$ ": IFA $\$=\mathrm{FI} \$ \mathrm{THENB}$ $\$=C L \$(C P)$
PD $78 \mathrm{ZL}=-(\mathrm{A} S=\mathrm{FIS})-2 *(\mathrm{~A}=\mathrm{TH} S)-$ $3^{*}(A S=H P \$)-4^{*}(A \$=S S \$)-5^{*}$ ( $\mathrm{A} \$=\mathrm{FB}$ )
AH 79 ONSPGOTO116,119
SE $8 \emptyset \mathrm{HI}=-1: \mathrm{SP}=2: \mathrm{GX}=\mathrm{GXOR}-2$ * ( PX >14): GOTO69
PQ $81 \mathrm{SP}=1: \mathrm{GX}=\mathrm{GX}-(\mathrm{GXAND} 2): \mathrm{POKE}$ V+21, GX: GOTO61
RX 82 JY=15-(PEEK (J)AND15): JU= JYAND1: JD=JYAND $2: J L=J Y A N$ D4: JR=JYAND8
CE $83 \mathrm{FB}=\operatorname{PEEK}(\mathrm{J})$ AND 16

MG 84 IFJU $=\emptyset$ ANDJD $=6$ ANDJR $=\emptyset$ ANDJ $\mathrm{L}=\emptyset \mathrm{ANDFB}=16$ THENA $=-(\mathrm{J}=563$ $2 \emptyset)+(J=56321): J=J+A: G O T O$ 82
MF 85 RETURN
FA 86 FORK $=\emptyset T 07$ : POKE $56097+$ (LP1) ${ }^{1} 16+\mathrm{K}, 11$ : POKE $56097+$ (CP $-1) * 1 \theta+\mathrm{K}, 1$ : NEXT: RETURN
DC $87 \mathrm{z}=-(\mathrm{SP}=2): \mathrm{POKEV}+4 \varnothing, \mathrm{CL}(5)$ : POKEV+39,CL (CP)
AR 88 POKEV, $28+16 * C X:$ POKEV +16 , GX: POKEV $+1,56+16 *$ CY
HA 89 IFZ $=1$ ANDOX $=$ PXANDCY $=$ PYTHE NPOKEV $+2, \operatorname{PEEK}(\mathrm{~V}):$ POKEV +3 , $\operatorname{PEEK}(\mathrm{V}+1)$
SF 90 POKEV $+21,1+2 * Z$ :RETURN
JR 91 DI $(Q 1, Q 2)=5: M T(Q 1, Q 2,2)=$ MT (Q1,Q2,2)+.1
EB 92 PRINTLEFTS(DWS, Q 2 * $2+2$ ) SP C (Q1*2+1) B\$AS:BL\$(Q1,Q2) =A\$: GOSUB262:RETURN
HD 93 PRINTLEFT (DW\$, Q2*2+2)SP $C(Q 1 * 2+1)$ VBS:DI $(Q 1, Q 2)=\varnothing$ : NS $=5$ : GOSUB $2 \varnothing \sigma$
EM 94 RV=RV-1:RETURN
GP $95 \mathrm{~A} \$=\mathrm{FB} \$: \mathrm{B} \$=\mathrm{CL} \$(\mathrm{CP}): \mathrm{DI}(\mathrm{Q1}$, Q2) =CP: LM=LM-. 5: GOTO92
MM 96 DIMBL $(18,8)$, DI $(18,8)$,PC $\$(3,3)$, MT $(18,8,2): S O=542$ 72
KS $97 \operatorname{DEF} \operatorname{FNRN}(\mathrm{X})=$ INT ( $(\operatorname{PEEK}(\mathrm{SO}$ $+27) / 256)$ * $(\mathrm{X}+1)$ )
HH 98 DEF $\operatorname{FNP}(X)=(\operatorname{PEEK}(S O+27) /$ 256) < X

DH 99 R\$="\{DOWN\}\{2 LEFT\}":FIS= " () "+RS+"*+":HPS="\{YEL\}; <"+R\$+" $=>": S S \$="\{$ RED $\},-"$ +RS+"./": FH= $\quad$ :HS= $\varnothing$
RC $10 \emptyset$ FB $="<? "+\mathrm{R} \$+" * \mathrm{Q} ": \mathrm{VB} \$="$ $\{B L U\}[\{7\} \in\{B L \bar{U}\} "+R \$+"]$ [": TH $\$="\{8\} £\{N\} "+R \$+"$ \{Q\}\{D\}":CPS="COMPUTER"
DH $101 \mathrm{~B} 1 \$=n ": \mathrm{B} 2 \$==":$ FORK=1TO3 $8: \mathrm{B} 1 \$=\mathrm{B} 1 \$+\mathrm{CHR} \$(34): \mathrm{B} 2 \$=$ B2\$+"R":NEXT
RB 102 DW\$="\{HOME \}\{24 DOWN\}":J $=5632 \sigma$
 $(\mathrm{K}, \mathrm{L})=\operatorname{CHRS}(97+4 * \mathrm{~K}+\mathrm{L}): \mathrm{NE}$ XTL, K
MQ 104 FORK $=$ ØTO 2: POKE $49152+\mathrm{K}, 2$ 55: POKE $49155+\mathrm{K}, 255$ : NEXT
QP 165 FORK $=49158 \mathrm{TO} 49203$ STEP3: POKEK, 224 : POKEK+1, $\sigma$ : POK EK+2,7: NEXT
XH 106 FORK $=$ ØTO2: POKE $49206+K, 2$ 55: POKE 49209+K, 255: POKE $49212+\mathrm{K}, 0$ : NEXT
HH 107 CLS(1)="\{GRN\}":CL\$(2)=" \{CYN\}":CL\$(3)="\{RED\}":C LS (4) ="\{YEL\}"
CH $108 \mathrm{CL}(1)=5: \operatorname{CL}(2)=3: \operatorname{CL}(3)=2$ $: \operatorname{CL}(4)=7: \operatorname{CL}(5)=12$
SR 109 DATA"SIMPLE\{5 SPACES\}", "VERY EASY\{2 SPACES\}"," RATHER EASY","ALMOST EA SY", "ALMOST HARD"
XS 110 DATA"RATHER HARD", "VERY

HARD\{2 SPACES\}","DIFFI CULT $\{2$ SPACES $\}$ "
FG 111 FORK=gTO7:READSK (K) : NE XT: RETURN
XP $112 \mathrm{~V}=53248:$ POKEV $+21, \varnothing$ :POKE $\mathrm{V}+16, \varnothing$ : POKEV $+2,28:$ POKEV +3 , 56
AH 113 POKE51192, $\varnothing$ : POKE51193, $\varnothing$ $: C X=\varnothing: C Y=\varnothing: G X=\varnothing: C P=\varnothing: L P$ $=2: S P=1: O X=\varnothing$
SK 114 FORK=SOTOSO+24:POKEK, 0 : NEXT: RV $=\varnothing$ : POKESO $+15,255$ : POKESO $+18,128$
CR 115 RETURN
EX 116 PX=OX:PY=CY:LZ=ZL:IFZL< 5THENQ1=OX: Q2 $=\mathrm{CY}$ : GOSUB9 1
FC 117 ONZL+1GOTO80,86,80,118, 81,69
PR 118 SC (CP) $=\mathrm{SC}(\mathrm{CP})+250$ : GOTO8 1
KQ 119 IFZL<5THENQ1=OX:Q2=CY:G OSUB91
KC $12 \emptyset$ ONZL+1GOTO121,130,133,1 35,136,138
GH 121 ONLZ+1GOTO122,127,125
HC 122 IFAS<>BLS(PX,PY)THEN125
$\mathrm{AE} 123 \mathrm{SC}(\mathrm{CP})=\mathrm{SC}(\mathrm{CP})+100: \mathrm{Ql}=0 \mathrm{X}$ : Q2 =CY: GOSUB95
BF 124 Q1=PX:Q2=PY:GOSUB95:GOT 081
DS 125 FORK $=1 \mathrm{TO} 2500: \mathrm{NEXT}$
PS 126 Q1=OX:Q2=CY:GOSUB93:Q1= $\mathrm{PX}: \mathrm{Q2}=\mathrm{PY}:$ GOSUB93: GOTO81
HK 127 FORK=øTO18:FORL=øTO8:C =A
KM 128 IFAS=BL $\$(K, L) T H E N Q 1=K: Q$ 2=L: GOSUB95: SC (CP) $=\mathrm{SC}$ (C P) $+50: \mathrm{A} \$=\mathrm{C} \$$

SH 129 NEXTL,K:GOTO81
CC 130 ONLZ+1GOTO132,80
FS 131 GOTO81
DC 132 A $\$=\mathrm{BL}$ \$(PX,PY): GOTO 127
KM 133 IFLZ=øTHEN125
BX 134 GOTO81
RX 135 ONLZ+1GOTO125,118:GOTO8 1
FP 136 IFLZ $=6$ THEN 125
MA 137 GOTO81
HP 138 IFLZ <>2THEN8 $\varnothing$
BP $139 \mathrm{~A}=\operatorname{PEEK}(55337+0 \mathrm{X} * 2+(\mathrm{CY} * 2$ ) *40) AND 15: IFA $=C L$ (CP) TH EN80
HA 140 LM=LM+.5:Q1=OX:Q2=CY:GO SUB95: SC (CP) $=S C(C P)+50$
RF 141 FORK=1TO4:IFA $=$ CL (K) THEN $B=K: K=5$
HR 142 NEXT: SC $(B)=S C(B)-50: G O T$ 081
ES 143 POKEV+21, $0:$ PRINT"\{CLR\} \{2 DOWN \} \{WHT\} \{3 RIGHT\}F INAL RESULTS:":PRINT" \{2\}\{RIGHT\}"B2\$
CS 144 PRINT" $\{4\}\{2$ RIGHT\}NAME" , "SCORE","\{2 LEFT\}BLOC KS WON \{DOWN\}"
$X D 145 \mathrm{~A}(1)=\varnothing: A(2)=\varnothing: A(3)=\varnothing: A($ 4) $=\varnothing$

JC 146 FORL=ØTO8:FORK= $=$ TO18: $\mathrm{A}=$ DI ( $\mathrm{K}, \mathrm{L}$ ) : IFA> ØANDA < 5 THEN $A(A)=A(A)+1$
BM 147 NEXT: NEXT
KQ 148 FORK=1TO4: PRINT" $\{$ DOWN $\}$
\{2 RIGHT\}\{BLU\}"PLS(K), C LS(K) ;:AS=STR\$(SC (K))
HF $149 \mathrm{Z}=7$ : GOSUB2ø4:PRINTC ${ }^{2}$ : A $\$=\operatorname{STR} \$(A(K)): Z=4:$ GOSUB 2 64: PRINTC\$:NEXT
AF 150 PRINT" $\{3$ DOWN $\}\{2\}$
\{2 RIGHT\}!"LEFT\$(B1\$,34 )"\#":FORK=1TO3:PRINT"
\{2 RIGHT\}\$"SPC (34)"\%": N EXT
FK 151 PRINT"\{2 RIGHT\}\&"LEFT \$( B1 $\$, 34$ ("'"
KR 152 HS=SC(1):W=1: $\mathrm{FORK}=2 \mathrm{TO4}$ : IFSC $(K)>$ HSTHENHS $=S C(K):$ $\mathrm{W}=\mathrm{K}$
HK 153 NEXT: PRINTLEFT $\$(D W \$, 2 \emptyset)$ TAB (5)"\{CYN\}THE WINNER: ";
JS 154 FORK=1TO4:IFW=KTHENNEXT : GOTO157
JG 155 IFSC $(K)=$ HSTHENA $=-K$ * $(\mathrm{A}(\mathrm{K}$ ) $>A(\mathrm{~W}))-\mathrm{W}^{*}(\mathrm{~A}(\mathrm{~W})>\mathrm{A}(\mathrm{K}))-5$ * $(\mathrm{A}(\mathrm{K})=\mathrm{A}(\mathrm{W})): \mathrm{W}=\mathrm{A}$

SQ 156 NEXT
MG 157 IFW=5THENPRINT"\{RED\}HIG H SCORE IS TIED": GOTOI5 9
DG 158 PRINT"\{BLU\}PLAYER"W" \{WHT\}"PLS(W)
AP 159 PRINTLEFT (DW\$, 24) TAB (8 )"\{YEL\}PRESS FIRE TO PL AY AGAIN"
KA 160 GOSUB82: IFFB $=$ ØTHEN 3
MS 161 GOTO160
JR 162 MX=FNRN (18): $M Y=\operatorname{FNRN}(8)$ : GOTO176
QK 163 NX=FNRN (18): $\mathrm{NY}=\operatorname{FNRN}(8)$ : GOTO175
KH 164 ONSPGOTO165,174
SH 165 IFHI>-1THEN197
SD 166 IFMT (MX,MY, $\varnothing$ ) $=-1$ ANDBL $\$($ MX,MY) <>SS \$THEN195
XF 167 MX= Ø:MY= $0: F O R L=\emptyset T 08: F O R$ $\mathrm{K}=\emptyset \mathrm{TO} 18: \mathrm{A}=$ FNRN (4)
SP $168 \operatorname{IFMT}(K, L, 2)>$ HIANDDI ( $K, L$ $)=\emptyset$ AND $(A=\emptyset 0$ RRV $>16 \varnothing$ ) THEN $M X=K: M Y=L$
BQ 169 NEXT: NEXT
AX $17 \emptyset$ A=FNRN (1): NX=MT (MX,MY, $\varnothing$ ) $: \mathrm{NY}=\mathrm{MT}(\mathrm{MX}, \mathrm{MY}, 1): \mathrm{HI}=\mathrm{MT}($ MX,MY,2)
$X B 171$ IFMT (MX,MY, $\varnothing)>-1$ THENIFN OTFNP (MT (NX,NY, 2) + SK*. $\varnothing$ $02+\mathrm{RV} * \cdot 001)$ ANDA $=$ ØTHEN16 2
DA 172 IFDI (MX,MY) > ©THEN162
CF 173 GOTOI97
GE 174 IFHI>-1THEN197
JA 175 ONLZ +1 GOTO176,186,183
XF 176 IFNX=-1THEN163
SQ 177 IFFNRN $(9)=$ GTHEN 193
QP 178 IFMT ( $N \mathrm{X}, \mathrm{NY}, \varnothing$ ) >-1THENIFN OTENP (MT (NX,NY,2)+SK*. $\varnothing$

Ø2＋RV＊．$\varnothing \emptyset 1)$ ANDRV $<17 \emptyset T H E$ N163
CE 179 GOTO193
PE 180 IFNX＝－1THEN163
GF 181 A＝FNRN（2）：IFA＝ØTHEN163
CD 182 GOTO193
XF 183 IFNX＝－1THEN163
EC $184 \mathrm{~A}=-(\operatorname{FNRN}(2)=\varnothing):$ IFLM $=(15$ +10 ＊SK）THENONA＋1GOTO163 ， 193
KH $185 \mathrm{NX}=-1:$ FORK $=\emptyset$ TO18： $\mathrm{FORL}=\emptyset$ TO8：A $=$ PEEK（ $55337+\mathrm{K} * 2+(\mathrm{L}$ ＊2）＊ 40 ）AND 15
PX $186 \operatorname{IFBL} \$(\mathrm{~K}, \mathrm{~L})=\mathrm{FB}$ \＄THENGOSUB 190： IFFL＝ØTHENK＝19：L＝9
BX 187 NEXT：NEXT
CP 188 IFNX＝－1THENNX＝FNRN（18）： NY＝FNRN（8）
QG 189 GOTO194
PS $190 \mathrm{NX}=\mathrm{K}: \mathrm{NY}=\mathrm{L}: \mathrm{FL}=\varnothing: \mathrm{IFA}=\mathrm{CL}(\mathrm{C}$ P）THENFL＝1：NX＝－1：RETURN
KE 191 B＝FNRN（1）：IFB $>$ ©THENFL $=1$
RD 192 RETURN
PQ 193 IFDI（NX，NY）$>6$ THEN 163
JK $194 \mathrm{HI}=5: M X=N X: M Y=N Y: G O T O 19$ 7
GH 195 IFLM $=(15+10 * S K)$ ANDBL $(M$ $\mathrm{X}, \mathrm{MY})=\mathrm{TH} \$$ THEN 162
GC 196 GOTO17
BS $197 \mathrm{JU}=-(\mathrm{MY}\langle C Y): \mathrm{JD}=-2$＊$(\mathrm{MY}>\mathrm{C}$ $\mathrm{Y}): \mathrm{JR}=-8^{*}(\mathrm{MX}>\mathrm{OX}): \mathrm{JL}=-4$＊ （ $M X<O X$ ）
EA $198 \mathrm{FB}=16: \mathrm{IFOX}=\mathrm{MXANDCY}=\mathrm{MYTH}$ $\mathrm{ENFB}=\emptyset$
CE 199 GOTO71
MH $2 \emptyset 0$ POKESO $+24,15$ ：POKESO $+5,9$ ：POKESO $+6, \varnothing:$ POKESO，NS：$P$ OKESO +1 ，NS
PG 201 POKESO＋4，33：FORSD＝1TO10 $\emptyset: \mathrm{NEXT}: \mathrm{POKESO}+4,32:$ RETU RN
KQ $262 \mathrm{NS}=175+75^{*}(\mathrm{~A} S=\mathrm{FI} \$)+25^{*}($ $A \$=H P S)+15 \emptyset \star(A \$=S S \$)+1 \emptyset$ g＊$(A S=T H \$)-25^{*}(A S=F B \$)$
XJ 2 G3 GOSUB $2 \emptyset \emptyset: R V=R V+1:$ RETURN
MG 204 B\＄＝LEFT\＄（＂øøøø日の日＂，Z）：C $\$=\operatorname{LEFT} \$(B \$, Z-\operatorname{LEN}(A \$))+\mathrm{R}$ IGHT \＄（AS，LEN（A\＄）－1）：RET URN
PX 265 POKE781，21：SYS599＠3：RET URN

[^2]C878：3E $77 \quad 77 \quad 77 \quad 77 \quad 77$ 3E $\quad 60 \quad 83$ C880：7E $77 \begin{array}{llllllll}77 & 7 \mathrm{E} & 70 & 78 & 70 & 00 & 2 \mathrm{C}\end{array}$ C888： $3 \mathrm{E} \quad 77 \quad 77 \quad 77 \quad 77 \quad 7 \mathrm{E} \quad 3 \mathrm{~B} \quad 00 \quad \mathrm{~A} 9$ C890：7E $77 \quad 77 \quad 7 \mathrm{E} \quad 77 \quad 77 \quad 77 \quad$ Øロ 9 E
 C8A ：7F 1C 1C 1C 1C 1C 1C $\quad$ 1С $\quad$ 1 7 C8A8： $77 \quad 77 \quad 77 \quad 77 \quad 77 \quad 77$ 3E $\quad$ Ø0 $\quad 50$ C8B $: 77 \quad 77 \quad 77 \quad 77 \quad 77 \quad 3 \mathrm{E} \quad$ 98 $\quad$ 日曰 07 C8B8： $77 \quad 77 \quad 77 \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 77 \quad 63 \quad 00 \quad 6 \mathrm{~B}$
 C8C8：77 $77 \quad 77$ 3E 1C 1C 1C $0 \emptyset 50$ C8D ：7F 77 ØE $1 \mathrm{C} \quad 38 \quad 77 \quad 7 \mathrm{~F} \quad$ ØØ $\quad 22$ C8D8：$\varnothing 0 \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 76 \quad 77 \quad 767676$ 3A C8Eも：ØØ FE FE ØE EE 6E 6E 6E 6E C8E8： $76 \quad 76 \quad 76 \quad 77 \quad 7 \emptyset \quad 7 \mathrm{E} \quad 7 \mathrm{~F} \quad$ ØØ 1 A C8Fの：6E 6E 6E EE ØE FE FE 90 7C C8F8：$\emptyset \emptyset \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad \mathrm{CA}$
 C 908 ：$\emptyset \emptyset \mathrm{FF} 80 \mathrm{BF} \mathrm{BF}$ B8 BB BA BA
 C918：$\varnothing 0 \mathrm{FF}$ Ø1 FD FD 1D DD 5D 29 C 920 ：BA BA BA BA BA BA BA BA B3 C928：5D 5D 5D 5D 5D 5D 5D 5D BB C930： BA BB B8 BF BE 80 FF gø 23 C938：5D DD 1D FD FD 01 FE Ø0 69 C940：FF $80 \quad 80 \quad 86$ B6 B6 B6 89 F3 C948：FF 01 Cl D9 D9 81 7D 8D 4F C950：9F $9 \mathrm{~F} \quad 8 \mathrm{E} \quad 818388380 \quad \mathrm{FF} \quad \mathrm{B} \emptyset$ C958：ED F9 F1 81 Cl Cl 1 FE CE C960： 0 F 1F 387 D E3 C7 CF CE FD C968： F Ø F 8 IC ØE C7 $8313 \quad 33$ BC C970：CC C8 C1 E3 7 C 38 IF ØF C4 C978：73 E3 E3 C7 ØE 1C F8 Fø 7F C980：3E $77 \quad 77 \quad 77 \quad 77 \quad 77 \quad 3 \mathrm{E} \quad$ Ø0 8D C988：1C 7C 1C 1C 1C 1C 7F 90 DE C99日：3E $77 \quad 97 \quad 3 \mathrm{E} \quad 7 \emptyset \quad 77 \quad 7 \mathrm{E} \quad 90 \quad 46$ C998： $3 \mathrm{E} \quad 77 \quad 67 \quad 1 \mathrm{E} \quad 07 \quad 77 \quad 3 \mathrm{E} \quad 00 \quad 7 \mathrm{E}$ C9AØ：77 $77 \begin{array}{lllllllll}77 & 7 \mathrm{~F} & 97 & 97 & 97 & \text { 日の } & 17\end{array}$ C9A8：7F $70 \quad 70 \quad 3 \mathrm{E} \quad 07 \quad 77$ 3E $\quad$ ØØ 9 C C9B C9B8：3F $77 \quad 97 \quad$ 日E $1 \mathrm{C} \quad 38 \quad 70 \quad \emptyset 0 \quad 2 \mathrm{E}$ C9C0：3E $77 \begin{array}{lllllllll}77 & 3 \mathrm{E} & 77 & 77 & 3 \mathrm{E} & \text { Ø0 } & 3 \mathrm{~A}\end{array}$ C9C8： $3 \mathrm{E} \quad 77 \quad 77 \quad 3 \mathrm{~F} \quad 97 \quad 77 \begin{array}{llllll} & 7 \mathrm{E} & 77 & 00 & \mathrm{CE}\end{array}$
 C9D8： $00 \quad 07$ IF 33 6F 69 Fl FF 4A C9Eの：のØ E $\quad$ F8 CC F6 96 8F FF C9 C9E8：FF CF $63 \quad 70 \quad 3 \mathrm{C}$ IF $\quad 07 \quad 0050$ C9F $: \mathrm{FF}$ F3 C6 ØE 3C F8 E $\emptyset \quad \emptyset \emptyset$ C2 C9F8：$\varnothing \emptyset$ FE FE FE FE FE FE FE ØD CAØØ：7F $\quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad$ Øø 16 CAØ8：$\emptyset \emptyset \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 60 \quad 6 \mathrm{~F} \quad 6 \mathrm{~F} \quad 6 \mathrm{~F} \quad 6 \mathrm{~F}$ FA CAlØ：ØØ FE FE 06 E6 F6 F6 F6 1E CA18：6F $6 \mathrm{~F} \quad 6 \mathrm{~F} \quad 6 \mathrm{~F} \quad 6 \emptyset \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad \emptyset \emptyset \quad 26$ CA20：F6 F6 F6 F6 06 FE FE 9067 CA 28：$\varnothing 0 \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 6060606060 \quad 39$ CA $30: \emptyset \emptyset$ FE FE $06 \quad \emptyset 6 \quad 96 \quad \emptyset 6 \quad 06 \quad 20$ CA38： $60 \quad 606060607 \mathrm{~F}$ 7F $\quad$ Ø0 28 CA $40: \emptyset 6 \quad \emptyset 6 \quad 06 \quad 06 \quad 06 \mathrm{FE}$ FE 00 A5 CA 48：$\sigma \emptyset \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 60 \quad 60 \quad 6 \mathrm{E} \quad 60 \quad 60 \quad 91$ CA50： 00 FE FE $06 \quad 06 \quad 76 \quad 96 \quad 06 \quad 02$ CA58：60 6Ø 6E 60 6Ø 7F 7F $0 \emptyset$ ØA CA60： $06 \quad \emptyset 6 \quad 76 \quad \emptyset 6 \quad \emptyset 6$ FE FE $\quad \emptyset \emptyset \quad \mathrm{D} 3$ CA 68：$\emptyset \emptyset \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 6 \emptyset \quad 6 \mathrm{E}$ 6曰 6 E 6Ø 66 CA7日：$\emptyset \emptyset \quad \mathrm{FE}$ FE $\quad 96 \quad 76 \quad 96 \quad 76 \quad 96 \quad \mathrm{C} 4$ CA78： $60 \quad 6 \mathrm{E} \quad 60 \quad 6 \mathrm{E} \quad 60 \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad$ Øの CC
 CA88：FE FE FE FE FE FE FE $\emptyset \emptyset \quad 1 \mathrm{~F}$
 CA98：80 C $\emptyset$ E F 1 FB FF EE E4 7C CAA $0: 2 \mathrm{E}$ 6E EE EE EE EE EE EE B5

CAA8：81 C1 E1 Fl F9 FD EF E7 5A CAB 日：DF DF DE DC DC DC DC DC E8 $\begin{array}{llllllllll}\mathrm{CAB} & \mathrm{E} 7 & \mathrm{~F} 7 & \mathrm{~F} 7 & 77 & 77 & 77 & 77 & 77 & \mathrm{~B} 6\end{array}$ CACØ：F8 FD FD 1D 1D 1D 1D F9 75 CAC8： FE FF FF C7 C7 C7 C7 C7 $\quad$ OF CAD $: 3 \mathrm{~F} \quad 7 \mathrm{~F} \quad 7 \mathrm{~F} \quad 71 \quad 76767677 \quad 8 \mathrm{~A}$ CAD8：8F DF DF DC 1C 1C 1C DD 5F $\begin{array}{lllllllll}C A E 0: E 7 & \text { F7 } & \mathrm{F} 7 & 77 & 97 & 97 & 97 & \mathrm{F7} & 39\end{array}$ CAE8： 01 Ø1 Ø1 Ø1 Ø1 Ø1 Ø1 Ø1 7E
 CAF8：EのEのEのEのEØEØEのEの 8E $\mathrm{CB} \emptyset 0: \mathrm{EE}$ EE EE EE EE EE EE EE 97 CBØ8：E3 El El El El El El El Aø CB10：DC DC DC DC DC DF DF DF BC $\begin{array}{llllllllll}\mathrm{CB} 18: 77 & 77 & 77 & 77 & 77 & \mathrm{~F} 7 & \mathrm{~F} 7 & \mathrm{E} 7 & 23\end{array}$ CB20：F9 1D 1D 1D 1D FD FD F8 47 CB28：C7 C7 C7 C7 C7 FF FF FE 48 CB30：77 71 CB38：DD DC DC DC DC DF DF 8F 15 CB40：E7 $77 \begin{array}{llllllll}77 & 77 & 77 & \text { F7 F7 } & \text { E7 8B }\end{array}$ CB48：$\varnothing 0 \quad 7 \mathrm{~F} \quad 60 \quad 40 \quad 43 \quad 40 \quad 46$ CB50： $0 \emptyset$ FE $06 \quad 82$ E2． $92 \quad 62$ 8A FE CB58： $4 \mathrm{E} \quad 4 \mathrm{~F} \quad 64 \quad 77 \quad 7 \mathrm{~B} \quad 7 \mathrm{C} \quad 7 \mathrm{~F} \quad \emptyset \emptyset \quad \mathrm{BB}$ CB60：72 F2 26 EE DE 3E FE $0 \emptyset$ 8F CB68：$\varnothing 1 \quad 01 \quad 91 \quad 01 \quad \emptyset 1$ FD FD FD EA $C B 7 \emptyset: F 8 C \emptyset C \varnothing C \emptyset C \emptyset F F F F F F D E$

John Cameron lives in Newcastle，New Brunswick，Canada．

## TYPING AIDS

MLX，our machine language entry program for the 64 and 128，and The Automatic Proofreader are util－ ities that help you type in Gazette programs without making mistakes． To make room for more programs， we no longer include these labor－ saving utilities in every issue，but they can be found on each Gazette Disk and are printed in all issues of Gazette through June 1990.

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## KODAK DICONIX <br> 701

The Kodak Diconix 701 inkjet printer-from the people who sell film in those little yellow boxes-might be your answer to one or both of two questions. First, do you need a printer that's as portable as your laptop? The 701 works either from AC or from a battery power pack. Second, do you want laser printer-quality graphics but can't afford a laser? The 701 provides $300 \times 300 \mathrm{dpi}$ resolution in a very small package.

Portable enough to take on the road but powerful enough for the office, the 701 is a fully functional letter quality printer. It takes up less space on your desk than a sheet of paper and weighs only 5.9 pounds, including battery. It's 2.4 inches high, 7.68 inches deep, and 11.7 inches wide. A sheet feeder is built in, allowing you to print as many as 30 pages at a time. For portable use, the optional battery is the same as that used by many popular video camcorders.

A Microsoft Windows driver is included for instant compatibility with Windows applications. The popular HP DeskJet Plus and IBM ProPrinter X24E printers are emulated, which means that most programs can easily use the 701 .

Print speeds approach those of laser printers. Up to three pages per minute in draft mode or two pages per minute in quality mode are possible (200 cps in draft, 120 cps in quality mode). Regular plain paper can be used, including letterheads and forms. Ink-jet transparencies can also be printed, enabling you to
make last-minute preparations for presentations on the road. The printhead, a replaceable self-contained ink cartridge, is good for approximately 800 pages in stan-dard-text draft mode.

Several fonts of different sizes are built into the printer. These are Courier at 5-,
and capabilities. The 701 was designed not only to be a full-featured desktop unit but also to be light and small enough (and, with battery power, portable enough) to take into the field.

Kodak's marketing strategy is to offer mobile printers


If you need a readily portable ink-jet printer with near laser quality, the Kodak Diconix 701 could be for you.

6-, 10-, and 12-cpi monospaced; HEVTA (Helvetica) at 10-point proportional; Courier at 10 - and 20 -point proportional; and Gothic at 15-, 16.67-, and 20-cpi monospaced. Also included are hundreds of ASCII characters and symbols, coded graphics, and country-specific characters.
The 701 belongs to a new class of computer hardware that Kodak calls "mobile computing equipment." While mobile equipment has the light weight and small footprint characteristic of portable equipment, it provides greater "horsepower"
as affordable alternatives to other types of desktop printers. The 701 is less expensive and a good deal lighter than most laser printers but prints very close to the same quality. It can also run from batteries, which laser printers can't do.

I installed and tested the 701 with a number of programs and had no problems. Installing the printer driver included for Windows let me (using Adobe Type Manager) print more than 200 fonts to the 701 using Windows 3.1. I also printed a number of 256 -shades-ofgray photographs using

Aldus PhotoStyler. The results were just short of amazing for such a small printer. It really is a viable alternative to laser printers.

The Kodak Diconix 701 gives you AC or battery-powered 300 -dpi printing in a powerful little package.
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## WINSPEED 1.03

"Faster than a speeding bullet, able to leap tall . . .'

OK, that was Superman. But WinSpeed moves things along pretty rapidly, too, and-unlike the Man of Steel-it does do Windows in Super VGA.

We'll get more objective in a moment, but Win-Speed-the software-only display accelerator from Pan-acea-was a distinctly pleasant surprise. I had reluctantly accepted that Windows was slow in displaying intensive graphics, such as those in CorelDRAW!. Try blending colors or doing "fountain" fills, and you'll sit with crossed arms for a while as your display grinds out the graphic object. Other Windows applications suffer from this same Januarycold molasses slowness.
Let's put it this way: Speeding up Windows is good. WinSpeed is good.

Speeding up Windows applications is usually done in one of two ways. Hardware upgrades are the more expensive approach. Buying a 486-50 is certainly one solution, as is buying an expensive special video adapter like ATI's 8514 board. More realistic for most of us is a


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## $\mathbb{N e w}^{2}$ from COMPUTTE



Here's the official guide to the latest simulation from bestselling game designer, Sid Meier. Author Keith Ferrell has worked closely with Sid Meier and includes insider information, hints, strategies, and background information that enhances and complements the simulation. This is the most readable, information-packed guide to Civilization. Ferrell is editorial director of COMPUTE magazine and editor of OMNI magazine. He is the author of scores of magazine articles and the author of several books, including the recently released Big Book of PC Sports.

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## REVIEWS

software upgrade. .
Panacea claims a two to five times increase in VGA display speeds. I installed WinSpeed on my 386-20 with a Trident TVGA Super VGA display board and found it does indeed deliver within that range. There were no problems during installation using the automated installation procedure, or when I reinstalled manually for this review. One caution: For WinSpeed to install properly, you must start Windows from the WinSpeed subdirectory.

CoreIDRAW! and Aldus PhotoStyler were two of my often-used applications that benefited dramatically. Scrolling in all Windows applications now seems around 30 percent or so faster, a very nice increase. WinSpeed achieves its speed by replacing the normal drivers shipped with Windows or with your Super VGA board with special drivers optimized for maximum display speed.

The amount of display-speed increase you get depends on which graphics board is used. WinSpeed is designed to work with a key set of Super VGA boards having specific types of VGA chips. By taking advantage of some little-known features of these VGA chips, WinSpeed gives you additional performance not available directly from the board's manufacturer. This isn't as limited as it sounds-the manual lists 45 boards WinSpeed supports.
Panacea writes approximately 90 percent of the drivers for video cards currently being sold, so the company knows a lot about optimizing display drivers for the major VGA chips. WinSpeed specifically works with Paradise, Tseng ET-4000, ATI, Trident 8800 and 8900 , V7, and ZyMOS 51 chips. Normally, the installation program detects the chip you have, but manual installation is also possible for nonstandard boards.

WinSpeed increases display speed for all three of the 256 -color VGA modes: $640 \times 480,800 \times 600$, and $1024 \times 768$ pixels per screen. It must use one of the 256 -color VGA modes of your adapter to achieve its speed, even when displaying 16 colors. So, a card with 256 -color capacity is required.

For my system, WinSpeed was a welcome and productive enhancement. RALPH ROBERTS

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## DFI 486/33

When I first powered up the DFI 486/ 33 with local bus video, my thoughts immediately turned to a line from a classic song by the Who: "I don't wanna cause no fuss, but can I buy your magic bus?"

The DFI 486/33 is one of the first relatively low-cost PC clones to feature local bus video. The computer's Super VGA graphics subsystem is directly addressed by the 486DX microprocessor, which gives you graphics performance three times faster than that of typical 16-bit Super VGA cards. Display data doesn't have to pass through the slow

16-bit ISA bus slots found on traditional PCs, but it can instead be sent directly to the chip set 32 bits at a time, at a speed much higher than the 8 MHz of the typical PC expansion bus.

Local bus is the second big innovation to hit PC video within the last year or so; the first was the Windows accelerator card. Windows accelerators may actually give you more speed than a local bus VGA setup-but only while you're running Windows. These cards have custom processors designed specifically for speeding up Windows and a few other applications, such as AutoCAD. But if you're not running Windows, your graphics performance with
one of these cards will normally be no better than with a vanilla VGA card. Local bus, on the other hand, speeds up all screen operations. If you don't live in Windows and want top performance for DOS-based graphics applications or game software, local bus is the way to go.

One important concern with local bus video is that it doesn't use ISA expansion slots. Early local bus implementations used custom, nonstandard slots or put the video circuitry on the computer's motherboard. In mid June, however, the VESA committee defined a standard for future local bus implementations.

DFI's local bus implementation predates the VESA standard. It's a unique hybrid of the custom slot and motherboard setups. Both the 486DX processor and the video setup are on a custom card with two connectors. One connector plugs into an ISA AT slot, while the other plugs into a custom slot that's in-line with the AT slot. The processor and its support circuitry are on the custom card, but the system's main memory and cache RAM are on the processorless motherboard, which DFI calls a station board. Putting the processor on a card makes processor upgrades literally a snap. The station board can hold up to 48 MB of RAM, and an additional 16MB can be added using a 32-bit memory card.

The system I tested was configured with a 486DX running at 33 MHz (386DX and 486SX configurations are also available), 4MB of memory, 256 K of processor cache memory, a crystalclear $1024 \times 768$ noninterlaced Super VGA monitor, a 200MB Maxtor IDE hard drive, and $31 / 2$-inch and $51 / 4$-inch floppy drives. The station board has eight expansion slots, six of which are available. One slot is occupied by the processor/video card, while another holds a DFI All-in-One expansion card, which includes floppy and IDE hard drive controllers, two serial ports, a parallel printer port, and a game port. Ribbon cables extend from this board to the COM2 and game port connectors, which block an adjoining slot. If you need to fill all six open slots in the computer, you'll have to sacrifice the use of these two ports.

The system case is fairly plain, but not bad-looking. Reset, Turbo, and Power buttons adorn the left front. These buttons are flush with the front of the unit and must be pressed in fairly far; it's unlikely you'll accidentally reset or turn off the machine. With both floppies installed, there's still a spare $51 / 4$-inch drive bay, suitable for a tape backup or CD-ROM drive.

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three-button serial mouse is Microsoft and Mouse Systems compatible, and it has a quality feel. The only really weak link in the system is the keyboard. DFI uses a Key Tronic enhanced AT keyboard, but it must be Key Tronic's bottom-of-the-line model. The keyboard is very light, and the keys feel very mushy. I'll admit, however, it's one of the quietest keyboards l've ever used, and I did eventually adjust to the keys' lack of positive feedback.

Of course, if you're purchasing a 486, performance is probably a big concern. With its speedy processor, 256 K of ultrafast cache RAM, and local bus video system, I never spent any time waiting for the computer. Word processor macros that take five or six seconds to execute on the 386SX/16 I normally use were practically instant on the DFI. Windows screen updates were incredibly quick; even running in 256 -color $800 \times 600$ mode, Word for Windows scrolled through documents with no stuttering at all. Graphics-intensive games such as Aces of the Pacific run silky smooth. The Tseng ET4000-based graphics subsystem includes 1 MB of RAM and supports resolutions up to $1024 \times 768$ in 256 colors.

The system's documentation is great from a hard-ware-configuration standpoint, but it never pretends to be a tutorial on how to use the machine. You'll have no trouble setting up the system or adding peripherals to it, but if you're new to MS-DOS computing, plan on buying a good PC tutorial book with the system.

The DFI 486/33 is a real gem. Although the configuration I tested retails for


Windows power users will be pleased to learn that hDC Power Launcher lives up to its billing as "the Toolbar for Windows."
$\$ 2,495$, DFI says the actual street price is likely to be 2530 percent lower than that. Of course, after using a system with performance like this, I'm hooked. To paraphrase the Who, "I don't care how much I pay, I wanna drive my [local] bus with you everyday."
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## HDC POWER LAUNCHER

Windows was designed to be infinitely extendible. That's the good news. The bad news is that most of that flexibility hasn't been evident until now. With hDC Power Launcher, however, you get both extendibility and a fresh, unique mixture of utility programs that go far beyond what the modest
name implies. The company calls Power Launcher "the Toolbar for Windows," and it is that, allowing you to add a single master toolbar visible in all Windows applications, as well as a custom toolbar for each program.

Included with the product are several related utilities, which the company calls MicroApps: a keyboard macro program that goes far beyond Macro Recorder, a mouse macro program, and Power Toolbox, which lets you create toolboxes. Several other utilities are included; my favorite is Virtual Desktop, which lets your screen stand in for a much bigger workspace. Power Launcher attaches itself to the System menu, so it's immediately available from all applications with a minimum of keystrokes.

Central to using Power Launcher and any of the MicroApps are what hDC calls Enhanced Commands, which execute whenever you click on an icon in the custom toolbox, launch a keyboard macro, or customize a mouse button. Like
many concepts in a wellcrafted GUI program, Enhanced Commands are easier to use than to explain.

An Enhanced Command can be viewed as an extension of the concept of running a program from Program Manager or File Manager, but it's much more than that. You can trigger keyboard macros, move and resize windows and icons, request input from the user, change an application's window caption, set the starting directory for an application, replace an application's icon, issue DDE commands, call routines from DLLs, run another Power Launcher script, and do any of this at any time as a scheduled event.

It's easy to tame this bewildering array of features, because each of the utilities sports a button called the Command Builder. When you click on it, you're stepped through a visual script-building process that lets you create an Enhanced Command without typing a thing. Left-brained, numbingly conventional traditionalist that I am, I much preferred simply typing a script into the included edit box, but it's a tribute to Power Launcher's infinite flexibility that the two approaches work equally well. Saving a command sequence as a script lets you attach that same script to a macro or toolbox icon or whatever, so you don't duplicate work.

The manuals are excel-lent-beautifully produced, intuitively organized, well written, and fairly complete. They could use much more extensive indices and examples for advanced scripting topics, especially in the sections on DDE and the use of DLLs. The online help is complete and, like the manual and hDC apps themselves,

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Is Po'wer Launcher worth the money? Absolutely-if you're a power user or if you're about to become one and are chafing under Windows' self-imposed limitations. This is a state-of-theart set of utilities. If you're new to Windows or use it only occasionally, Power Launcher probably isn't for you. Yet. tom CAMPBELL

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## LAPLINK PRO

LapLink Pro is a utility for managing files between computers. Files, directories, and whole directory tree structures may be copied, deleted, moved, and renamed. If you like, you may clone an entire drive.

Data compression is used to increase throughput speeds. Additionally, text files may be viewed and even edited. (LapLink includes a full-screen text editor which may be applied to lo-
cal text files. There's even a largetype mode for laptop displays.) One thing LapLink won't let you do is global management of selected files. Hence, you're restricted to transferring files only from the directory you're in, unless whole subdirectories below the current directory are being passed. Wildcards may be used when doing copies, both for selecting which files to copy and for selecting which files not to use.

The program is remarkably easy to use. Getting it up and running requires almost no thought, and usage will be intuitive to anyone with moderate computer experience and only a little presence of mind. The program works with two computers at a time-called local and remote. The local computer is the one you're typing on; either computer can be used at any time for controlling communications between the two. Communication is established through a serial port, parallel port, or modem connection. A set of connecting cables is supplied with the software.

The program checks each communication port from the moment it's run; if it finds a LapLink connection there, it reports that the remote computer is available. The screen is split into two windows: one for the current directory
contents on the local computer, the other for the same on the selected remote computer. An alternative to stepping through each directory by ascending or descending the directory hierarchy from your current level is an interactive tree mode. In tree mode, you may travel along a tree diagram while simulta-


LapLink Pro makes it easy to manage files between two or more computers.
neously looking at a list of files for each directory.
For most file-handling activities, LapLink effectively merges the two communicating computers into one computer with two keyboards. Unfortunately, DOS isn't accessible on the remote computer, but (as is commonplace these days) you may drop from the local LapLink into the DOS shell and return again. You can even launch another program and return to LapLink at its conclusion, but this, too, is only available on the local computer.

I tested LapLink Pro on my three primary computers-an 8088-based XT, an 80286-based machine, and an 80386-based AT-with both parallel and serial connections. During this same period I installed on all three a utility for compressing disk drive files to extend storage capacity. Unfortunately, the compression utility created a variety of problems, including mangled system data on the boot partition of the XT hard drive. Fortunately, l'd backed up all of the important XT directory structures to the high-capacity hard drive of my 386 as a practical test of LapLink.

But LapLink was not yet through helping me. Because of that crash, I decided that the best solution to my diskcompressor problems was to restore the drives to normal formatting, a process which involved the recording and safekeeping of dozens of directory structures and a few hundred megabytes worth of files-something which would have been incredibly tedious and time-consuming before LapLink. Going through a process somewhat similar to a high-tech version of Tower of Hanoi, shuttling directories back and forth between the three computers, I had all three hard drives formatted and restored in a reasonable amount of time-and almost without tedium. Lap-

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Link turned a potential crisis into an interesting afternoon's work.

My three computers are hooked together at their parallel and serial ports. Occasionally, I'm also linked by modem to another computer running LapLink. In theory, then, one might consider having a collection of computers communicating freely with one another. If computer $A$ is linked to computer B and computer B is linked to computer C , then not only can $B$ communicate with both $A$ and $C$, but $A$ should be able to gateway through $B$ to get to $C$ and vice versa. This principle can be daisychained to link as many computers as you like, each having access to any other. In practice, however, only the first case-that of B communicating with both $A$ and $C$ (though not at the same time)-is possible with the current version of LapLink. (Traveling Software recently announced a new "corporate 10-pack" for linking mul-
tiple computers.)
Business travelers trying to keep up-to-date records are well served by LapLink Pro. In the first place, connecting with another computer over the phone can be as easy as running LapLink on the other computer and calling it through LapLink on your own. No hassles-direct and straightforward. One very useful feature of LapLink is that it will synchronize directories for you. This means that it will update the files in the selected directories of both the local and remote machines so the selected directories match.

File selections for copying depend on what filenames aren't duplicated and, if some are, what the most recent file is. Hence, you can easily ensure that your laptop drive is in agreement with your desktop. Changes made on both computers are filed with a minimum of trouble. Another neat feature is the one for copying existing files only.

That means that if there are only specific files you need to copy, files which already exist in the selected directory of the receiving computer, then only those files will be copied and no otherseven if every file in the source directory is highlighted. For example, if your receiving computer is a spacelimited laptop which only needs an update of certain specific records and not a whole database of files, this selection will filter out the unneeded files and transfer only those required.

One additional feature is quite handy. LapLink Pro provides built-in support for the Xircom parallel port multiplexer, so LapLink and your printer can share the same parallel port.

It doesn't take long to discover that if you work with more than one computer, LapLink Pro is an indispensable utility. It's fast, reliable, and extremely easy to use. I highly recommend it.
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## REVIEWS

man of the Department of Emergency Medicine at Holmes Regional Medical Center in Melbourne, Florida.

The beauty of Home Medical Advisor is that Dr. Schueler, an advocate of preventive medicine and patient education, offers an enormous amount of medical information in easy-to-understand terms. And you don't have to be a computer whiz to get to that valua-


Who needs house calls when you've got a Home Medical Advisor?
ble information. You navigate the program with simple keyboard or mouse commands.

Any parent who makes amateur medical judgments-When is a cut deep enough, a fever high enough, a twisted ankle injured enough to merit a visit to the doctor?-will find Home Medical Advisor a handy resource.

For new parents dealing with the bewildering world of childhood diseases, illnesses, and injuries, it offers stiff competition to the medical sections of Dr. Benjamin Spock's renowned reference book.

Home Medical Advisor is constructed around six linked files: Symptom, Disease, Injury, Poison, Drug, and Test. Each can be accessed by clicking (with a heart-shaped cursor) in the main menu or by clicking on menu buttons that run along the bottom of the screen.

Say you can't remember which pain reliever-acetaminophen, aspirin, or ibuprofen-is appropriate to administer to a 12-year-old soccer player with a swollen ankle. You can consult the Drug file and find more than 800 prescription and nonprescription drug references as well as their indications, side effects, and interactions with other drugs.

Or let's say that all you have to work with is a symptom, such as ear pain. In the Symptom file, a series of questions helps you analyze the problem and make one of 450 diagnoses. The Symptom file includes more than 600 color VGA illustrations; many are anatomical

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and can help you localize exactly where it hurts.

Once you've arrived at a diagnosis, you can learn a great deal about your disease or injury. The Disease file gives detailed information about the signs, symptoms, evaluation, and treatment of more than 450 diseases. The Injury file is a guide to more than 130 different injuries, from a sprained ankle to a gunshot wound.

The Poison file spotlights more than 500 common household substances and products and tells you what to do if ingestion of any of them occurs. The Test file covers more than 125 of the most frequently performed medical tests and is a great way for you to become an informed patient before undergoing any medical testing. Information from any of the files can be outputted to dot-matrix or HP LaserJet printers.

A seventh file, a Referral file, is available upon registration of your software; it provides a listing of board-certified specialists in your state, making it easier for you to choose a doctor.

Home Medical Advisor is a great crowd pleaser; it leaves you wanting more. Adding some capability for the user to enter personal medical history, such as the last time you had a tetanus shot, would be a real help. The manual includes a glossary and instructions for basic procedures such as taking a temperature, but these deserve a spot in the program.

In addition, I found myself wishing for illustrations in the Disease and Injury files. The graphics are well done, but too often illustration opportunities are wasted on mere head shots of fictitious
physicians.
If you have a monochrome VGA monitor, you'll have trouble distinguishing between text and important special references called hot keys, which are programmed to appear in red. If Alt-X, which according to the documentation gives you access to the Drug file, doesn't work in your copy, try Alt-R, which retrieved the Drug file in my review copy of the program.

The greatest disappointment in Home Medical Advisor was the number of grammatical errors, punctuation problems, and typos in both the software and the documentation. Let's hope the good doctor asks a professional writer to diagnose these easily fixed problems in future updates.

If the intent of Home Medical Advisor is to educate and nurture patients, then it certainly succeeds. Its most powerful feature is cross-referencing. Every entry is littered with hot keys, which when clicked on lead you through catacombs of related information. You can journey tirelessly through-and even become addicted toall the data included in Home Medical Advisor.

Dr. Schueler's Home Medical Advisor 2.0 is just what the doctor ordered, for everyone from new mothers and fathers to the parents of young athletes to elderly users facing increasing health problems.
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## IMAGE COMMUNICATIONS TWINCOM 96/42i

In a crowded field of modems, it's hard to be distinctive. But that's just what this internal 9600 bps modem does-stand out in the crowd. Besides having fast transfer speeds, it implements the newest error-correcting and data-compression techniques. And a unique system of speed buffering allows data to be exchanged between the modem and computer at speeds of up to $38,400 \mathrm{bps}$.

Installing the card was easy. Step-by-step instructions made installation almost foolproof. I was a bit surprised that the default COM port setting was COM4, since most modems use COM2. Don't worry, though: Setting the port is as easy as flipping several switches as indicated by a chart in the manual. Another surprise was finding there wasn't any telecommunication software included, although that helps keep the price down.

Two different error-correction methods are available. You don't have to worry about either one. When modems connect, they determine and establish the best technique for the circumstances. For those interested in the technical details or for the rest of you, who want to know what to ask the salesman in the store, LAP-M and MNP-4 are the two types of error-correcting methods included. Both of these dramatically reduce the possibility that line noise or other interference will corrupt the flow of information.

Another new technology
that's built in is data compression. You don't have to know anything about it; the modems figure out what to do when they first connect. The V. 42 bis flavor of compression can quadruple data throughput when transferring compressible data. The MNP-5 variety can double the data throughput. All of this means that you'll send and receive information at a much faster rate.

The faster rate of data transfer poses a new problem. Since the modem is sending at a rate of 9600 bps over the phone line while compressing the data, it needs data from the computer at a faster rate than 9600 bps. Why? Remember that compression can usually at least double the data throughput. If the modem is using compression and communicating at a rate of 9600 bps, then, with the doubled throughput, it's sending at an effective rate of 19,200 bps. That means it needs information from the computer at the rate of $19,200 \mathrm{bps}$. In the best situations, with V.42bis compression, it's sending at an effective rate of $38,400 \mathrm{bps}$ and needs information from the computer at that rate.

The folks at Image Communications engineered the perfect solution in what they call speed buffering. Regardless of the over-the-phone communication rate, the baud rate of the computer can be set to $38,400 \mathrm{bps}$. Two internal buffers on the modem card manage the overflows and underflows of data. That way, under the best of circumstances, you can get an effective communication of $38,400 \mathrm{bps}$. At that rate I can send my entire Windows subdirectory (about 12MB) in about 42 minutes. That's incredible!

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## OMAR SHARIF ON BRIDGE

For bridge enthusiasts with some aces to play, there's finally a bridge game that'll help you fine-tune your game while you have a great time. The only thing you'll miss is your partner's frowns when you pass while he's holding all the points, or when you go down because you miscounted the trump.
Omar Sharif on Bridge is so easy to use that I didn't read the manual for several weeks. Pull-down menus and popup dialog boxes make it all happen. The well-designed interface logically groups choices together, and a single mouse click or keypress does everything.

A digitized voice narrates gameplay; it sounds like Omar himself. On my Sound Blaster the voice sounds great. On my computer at work, equipped with only a PC speaker, it sounds so bad I have to turn it off.

Beyond the cosmetics is the real bridge engine-bidding and card playing. In both areas the program performed well. If I could be as consistent, my game would improve dramatically. Bidding followed all of the standard conventions. None were mentioned in the manual, and you couldn't pick the ones you wanted to observe. But it dutifully responded to my 4 No Trump bid by going into Blackwood. Weak 2 bids and takeout doubles were also part of its standard arsenal.
I did note several oddities that made the bidding uncannily human. Here's an example: I was dealt a hand with nine spades (missing only the ace at the top) and some other points. Needless to say, I wanted to get the bid, but so did West. He outbid me and ended up at seven hearts. I had at least one loser and prudently stopped at six

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## REVIEWS

spades. He should have known he had at least one loser, too. At the first opportunity I played my ace of diamonds, took the trick, and probably created some new silicon-based curse words in the process.


Hone your bridge game at home on your computer with Omar Sharif on Bridge.

If the programmers wanted a perfectly playing bidding routine, they didn't quite make it. If they wanted to simulate human play, they got pretty close. I can't count the number of times l've faced an opponent who was determined to take the bid, no matter what

The card-playing half of the game regularly took advantage of my mistakes. It never made mistakes and remembered every card. It took my best effort to keep up. If you're practicing the card-playing portion of your game, this'll give you a real workout. It's a good way to do your calisthenics before you get to the table and risk the ire of your partner.

Here, too, I noted some oddities. I think it's fair to say even to this day that academics are sorting out the issues of artificial intelligence. It's difficult, to say the least, to get a computer to really think. While the game played remarkably well, some insight and intuition on its part would have helped.

On one hand in which I took the bid, I got a hint for each move. I wanted to understand how the computer was thinking. It was the dummy's lead, and I was eying a possible finesse that needed to lead from the dummy. The computer advised me to play a low card from the dummy instead of taking it with a high card. The advice box told me that this was so I could lead from my hand. On the very next play it told me to lead a low card from my hand so the dummy could take the trick and gain the lead. I could have taken either trick from the dummy or my hand. It then made the finesse I wanted to try. I had to scratch my head over this. Even though the net effect was the
same, it was a rather illogical way of doing it.

If you're serious about bridge and have trouble rounding up three other people to play, or if you want to practice so you can win more matches, this is a great benefit. You can play anytime you want. You'll face a reasonably good opponent, and you can get advice and learn more about the game. And best of all, you won't get any frowns after a bad play.
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Of course, all of the more analytic features are here-constellation lines, coordinate lines, object labels, local and celestial coordinates, tracking, and encyclopedic information. You can search for stars, constellations, Messier and NGC objects, and even userdefined objects! If you're trying to learn your way around the starscape, a flash card option paints an unlabeled patch of random sky for you.

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Mike Smithwick's. He originally wrote it for the Commodore Amiga during, he notes, "five years of parttime work." The Amiga version was received with wide popular acclaim. Now ported to the IBM PC, Distant Suns has all of the Amiga features and more; its praises continue to be sung. The manual itself, also written by Smithwick, is very well done, serving both to guide the user in the operation of Distant Suns and to provide a fine introduction to astronomy; an appendix even explains varieties of telescopes, so that a reader unfamiliar with these devices can make an informed purchase.

Here's my only complaint: The program must be run under Windows-an operating system for which I prefer not to pay the storage overhead. To have been given the option of a stand-alone would have been nice. But that's my only serious complaint, and a subjective one at that. It's for Distant Suns almost exclusively that Windows remains on my hard drive. So consider that to be more praise for Smithwick.

Distant Suns works best in VGA graphics mode. A fast microprocessor makes things like screen updates happen more rapidly. A fast CPU combined with a math coprocessor will make the program hum nicely. Whatever your system configuration, however, count on an extraordinarily pleasant experience. BRUCE M. BOWDEN

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Distant Suns offers a comprehensive tour of the heavens, past and present-as long as you're running Windows.


With Professional Help for WordPerfect, the answer you need for the popular word processor is a keystroke away.

> PROFESSIONAL HELP FOR WORDPERFECT

Like many people, if I had to choose just one reason for owning a personal computer, word processing would be my immediate first choice. Though discussions
of the merits of the various text editors tend to be more emotional than rational, my own strong preference (and the preference of millions) happens to be WordPerfect.

WordPerfect has expanded enormously in scope and power over the years, and the reference manual reflects that growth. More than 1000 pages long, the
documentation for WordPerfect 5.1 can make learning about a particular feature an arduous task.

Professional Help for WordPerfect reduces the need to thumb through the manual or workbook. It's a TSR (Terminate and Stay Resident) program, so you can call for help at any time from within WordPerfect. It takes up only 6K of memory but provides access to a half megabyte of information in compressed form.

The Alt-H hot key brings up the Professional Help for WordPerfect Topic Index screen, presenting a list of more than 180 WordPerfect features. You can scroll through the list for the topic of interest or go to it directly by typing enough letters of its name to identify it. With the cursor on the topic, press Enter to bring up a screen of information and instructions. You can use the highlighted cross references contained in the help screens to jump to related information.

For just one example, many WordPerfect users are aware that WordPerfect supports special characters, but how many can claim to know how to access all 1500 of them? To use one of these characters, you must press Ctrl-V and then a two-number designator. Since most users can't remember the code, out comes the manual. With Professional Help for WordPerfect, Alt-H brings up the index screen, typing spe takes you to Special Characters, and pressing Enter brings up a list of the characters and their designators. A few keystrokes replace minutes of page flipping.

Briefly put, whether you're a WordPerfect buff or a professional user, you may well

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## HERCULES <br> GRAPHICS STATION GOLD 16

If you're looking for a Windows or GUI accelerator that's also a CAD engine and an animation platform, read on: The Hercules Graphics Station Gold 16 card has it all. And, if that's not enough for you, there's TIGA compatibility for true photorealistic image display and manipulation, as well as a 32,768 -color palette in Windows.

Right from the start, I should make it clear that the Graphics Station Gold 16 card in the configuration I received for review has no built-in VGA capabilities; it's meant to be used in conjunction with an existing VGA card that connects via an included ribbon cable. Hercules also offers the Graphics Station Gold 16 card with built-in VGA, as well as other configurations with more advanced features at correspondingly higher prices.

Everything about the Graphics Station Gold 16 card exemplifies the excellence in engineering and manufacturing on which Hercules has built its reputation. The full-length board utilizes the popular Texas Instruments S3 graphics proces-
sor chip with 1 MB of video RAM as the standard configuration to deliver razorsharp images with pure color saturation at refresh rates of up to 75 MHz . This ensures comfortable, flickerfree viewing on today's better monitors. This board is a high-end video product that


Juice up your GUI with Hercules Graphics Station Gold 16, which can dramatically improve your system's graphics.
will serve the most demanding user without a whimper, while maintaining a price point that makes it affordable for just about everyone who's looking to increase the speed of video performance significantly.

A single 15-pin D connector is located on the board's mounting bracket for attaching the monitor's video cable, and installation is a quick and painless procedure that can be accomplished in just a few minutes. Installing the Graphics Station Gold 16 card consists of inserting the card in any available full-length 16bit slot and connecting the ribbon connector cable from the card's pin connector to the "feature" connector of the resident VGA board.

Either pin-type or edgetype VGA board feature connectors can be accommodat-
ed, since the Graphics Station Gold 16's ribbon cable has both types of connectors on it. A supplied 75ohm terminator plug is then inserted into the 15-pin socket of the existing VGA board, and the monitor cable is connected to the $15-$ pin D connector of the Her-
laced. Its true-color capabilities are truly spectacular. A rich assortment of drivers is supplied with the card for Windows and AutoDesk programs such as Autodesk 3D Studio, AutoShade, and Animator Pro.

Also included are several utility programs for adjusting monitor performance, changing display resolutions, and adjusting the display parameters interactively via the exclusive Hercules MoniTrac feature, which gives you the best fit for your particular monitor. Once the card has been adjusted to achieve the best possible image from your display, MoniTrac saves the adjustments in a configuration file that loads these settings automatically every time.

If you have high-end video or GUI needs but you're on a low-end budget, the Hercules Graphics Station Gold 16 may be the best way to go.
TOM BENFORD

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## THE CASTLE OF DR. BRAIN

My hat's off to Sierra OnLine for putting together this unforgettable, madcap, educational adventure game. Not only did The Castle of Dr. Brain hold my attention, but I also became addicted to solving the puzzles in order to reach the good doctor's laboratory.

Dr. Brain is looking for a lab assistant with special problem-solving abilities. It
cules card. Since there are no jumpers or switch settings to deal with, even a novice can achieve a successful installation. Once you've installed the hardware, all that remains is to load the driver and utility software.

I liked that the Graphics Station Gold 16 worked with my existing VGA card, a Truevision Video VGA with Overlay, but most users will probably want to purchase the version of the Graphics Station Gold 16 that comes with built-in VGA; even with the built-in VGA, you still have the option of bypassing it to use an existing VGA card via the ribbon connector cable. There's plenty of configuration flexibility here.

The Graphics Station Gold 16 supports virtually all resolutions, up to and including $1024 \times 768$ noninter-

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Parents and children alike will enjoy The Castle of Dr. Brain.

Brain's laboratory.
Parents searching for a game to stimulate their child's mind as well as a game that's fun to play should check this one out. Elementary children may need Mom's or Dad's help with some puzzles. Older kids shouldn't face anything they haven't seen before except maybe the binary conversion puzzle and the sequence in which they program the robot.

This game's not just for kids. Adults can face the challenge, too-if they dare. You won't find any shoot-'em-up action in this one, just pure brain-teasing satisfaction with topnotch digitized sound and animated graphics.

The generic user's manual can be used for all Sierra games. This may confuse some users, since the icons may not be the same for all games. There are also general tips for solving adventure game puzzles. There's a Fantastic Book of Logic Puzzles, as well, which may help with some of the puzzles.

The technical support department is helpful and friendly, but the support number isn't an 800 number. That means you pay the big bucks for the long-distance call.

If you're an adventure-gaming nut like me, you'll love The Castle of Dr. Brain.
JOYCE SIDES

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The Wyse Decision 386/40 is a highperformance machine for desktop power users. It's a system most businesses and individuals who need a powerful, fast system will find satisfactory. Its use of the high-speed $40-\mathrm{MHz}$ Am386DXL microprocessor makes it a desirable computer for people using large complex spreadsheets, databases, and Windows.

The Decision comes standard with a $40-\mathrm{MHz} 386$ processor, 4MB RAM, one 8 -bit and seven 16-bit expansion slots, one parallel and two serial ports, and four mass storage shelves. In addition, the Decision comes with DOS 5.0, as well as setup and utilities disks.

The Decision comes in four standard configurations. Model 1 includes one $51 / 4$-inch 1.2 MB floppy drive, while Model 3 includes one $31 / 2$-inch 1.44MB floppy drive; both Models 1 and 3 also include a hard disk interface and cables so you can install a hard drive. Models 120 and 200 come with one $31 / 2$-inch floppy drive and a hard drive-120MB and 200MB respectively. There's also a variety of optional monitors and other enhancements available at additional cost. The model I reviewed was the 200 with an additional $51 / 4$-inch floppy drive.

Once removed from the box, the Decision took just a few minutes to set up. Setup involved simply plugging in the monitor and keyboard. Installing the second floppy drive took me about 30 min utes; someone with more experience could probably finish the job faster. The manual includes easy-to-follow instructions for installing the drive. As with many installation instructions, you'll need to study the diagrams and compare them to the actual hardware before proceeding. But in general you should be able to install your own drive. The slowest part of the process was actually getting the cable connect-ed-it's tough if you don't have long, thin fingers.

Once the drive was installed, it was easy enough to run the setup disk and reconfigure the system to include the new drive. Although I didn't install a second hard drive, the documentation states that any hard drives added will automatically be configured and that the system can boot up and run without a keyboard or video.

If you've never used a $40-\mathrm{MHz} 386$ computer, you're in for a pleasant surprise. This computer is fast! Installing Windows and other applications seemed less of a chore than with slower systems. The drives run quite efficiently as well.


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Using The Norton Utilities Version 6 System Information, SYSINFO, I got the following benchmark comparative data: The Decision 386/40 MHz ranked at 41.3 for CPU speed, 7.0 for disk speed, and 29.7 overall. For the Compaq $386 / 33 \mathrm{MHz}$, the numbers were 34.7, 8.4, and 25.9. For the IBM AT $286 / 8 \mathrm{MHz}, 4.4,2.1$, and 3.7. For the IBM XT $88 / 4.77 \mathrm{MHz}, 1.0,1.0$, and 1.0 . This data confirmed the hands-on performance I experienced.

I tried several of my favorite applications on the Decision, including Windows and WinWord. As you would expect, these applications installed much more quickly than on slower systems. Windows ran at a respectable speed, and WinWord loaded files nicely. The spelling checker on the usually fast XyWrite word processor moved from word to word instantly. I got the same improved speed with Quattro Pro and other software.

Not only is the Decision very fast, but it's also quiet-the fan is much quieter than with other MS-DOS computers l've used.

It's easy to recommend the Decision. The machine is fast and reliable and comes with a one-year warranty and an optional on-site service warranty for just $\$ 99$ a year. The service program includes a toll-free technical assistance number. Windows users will find the standard 4 MB of 32 -bit memory eminently satisfactory. If you need an additional hard or floppy drive, you'll find installation quick and easy. And, with plenty of extra slots, expanding this system should be no problem. STEPHEN LEVY

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> Computers find missing children, rebuild a riot-torn city, coach baskethall, and more.

## Helping Rebuild L.A.

Families displaced from their homes following the Los Angeles riots are getting a helping hand from AST Research. The company is donating computer systems to the Rebuild L.A. extragovernmental task force.

AST donated 486-based EISA file servers, which are being used as the data-processing hub of the Rebuild L.A. administrative offices. The company also donated 386-based desktop and notebook systems to L.A. food distribution groups for controlling inventory of food, clothing, and person-al-care items, making logging in and tracking down needed supplies much less timeconsuming.

Each food distribution center is equipped with a fax/ modem for communicating and transferring data between other centers and the Rebuild L.A. offices. Notebook computers are used at remote locations.

AST's effort is part of a technology coalition formed by Rebuild L.A. that includes companies such as Microsoft, Novell, Epson America, and WordPerfect. Orange Countybased software company Dariana orchestrated the effort to get technology donations from the companies involved.

## Your Last Computer

How would you like a computer guaranteed to last as long as you will? Hyundai is feeling pretty self-confident about its computer products. In a bold move, the company recently began offering a lifetime war-ranty-a first for a computer manufacturer-on its current line of 386 and 486 PCs and notebooks. The warranty, which is limited to a product's original user, covers the base system, including the motherboard, and related components such as the video card, floppy drives, and keyboard.

## Hello, Operator?

Reach out and ... press pound now if you want to play telephone tag with a mechanical voice in a tunnel. Hang up and write a letter if you want to contact a person. A recent report by Frost \& Sullivan International won't be good news for those who are hoping voice mail is just another fad. In fact, $F \& S$ sees an "explosion" in the E-mail/voice-mail industry. The research firm predicts products and services for both electronic mail and voice mail will jump from the current $\$ 2.9$ billion to $\$ 10.8$ billion by 1996.

We'll look back fondly on those long-forgotten days when telephones were used for human interfacing.

## Missing Children

Approximately 9000 missing children are currently listed with the National Center for Missing and Exploited Children (NCMEC) in Arlington, Vir-ginia-and some have been missing for years. Hopefully, the center's new state-of-theart electronic imaging network, which greatly expedites processing and distributing photos of the victims and their abductors, will make it possible for more children to be found quickly.

The Missing and Exploited Children Information Network, developed for NCMEC by Applied Multimedia Technologies of Atlanta, Georgia, and Intellibit of Vienna, Virginia, permits rapid photo and text-record transmission to any Group III fax machine in the world. A photograph is scanned into a computer, where it can be duplicated and distributed within hours.

The system accommodates high-quality photographs of missing children and their abductors in both gray scale and digitized color, and it can "age-progress" images as
well. The images can be easily captured and compressed. Then they can be stored, searched, displayed, and transferred with text case records.

Those using the system access it through low-cost PCs (286, 386, and 486 machines), standard VGA monitors, and regular telephone lines to search and retrieve master records and photos. High-quality halftone grayscale photos can be remotely printed on any compatible Hewlett-Packard LaserJet II printer. What used to take days can now be accomplished in a matter of hours with the new system, says NCMEC spokesperson Julia Cartwright.

## NBA Laptops

IBM has gone pro-basketball, that is. As of the 19911992 season, IBM is the "official computer" of the NBA. But the association between the two organizations goes further than mere sponsorship: IBM has donated PS/2 L40SX laptops to every NBA coaching staff and is in the process of developing software for them, as well.

Computers are just starting to enter the sports arena as part of a technological frontier that will be crucial to teams and athletes of the future who want that "winning edge." As an example of how the laptop could be used, say a team's coach calls a timeout to diagram a play. With the touch of a button, his laptop shows the team the play that's been working best against their opponent all night-one that differs from that of the pregame scouting report. Their "insight" could give them the edge that makes the difference between defeat and victory.

And that's only the beginning. There may be hundreds of applications for this technology yet to be discovered.

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