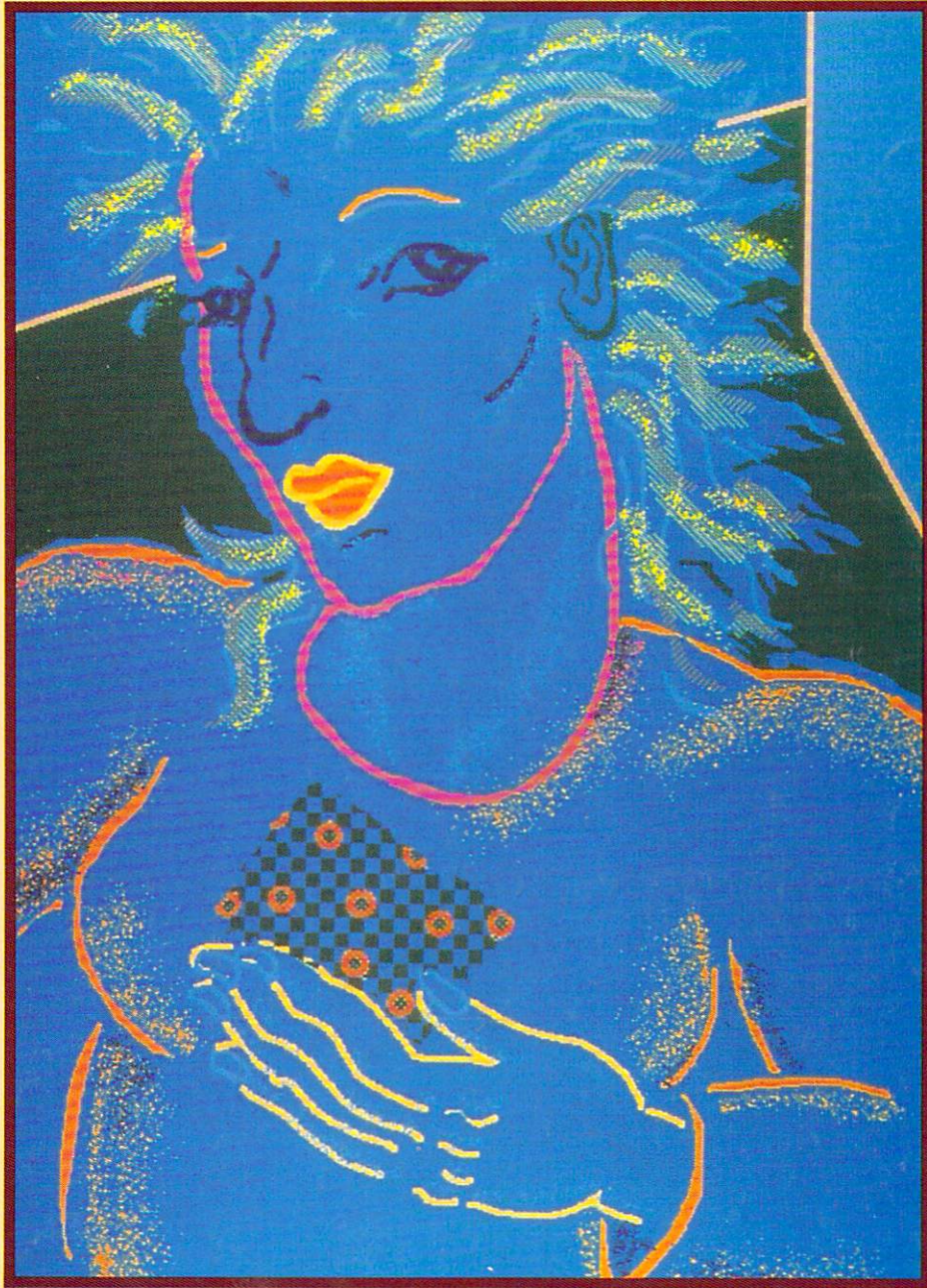


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APRIL 1991



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Michael S. Hedgepeth
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21 January 1991

Ed Bates
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Dear Ed:

Well, we're finally settled in.

The kids are registered in school. We've unpacked everything but the pictures. And I'm in my new digs.

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I love it. That is, when I can get to it. Barbara's putting all her recipes on computer. And John's at the age where it seems like there's a term paper due every week.

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Hed

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Why is the sky blue?
When will the bull market be back?
How much does Isaac Asimov weigh?
Why won't my Macintosh talk to my laser printer?
How do you fold fitted sheets?
How's the weather up there?
Where can I find the best steak in Chicago?
How much is that doggie in the window?
How is OS/2 going to affect me?
Which hard drive is best for me?
Will you marry me?

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Do you have an abnormal craving for software? Read how one person became a compulsive software consumer—helpless, spineless, capable of absolutely no self-control.

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ANTHONY CHANDLER

Learn programming tricks that make poky old BASIC get up and move.

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TOM NETSEL

There's important news for U.S. readers who buy Gazette from newsstands. Starting with the May issue of *COMPUTE*, Gazette will be available by subscription only.

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The Death Adder is tyrannizing the people of Yuria. Only three heroes have the powers to stop him in *Golden Axe*. Then discover what happens in a toy factory after dark in *Night Shift*. Check out *Bell Term*, an 80-column terminal program for the 64.

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KEITH GROCE

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MILTON JOHNSON

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ROBERT C. TRAIN

Order and organization can be produced out of chaos by the repetition of simple but constant rules. Test this theory to see what emerges from seemingly chaotic sequences with these programs for the 64 and 128.

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COMPUTE

NOW INCORPORATING **COMPUTE'S PC** MAGAZINE

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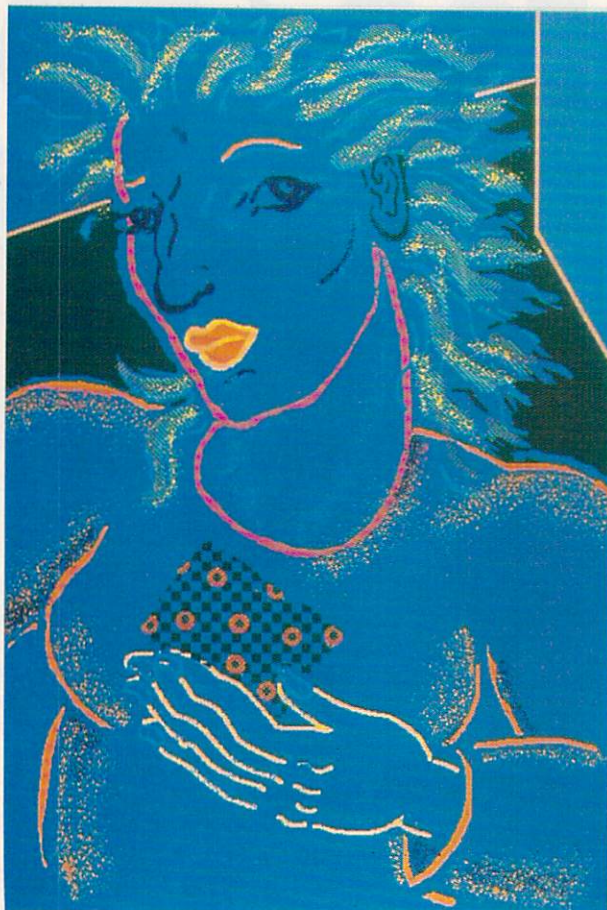
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Put your business advice into a book.

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Modem transmissions cause a lot of confusion, even among otherwise informed computer and modem users.



ON THE COVER

Barbara Nessim, whose paintings and drawings have been shown in museums and galleries worldwide over the last 25 years, created the art on our April cover using an NEC PC 100 personal computer and that system's graphic software. Titled *The Gift*, the work was inspired by the Japanese custom of giving a small gift when meeting friends and acquaintances.

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KBD

Control your keys!

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Teach Scroll Lock a new trick.

NewFiles

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File Hunter 1.9

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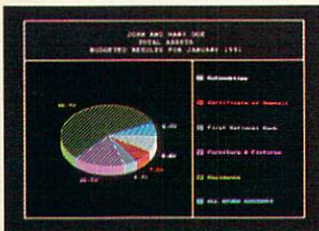
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P E T E R S C I S C O

Nothing puts a sinking feeling into your gut faster than a computer that won't boot or that shuts down in the middle of a save. All of a day's work—straight down the tubes. But a system crash need not be fatal. If you've taken precautions, if you've made backups of your data and applications, then you can bring your PC back from the dead with a minimum of loss.

Unfortunately, a lot of PC users don't think a system lockup will happen to them. A crash, like a car accident, is something that happens to the other guy. They're wrong. Nobody is immune to system failure. Horror stories about failed PCs are repeated at user group meetings, are posted on BBSs, and make the rounds at the office. They're part of computing community folklore, small lessons in the inevitable.

During my first job as a journalist, writing for a computer trade magazine in the Northeast, a colleague and I once put in a 12-hour marathon writing session, pulling together two lengthy feature articles scheduled to run in that week's issue. We finished late at night, giddy from staring into our CRTs, satisfied from having beaten the deadline once again. When we came to work the next morning, we discovered that one of the systems managers had accidentally dropped a printer on the disk that contained not just our stories, but the contents of the entire magazine. Luckily, a backup from the night before saved almost the entire issue—except for our articles, which we had stored on disk *after* the daily backup. We got a lot of sympathy from

our co-workers, but that didn't save us from having to rewrite our articles from memory. It was a long day.

The adage that an ounce of prevention is worth a pound of cure was penned a long time before the personal computer came along, but a framed print of that advice should hang over every computer user's desk. If you want your system to recover from a crash, keep backup disks that you can recover from. Ideally, you should back up your entire system once a month and make backups of your data files weekly. You might think it's a pain in the neck to spend that much time in front of your computer swapping disks, but when your 60-meg hard disk slips into the ozone, you'll be glad you did.

You'll also want to read this month's article about system recovery, "Is There a Doctor in the House?" It can help you find the right strategy for getting a sick system back

on its feet. If you're in the market for a commercial diagnostics program, it will help you there, too.

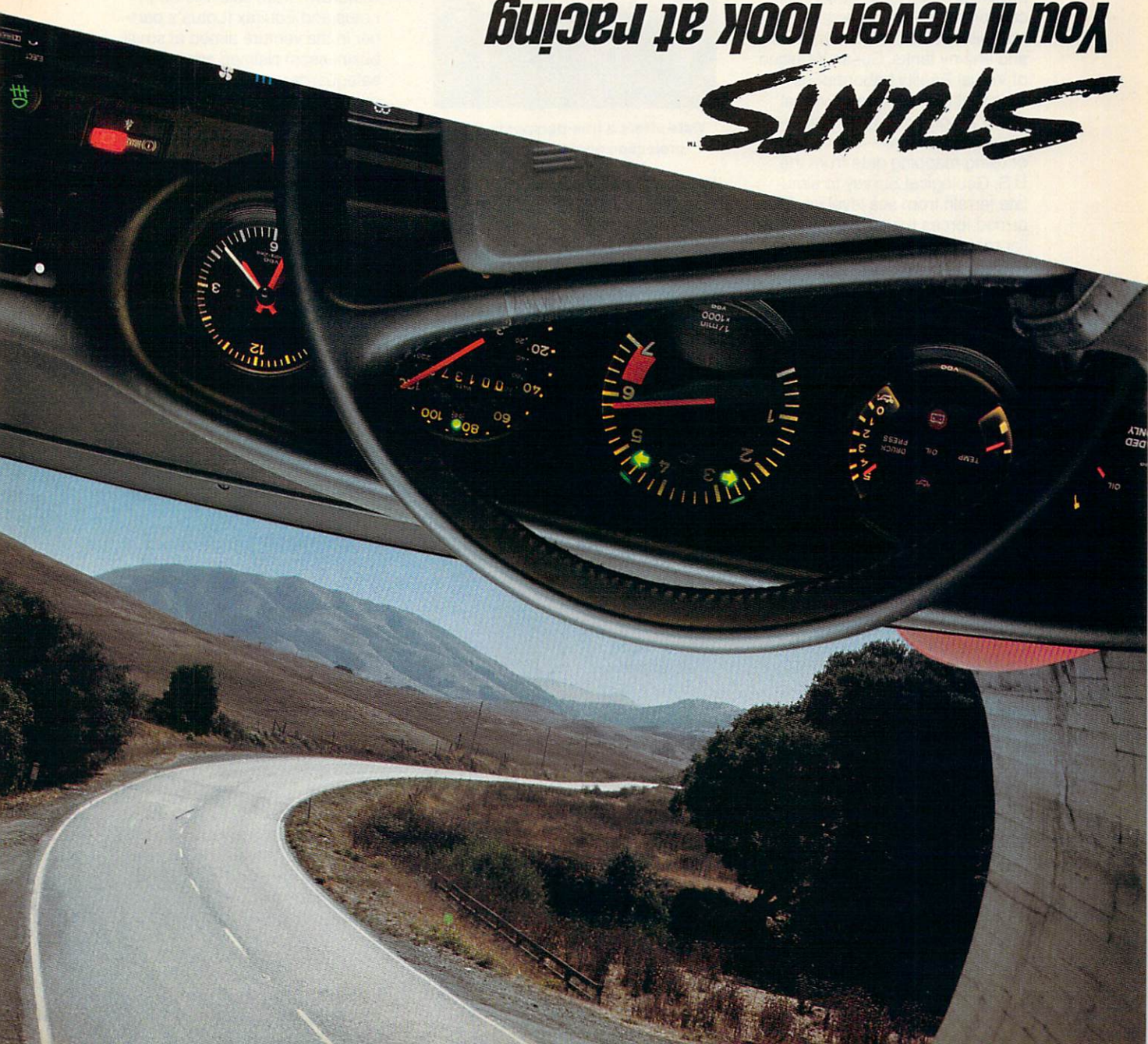
And now for something completely different. When Apple computer introduced last October a series of "low-cost" Macintosh computers, it sparked anticipation over the Cupertino computer maker's return to the home computer market. Since saving the Macintosh from extinction in the mid-eighties, John Sculley and company have succeeded in remaking Apple's image as a freewheeling entrepreneurial company that made machines for the masses into a serious contender in the corporate computing world. The Macintosh, dismissed glibly at first as a toy, became recognized for its technological edge in connectivity, graphics processing, and software implementation under a common user interface.

Midway through 1990, Apple found itself threatened again, this

time by software and hardware developments in the MS-DOS world. The company countered with three Macintosh computers designed to recapture the excitement of the Mac's original intent—to bring computing power to the individual.

Amid reports that the Mac Classic is in short supply because of unexpected demand, Associate Editor David English examines what the new Macintoshes have to offer the home computer user. His discussions with consumer software publishers reveal a sincere level of commitment to Apple's flagship. For PC owners contemplating a second machine, stepping into the Mac world seems more possible today than ever before. □





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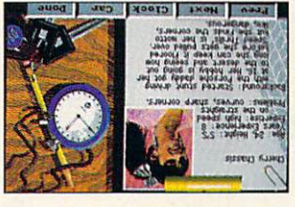
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NEWS & NOTES

Virtual Reconnaissance

Let your computer do the walking—through enemy territory. Virtual reality technology, which has clear scientific and recreational potential, could also allow American forces to explore hostile terrain without fear of Scud missiles and enemy tanks. Susan Woeltjen of Virtual Reality Laboratories says that her company's virtual reality programs for the Amiga—*Vista* and *VistaPro*—are capable of using mapping data from the U.S. Geological Survey to simulate terrain from sea level up. The armed forces have access to similar mapping information for the entire planet, says Woeltjen. In fact, she said individuals in the military have already purchased



Vista offers a true-perspective 3-D projection engine and more.

the programs. For more information about *Vista* (\$99.95) or *VistaPro* (\$149.95), contact Virtual Reality Laboratories, 2341 Ganaador Court, San Luis Obispo, California 93401 (805-545-8515).

—MIKE HUDNALL

To Market, No Market

Bowing to strong public pressure, Lotus has announced that *Market-Place:Households* and *Market-Place:Business* would be withdrawn from sale. Although Lotus and Equifax (Lotus's partner in the venture aimed at small businesses) claimed adequate safeguards were in place, consumer rights groups feared the software/CD combination would result in wholesale invasion of privacy. Lotus president and CEO Jim Manzi stated, "Balancing the advantages of easier access to information with the individual's right to privacy is only the first of many new issues our industry will grapple with in the coming years."

—ROBERT BIXBY

Across the Sea

The European Computer Trade Show scheduled for April 14–16 in London is prepared to play host to more than 120 exhibitors, from hardware manufacturers to productivity and entertainment software developers.

As part of the show, COMPUTE will present five awards covering MS-DOS, Amiga, and Commodore 64 products. This year, *Windows 3.0* (Best Productivity Program: MS-DOS), *Wing Commander* (Best Entertainment Program: MS-DOS), *GeoWorks Ensemble* (Best Technical Achievement: MS-DOS), *Amiga-Vision* (Best Product: Amiga), and the CMD HD Series Hard Drives (Best Product: Commodore 64) will take home the COMPUTE Choice prizes.

—PETER SCISCO

Control the Media

If you've been looking for a way to link your computer with your video equipment, Sony's new Vbox could be your dream come true. It's an inexpensive (\$249.95)

computer/video interface that works with Sony video decks and 8mm camcorders. Using Sony's ViSCA (Video System Control Architecture) protocol, the Vbox lets you handle complex video switch-



ing and synchronization from within your presentation or multimedia software. Apple has endorsed the ViSCA standard, as have Farallon and MacroMind, makers of

Farallon MediaTracks and *MacroMind Director*. Sony said that it is working with several developers to provide support for MS-DOS and *Windows* applications.

—DAVID ENGLISH

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LETTERS

Gratifying Graphics

Not since *Profiles* went belly up have I enjoyed a computer magazine as much as I enjoy *COMPUTE*. After *Profiles*, I tried several and thought there was one I liked but couldn't remember which one—all the names are alike. I've started and stopped several subscriptions. Then I just stopped reading them altogether. I've been bundling up my unread and old magazines for school libraries.

I just happened to take my December 1990 *COMPUTE* on a trip and discovered I like this magazine. You provide good information and have a nice graphic layout. (Does David Leich sell posters of his work or limited editions?) Your "Art Gallery" is great.

Although I never want to program, I do want to know all I can about how my computer works. An excellent example of an article that helps me do just that is George Campbell's discussion of the SET command ("Becoming a PC Environmentalist," p. PC-8). That was the kind of article I cherished in *Profiles*—computer tips for the nonprogrammer, ways to customize, shown clearly.

Like the typefaces in *Profiles*, the typefaces in *COMPUTE* are readably enhanced!

The only review I read—of *WordStar 6.0*—was too sweet. I would like to know more of the problems. Does Mike Hudnall work for *WordStar*?

I like your color-coded sections. I'm an MS-DOS user but like to know what Apple is up to.

Keep up the excellent work.

LANI MEIN
SAN FRANCISCO, CA

Mike Hudnall responds:

I do not work for WordStar, but I can understand your concern about the "sweet" praise for WordStar 6.0. Readers deserve to know the strengths and weaknesses of a product, especially when the investment is substantial. You'll get no argument on that point.

With all that said, I believe WordStar 6.0 deserves high praise. It has improved some features and added others; while it wouldn't help for me to enumerate the shortcomings of past versions, I believe in giving credit where credit is due for this latest version of Wordstar. I mentioned the tremendous flexibility version 6.0 gives you over the writing process; this flexibility seems to me to be the result of the developers' listening to consumers and learning from experience. Previous versions did not offer the same degree of flexibility.

I've heard complaints about WordStar's Ctrl-Key combinations, but I haven't had any trouble learning or using them. If you prefer using a mouse, the lack of better mouse support is problematic. However, as I pointed out in the review, this is a program primarily for touch-typists.

In the review I tried to focus on what would help readers decide whether the product meets their particular needs.

As for the inquiry about our cover, I found that posters and prints are not available. However, I did come up with some information about the artist and the art on December's cover.

According to a representative of Rosebush Vision, the company that handles this art, the artist's name is Donald Leich, not David Leich, and he works at a New Jersey company called Intelligent Light. Donald, we apologize for the error.

Do you have questions or comments? Send your letter—with your name, address, and daytime phone number—to COMPUTE Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We regret that because of the large volume of mail received, we can't respond individually to questions. We reserve the right to edit letters for clarity and length.>

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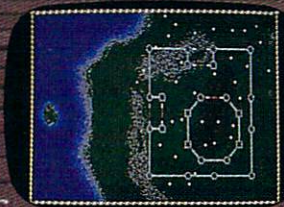
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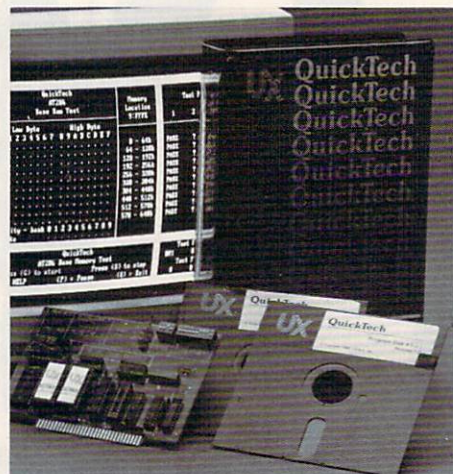
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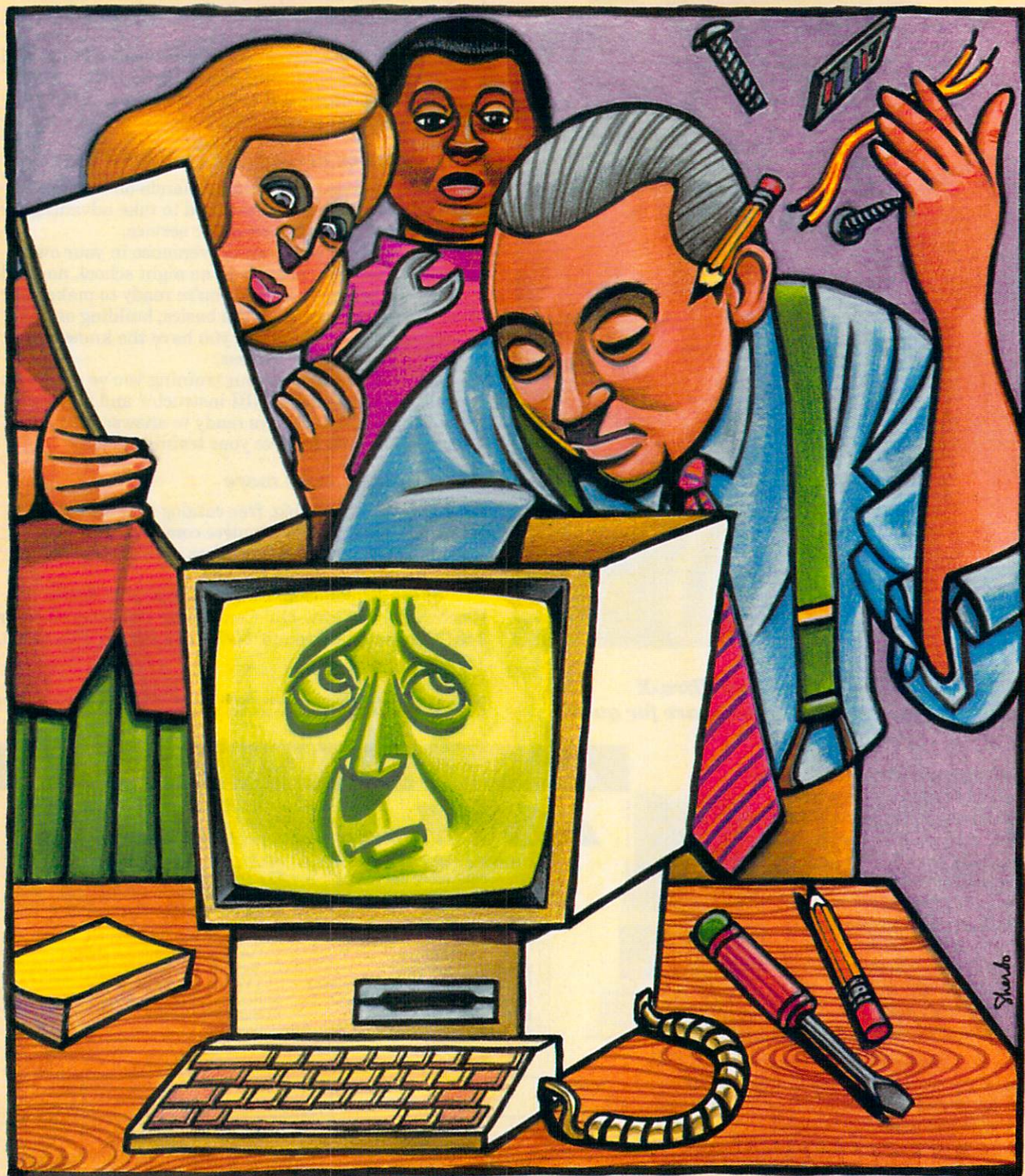
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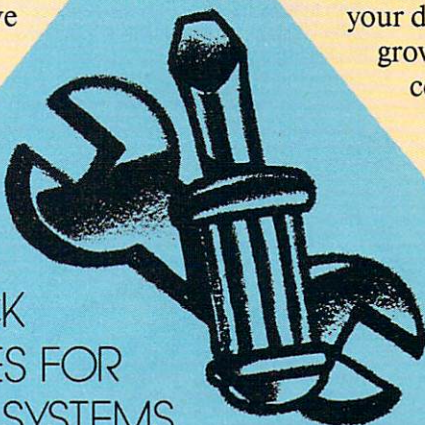
In The House?

Scenario 1:

You wake up late, throw on your clothes, grab a glass of orange juice for the road, and head for the car. You slip the key into the ignition, turn it, and hear click! . . . click-click! With disappointment, you realize you have a battery problem. You head back inside, call your neighbor, and ask him to come over with his jumper cables.

Scenario 2:

You arrive at work and follow your usual morning script. You flip the switch on your PC, hang up your coat, and head down the hall to fill your coffee mug. After settling into your chair at your desk, you realize with growing dread that your computer hasn't responded. Your AUTOEXEC.BAT file hasn't been run, and your monitor is blank.



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In recent years, we've grown to count on our cars and our computers. Although both are more reliable now than in years past, both still break down. Most people, however, are better equipped to handle a malfunctioning car than a misbehaving computer. In most cases, computer problems aren't serious. A reasonably quick and inexpensive repair for most malfunctions is possible, provided you know what to look for and what to do. Experience is a good teacher, and this article will help give you a head start on that experience. >

T O N Y R O B E R T S

Power On!

Each time you switch on your system, it quickly runs through a series of tests that evaluate the hardware and make sure everything's operating properly. The disk drives spin briefly, you hear a beep, and a memory test is run.

In most cases, the system passes this Power-On Self Test (POST), and the computer dives into the AUTO-EXEC.BAT file. By the time you look up from your desk calendar, the system is ready for you to begin work.

Sometimes, though, there's a problem. Perhaps you're brought to attention by a series of strident beeps, or maybe nothing happens at all.

If your system is totally unresponsive, start playing detective, and start with the obvious. Is everything plugged in? Is the power strip turned on? Are the brightness and contrast switches on the monitor adjusted properly?

If the computer noisily informs you that there is trouble, the number of beeps you hear is your clue to where the problem is. To decipher the beeps, however, you'll need the manual that came with your system.

The POST is part of your system's BIOS, and BIOS manufacturers are not consistent with all error messages and codes. The manual may have an appendix titled something like "Troubleshooting," which often can help you isolate problems.

Stop, Look, Listen

If the cables outside the machine are snug, listen for the PC's fan when you switch on the machine. If the fan isn't turning, check the back panel for a 110-/220-volt selector switch, and make sure it's set properly (most likely 110 volts) for the power you're using. If the fan runs but the system doesn't operate, it's time to open up the case and check the internal connections. (See "Working Inside Your PC" for instructions on how to safely open up and make internal adjustments to your computer.)

Check the connections from the power supply to the system board and from the power supply to the disk drives. Check the disk drive data cable connections on the disk drives and the disk controller. Check to see that all boards in the system are properly seated in the slots on the motherboard. And make sure all memory and system chips are snug in their positions.

If you have an AT-class computer, sooner or later you'll experience a CMOS RAM failure. CMOS RAM is a bit of memory, backed up by batteries, that remembers the system time and configuration. When the batteries run down, the data stored in

Working Inside Your PC

Today's computer equipment is designed to be opened and modified. You're expected to change boards and add hardware. If your system is in trouble, don't despair: you're qualified to open it up and make the first attempt at repair.

There's no reason to fear that you'll damage your system if you follow a few simple precautions.

- Be careful of static electricity. Work in a noncarpeted room if possible, wear tennis shoes, and discharge yourself before touching any of the components inside the computer. While a static shock hardly harms a human, it could mean curtains for a computer chip. Also, remove jewelry and watches before reaching into the computer.
- Always turn off and unplug the system before opening it. Never try to insert or remove circuit boards with the system powered up. To do so invites permanent damage to the boards.
- Never even think of opening up a system's power supply. There's nothing inside you can fix. If a power supply fails, replace the whole unit. Also, don't be tempted to open up and work on a monitor. Even though the power may be off, there are power-storing capacitors inside that can deliver a nasty shock.



CMOS RAM will be lost, and the system won't know how to boot itself. You may receive a warning of an impending CMOS RAM failure if your system clock loses time rapidly when the power is shut off. In other cases, CMOS RAM fails suddenly.

To correct the problem, run the setup program and give the computer all the information it needs to know about memory, disk drives, monitors, and the time and date. The computer will reboot, and everything will be fine until you shut it off again.

PC Tools

To get inside your computer, you'll need a screwdriver, most likely a Phillips head. A few systems use different schemes, but for most computers, remove five or six screws on the back of the case. No doubt you'll see many more screws than that, but most of them secure items such as the power supply to the system chassis. Opening the case requires removing only the screws at the edges of the system—the ones at the four corners and probably one at the top center.

After the screws are out and set aside in a safe place, slide the top off gently, being careful not to catch and pull any internal wires as you go.

If you're checking out a malfunctioning machine, run through the following checklist.

- Are the wires from the power supply plugged firmly into the motherboard?
- Are the wires from the power supply plugged firmly into each of the disk drives?
- Are the drive data cables plugged firmly into each drive at one end and into the disk controller card at the other?
- After you've made sure you're not loaded with static electricity, gently press each of the memory chips to make sure they're firmly seated. Do the same for the other chips on the motherboard.
- Reseat expansion boards. Remove the screw that secures each board to the back of the system. Grasp the board with both hands and gently lift the board straight up. Reseat the board by pushing it straight down into its slot and replacing the screw. During this process, be careful that the board you're working with doesn't scrape against or otherwise damage adjacent boards.

After you've checked your system's components, carefully replace the cover, plug the computer in, and give it a test. If the system doesn't boot, open it back up and go through the checklist again. It's not uncommon to inadvertently loosen a cable while working in the system.

On most systems, the setup program is part of the system BIOS and is activated by a special key combination such as Ctrl-Alt-S. On some systems, the setup program is a separate program that can be kept in your hard disk's DOS directory and on a separate boot disk that can be used to start the system if it's impossible to access the hard disk.

If you had CMOS RAM problems today, chances are you'll experience the same trouble tomorrow and every day until you replace the batter-

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ies that have worn down. There are several different battery configurations used to power CMOS RAM. Some systems use one or two lithium batteries; others use four standard 1.5-volt AA batteries. Lithium batteries last far longer than AA batteries, but they're correspondingly more expensive.

The next time you have your system open, note the type of batteries used to power CMOS RAM. That way you'll be able to buy the correct replacement easily when your battery starts to fail.

Some systems are built with a lithium battery soldered into place on the motherboard. Such motherboards also include a connection for an external battery should the original fail. Refer to your system documentation for the location of the connector and the jumper that needs to be switched to activate the external power source.

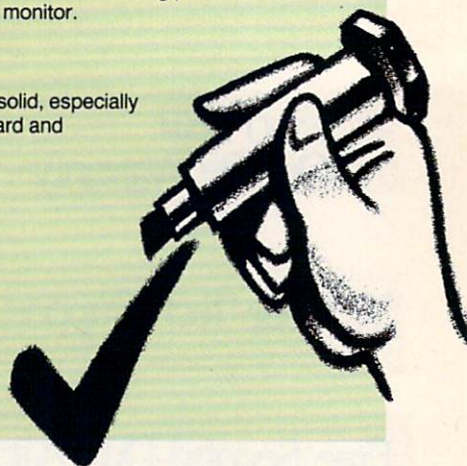
Software Solutions

Although this article deals mainly with hardware problems, don't overlook software as the culprit if your system starts misbehaving. If your machine starts acting erratically while you're at work, save your files and reboot the system. In most cases, a reboot will clear the problem.

Another behavioral problem might result from conflicting memory-

Disaster Checklist

- Is everything plugged in? Check all external connections, including power connections and connections to peripherals, especially your monitor.
- Is your 110-/220-volt selector set correctly?
- Open the case. Are all the internal connections solid, especially those from your power supply to the motherboard and from the disk controller to the disk drives?
- Are all the boards seated properly?
- Are the batteries that back up your CMOS OK?
- Are there conflicting TSRs in your system?
- Are the system files on your hard disk?
- Has the keyboard been locked out?



resident utility programs. If you've recently added or upgraded your software in some way, you may have unknowingly added a conflict. Getting software to work together is a balancing act.

System software sometimes gets corrupted, and it can happen in a variety of ways. An electrical glitch can damage an important file, or an ill-mannered software installation program can throw a monkey wrench into your system. It's good insurance

to make a boot disk that contains the system files of the DOS version you normally use, as well as copies of AUTOEXEC.BAT, CONFIG.SYS, any driver files installed by CONFIG.SYS, and important DOS commands (such as SYS, FORMAT, FDISK, and CHKDSK). Put the disk aside and use it only as a backup if your system appears to be corrupted.

Damaged data files also cause difficulties. Data files may become damaged when a program is terminated unexpectedly, such as when the power fails or a user simply shuts off the machine and heads home without exiting the program properly. A database that is suddenly unable to locate data may suffer from this problem. The DOS utility CHKDSK can identify and correct files whose pointers are no longer accurate. Running CHKDSK or a similar program regularly can help prevent this type of problem from popping up.

Hard Life

One of the most sickening moments in a computer user's life is the time the hard disk won't boot. At that moment, all your work hangs in the balance. Has the hard disk gone bad, or is it just resting?

First, try powering down the machine, waiting several seconds, and then rebooting. If there still is no response, boot the system using your boot disk; then, after the system is running, try to access your hard disk. If the system won't boot from a floppy disk either, you have a possible controller failure. Open the system and reseal the controller board; then try again.

If you're able to operate normally after booting from a floppy, your system has lost some of the information it needs to get going. If you see a message indicating there's been a boot

Computer Repair Toolkit

Simple troubleshooting work on a computer requires very few tools. But having the required tools handy when you need them makes the task much less frustrating and time consuming.

At the minimum, you'll need screwdrivers. Have at least one medium-size flat blade and one medium-size Phillips-head screwdriver. If possible, add a small flat-blade screwdriver as well. This is handy for attaching and detaching cables from the back of the system.

Other items for the tool box include a pair of tweezers, a small pen knife, and a small bottle or box for storing spare screws.

If you can't easily assemble this tool collection, consider buying one of the inexpensive tool kits you see advertised in nearly every computer mail-order catalog that comes your way. The kits contain screwdrivers, tweezers, chip extractors, and usually a very handy clawlike device that's great for picking up screws that slip from your fingers and fall down between expansion boards. On the software side, hardly anything is more comforting and time-saving than having good utility software on hand when you need it. Such software isn't used every day, but it can save hours of anguish.



A disk utility program of some kind is essential. Look for programs that can undelete files, analyze disks for bad sectors and move data to safe areas, restore the system files, and help rebuild data files. *The Norton Utilities* version 5.0 (which contains the *Norton Disk Doctor*) from Symantec, Central Point Software's *PC Tools Deluxe*, and Fifth Generation Systems' *Mace Gold* are among some of the most popular and trusted programs of this type. These generally are considered to be data-recovery tools.

It may also be helpful to have a system diagnostic program of some sort. These programs check out all areas of the system and can report on memory, the disk drives, and ports. These programs allow you to identify exactly what's inside a system without opening it up. *Check It* from Touchstone Software and *System Sleuth* from Dariana Technology are two candidates.

These programs can go beyond simple system troubleshooting and help you resolve such things as memory conflicts and interrupt conflicts. *System Sleuth* also includes extensive tutorials in its manual, helping you to understand the operation of your system as you check its components.

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disk failure, run setup to make sure the hard disk type is properly set.

If you receive the message *Non-system Disk*, the information that tells the system that the hard disk is a bootable device has been lost. To correct this problem, attempt to restore the system files by using the DOS SYS command from your boot floppy. If that fails, you can usually restore a disk to service by backing up all the data on the hard drive, reformatting the drive, installing new system files, and restoring the data files.

An easier solution than either of the above might be to run a disk utility program such as *Norton Disk Doctor* (from *The Norton Utilities*) to identify the problem and make repairs. If you have such a program handy, it can save you time and put you back to work with the confidence that the problem has been corrected.

If you have booted from the floppy disk but are unable to access the hard drive at all, you may be due for a drive replacement. Put your ear close to your machine and listen for the sound of the hard disk spinning. If you're not sure whether you hear the disk or the fan, switch off the power. The fan will stop spinning quickly while the hard disk will take several seconds to come to a stop. Similarly, when you turn on the power, you should be able to differentiate between the fan and the disk.

If the hard disk is not spinning, open the machine and check the power supply cable. If the power is properly connected but the hard disk does not spin, plan to buy a new one.

Sometimes it's possible to coax a reluctant drive into spinning up one more time by powering the system off and on a few times. If the drive comes back to life, though, don't expect it to last long. Back up all of your data now, and make arrangements to replace the disk. If you can't get the disk going again, all is not lost. A computer repair center may be able to get the drive going long enough to recover your data for you. If not, you'll have to rely on your backups, so make sure they're up to date.

Key Points

Another problem that plagues computer owners is a failure of the keyboard or one or more of its keys. If the entire keyboard is unresponsive, check to see that it's plugged in. Also consider whether someone has locked the keyboard with the key lock on the system unit.

Be aware that keyboards for XT- and AT-style computers differ. Many keyboards, however, have a switch on the underside that allows one keyboard to be used with either type of

system. If your keyboard has such a switch, make sure it's properly set.

If another computer system is available, try exchanging keyboards with it. If your keyboard fails on the other system, the problem is either in your keyboard or in the cable, with the cable being the most likely source of the problem. If your keyboard works on the other system but the other system's keyboard does not work on yours, the problem may be in the keyboard connector; and that would require a trip to the service center.



Sometimes it's possible to coax a reluctant drive into spinning up one more time.

If only one or two keys are giving you trouble, you may be able to correct the problem with a little cleaning. First, grasp the offending key cap and attempt to pull it straight up and off of the key switch. If you are unable to remove the key cap with gentle pressure, try using a small screwdriver to gently pry the key cap off. If you continue to meet resistance, stop! Some key caps are not designed to be removed.

If you can remove the key cap, examine the area around the key switch for debris or dust. Use a cotton swab dipped in denatured alcohol to clean the area. In many cases, dirt or crumbs can interfere with the operation of the switch and can keep it from making proper electrical contact.

If you're unable to remove the key cap, you can perform the same cleaning operation, but you'll have to open the keyboard to do it. Turn off the computer and unplug the keyboard. Turn it upside down and set it on a soft surface, such as a towel. Remove the screws on the keyboard's bottom, and separate its top and bottom halves.

If the keyboard assembly is secured to the bottom half of the case, you'll be able to examine the area under the key caps and to use your cot-

ton swab to brush away dirt.

Otherwise, remove the screws that hold the keyboard to the top half of the case, lift out the keyboard, and then perform your cleaning.

If you're unable to get your keyboard working again, plan to buy a replacement. Few repair shops even attempt to fix a broken keyboard. Replacements are inexpensive, and chances are you can find a keyboard that's much more comfortable than the one that came with your system.

Northgate and Zeos replacement keyboards have excellent reputations, and you'll be able to get a new one for less than \$100. When ordering a replacement, you can choose whether the function keys are on top or along the left side. You can buy models that click when you type, and if your office is cramped, you can find reduced-size keyboards that take up a little less precious desk space.

Having an idea how to troubleshoot minor system problems is a real confidence builder for computer users. Keep a log of your troubleshooting activities. Make notes of the troubles your computer experiences and how you solve the problems. Such records can be handy when your neighbors and office mates start calling on you to diagnose their computer ills. □

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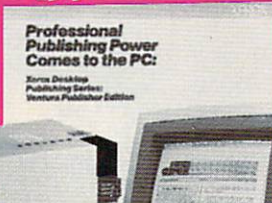
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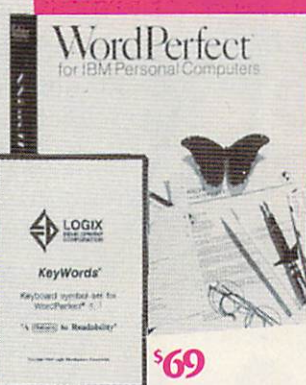
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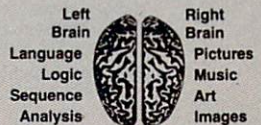
BREAKTHROUGHS in language technology by European learning researcher **Dr. Georgi Lozanov** are the basis of the remarkable

"American managers with language skills open more doors."

Wall Street Journal Editorial
July 25, 1988

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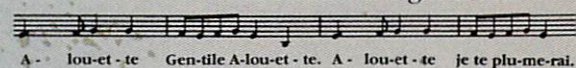
"(the superlearning method is) fascinating... the results are extraordinary."

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"American ignorance of other tongues has been hurting American business executives in their competition for (overseas) markets."

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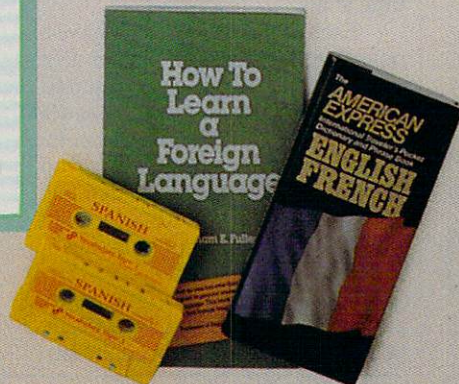
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SHAREPAK

R I C H A R D C. L E I N E C K E R

Since this month's issue talks about computing in Europe, we're bringing you a *SharePak* that will help you make the most of a European vacation. If you're not planning a European vacation, relax; this disk will give you some of what you might be missing. Start off with *Schedule*Master* and organize your preparations for a flawless departure. You can even use *Schedule*Master* to finish your work early so that you can get an early start on your vacation preparations. While at your recreation destination, collect all the recipes you can and enter them into *Meal-Master*. Then when you're back, you'll be able to recreate the culinary delights that you enjoyed the most. Once home, you can get even more exotic and experience an adventure on another world by playing *The Monuments of Mars!*.

SharePak gives you value in every byte. We screen hundreds of programs and choose only the very best.

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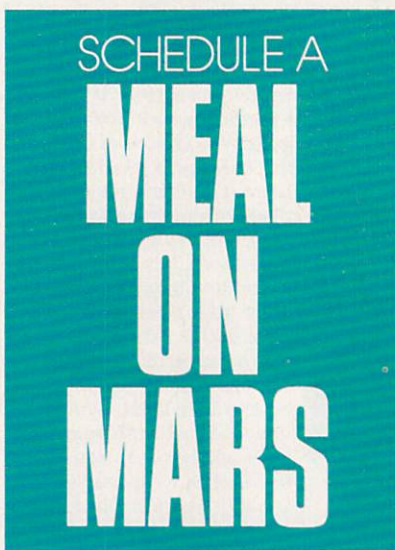
Schedule*Master

*Schedule*Master* is a powerful but easy-to-use system for managing your daily schedule and to-do list. Unlike other systems that can take weeks to master, you'll find that learning all the program has to offer takes almost no time at all.

Each schedule entry can have a note attached to it with further information. The note field can be up to five lines long. Store as many as 4000 records along with 4000 notes in the database file. Deleted items give up their space immediately so that the schedule file never needs to be compressed. Extensive searching capabilities let you find information once you've entered it. And mouse support gives it the final professional touch you'd expect in a quality program.

The program doesn't make a lot of demands on your hardware. Any system with at least 350K of free RAM will run *Schedule*Master*. It will take advantage of your hard drive but doesn't require one.

A printer configuration file lets you specify the parameters you'll need for perfect printouts. Don't worry, though; the program comes set up to work with IBM proprinters and Epson compatibles. That means most people are ready to go from the start.



If you want to get organized, get this program. You'll be able to maximize your efficiency and make time for other things, like vacations.

Meal-Master

Menu-driven *Meal-Master* is a database system especially created and tailored to manage recipes. With *Meal-Master*, you can store, update, and print your recipes in a variety of formats. But the real power of *Meal-Master* lies in its search and utility functions.

You can search for recipes using any combination of title, category, or ingredient criteria. Imagine being able to find all the recipes that can be made with a certain ingredient. Just

change the number of servings a recipe makes, and all the individual ingredient amounts will be adjusted automatically.

To help in entire menu preparation, you can mark recipes as you select them. Then activate the shopping-list function. *Meal-Master* will find the ingredients for all the marked recipes, total the quantities of like items, and print a shopping list.

You won't have to spend much time learning how to use the program—it's menu driven. That means that all choices are clearly laid out and intuitive. And when you run it for the first time, it's smart enough to ask you several setup questions before proceeding. Your setup information is saved to disk, and you don't have to worry about it again.

Meal-Master not only replaces the dogeared, disorganized collection of index cards found in most kitchens; it also provides a valuable tool for meal selection and preparation.

The Monuments of Mars!

An arcade/adventure game set in the near future, *The Monuments of Mars!* lets you explore a secret underground city on Mars. In this volume you must survive 20 unique and challenging levels filled with puzzles, traps, creatures, and useful artifacts.

You'll explore the Martian structures that many NASA scientists believe were built by an ancient Martian civilization. The monuments include the city, the fortress, the pyramid, and the most famous monument, the face—a one-mile-long structure that looks exactly like a human face.

The game scenario finds you part of several special missions to rescue missing astronauts and to discover the secrets of the Martian monuments. The game begins just after your ship has landed on Mars near the site of the cliff, one of the many monuments.

If you suddenly vanish like previous explorers, you can start over. But you might get lucky, find the entrance to each monument, and discover the secrets hidden within. □



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The Monuments of Mars!



Meal-Master



*Schedule*Master*

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MACS FOR THE MASSES

THREE NEW MACS PRICED TO SELL

Computers for the rest of us? That's what Apple hopes it has with its three new Macs: the Classic, the LC, and the IIsi. With earnings down for the third quarter of 1990, Apple had been criticized for concentrating on its high-end models at the expense of its entry-level machines.

The new Macs are designed to shore up Apple's low end with a competitively priced black-and-white Mac, an entry-level color Mac that sells for less than half the price of any previous color Mac, and a new color Mac II that's \$1,600 less than the model it replaces. With increased competition from *Windows 3.0* and a barrage of cheap MS-DOS computers, Apple had to act and act decisively.

Up Close and Personal

The long-awaited Macintosh Classic can best be described as a Mac SE without the expansion slot—but at half the price. It replaces both the Plus and the SE in the product line. Like the SE, the Classic includes a 1.4MB SuperDrive that can read and write Mac,

MS-DOS, OS/2, and Apple II ProDOS disks. The SuperDrive is now standard across the entire Macintosh line.

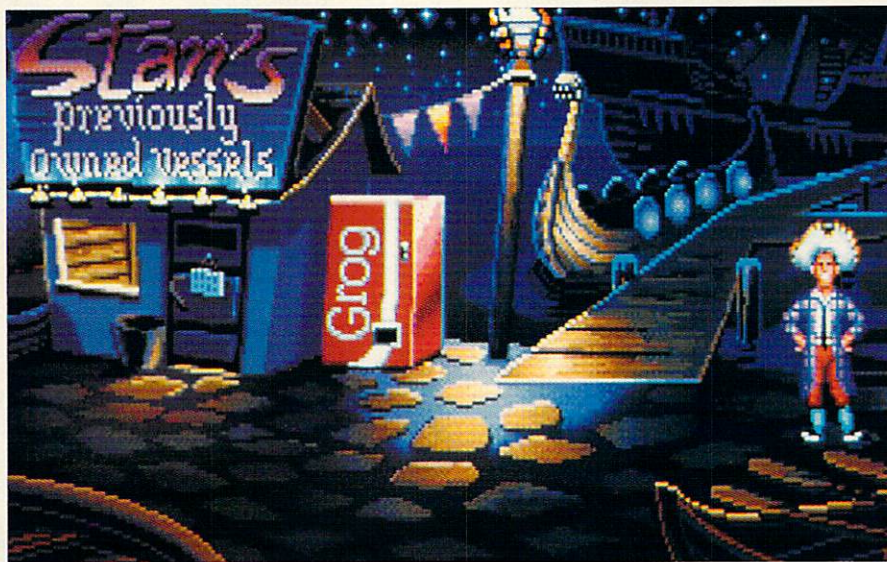
Apple had planned to sell the floppy disk version of the Classic for about \$1,500 but decided just weeks before the announcement to offer it at a more competitive \$999. That price matches the entry-level PS/1 from IBM, which is also black-and-white and has a single floppy drive. A 40MB hard disk version of the Classic increases the price to \$1,499. The floppy disk version has 1MB of RAM, while the hard disk version has 2MB. Both can be expanded to 4MB.

Why drop the expansion slot? Apple argues that 90 percent of SE owners never used it, and eliminating the slot means the Classic can get by with a smaller logic board and a more modest power supply. Like the SE, the Classic has six ports along its back, including a SCSI (pronounced *scuzzy*) port that can connect up to seven SCSI devices and an ADB (Apple Desktop Bus) port that can connect up to three input devices (a mouse and keyboard are included). ▶

DAVID ENGLISH



THESE PIRATES HAVE TONGUES AS SHARP AS THEIR SWORDS.



Lucasfilm™ Games' swashbuckling new graphic adventure lets you trade insults with some of the saltiest seamen to ever sail the seven seas.

In *The Secret of Monkey Island*,™ you'll sling one-liners with a fast-talking used ship salesman, a sarcastic swordmaster, a wisecracking corpse, and a prisoner whose breath would stop a horse. You'll also hunt for buried treasure, chase after a beautiful woman, and—perhaps—unravel one of the twistiest plots in the history of adventure gaming.

You're short, broke, clueless and friendless.

And you've just arrived on Mélé Island seeking fame and fortune. Explaining to anyone who'll listen that you want to be a pirate.

Being the easy-going types they are, your new pirate pals invite you into the club. Just as

soon as you've completed three *tiny* trials.

Among other things, you'll need to sedate some piranha poodles, burglarize the governor's mansion, and do business with the scum of the earth. And if that's not enough, you'll have to figure out whether the 300-pound voodoo priestess covets your rubber chicken, fetid fish, pack of breath mints, or...

If the brigands don't grab you, the graphics will.

Lucasfilm Games set today's graphic standards with games like *Loom* and *Indiana Jones and the Last Crusade*. Now *The Secret of Monkey Island* ups the standards a few more notches with

stunning 256-color VGA graphics (16-color EGA version also available), proportionally scaled animated characters, and cinematic pans and camera angles.

Our acclaimed point 'n' click interface



has been improved even more. So have our sound effects, which are backed by a captivating calypso and reggae music track.

Enter the Monkey Island Treasure Hunt and win a FREE Carnival Caribbean cruise!

If you can solve a few sneaky puzzles in a special demo of *The Secrets of Monkey Island*, you might just win one of the sweetest prizes since Captain Kidd's treasure chest. A Carnival Cruise for two, one of a hundred AdLib™ sound cards, or one of hundreds more prizes! You'll find the demo and complete rules in specially-marked boxes of 3M diskettes.

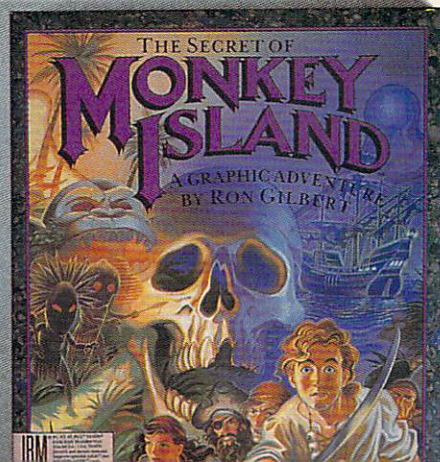
Or send a self-addressed, stamped disk mailer to: Monkey Demo, PO Box 10228, San Rafael, CA 94912.



So act fast, think fast, and enter fast. Because while playing *The Secret of Monkey Island* is an adventure, winning the Treasure Hunt is a real trip.

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No Anchovies

With the Macintosh LC, Apple has reduced the price of a complete color Mac system by a whopping \$4,500. Though not officially a Mac II, the LC uses the same 16-MHz 68020 processor as the original Mac II. It's about the size of a small pizza box, weighs just 8.8 pounds, is expandable to 10MB of RAM, and has seven ports and 8-bit color built in (for 256 colors from a possible 16.7 million). Spend an additional \$199 for a video-memory upgrade, and you can move up to the new 16-bit color (for 32,000 colors from 16.7 million). And like the other color Macs, the LC will be able to accept a 24-bit color card (for all 16.7 million colors).

One of the most interesting features of the LC is its ability to record sound. Both the LC and IIsi include a new sound-input port and a small microphone. The new System 6.0.7 adds the ability to record, play, and save sounds at any time, and a new *HyperCard* stack makes it easy to edit your sounds. Apple is encouraging software companies to integrate sound input into their existing applications.

A version of the LC with 2MB of RAM and a 40MB hard drive but no monitor has a suggested list price of \$2,499. The street price of this model with a monitor is expected to be about \$2,000. A second version, with one or two floppy drives but without a hard drive or monitor, will reportedly be available only to primary and secondary schools. Apple also plans to offer an inexpensive Apple IIe card for the LC's single 020 Direct Slot.

Silly Initials

Like the LC, the Macintosh IIsi has built-in sound input and 8-bit color. It also has eight built-in ports, uses a speedy 20-MHz 68030 processor (making it about six times faster than a Mac Plus), and can currently be expanded to 17MB of RAM.

The IIsi's single slot can take either a Mac II NuBus card or an SE/30 Direct Slot card—though both require an optional adapter card. Apple's adapter cards include a math coprocessor, but similar cards from PSI are available without the math chip.

The IIsi is available in two configurations: one with 2MB of RAM and a 40MB hard drive for \$3,769, and the other with 5MB of RAM and an 80MB hard drive for \$4,569. Nei-

ther price includes a monitor or keyboard, but expect both systems to be heavily discounted.

The Little Engine That Could

As part of Apple's aggressive move to fight back, the company is publishing the results of a study that shows the new Macs performing faster and costing less than comparable MS-DOS machines. The speed tests were performed by Ingram Laboratories using *Windows 3.0* programs that run on both platforms.

Money Talks

Within days after the Apple announcement, dealers were already discounting the Classic. Prices averaged about \$900 for the \$999 floppy disk model and about \$1,250 for the \$1,499 40MB hard disk model. New York City's Computer Era led the way by slashing the price of the \$999 model to \$749.

By the second week, the California-based Connecting Point chain franchise had sold over 10,000 Classics and had 18,000 on back order. While Apple has back orders for all three new machines, nearly half of them are for the Classic.

The price comparisons included computers from IBM, Compaq, and Tandy—with the 8-MHz Classic compared to 10- and 12-MHz 80286 and 8086 machines, the 16-MHz LC compared to 16-MHz 80386SX and 10-MHz 80286 machines, and the 20-MHz IIsi compared to 20- and 25-MHz 80386 and 25-MHz 80486 machines. While the study makes a strong case for Apple against the big three, it doesn't mention that similar MS-DOS computers are available from many smaller vendors for much less.

Ultimately, sales will determine whether the new Macs will help Apple build on its 10-percent market share. Apple's market share, as a company, is about the same as IBM's, but only Apple produces Macs, while literally hundreds of companies put together IBM-compatible PCs. So far, Apple has been able to make it purely on innovation, but the enormous popularity of *Windows 3.0* has cut into its lead. By making its Macs more price competitive—at least with machines from the other big-name computer manufacturers—Apple is adjusting to the new realities of the marketplace.

With software, the Mac is in a much stronger position. In terms of dollars, the Macintosh accounts for

about 20 percent of all software sales. Because of Apple's previous push into the business community with its high-end Macs, there's already a good mix of high- and low-priced productivity software. But there are many more entertainment titles for the PC and many more educational titles for the Apple IIe. With the Classic priced aggressively for the home and the LC heavily discounted to the schools, will we soon see a deluge of games and educational programs for the Mac?

Shelf Life

If the experience at Electronic Arts (EA) and Sierra On-Line is typical, Mac owners will soon see a variety of games from some unfamiliar places. In the past, both companies had pretty much ignored the Mac. Now, according to Bing Gordon, EA's senior vice president of marketing and planning, the new machines have helped convince the company to develop both *PGA Tour Golf* and *Starflight 2* for the Mac. Likewise, Sierra has announced it will release 14 games for the Mac.

Educational software developers have eagerly awaited both the Classic and the LC. Because Apple provided Scholastic Software with the new machines 12 months before they were officially announced, Scholastic should have 16 Mac products available by the time you read this. Peter Kelman, Scholastic's publisher, predicts that the Mac will become "the school machine of the nineties." He says that schools are scrambling to change their Apple IIGS orders to orders for the Macintosh LC.

That same optimism is voiced by many industry analysts. Stewart Alsop, publisher of *P.C. Letter*, says, "Apple will do very well with its new product line." Jeffrey Tarter, publisher of *SoftLetter*, goes even further. He says, "Apple is going to sell every one it can make, and it's going to be able to make lots of them."

While some Wall Street analysts have expressed concern about Apple's having to lower its prices, Tarter suggests that Apple has a lot to gain. "It's often said that you can find lots of people who have switched from DOS machines to Macs, but it's real hard to find someone who has switched from a Mac to a DOS machine. If Apple can start more people early on the cycle, they're more likely to move them up to the more expensive machines." □

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H O M E



In fairy tales the good guys invariably triumph. Recall, for instance, the fable about the little engine that hauled a line of freight cars up the mountainside and seemingly accomplished the impossible.

GeoWorks' GEOS (Graphical Environment Operating System) may prove the modern equivalent of that fable. Facing an uphill struggle as it tries to penetrate a field now dominated by *Microsoft Windows*, GEOS hopes to deliver the GUI goodies to the sizable market segment Microsoft seems to have overlooked.

Skinny Minimal

GEOS's minimum hardware requirements are indeed minimal. It operates on any PC-compatible computer system, including hard disk-equipped XT's with 512K of RAM, a mouse, and a monochrome or color graphics monitor. Estimates of the total number of XT's and 286's that can't do *Windows* right (*Windows* 3.0 was designed primarily for 80386-based computers) range as high as 20 million. GEOS may inherit this enormous market—providing that it survives. Considering the potential threat it poses to *Windows*, you have to wonder whether this kernel will take root and grow or wither in Microsoft's long, dark shadow.

The presence of expanded or extended memory will speed up disk-intensive operations, as will a fast hard disk (28 ms or less access time). Since *GeoWorks Ensemble* (the collection of programs and utilities

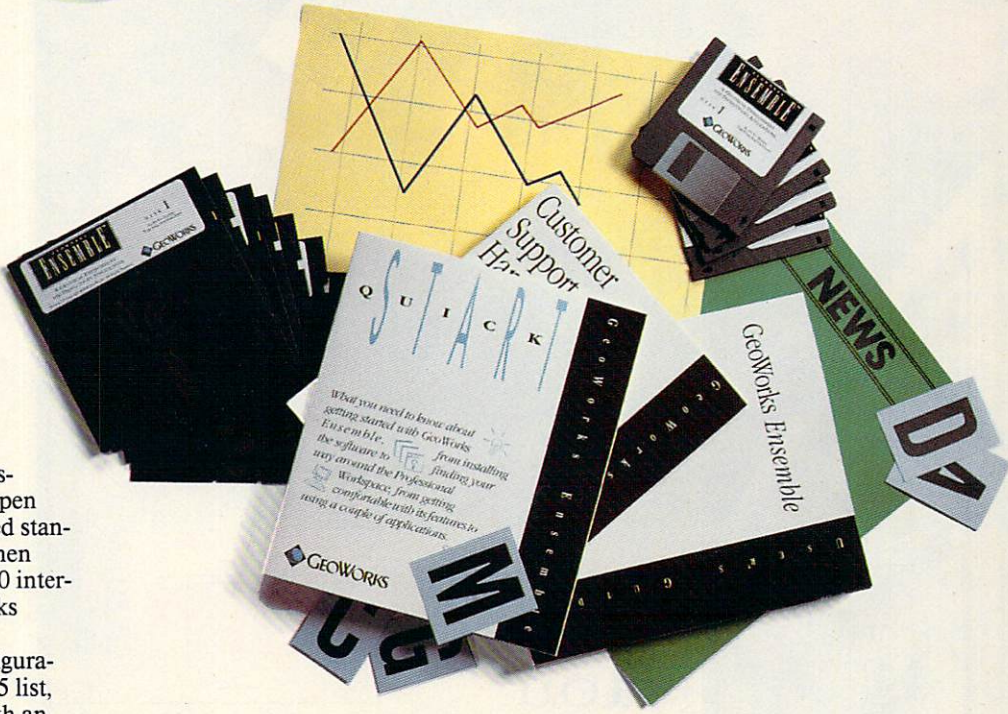
COMPUTE CHOICE

Howard Millman

THE HOT LITTLE GUI THAT CAN—AND WILL—WIN YOUR HEART WITH POWERFUL UTILITIES, ATTRACTIVE DISPLAYS, AND MULTITASKING

OFFICE

MARK WAGONER © 1991



GeoWorks has released to introduce the GEOS operating system) adheres to a standard known as *Motif*, its display screens comply with the Open Software Foundation's suggested standards for graphic interfaces. When compared with the *Windows 3.0* interface, OSF/*Motif*'s interface looks crisper, clearer.

Booting in its default configuration, *GeoWorks Ensemble* (\$195 list, \$150 street price) greets you with an inviting welcome screen that offers three large icons labeled *Appliances*, *Professional*, and *DOS Programs*.

Clicking on *Appliances* summons four deliberately innocent-looking software appliances: a standard (non-scientific) calculator, a Rolodex-like address book (with a built-in phone dialer), a handy calendar/date planner, and a notepad. No one requires detailed instructions on how to use a Rolodex or a calculator, so anyone can learn how to use these appliances within minutes.

The *DOS Program* button (naturally) leads to *DOS*. By default, this path guides you to only one destination—the *DOS C>* prompt. *GeoWorks*, however, enables you to subsequently set up your own selection of buttons, complete with representational icons, to launch *BAT*, *COM*, or *EXE* applications.

Working on a Professional Level

Clicking on the *Professional* button takes you to a screen that contains nine *GEOS*-specific programs including a word processor, a file manager, two telecommunications modules, and a draw program. These applications run in *GEOS*-supervised windows. The windows can be resized, minimized (collapsed to an icon), maximized (expanded to full screen), or moved by dragging the title bar with the mouse. Some windows elements, such as icons, can be dragged around to suit your preferences (or level of hostility).

Commands are selected with the mouse from *GEOS*'s cascading (drop-

down) menus. Most of the common commands have shortcut keys (usually a combination of *Alt* or *Ctrl* plus a mnemonic alpha key).

GeoWorks Ensemble's windows offer the expected complement of *GUI* features. Scroll bars and arrows in the right margin scroll the text up and down smoothly or screen by screen. Maximize and minimize buttons duplicate menu selections to expand or reduce the screen. With more than one window onscreen, you can switch between them by clicking inside of the window you want active. And finally, *GEOS*'s omnipresent *Express* button provides a shortcut to switch between applications without first returning to a central file manager.

GeoWorks Ensemble employs preemptive multitasking (also called *time slicing*) to run multiple *GEOS*-specific applications in the background. *GEOS* prioritizes the running applications and then apportions time from the computer system's single *CPU* (whether the *CPU* is an 8088,



From the Welcome screen, you can enter one of three interface areas.

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8086, 80286, 80386, or 80486) to all applications in the queue. This makes for fast, efficient multitasking.

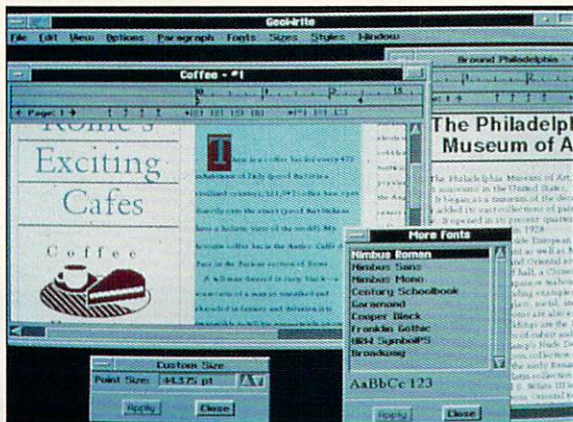
Built-In Applications

The GEOS operating system could do little but promise without *GeoWorks Ensemble*, a built-in suite of applications. After you've put them through the hoops, however, a couple of the programs will leave you with curiously mixed feelings. On one hand, these applications are very technically advanced. But at the same time they're unexpectedly incomplete.

Consider *GeoWrite*, a first-rate WYSIWYG word processor with a rich assortment of page-publishing features. *GeoWrite* supports (as do all *GeoWorks Ensemble* applications) multiple scalable fonts to deliver nearly 800 text sizes (from a tiny 4-point to a billboard-sized 792-point). Its PostScript-like type manager blends bitmap and outline fonts, thereby ensuring that the typeface and font you see on your screen will match the one your printer produces, regardless of whether it's a 9- or 24-pin dot-matrix printer or a PCL-based (Hewlett-Packard-compatible) laser printer.

A Pretty Face

In a product packed with innovative technology, *GeoWrite's* WYSIWYG display distinguishes itself. In addition to rendering manual leading (finely varying the spaces be-



Multiple windows, incorporation of graphics, and fonts are just the beginning of *GeoWrite's* advantages.

tween lines) and positive/negative kerning (changing the space allocated to a character without changing its shape), *GeoWrite's* custom borders, drop shadows, and multiple columns enable you to enhance the appearance of even the most routine documents.

So what's not to like? Well, it's not what *GeoWrite* includes that's the problem; it's what it's missing: macros, search-and-replace capability, a thesaurus, and a spelling checker. When compared to the advanced bells and whistles *GeoWrite* offers, these missing features are as basic as toast for breakfast.

Surprisingly, *GeoWorks Ensemble* also omits a spreadsheet and a database, two essential applications. A company representative, however, said *GeoWorks* plans to release both applications later this year. Registered purchasers of *GeoWorks Ensemble* version 1.0 will receive a free upgrade.

More Geology

The rest of *Ensemble's* built-in applications will fulfill reasonable expectations and needs.

As the centralized rendezvous for all Professional applications, *GeoManager's* primary mission is to shield novices and occasional users from DOS's jargon; it does that well while providing full functionality via pull-down menus. >

Face to Face With Graphical User Interfaces

Power users are turning to graphical user interfaces (GUIs) for the ease of use they provide. But what about those of us *without* 386 VGA systems? Fortunately, there are GUIs designed to make computing easier on 8088, 8086 and 80286-based systems, and one of the most important decisions you'll make is choosing which GUI to work with.

Can We Talk?

First, you'll want to choose a GUI that "speaks" your language—English, plain and simple. That way you won't have to learn how to communicate with your computer before you start to use it—you'll already be on speaking terms.

Easy Operation

Second, your GUI should have neat, organized displays that present your options clearly and concisely. Easy-to-follow graphics make it simple for you to see exactly where you are in a program. Handy pull-down menus keep your options tucked away and out of sight until you call for them. And pop-up dialog boxes guide you through tasks, making sure that your computer does what *you* want it to.

Something in Common

GUIs provide a uniform operating environment, which alleviates the frustration and confusion of switching from one task to the next. Programs based on the same GUI have the same look and feel to them, making each new application easier to learn. Of course, you'll also want to choose a GUI supported by many of the leading software publishers. That way you'll be sure to find readily available software for home, school or business.

Those Little Extras

Another feature to look for in a GUI is a help function that's *context sensitive*—one that's able to "sense" which task you're currently running and provide help for that specific task.

For true convenience, your GUI should operate with just the point and click of a mouse cursor controller. The mouse makes it quick and easy for you to select your choices from menus and dialog boxes, taking the mazes out of getting around the many computing options your GUI offers.

Fortunately, there is just such a user-friendly GUI: Tandy's DeskMate® Graphical User Interface. It's affordable, too—the proven format of DeskMate gives you instant convenience without having to upgrade your system memory beyond 384K. And it's available from over 7000 Radio Shack stores across the country. So take a scroll through DeskMate and discover for yourself just how easy computing can be.

Within *GeoManager*, disk directories are depicted graphically as folders. Folders, in turn, contain subdirectories or files or both. Drive icons streamline switching to other system drives and displaying their files. By default, a drive's contents will display graphically, or you can change it to a text listing (much like a standard DOS display).

GeoDraw's eight tools enable you to create geometric primitives (ellipses, boxes, lines, and polygons) as well as text. *GeoDraw* imports and exports PCX and TIF images and can transfer them to *GeoWrite*. Since GEOS (and therefore all of its applications) is object oriented, fusing and separating image components are quick and easily mastered. Likewise, when you use GEOS's font manager, *GeoDraw*'s text and drawings print out beautifully, even on a 9-pin dot-matrix printer. You can also print text in solid colors, reverse, several vector patterns, and increasingly translucent half tones, as well as at any angle.

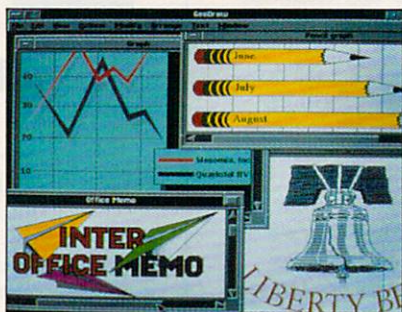
Keeping Track

GeoDex is similar to the address book available under the Appliance icon except that it offers such additional features as text searching and multiple-viewing modes.

GeoPlanner tracks your appoint-

ments by organizing and searching through multiple daily, weekly, monthly, or annual events. Alarms alert you to appointments.

GeoComm delivers the requisite telecommunications features. The dedicated access software for America OnLine, a subset of *GeoComm*, ad-



GeoDraw provides object-oriented graphics for business or personal use.

hers to the GEOS graphic interface, so the feel and flavor of the geographical display remain consistent throughout your online time.

Seamless America

From my meanderings through its Teflon terrain, I would say that America OnLine holds promise as a low-cost, easy-to-use source of information and entertainment. For

example, America OnLine's People to People forum invites you to drop in anytime and participate in its forever ongoing discussions. Also, peruse America OnLine's numerous high-quality entertainment, productivity, and utility downloads.

Unquestionably, GEOS faces a long uphill climb. Still, tiny GeoWorks is off to an astonishingly good start and running strong. Now that reminds me of another story I heard as a child. This one's about a mouse that roared. . . .

Ease of Use	★★★★★
Documentation	★★★★★
Features	★★★★
Innovation	★★★★★

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IBM PC and compatibles; 512K RAM; DOS 2.0 or higher; hard drive; CGA, EGA, VGA, or Hercules graphics adapter; mouse—\$199.99

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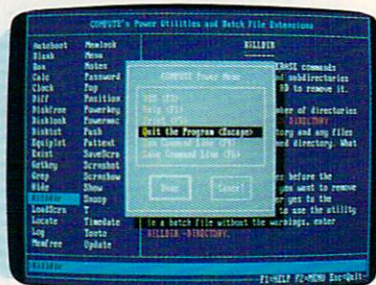
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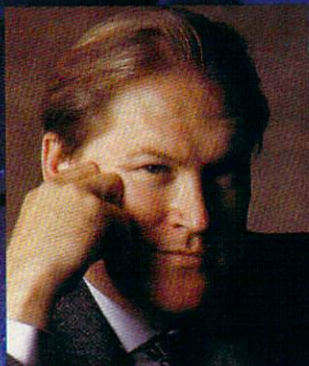
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WORKPLACE

D A N I E L J A N A L

There's this beach house I know of right on the ocean that has a view of the tide from every room. I want it. I want to open the floor-to-ceiling sliding-glass doors leading from the carpeted loft office onto the open-air deck overlooking the blue surf and breathe in the salty air as I earn my daily bread.

I want to hear the person on the other end of the phone say, "What's that noise in the background?" And I want to reply: "Noise? What noise? Oh, that. That's just the ocean, and it's high tide."

Now I have to see if I can afford it. I have two choices: I can call my tax advisor, who knows me, my investing temperament, my financial stability, and my tax situation. Or I can invest a couple of hundred dollars in software endorsed by celebrities.

I decided to give the celebrities the first shot. After all, if I live at the beach, the stars might be my neighbors. Why be rude to the neighbors?

Andrew Tobias' *Financial Calculator* published by MECA Ventures (203-226-2400) calculates mortgages quickly. I typed in the loan amount, interest rate, and number of years on the loan. I found that a 30-year, fixed-rate mortgage was quite affordable. For the fun of it, I changed the mortgage rate from the special 8 percent the bank offered to the prevailing 10 percent offered by the S & L. The computer took about two eye blinks to compute the difference. I blinked twice when I saw the savings that would result from that 2 percent difference. What a deal!

"Now," I thought, "if I make the down payment and the closing fees, I'm going to be strapped for a couple of months. Where can I get some extra income?"

Rather than think of ways to work harder (what's the point of working at the beach if you can't join the 5:00 p.m. volleyball game?), I wondered if I might be entitled to a tax refund. If the refund was sufficient, I wouldn't have a cash-flow dilemma to worry about.

I sought the advice of Sylvia Porter and her *Rapid Tax*, published by DacEasy (214-248-0205). This program computes your federal and state income taxes. If you don't know which forms to fill out, the program will ask you a series of more than 50 questions; your responses will indicate which forms to use. A lucid manual explains how to complete the forms. The manual is so clear, the IRS should issue it along with its forms.



First, I needed to find the dollar figures for all Sylvia's financial questions. Fortunately, this was not a taxing experience, since I keep all of my financial records on *Quicken* from Intuit (415-322-0573), a program that keeps running totals on my income and expenses based on my checks and deposits.

Both programs are easy to use. After filling out forms for nearly one hour, Sylvia told me I would get a refund of about three month's mortgage, maintenance, and taxes! I began to smell salt air.

This sounded too good to be true. I called my tax advisor and asked him to go over the numbers.

He figured the mortgage in about five eye blinks. He analyzed my tax return from the past year and asked about current income, assets, and an-

anticipated income. He added the carry costs, taxes, mortgage payments and living expenses.

With steam rising from his calculator, Chet said, "You have a good chance of being approved for a mortgage and being able to pay for it each month." He also gave me investment advice, which the other programs could not do. He advised me to sell my condo (which I had expected to do). "You'll also save money because you won't have to pay for a vacation because your house is a vacation."

Hot diggedy! I could buy the beach house!

Only one question remains: Who won the battle between human and computer, or in this case, tax advisor and tax software? The software cost approximately \$200, less at discount stores and mail order. I worked on it for two hours. My tax advisor spent about an hour, offered advice the computer programs couldn't possibly match, and charged me \$125. The human wins! (Sounds like a line from a grade-B sci-fi flick.)

You won't go wrong by buying any of the programs I've mentioned here, however. All of them perform as promised: They forecasted my taxes and computed the mortgage on the beach house. They're excellent tools that I can use to double-check the advice of my financial advisor.

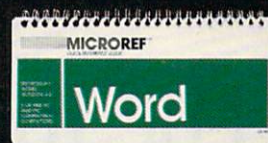
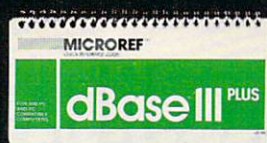
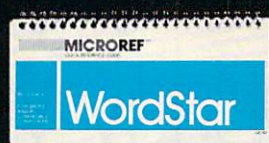
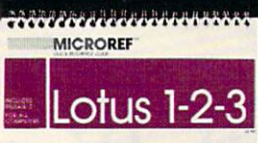
However, they can't replace a human being's acumen for deciding other factors, such as selling my condo to help raise the down payment on the beach house. Also, I'm sure that my tax preparer was better able than I to make sure I had used all the right forms, took all the entitled deductions, and paid the correct amount.

The lesson? Computers are very good at managing information and presenting it in a solid, usable manner, but they can't suggest financial plans and strategies that match the capabilities of a trained, seasoned, financial pro. Remember that the next time you want to run the financial side of your home business yourself.

Gotta run. Surf's up. □

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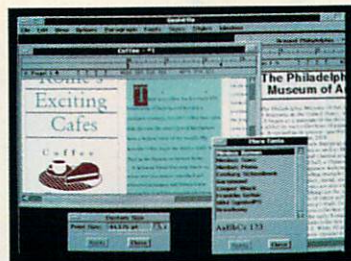
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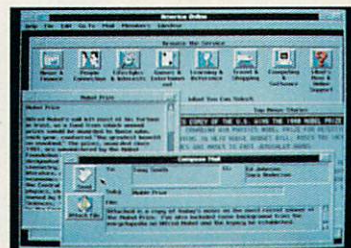
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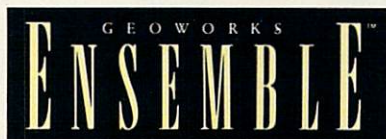
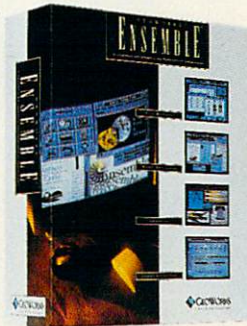
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MODEMS MADE EASY

MASTER THE MYSTERIES OF MODEM SPEEDS

Modem transmission speed is the source of a lot of confusion, even among otherwise informed computer and modem users. The problem stems from the interchangeable use of *baud* and *bits per second*. I suspect this is because it's easier to say *baud* than *bits per second*, though misinformation has a hand in it, too.

If you've ever found yourself confused by the relationship between bits and baud rate, or if you think that a modem's baud rate is the same as the number of bits or characters it transmits per second, read on.

Background Bits

Bits per second is a measure of the number of data bits (digital 0s and 1s) transmitted each second in a communications channel. This is often called the *bit rate*. Individual characters (letters, numbers, and so on), also referred to as *bytes*, are made up of a group of data bits.

Depending on its type, a character may be represented within a computer by a string of seven or eight bits.

Seven-bit characters usually represent the 128 standard ASCII characters found on your computer keyboard.

In addition to the standard ASCII codes, 8-bit characters can represent control characters and special token or graphics characters peculiar to a specific machine. The line-drawing characters in the PC's extended character set are a good example.

Any character with an ASCII number higher than 128 is an 8-bit character. The number of bits sent for each character can change during transmission, as we'll see. (Again, the transmitted character is often referred to as a *byte*, or on older systems, a *data word*.)

While a modem's bit rate is related to its baud rate, the two numbers are not always the same.

Get Baudy

Baud rate is a measure of the number of times per second a signal in a communications channel varies, or changes states. States can be many things, including frequencies, voltage levels, or frequency phase angles. ▸

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One baud is one such change. So, a 300-baud modem's signal changes in state 300 times each second.

However, contrary to what you might expect, a 1200-baud modem's signal doesn't change state 1200 times per second. And that fact has an important bearing on why it is inaccurate to say *baud* when you mean *bps*.

Raw Bits

Depending on the modulation technique it uses, a modem can send one or more (or less) bits with each baud or change in state. To put it another way, one change of state can send one bit—or more or less than one bit.

Thus, baud and bps are very different.

As mentioned earlier, the number of bits a modem transmits per second is based on the number of bauds (changes in signal) that take place each second.

The numbers for bps and baud are not always the same because one baud can represent one bit, more than one bit, or a fraction of a bit.

To illustrate this, first consider a modem with a baud rate of 300 using a transmission technique called *FSK* (Frequency Shift Keying, in which a signal changes to any of four different frequencies to represent digital 0 and 1 signals from both modems).

With *FSK*, each baud (which is, again, a change in the state of the sig-

nal) sends one bit. Only one change in state is required to send a bit. Thus, the modem's bps rate is also 300: $300 \text{ bauds per second} \times 1 \text{ bit per baud} = 300 \text{ bps}$.

Similarly, if a modem operating at 1200 baud were to use one change in state to send each bit, that modem's bps rate would be 1200. (There are no 1200-baud modems, by the way. This is only a hypothetical example.)

Now, consider a hypothetical 300-baud modem using a modulation technique that requires two changes in state to send one bit, or half a bit per baud. This modem's bps rate would not be 300 bps, but 150 bps: $300 \text{ bauds per second} \times \frac{1}{2} \text{ baud per bit} = 150 \text{ bps}$.

To look at it another way, bits per second can also be obtained by dividing the modem's baud rate by the number of changes in state, or bauds, required to send one bit.

Real Speed

Now let's move away from the hypothetical and into reality, as it exists in the world of modem modulation.

First, lest you be misled into thinking any 1200-baud modem can operate at 2400 bps with a two-bits-per-baud modulation technique, remember that I said there are no 1200-baud modems.

Medium- and high-speed modems use baud rates lower than their bps rates. Along with this, however, they use something called *multiple-state modulation* to send more than one bit per baud.

For example, 1200-bps modems that conform to the Bell 212A standard (which includes most 1200-bps modems used in the U.S.) operate at 300 baud and use a modulation tech-

nique called *phase modulation* that transmits four bits per baud. These modems can operate at 1200 but not 2400 bps because they are not 1200-baud modems; they use a baud rate of 300. So, $300 \text{ baud} \times 4 \text{ bits per baud} = 1200 \text{ bps}$, or $300 \text{ baud} = 1200 \text{ bps} \times \frac{1}{4} \text{ baud per bit}$.

Similarly, 2400-bps modems that conform to the CCITT V.22 recommendation (which includes virtually all 2400-bps modems) actually use a baud rate of 600 when they operate at 2400 bps. To achieve a bps rate of 2400, they use a modulation technique that transmits four bits per baud: $600 \text{ baud} \times 4 \text{ bits per baud} = 2400 \text{ bps}$, or $600 \text{ baud} = 2400 \text{ bps} \times \frac{1}{4} \text{ baud per bit}$.

Thus, a 1200-bps modem is not a 1200-baud modem, nor is a 2400-bps modem a 2400-baud modem.

Now let's take a look at 9600-bps modems. Most of these operate at 2400 baud, but (again) use a modulation technique that yields four bits per baud. Thus: $2400 \text{ baud} \times 4 \text{ bits per baud} = 9600 \text{ bps}$, or $2400 \text{ baud} = 9600 \text{ bps} \times \frac{1}{4} \text{ baud per bit}$.

Characters per Second

Usually abbreviated *cps*, *characters per second* is the number of characters (letters, numbers, spaces, symbols, or control or other 8-bit characters) transmitted by a modem in one second.

Cps is often the bottom line in rating data transmission speed. It is certainly a more effective way of thinking about text data transfer than baud- or bit-rate.

Determining the *cps* rate is easy: Simply divide the bps rate by the number of bits sent for each character. You must of course consider more than just the seven or eight bits that make up each character binary digit. In fact, as many as ten bits may be transmitted for each character during ASCII transfer, whether seven or eight data bits are used.

This is because the sending computer adds bits that mark the beginning and end of each character (called *start-* and *stop-bits*). In addition, the system usually adds a parity bit during 7-bit ASCII transmission. (The computer's serial port takes care of adding the extra bits as well as stripping them out at the receiving end.)

So, in asynchronous data communication, the number of bits per character is usually 10 (either seven data bits plus a parity bit, a start bit, and a stop bit, or eight data bits plus a start bit and a stop bit). Thus, using 10 bits per word:

300 bps = 30 characters per second
1200 bps = 120 characters per second
2400 bps = 240 characters per second

Analog vs. Digital Signals

Before your computer can send something over a modem, it must be translated from digital (or binary) to analog. Let's take a closer look at analog signals and why they're used in data communications.

What Is an Analog Signal?

Strictly defined, an analog signal is a signal that varies in a continuous manner. In contrast, a digital signal varies in a discontinuous manner. Analog signals vary continuously between their minimum and maximum values, while digital signals do not vary in the same way. A digital signal is always at either a minimum or a maximum level or value (or in one state or the other), with no in-between.

Analog signals, on the other hand, cover the entire range between maximum and minimum values. You can visualize an analog signal as a sine wave, while a digital, or binary, signal is in the form of a square wave.

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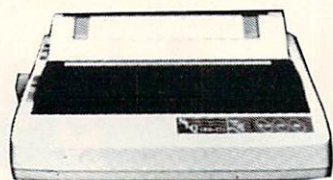
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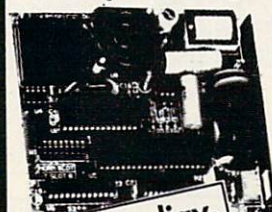
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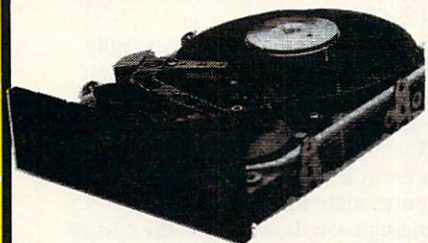
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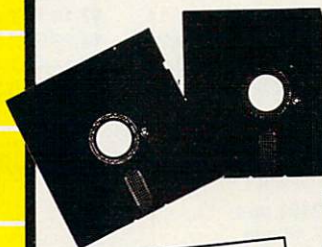
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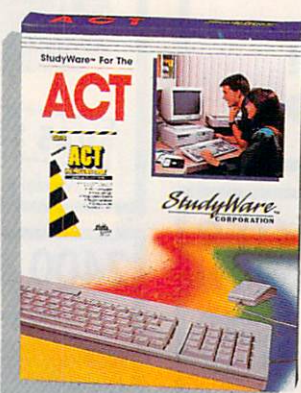
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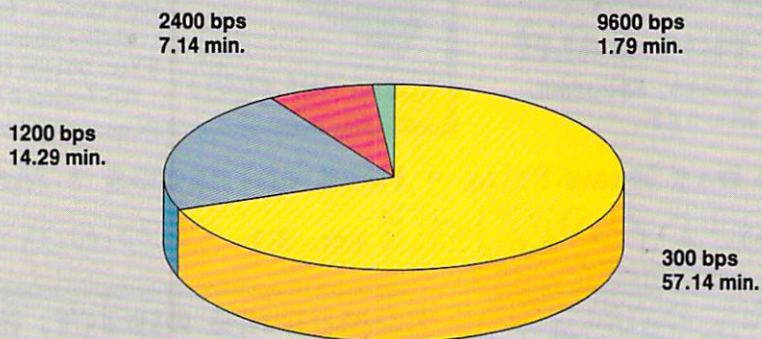
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How Long Does It Take?

Using ten bits per character as a guideline, how long does it take to download a file from a BBS? You can use the formula $(\text{bps}/10 * 60)/1024$ to determine the number of kilobytes per minute. With this formula, you get values of 14K per minute at 2400 bps, 7K per minute at 1200 bps, and 1.75K per minute at 300 bps. Here's a table that shows how many minutes it would take to download files of 10K, 100K, and 500K, and how much this would cost at a rate of \$12 per hour.

	10K	100K	500K
300 bps	5.71/\$1.14	57.14/\$11.43	285.71/\$57.14
1200 bps	1.43/\$0.29	14.29/\$ 2.86	71.43/\$14.29
2400 bps	0.71/\$0.14	7.14/\$ 1.43	35.71/\$ 7.14
9600 bps	0.17/\$0.04	1.79/\$ 0.36	8.92/\$ 1.79

Downloading a 100K File



Common Speeds

The most commonly used communications rates for dial-up computer communications (including BBSs and online services like CompuServe, DELPHI, and GENie) are 300, 1200, and 2400 bps.

Some older systems—especially Telex—communicate at 110 bps, but these are gradually going the way of the dinosaur. Modems with speeds of 4800 and 9600 bps are available, but at present few online services or BBS's accommodate them. This will be changing soon, however, as the cost of high-speed modem technology drops and the demand rises.

Super Fast

Modems with even higher bps rates (19,200 and up) exist, but these are not used with CompuServe, GENIE, America OnLine, and most other dial-up systems; 9600 bps is generally accepted as the upper limit on asynchronous data transmission via voice-grade telephone lines.

At present, using higher transmission rates requires special dedicated lines that are *conditioned* (that is, lines are shielded from outside interference) as well as expensive modulation and transmission equipment. □

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PATHWAYS

S T E V E N A N Z O V I N

Thomas Jefferson once said that the people are made safe by the information that they possess and that they're the sole guardians of religious and political freedom. Although it's two centuries old, his observation sums up the philosophy of perhaps the first political party to offer a computing-based vision of government.

The tiny Independent High Tech Party runs out of headquarters in Hopkinton, Massachusetts. Its prime mover is 38-year-old Leonard J. Umina, a good-natured Digital Equipment executive and former Republican who has never held public office. Umina and four associates recently offered themselves as candidates for Massachusetts's highest executive positions in last November's elections, with Umina himself running for governor.

Umina, an authentic political outsider, may well have the distinction of being one of the few computer-literate people ever to have run for governor of any state. But that's not what's interesting about him—or his party. He's grappling with a problem that soon may be a major issue.

Umina believes that Americans today are in danger of losing their freedom because they no longer have access to the information that guarantees it. In a democracy, the people themselves possess and control the information they need. This was something Jefferson understood. The Declaration of Independence was printed by small, independent presses, not the royal printers of King George.

However, even a democratic government can deny public information to ordinary citizens—or even to politicians within the system itself. In Massachusetts, says Umina, the state legislature had to invoke the Freedom of Information Act to find out from the governor's office what was in the state's checking account and how many employees were on the state payroll. This was plainly information that people had a right to know and that was available in the state's com-

puterized accounting system, but it never had been made public.

A free press should guarantee the free flow of information that democracy requires. Today's computer systems, however, can interfere with press access to vital information.

Nonetheless, Umina believes that electronic technology is also the key to restoring the free spread of information, possible through a new program he and his party have proposed, called *Public Access Computerization*. This involves putting all government information—such as proceedings of legislative meetings, accurate income and expenditure figures for govern-



ment programs, the full text of government contracts, and so on—on a mainframe that's freely accessible via modem or network from any computer. The mainframe would be run by an independent agency not controlled by any branch of government or political party. "With government's every action so visible, waste, corruption, theft, and dishonesty will be eliminated," he claims.

Furthermore, Umina would ensure the availability of computers in public areas, mainly libraries, so that anyone could access the government database. "I want every person to be able to examine any part of our state government's operation from the library, home, or school. I want high school and college classes to be able to study our government and its operation and to recommend alternatives

and changes to programs, expenditures, and activities."

Public Access Computerization would help local governments as well. Massachusetts is currently suffering through a major recession, but the state government sat on the budgetary bad news as long as possible before making it public. This forced local officials to make last-minute guesses at future levels of state aid. Under Umina's system, state fiscal information would be visible at all times, making budgetary guesswork unnecessary and cutting waste.

In his public statements, Umina hasn't dealt with all the potential problems of Public Access Computerization. How much would it cost? Could it be implemented on a state level only, or would it have to be a national program to include all the federal information that states need to plan their own programs and budgets? How could it be protected from hackers and dirty tricksters? Could you convince the public to use it? Still, Public Access Computerization was the only truly new idea aired during the Massachusetts campaign season. It deserved serious examination.

It didn't get it, of course. Umina and his High Tech Party met the same fate suffered by most other fringe parties that nibble at the edges of U.S. politics. With no party organization, no political machine, no television advertising, and no money, Umina's bid for governor was bound to fail—and did, even in an election in which many voters expressed an intense dislike for both major candidates. The local press had a field day with the group, calling them "Boy Scouts," "Don Quixotes," and "hopelessly naive." It may be that offbeat candidates without major party backing can no longer win American elections or that freedom of information is too abstract an issue to have much voter appeal.

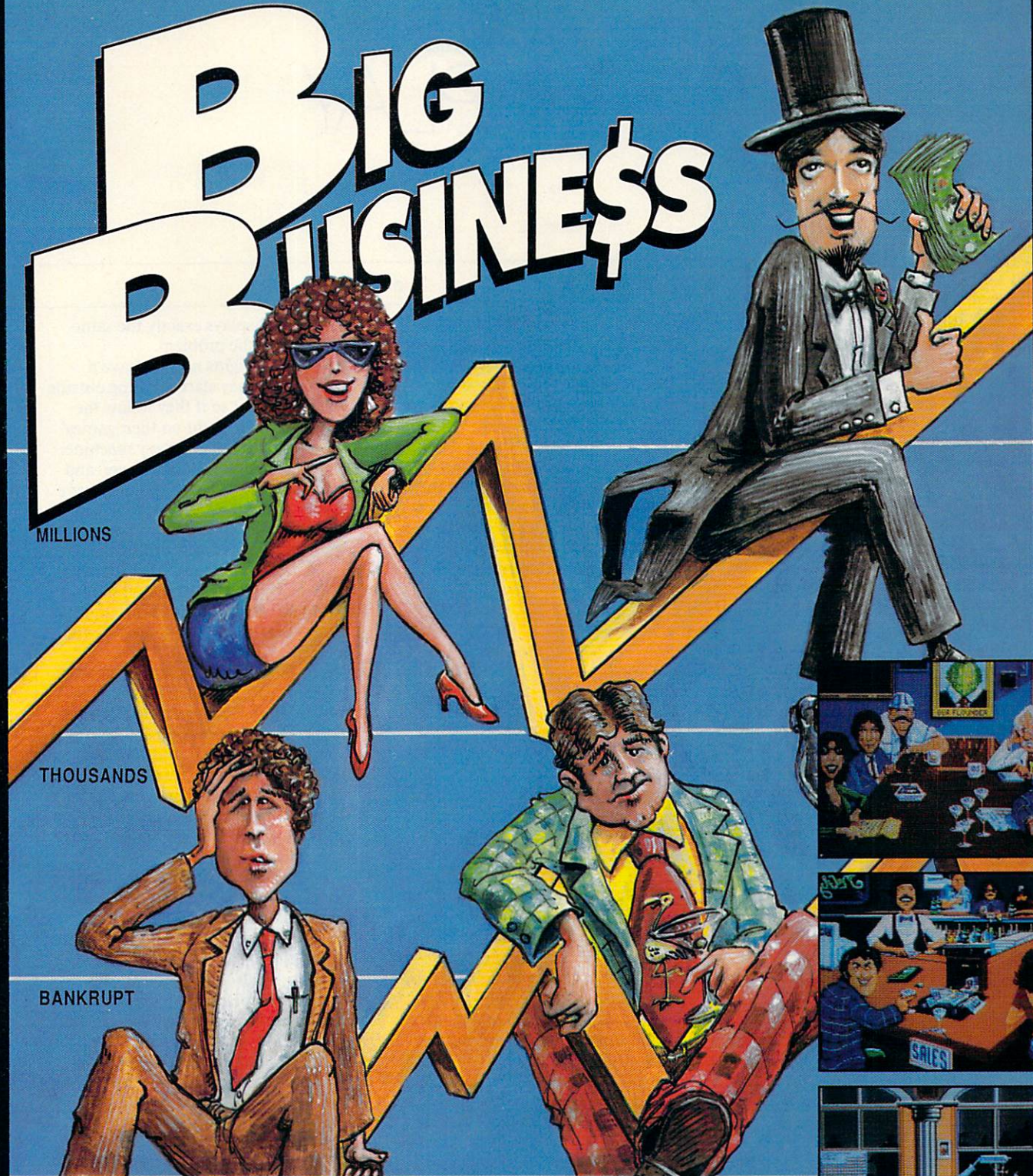
Judged by the honesty and forward-looking nature of the party platform, Umina and his Independent High Tech Party are onto something. Is anybody listening? □

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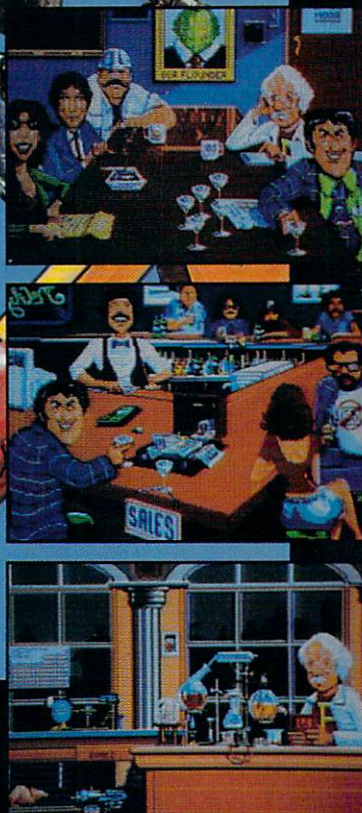
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GAMEPLAY

O R S O N S C O T T C A R D

Games are the most demanding programs that your computer will ever run. A lot of things are going on all the time—not like with your word processor, which just sits there waiting for you to press a key. As much of the game as possible has to be in RAM because if the program has to keep going to the hard disk to get data, the game lurches along like a square-wheeled cart.

That's why gamewrights keep asking for more and more capability from your machine. They have increased the RAM requirements until now a lot of games demand a 640K machine. Some games even require (or at least the game's developer recommends) expanded or extended memory. To free up as much low memory as possible (all of the RAM below 640K), you may have to boot with a stripped-down configuration whenever you want to play. (I use *BootCon* from Modular Systems, a terrific little dirt-cheap program that gives you a menu of possible configurations every time you boot.)

But even with 640K, an EGA display, and a hard disk, the game publishers have hit a wall. How can they know which SVGA display you're using? Which expanded memory manager? Which sound board? They can't know.

Yet they *have* to know—because if they create a game that can only run on a marvelous machine owned by exactly 12 people in the world, they aren't going to be able to make a profit selling it for \$49.95.

Every step upward in hardware requirements knocks out thousands of potential players that can't possibly buy the game. There's a constant risk of leaving the gaming audience behind, which must be balanced by the gamewright's temptation to push the hardware as far as it can go.

When the game publishers began to sell games that could only be played if you had a hard disk, when they first created games too complex to be ported to the Commodore 64, when they first published games that required

more than 256K of RAM to run, when they first published games that *had* to have an EGA display or better, they went through as much pain as if they were passing the corporate equivalent of a kidney stone.

It isn't just the financial risk. Gamewrights are artists. They want their games to be perfect, but they also want their games to be widely available. I've never met an elitist gamewright. (I got a letter from one once, but I've never actually *met* one.)



There's also a practical programming reason for staying away from high-end machines: standards. Those big mammas don't have any.

Back in the days when all the PC clones had 256K and a CGA display, a program that ran on one machine would run on all of them. But anybody who's used a 386 or 486 machine with extended memory and an SVGA display knows that no two models are exactly alike. I've had games that ran on my Hyundai 386 crash on my Northgate 486, and vice versa; and I've had programs do weird things on both—but *different* weird things.

It's not just a problem of game programmers' using suspect direct-memory-access schemes or kludges in order to speed up or enhance the game. The hardware itself isn't identical anymore. All 256K PCs with CGA displays were identical, from a programming point of view. But a programmer can't count on any two 386 machines handling extended memory

or SVGA displays exactly the same way. That's the problem.

Gamewrights need to have a standard as they start reaching outside the 640K limit so if they follow the rules, they can count on their games' running smoothly on *every* machine.

The answer is already here, and it's in the software. Players only have to fork over 90 bucks, not 5,000, in order to get the environment the game requires. The answer is *Windows 3.0*.

I never liked the earlier incarnations of *Windows* because all my favorite software kept crashing, and I didn't like the software that *did* run.

But with the latest *Windows*, Microsoft has finally got it right. To my shock, *Windows* actually makes my non-*Windows* programs behave better. For instance, I'd been having trouble with *Glyphix* and *WordPerfect* locking up or giving me divide errors whenever I tried to print complex documents on my Laserjet. But when I run them under *Windows*, they behave perfectly.

Most of the games I've tried work fine under *Windows*, so at least it does no harm. And even some of the untidy crash-prone games are improved by running them under *Windows*. For instance, *Railroad Tycoon* always locked up or crashed on my machines at least once per playing session. Under *Windows* it still happens, but I get plenty of advance warning because the game acts weird for a while before it dies. *Windows* provides life support just long enough for me to save the game.

Windows should become the new game-development standard because it works and it works well. Gamemakers will have to spend a bunch of bucks tooling up to work with *Windows*, but it'll be worth it.

Two years from now, most PCs will run under *Windows*. The installed base will be huge. And game programmers will know that as long as they obey the *Windows* protocols, their games will be playable on *every* machine that has *Windows*.

It can't happen too soon for me. ☐

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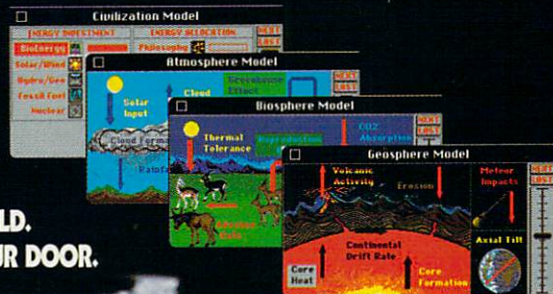
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Aesthetics

Beauty may be in the eye of the beholder, but golf courses seem most appealing when they blend in with the natural terrain. Early designers didn't have much choice, but even modern designers with access to powerful bulldozers, graders, and scrapers, and the ability to move hundreds of tons of earth, strive to make it look as if the original land were created with a golf course in mind.

You would think it difficult to make the green turf of a golf course blend in with the desert, but Nicklaus' Renegade Course at Desert Mountain is almost invisible as you drive by only 100 yards from the fairway. Con-

taining the entire course between natural rises accented with 100-year-old saguaro cactuses, Nicklaus used the indigenous plants and terrain as the predominant hazards on the course.

You don't find straight lines or perfect circles in the woods, meadows, or mountains, and except for flagsticks and club shafts, you shouldn't find them on a golf course either. While "cookie-cutter" bunkers, greens, and tees were popular in the British Isles in the late 19th century, modern design favors a more free-form approach where each element seems to flow from the contours of the land.

Recent advances in turf management equipment have allowed more and more courses to take advantage of contour mowing for sculpted fairways. The days of the old and imprecise gang-mowers being pulled behind tractors is over, and the replacement allows more control over the shape and precision of the fairway. Contour mowing is more pleasing to the eye and can be used as a strategic element by altering the size of landing areas at various distances from the tee.

Routing the Holes

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Course Routing Screen

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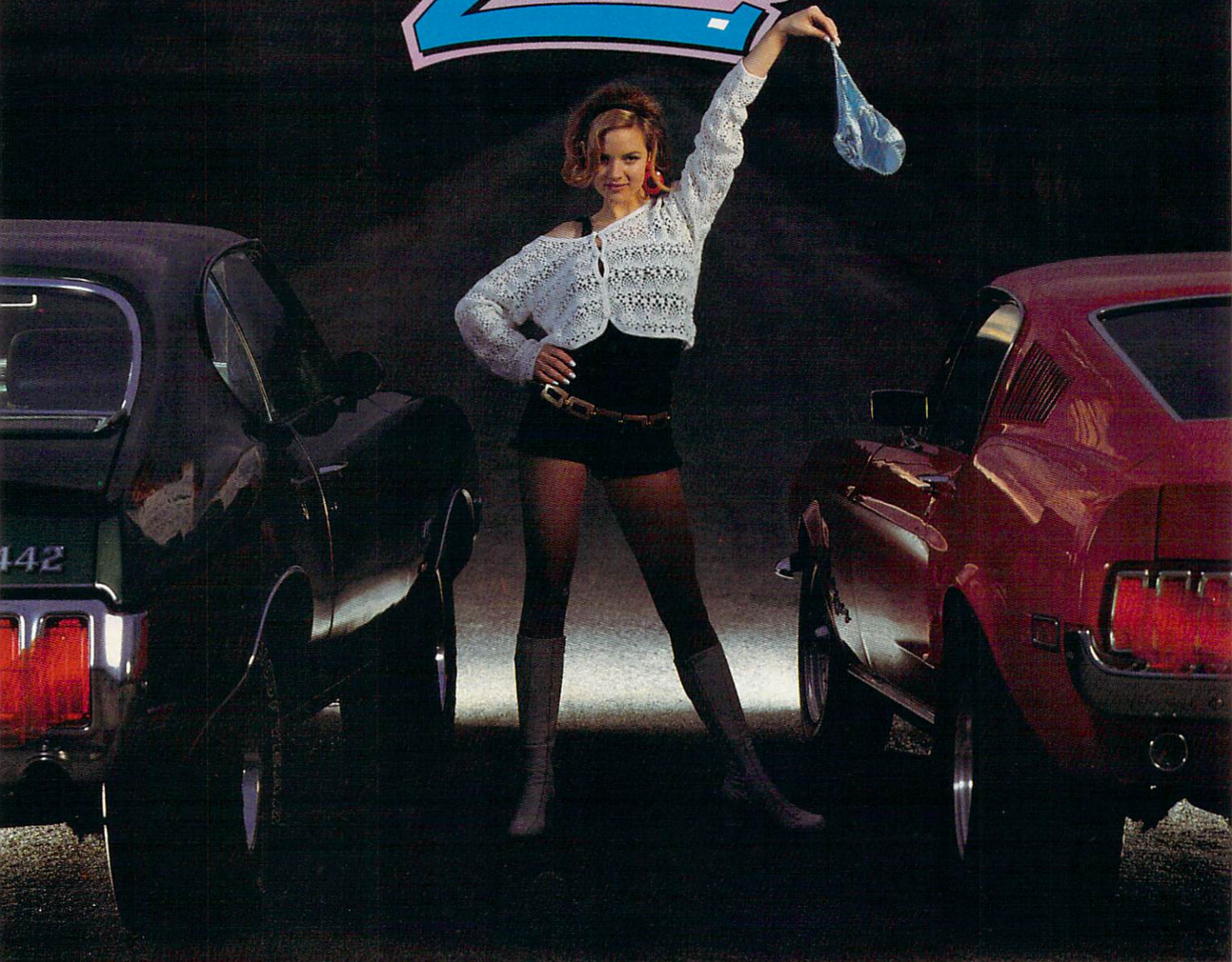
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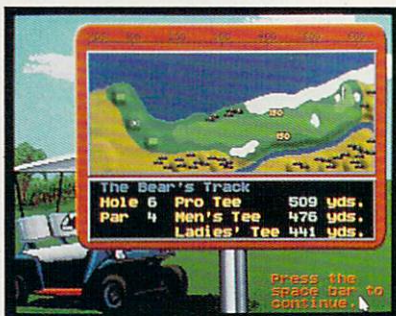
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re-create the ambiance of an early course, however, the design and placement of bunkers have become more of a craft than a natural occurrence.

Raised bunkers are the most common type on American courses, with the side facing the hole (the lip of the trap) at a higher elevation than the side facing the tee. It's an accepted practice to make the lip higher the closer you get to the green. In most cases, fairway bunkers are relatively shallow, while green-side bunkers have more depth. The thinking is that you've already penalized the golfers by making them hit from the sand, so give them a chance to advance the ball with a well-played shot.

When building fairway bunkers, use them to narrow the fairway and create a narrower landing area for the big hitter. By requiring accuracy on



Hole Overview Screen

and contour of the building site, but it has become almost standard practice to locate the 1st tee, 9th green, 10th tee, and 18th green next to the clubhouse, where golfers can visit the pro shop or grab a bite to eat. Careful designers also ensure that these same holes do not play into a rising or set-

from two directions. Modern designers largely endorse a looping design where holes play in every conceivable direction over the 18 holes.

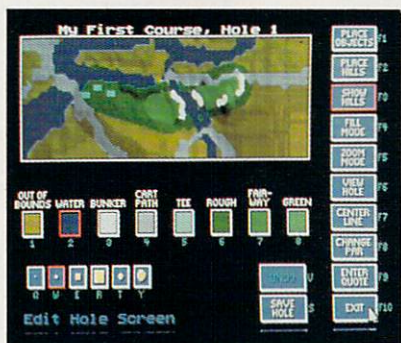
Keeping the interest level high is one of design's primary goals, and spacing the par 3s and 5s out over the round brings some variety to the

long shots, you take away some of the "long-knockers" advantage during a round and provide a fairer test of golf. When adding sand near the greens, leave some grass between the green and bunker.

The theory behind the use of bunkers around the green could change in the future. The professionals have become so adept at playing from the sand that they sometimes intentionally hit into the bunkers rather than risk a lie in tall grass. Some designers add tall grass to the lip of the bunker to prevent that strategic move.



Place Objects Screen



Edit Hole Screen

Greens and Pin Placement

Creating a test of a golfer's short game depends upon the careful consideration of the size and contour of the putting surface and the placement of the pin in relation to the slope. While wildly sloping greens are an obvious challenge to the game played on the dance floor, building subtle breaks into the shaved grass is an important aspect as well. In many ways, a barely perceptible break tests the golfer's ability to "read" the green more than a twisting one.

Fair pin placement becomes vital on greens with dramatic changes in elevation. It doesn't make sense to allow a player to hit a shot to the

ting sun to slow down play.

Most designers avoid parallel fairways where errant shots could be dangerous to golfers walking or riding on other holes. When there's no way to avoid it, use trees to isolate one fairway from the other. One of the problems with early courses that played out in a straight line and then back in a straight line is that golfers only played with the wind blowing

game. It isn't etched in stone, and some fine courses have back-to-back short or long holes, but repetition isn't conducive to a championship layout.

Bunkers

The first bunkers were carved out of the links grass by the winds along the Scottish coast, and these unkempt areas spelled real trouble for early golfers. Unless a designer is trying to



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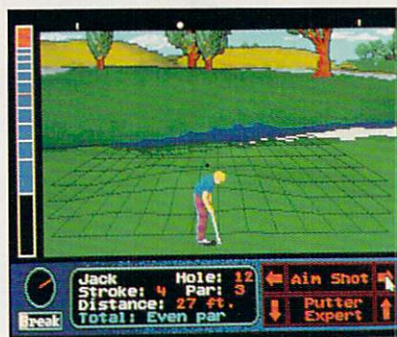
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green and then take away any chance of hitting the first putt near the hole. You can require that a perfect shot is the only way to keep it close, but when you build a two- or three-tiered green or add a steep section, don't place the hole too close to the bottom of the slope. Putting's tough enough without impossible pin placements.

Pin placement and the slope of the green affect more than putting, pitching, and chipping. You can tuck a pin close behind a sand trap when you've planned a par 4 hole for an approach shot with a high-flying wedge or 9-iron, but the same placement on a 210-yard par 3 where a boring 2- or 3-iron is required wouldn't create a



Wind Indicator



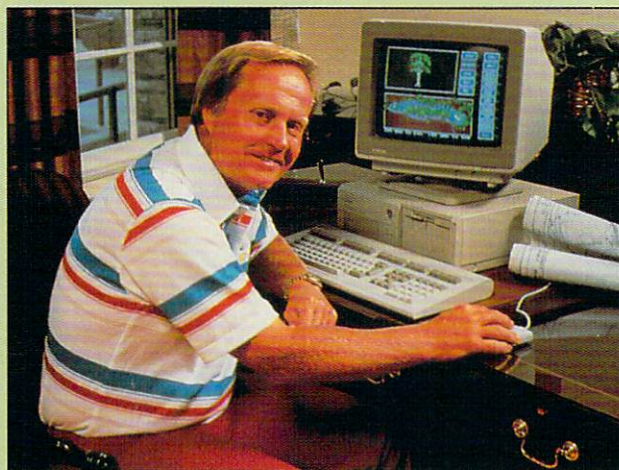
Break Grid Indicator

proper opportunity for par.

Course designers haven't come up with a specific formula for the size of greens. Robert Trent Jones, Sr. built enormous greens, while Nicklaus designs usually include small- to medium-sized putting surfaces. While size is affected by the severity of the hazards around a hole, many designers decrease the green size as approach shots become shorter. A 450-yard par 4 usually has a larger green than a 375-yard hole that follows. □

This feature is an excerpt from *The Official Guide to Jack Nicklaus Computer Golf* by Mike Harrison. The book is available for \$12.95 (plus \$2.00 shipping) from COMPUTE Books, c/o CCC, 2500 McClellan Avenue, Pennsauken, New Jersey 08109.

Jack Nicklaus on Course Design



Currently commanding a \$1 million fee for a design, Nicklaus is one of the world's most sought after architects, renowned for his flexibility in creating beautiful and challenging courses for all calibers of players. As history's greatest golfer and one of the innovators of modern course design, his comments on design theory are especially insightful.

- "Golf is a game of precision, not strength; it's a thinking man's game. There's no challenge in just whacking the ball. A golf course should be enjoyable and offer variety to every golfer, no matter what his level of skill or strength. My aim primarily is to test a golfer's accuracy. I try to use the richest possible mix of shot values—varied tests of precision."
- "Golf is more enjoyable, especially for the average player, when it is played primarily downhill rather than uphill, and with rather than against the flow of the terrain."
- "Avoid routing opening and finishing holes so that sun becomes a problem at the beginning or end of the day."
- "Direct as many holes as possible so that, under prevailing wind conditions, the course plays at its easiest, and is at its toughest when the wind comes from unexpected quarters."
- "When I design a par 4 hole, I try to emphasize tee placements so the average golfer will be playing the same club to the green as I would. I'm sure the average golfer is tired of playing every par 4 with two woods and an iron. On my par 4s, I try to create a need for thought and shotmaking precision, not power."
- "Too many of today's par 3 holes are just too long. A one-shot hole should be an accuracy hole, and for accuracy you use your irons. Most of the par 3s I've designed have been between 140 and 210 yards."
- "I've always believed that it's much more comfortable for the average golfer and the good player to have a golf ball collected rather than repelled. I like to feel as though my fairways are down, my greens are down, and the golf ball that hits the green is collected into the hole area."
- "I personally like Bob Jones's concept of building par 5s that are intrinsically par 4 and one-half. They are within reach in two if the golfer puts a pair of long, accurate shots together."
- "All first-class golf courses and all outstanding golf holes have one thing in common to the golfer's eye: they look absolutely natural, as if the terrain had always been that way, waiting to be discovered for golf."
- "With medium-to-small greens, you call on the player to hit more chips, pitches, and sand shots and require a successful golfer to master the finesse shots in addition to the rest of the game. Smaller greens also speed up the putting process, the slowest part of the game today, and the element most responsible for the five-hour rounds that destroy the enjoyment of the game."
- "Every hole should require the golfer to make one very good shot to make par and one great shot to make birdie. It's the essence of great design and the area where the early masters truly excelled."
- "Use whatever topographical features exist naturally to create holes that never become dull or stale no matter how many times you play them."
- "Utilize land roll, woodland, water, rough, and sand as hazards in a varied and balanced way throughout the 18 holes."
- "Strive to vary the location and configuration of fairway bunkers depending on the use to which the course will be put, creating them sometimes purely for directional purposes, sometimes purely for strategic purposes, and sometimes as a combination of both."
- "Every green should be tailored to the hole and to its surrounding land in size, shape, and contour. Every bunker should be tied to the flow of the green and its adjacent terrain."

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LETTERS *continued from page 10*

Where It's AT

I have been searching for a reasonably priced PC. I discovered that there are two different kinds: a PC and an AT. What are the differences between these two kinds of computer? Which is better? Which has the most software available for it?

AARON WESTER
SAN DIEGO, CA

Any software that will run on a PC- or an XT-compatible will almost certainly run on an AT. On the other hand, there is a large and growing body of software (particularly productivity software) that won't run well or won't run at all on a PC- or an XT-compatible. Therefore the AT has the most available software. The PC and XT are based on the Intel 8088 and 8086 computer chips. The AT is based on the 80286 chip. These microprocessors are very closely related, and the 80286 can be operated exactly like an 8088, only faster.

However, if you're considering a computer that you'll be using for a few years, do yourself a favor and take a good look at an 80386SX or 80386DX computer. These computers will run all PC, XT, and AT software, but they will run the software much faster. You'll find the 80386SX computers only a few hundred dollars more than a good AT. Software is already being introduced that will run only on an 80386 computer. Windows 3.0, for example, has many capabilities that you can use only on an 80386, including the ability to multitask DOS programs.

But if you have some favorite software that will run on a PC- or XT-compatible computer and you never plan to upgrade the software or perform any other kind of work on the computer, you can save a lot of money by buying the lowest-level machine that you can. Not everyone is interested in working with cutting-edge software and hardware. That's why ten years after the PC's introduction there's still a healthy market for the machine.

Learning Early

My 14-year-old son is very interested in learning computer programming. He is a very talented artist and is particularly interested in graphics and animation. What type of computer system, additional hardware, and software would he need to become a serious graphics programmer?

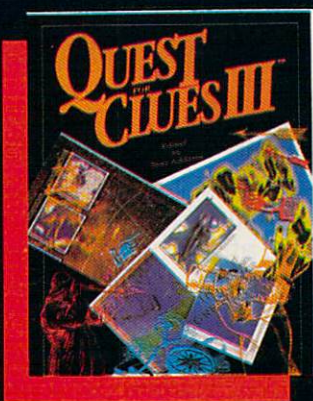
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Captain
Author
Dr. John A. Armstrong
*International Business
Machines Corporation*
James E. Clark
*AT&T Computer
Systems*
Samuel H. Fuller
*Digital Equipment
Corporation*
John Markoff
The New York Times

WEST COAST TEAM

Heidi Roizen,
Captain
T/Maker Company
Dave House
Intel Corporation
Ed Juge
Radio Shack
Philippe Kahn
*Borland International
Inc.*
David E. Liddle
*Metaphor Computer
Systems*

Founders

Pat Collins Nelson and
Dr. Dave Nelson

Underwriter

Apple Computer, Inc.

"The Examiner"

Bill Gates
Microsoft Corporation

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LETTERS *continued from page 57*

The current standard in PC graphics output is PostScript. If your son learned the PostScript language and owned a PostScript laser printer (or a laser printer with a PostScript clone), he could create graphics on just about any kind of computer and print them out. The drawback of this kind of arrangement is that unless he is using a NeXT or other machine with Display PostScript, he would probably be unable to see the graphics on the computer screen before they were printed out. To create PostScript graphics on the PC with an interactive graphics program that would allow him to see onscreen what he is drawing, he could use Arts & Letters Graphic Editor, Micrografx Designer, or Corel Draw. Each of these programs requires a PC, Windows, and a mouse in addition to a PostScript laser printer to create the best output. With regard to recommendations among PCs, the simple rule of thumb is *The faster the better*. Nothing eats up processing time like graphics, so your son will probably want something faster than the 12-MHz 80286 machines available in most discount retail stores.

If you want to avoid purchasing Windows and a PostScript laser printer, consider DrawPerfect. It will create the same high-quality printout on a PostScript or a non-PostScript laser printer, so it will save you some money, but it doesn't have as many features as the other two programs. GEM Artline is another non-Windows graphics program you should consider.

All of the programs mentioned so far are called draw programs. Each object you draw with one of these programs can be individually sized and moved without disturbing anything else in the drawing. There are a number of paint programs available as well. They are generally simpler to use, but they don't provide the clean printer output of a draw program, and it's difficult or impossible to move or adjust individual parts of a paint graphic without disturbing other objects, necessitating painstaking repairs. DeluxePaint II and PC Paintbrush are two popular paint programs.

Animation programs grew out of paint programs. There are several animation programs for the PC, including Fantavision, DeluxePaint Animation, and Autodesk Animator. To get the most out of them, you should use a VGA adapter. □

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PC VIEW

C L I F T O N K A R N E S

T. S. Eliot was right: April is the cruelest month. And most of us know why. April is tax time, and income taxes have become an American institution regarded with double doses of fear and loathing.

A computer ought to be able to provide aid and comfort in these dreary days preceding April 15. But even though I've tried some good tax software, I've always wound up doing my taxes by hand—that is, with a pen, paper, and a pocket calculator. Until this year, that is.

This year is different because I've found the closest thing to the ideal tax program—*MacInTax* (Softview, 1721 Pacific Avenue, Suite 100, Oxnard, California 93033; 800-622-6829; \$99).

As its name suggests, *MacInTax* was originally developed for the Macintosh, and it took full advantage of the Mac's graphic power. Now, *MacInTax* is out for PCs running *Windows 3.0*, and it's unbeatable.

What makes *MacInTax* so good? The answer is simple. It does one thing better than almost any other tax program: It shows you each Federal tax form from the 1040EZ to the 4952 exactly the way it appears on paper. And it prints forms on a dot-matrix or laser printer that are acceptable to the IRS.

MacInTax comes on two 3½-inch 720K disks or one 5¼-inch 1.2MB disk and includes a 165-page manual. Installation is quick and effortless. If you have a laser printer, the program comes complete with all the downloadable fonts (Futura and Helvetica) you'll need to produce a picture-perfect 1040.

When you run the program for the first

time, the opening screen is simplicity itself. You'll see a small window called the Forms Guide that offers advice on whether you need to use the 1040EZ, 1040A, or 1040 form. To start your taxes anew, select your primary form from the FormSets menu, and you're off.

You'll see a 1040 form that's an exact replica of its official IRS paper counterpart. From here, you simply fill in the blanks. As you'd expect, the program does all the math and house-keeping automatically. If you don't understand a question, you double-click on it and *MacInTax* displays a help window of relevant information from the IRS instruction booklet. The entire instruction booklet is available this way as context-sensitive help.

When you need to use a work sheet or another form, you go to the Forms or Worksheet menus and make your selection. Naturally, the work sheets and schedules are automatical-

ly linked to your 1040, so you don't have to manually enter totals computed on the supplemental sheets.

MacInTax is one of the best examples of the power and usefulness of a graphical user interface, or GUI, and it's one excellent result of a long battle to model the analog world in the digital terms of a computer.

Doing this modeling is tough. The real world presents itself to us in super-duper high resolution with zillions of colors. In the early days, the first personal computers had a limited arsenal of one color that was displayed by pixels the size of your fist. Technology has improved dramatically, and today super VGA, with its 800 × 600 resolution and 256 colors, is fast becoming the standard. We're still a long way from producing a digitized reality on a par with our perception of the real world, however.

To give an example from *MacInTax*, the 1040 form the IRS sends you has a resolution of something like 2400 dots per inch (dpi). The form you print with *MacInTax* on your dot-matrix or laser printer will be 300 dpi. And the image of the form you see on the screen will be close to 70 dpi. The amazing thing is how impressive a video resolution of 70 dpi and a printer resolution of 300 dpi are. But when video and printer resolutions come closer to 2400 dpi and when your printer's color capability approaches that of video, we'll see breathtaking examples of PCs modeling the real world.

Until we get there, *MacInTax* is one of the best examples of what is possible with the state of the art in PC hardware and operating systems. □





NEWS & NOTES

The Business of Education

IBM chairman John F. Akers says business has committed to a 10-year effort to thoroughly reform the U.S. educational system and help reach the educational goals set by President Bush and the nation's governors. Speaking before an audience of high school and college educators at the College Board National Forum, Akers said, "Weakened education means a weakened work force, weakened international economic competitiveness, a weakened U.S. standard of living, and a weakened democracy. Business is prepared to do whatever it can to help."

Akers was a good choice for a speaker on this subject. IBM has shown a strong commitment to American education for years.

In his speech, Akers described the 10-year commitment of the Business Roundtable, 200 chief executive officers of major U.S.-based corporations, to stimulate education reform. Akers serves as chairman of the Business Roundtable's Education Task Force.

"Roundtable members are committed to roll up their sleeves, educate themselves, get into the nitty-gritty of the educational process, and work closely with every state government, as well as federal and local authorities, educators, parents, and community leaders," Akers said. "And, though the road will be long and hard, I know we can make progress."

Akers said parents need to act in the belief that education—particularly the teaching of ethical values—begins at home. He closed by suggesting two remedies for U.S. citizens who want to begin repairing the system: realism and discipline. He defined realism as an "unflinching resolution to face facts, ask tough questions, major on the basics," then went on to call for "discipline that leads parents to put their children—and their children's education—first, schools to commit themselves to turn out winners, corporations committed to eliminate shoddy work and achieve world-class efficiency and quality, and discipline that leads federal, state, and local politicians to look beyond today's comforts and next week's elections to the enduring good of this country."

Paradox: Winning the Database Wars?

Borland International's *Paradox* relational database management system is gaining ground—so much so that it reached the top of the heap in the database field during the third quarter of 1990. During that period, *Paradox* captured a 34-percent share of the market, compared to the 22-percent share held by its nearest competitor. The figures, gathered in an independent survey conducted by Computer Intelligence of La Jolla, California, showed that 44 percent of all relational database purchases made in September 1990 were *Paradox* purchases.

Computer Intelligence collects its data by surveying each month more than 1500 sites with 500 or more employees. It conducts interviews about actual PC computer software purchase activity. All sources of product, including retail, direct, and mail order, are included in the study. The maximum sampling error for the three-month average is ± 2 percent with a confidence level of 95 percent.

A Six-Pack Writers Should Consider

Under most circumstances, serious writers should probably avoid six-packs when they're working. One exception might be the new *WritePro Sixpack*. It's the first product to contain all six available *WritePro* lessons, including the latest lessons, 5 and 6. *WritePro* is a highly acclaimed computer program that actually teaches creative writing techniques to beginners, intermediates, and published professionals.

WritePro's first four lessons, called *WritePro 1/2/3/4*, show users how to create rounded characters, well-developed plots, momentum, and suspense, as well as how to write beginnings that hook the reader and how to master point of view, description, narrative, immediate scenes, and dialogue. Lessons 5 and 6 show you how to make dialogue come alive, make writing visual, implement the secrets of cutting used by professionals, step up pace, root out clichés, increase tension, and become your own best editor at a time when book publishers no longer provide detailed editorial help. An innovation in the new lessons is the use of the computer itself to do *flab editing*, highlighting possibly unnecessary words so you can see your writing both with and without the words before deleting them. *WritePro 1/2/3/4*, with four lessons for IBM and compatible computers, lists for \$79.95. The new *WritePro Sixpack*, with all six available lessons, lists for \$119.95. If you're interested, contact WritePro at 43 Linden Circle, Scarborough, New York 10510. ▶

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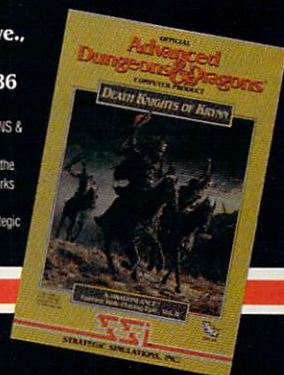
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NAME	AC	HP
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LEDEKA	10	20
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PHILIPPE	10	20

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NEWS & NOTES

From the Boardroom to the Bedroom

BedWare Unlimited has brought the computer age into the bedroom with an entirely new kind of spreadsheet. It goes on a bed, not in a disk drive.

BedWare is actually offering 50-percent cotton, 50-percent polyester percale bedsheets. Dubbed *The User Friendly Bedtime Program for Computer Lovers*, the sheets are printed with horizontal blue-and-white striping and vertical borders to simulate tractor-feed paper (the traditional computer printer paper with punched holes and perforated tear-off strips).

President and founder of BedWare Unlimited Scott R. Etheredge said, "The SpreadSheets themselves are only half the fun. They are packaged with entertaining, computer software-related graphics, plus captions and quotes that make them the computer lover's bedtime adventure. They're the perfect gift for both sexes ages 5 and up, and they look great in any bedroom."

SpreadSheets package copy includes the tag line, *Design Engineered in Silicon Valley*, along with a pictorial series of tongue-in-cheek user testimonials "guaranteed to put you to sleep."

BedWare is also introducing HeadCrashers—separately packaged, standard-size pillowcase sets in the same design as those that accompany the full sets of SpreadSheets. SpreadSheets are available in complete twin and queen sets and are priced at \$45 and \$59 respectively. HeadCrashers, standard pillowcase-only sets, are \$17. They can be ordered from BedWare Unlimited, 15720 Winchester Boulevard, Los Gatos, California 95030.

Still the King

Everybody wants to know what other people are up to—even computer users. According to a recent survey conducted by Fuji Photo Film U.S.A., most computer users still use their home computers for word processing. More than 91 percent of home office workers responding to the survey said they use computers in their homes for writing and related purposes. Spreadsheet manipulation, accounting, and bookkeeping (regular tasks of 71 percent of the respondents) together are the second most popular home computer application.

Entertainment and game-playing took a close third, indicating that home computer enthusiasts play as hard as they work. Other popular home computer uses include database management (62 percent), mailing lists (40 percent), desktop publishing (34 percent), and online interaction via a modem with computer services and other personal computers (28 percent). The survey accepted multiple responses.

A Tailless Mouse

Z-Nix has added a new twist to working with a mouse. With its new Cordless Super Mouse, you no longer have to worry about that long "tail" always getting in the way. Z-Nix didn't use a carving knife, either. The new Cordless Super Mouse uses the same infrared technology employed in VCR remote controls, with an effective range of up to eight feet. The two-button cordless mouse is the first ever to feature a long-life rechargeable battery for uninterrupted use.

The Cordless Super Mouse has a resolution of 400 dots per inch and can be operated at angles up to 45 degrees. It also features a built-in intelligent driver, allowing users to tailor the motion of the cursor to personal preference. The suggested retail price is \$179. The Cordless Super Mouse will be sold through major Z-Nix retailers including Tandy, CompuAdd, CMS Enhancements, Headstart/Magnavox, Commodore Europe, and PC Brand.

The Next Scream You Hear

It may sound like some kind of joker's novelty, but the PC Screamer is serious business indeed. The PC Screamer is an electronic alternative to the old method of securing computer hardware with anchored cables and securing locks. Rather than physically tying down protected computer hardware, PC Screamer hides inside the computer and sets off an ear-piercing siren that will actually scream loudly while a would-be thief tries to carry the computer out the door.

Better yet, the PC Screamer can't be cut or easily tampered with. It can't even be seen easily because it adheres to the inside of the computer's case with a self-adhesive strip and plugs into a disk drive power cable. The power source is a long-life nine-volt alkaline battery. The PC Screamer is completely self-contained.

Fortunately, it's smart enough to know to keep quiet during normal computer use. If you're interested, write to Vantage Point Technologies, 1318 East Mission Road, Suite 376, San Marcos, California 92069. □

"News & Notes" is by Alan R. Bechtold, editor of *Info-Mat Magazine*, an electronic news weekly published by BBS Press Service.

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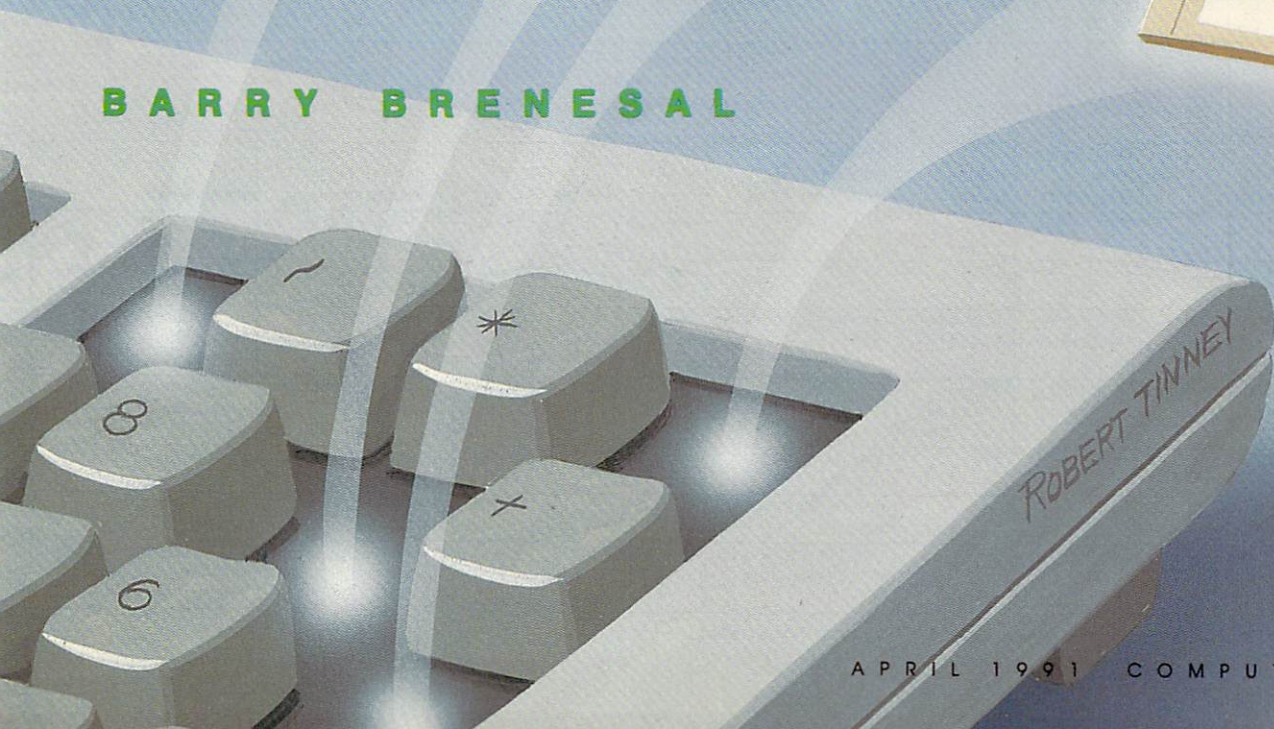
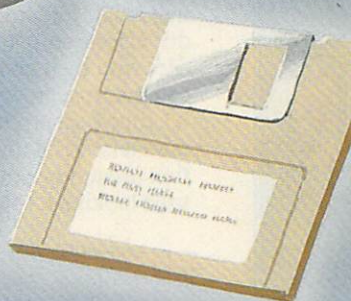
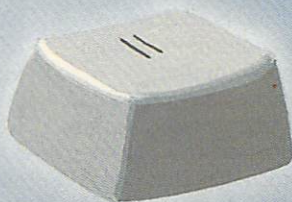


KEYBOARD MAGIC

TURN YOUR
KEYBOARD INTO
A MAGIC WAND

The magic of macro software can turn your keyboard into a treasure chest of timesaving tools. With a single keypress, you can do the work of 10—or 100—keystrokes. Imagine, for example, pressing a single key and having the time and date pasted into your word processing document or having a single keystroke run a batch file. These are just two examples of what you can accomplish with macro software. ▶

BARRY BRENESAL



After typing almost any series of keystrokes enough times, most people will start looking for a shortcut. With the right macro software, you can simplify almost any task—no matter how complex—to a single keypress.

How Macros Work

Macros work by intercepting certain keypresses and substituting others. You tell the program the specific keys you want to use and exactly what they should accomplish.

For example, you could have your macro program send the string DIR/P<Enter>, which gives a page-formatted directory listing, each time you press Ctrl-D at the DOS prompt. In macro parlance, Ctrl-D is called the *hot key*, and DIR/P<Enter> is the *macro*.

In some macro software, the number of commands you can apply to a single key is only limited by memory and personal creativity. You could use a macro to move a budget file onto a ramdisk, invoke your favorite spreadsheet, load in the budget, or activate another macro file with useful key substitutions—all at the press of a single key combination.

Another keypress might print several files generated after a specific date, save them from hard drive to floppy, exit your application, and unload the macro program itself.

DOS also has many complex and difficult-to-remember series of parameters (can you remember how to format a 720K 3½-inch disk in a 1.44MB drive, for example, or how to copy files with their archive bit set?). Applications have grown very powerful, but it's time-consuming to look up the parameters for all this in the documentation (assuming you don't first spend time looking for the documentation).

Macros present the perfect solution to these and other frequently used, complex commands. Create brief macros to match the common commands you'll need to issue, and file the documentation away.

Macro Marvels

Now that we've looked at some uses for macros, let's consider a few macro programs. The ones listed here are among the best, and they should be widely available (publishers' addresses are listed at the end of this article). Two of these, *PC Tools Deluxe* and *Superkey*, are commercial products. The others are shareware, available on many computerized bulletin boards. All offer good value, though each provides unique features that will be appreciated by users with specific needs.

If you subscribe to *COMPUTE's PC Disk* and want to give macros a try right now, see the section below on *SuperMAC*, the powerful macro program included on this issue's disk.

Anarkey. Macros are only a small part of *Anarkey's* features. It's a command line editor, especially helpful to the power user who wants more control over command entry in DOS. *Anarkey* supports multiple commands per line and storage and retrieval of past command lines. Although this feature (often called *command line history*) is available in other operating systems and programs such as Digital Research's DR DOS 5.0 and PC Kwik's *PCKKEY*, only *Anarkey* includes a completion key that finishes command line entries upon request, based on the contents of the history buffer. The program can be placed in expanded memory, and it supports all versions of the LIM EMS, including 3.2 and 4.0.

Anarkey doesn't intercept key-

strokes the way several other macro programs do. It waits a little longer, reinterpreting the onscreen ASCII character according to your recorded instructions. You might redefine *d* as *dir*. It still looks like *d* on the command line, but it now invokes a directory listing of all files.

Only letter-key combinations can be substituted as macros (no function or special keys). The program also expects the first word or uninterrupted series of characters to form a command and will try to execute it. Within these limitations, *Anarkey* is a powerful and reliable performer.

Newkey. This program combines some clever macro programming concepts with useful batch functions. Unlike most key-reconfiguration utilities, *Newkey* doesn't require DOS command line entry for key substitution. It comes with a pop-up application screen that can be invoked within most applications. From it, you can create, display, load, and save macros.

Batch operations use Pascal-style parameter commands for integration with macros. {WAITANY} stops macro playback until a key is pressed. {SLOWTYPE} resolves the problem of applications that cannot process fast macro playback, resulting in discarded keys. {CTRL+[} creates a variable-length entry field—useful when you want to fill in the blank anywhere in a key substitution. A macro that starts *My dear esteemed colleague* will pause for your input and continue after you've pressed Enter with its predefined contents, *it has come to my attention...*

Newkey also offers advanced features such as the ability to cut and paste between applications. When macro lists grow too long to keep in memory (yours, not the computer's),

How They Stack Up

Product Name	Default Macro Buffer (in characters)	RAM Use (conventional)	RAM Use* (expanded memory, conventional part first)	Commercial/Shareware	Cost	Configurable Keys	Notable Features
<i>Anarkey</i> 3.0	500	11K	1K/10K	Shareware	\$25.00	All character-key combinations	Command line editor, command completion key
<i>Newkey</i> 5.0	1000	62K	33K/38K	Shareware	\$43.00	All key combinations, function keys	Online demo, cut and paste, variable length fields
<i>Superkey</i> 1.0	8000 (can be enlarged to 65K)	128K when invoked, 63K when resident	Does not use expanded memory	Commercial	\$99.95	All key combinations, function keys	Excellent documentation, menu interface, command line editor
<i>PC Tools Deluxe</i> 6.0 Desktop Module	To the limits of memory	360K when invoked, 40K when resident	40K/320K	Commercial	\$149.00	All key combinations, function keys	Part of complete <i>PC Tools</i> product set
<i>DKey</i>	1024	3.1K	Does not use expanded memory	Shareware	Free	All single, function, and combination keys	Low memory consumption
<i>Ansikey</i> 1.0	None	None	Does not use expanded memory	Shareware	\$10.00	All function keys, key combinations	No memory consumption, requires ANSI.SYS
<i>SuperMAC</i>	64,535	7K	Uses conventional memory only	Commercial	\$ 9.95	All Ctrl, Alt, Shift, and function-key combinations	Hot key to uninstall, on/off toggle, up to 500 macros, easy reconfiguration

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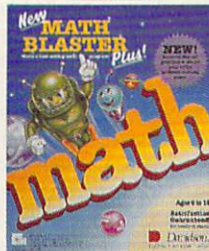
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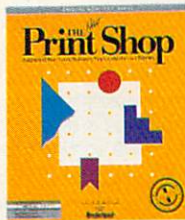
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4. Child's name _____
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you can build colorful menus that display and configure them at the touch of a function key.

True, these are more advanced options that require a little effort. But *Newkey's* basic command structure is simple and intuitive. There's even an unexpected bonus: a guided tour on-line demo with very good abbreviated explanations of many features.

Superkey. None of these products are difficult to master, but Borland's macros are almost self-generating. After it has loaded, Alt-/ brings up the pull-down menu screen. Commands are activated when you select them from menus via scrolling or press a hot key for first-letter entry on every level. F1 calls up good, brief context-sensitive help screens at any time.

Like *Anarkey*, *Superkey* includes a command stack option, which shows the last 255 characters entered at the command line. Like *Newkey*, it configures a display menu to review all active macros. Unlike either, *Superkey* provides DES (Data Encryption Standards accepted by the National Bureau of Standards) encryption. Of course, encryption, too, can be executed on a file from a macro.

A layout editor displays your keyboard layout on the top half of the screen. You can then move and re-define any keys, creating a separate file with the LAY suffix. Load in this file, and your reconfigured keyboard will be displayed in the bottom half of the screen. Printing it gives you a handy reference to changes created for that keyboard layout.

PC Tools Deluxe. The macro editor is only a small part of *PC Tools Deluxe*, but (as with the rest of Central Point Software's package) there's no skimping. It includes an attractive menu interface, options for timed pauses, and both fixed- and variable-length entry fields. Macros can be configured for universal operation, *PC Tools* activity only, or non-*PC Tools* activity.

While you probably won't buy *PC Tools Deluxe* specifically for its macro editor, the editor is certainly a useful feature to have available along with the excellent hard disk-management utilities. Read up on it sometime, while you're busy defragmenting your drive.

DKey. If *Newkey*, *Superkey*, and especially *PC Tools Deluxe* are the lions among macroware, *DKey* is decidedly the mouse. But sometimes you don't want a lion for a task—especially when you have only a small memory hole in your 640K of conventional RAM to crawl through.

Even a few kilobytes of RAM can make the critical difference between

Rules to Live Long and Macro By

1. To begin writing effective macros, keep a list for several weeks of your computer tasks. Simple tasks don't require much keyboard entry, and there's little reason to automate them. Look, instead, at tasks built out of *processes*, where the process is a series of commands.
2. Other good candidates for macros are commands with too many complex options to remember easily.
3. When you automate these tasks, choose key combinations not usually found in most applications. This will avoid potential key conflicts.
4. The time may come when you find yourself engulfed by macros (like potato chips, one is never enough). Group them into batch files arranged by application. Then execute just the file you need. When you're through with that set of macros, unload them from memory according to the utility's specification.
5. An alternate method of grouping batch files with macros is by user. This is especially handy if you share a work site or run a network. Remember to choose distinctive filenames: JSMITH.BAT is better than JAMES.BAT, for example, and JBSMITH.BAT is better still.
6. If you multitask, be sure to read the application's instructions about TSR utilities. *DESQview* disables some aspects of *PC-Kwik's* Power Pak, while leaving others (screen acceleration and RAM drive) intact. Note that *Microsoft Windows* provides its own reconfiguration platform via *Recorder*, though it's slower to program and run.
7. Another problem is potential conflicts with other TSRs. These conflicts can cause a variety of difficulties, including locked displays and macros that refuse to function. Try varying the order of your TSRs if this occurs.
8. Consider learning batch-file programming once you've become more familiar with macros. Batch language is relatively simple to learn. Once you know it, you'll be able to use a lot of inexpensive software utilities that expand your macro horizons.
9. Be sure to keep handy a list of all your key reconfiguration files with each macro and its changes. It's easy to forget specific key combinations, and pressing the wrong ones might have a variety of unpleasant effects.
10. As your needs change over time, go back and review your current computer use. Make sure your macros are serving you. Get rid of ones you never use, and continually re-view your computer use to see if you can add new ones.

success and a crashed program when you load some memory hogs. This is where *DKey's* 3.1K of RAM (including a default 1K macro buffer) is most welcome. There are no bells and whistles with this product—just simple, effective performance.

Ansikey. Huang's *Ansikey* is an outsider in this group. It uses the ANSI.SYS device driver that comes with DOS rather than RAM. The program reallocates up to 80 different key combinations, including F1-F12 and various key combinations with keywords [ALT], [CTL], and [SFT].

Since *Ansikey* functions outside memory, it won't work inside programs that use ROM BIOS interrupts for keyboard input. Any application that redefines these will negate *Ansikey's* changes until you return to DOS. Depending on your needs, this can be either a negative or a positive feature.

Be warned: There are many excellent ANSI.SYS substitute drivers on the market, and they don't always work like *Ansikey*. You'll discover this immediately because the commands simply won't work. But if you can put *Ansikey* to work for you, you'll have a driver that will provide a small, effective macro utility that completely avoids RAM drain.

SuperMAC

Getting on the macro bandwagon is easy with *SuperMAC*, included on this issue's disk. Written by Rick Leinecker, COMPUTE's programming manager, *SuperMAC* is a powerful program that goes head to head with the commercial and shareware products discussed above. If you subscribe to *PC Disk*, you'll find *SuperMAC* on this issue's installment. If you don't subscribe and you'd like to order the disk, see "On Disk" elsewhere in the magazine.

In *SuperMAC*, your macro definitions go in a text file, which you can create with a word processor in its ASCII mode or with a text editor. This text file needs to follow some simple syntax rules so *SuperMAC* will be able to interpret it. When *SuperMAC* runs, it loads your macro text file, converts it to a form that the computer understands, and then watches each keypress to see if one of your specified hot keys has been pressed.

There are two types of entries you can use in a macro. The first type is a special command. In the text file, these special commands must start with a < character and end with a > character. The second type of entry is a literal character. These characters

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Right after the **BEGDEF** directive, you specify the hot key that will activate your macro. Be careful when choosing these, since they may conflict with other hot keys and programs that you use. Notice that only the special commands are in brackets.

If you don't specify a filename, a file called **SUPERMAC.MAC** will be searched for in the current directory. You can specify a different filename by adding a command line argument with either a filename (that will be searched for in the current directory), a directory name (that will be searched for a file called **SUPER-MAC.MAC**), or a full path and filename.

SuperMAC does have a limit of 500 macros. You also have to consider that each macro allocates memory. This means that besides that 500-macro limit, you'll want to set a reasonable limit based on the amount of free RAM you want to give up.

There are two special hot keys built into *SuperMAC*. One lets you uninstall the program by removing it from memory. The default hot key for

this is Right Shift-Ctrl-F9. If it's not safe to uninstall (if another TSR is loaded after *SuperMAC* or you're in an application, for instance), you'll hear a series of beeps, and the program won't remove itself. To remedy the situation, you can try unloading other TSRs that were loaded after *SuperMAC* or quit your application and try again from the DOS prompt.

The other built-in hot key toggles the macro capability on and off. The default for this hot key is Left Shift-Ctrl-F10. You'll hear one of two frequencies of beeps here. The lower beep indicates that the program is inactive, and the higher one indicates that the program is active.

You can change these two hot keys by adding /h to the command line when you run *SuperMAC*. When the selection screen comes up, all you have to do to pick a new hot key is press the combination you want. The new configuration will be saved.

If you forget how to use *SuperMAC*, you can type **SUPERMAC /?** from the DOS prompt and get a brief set of instructions. □

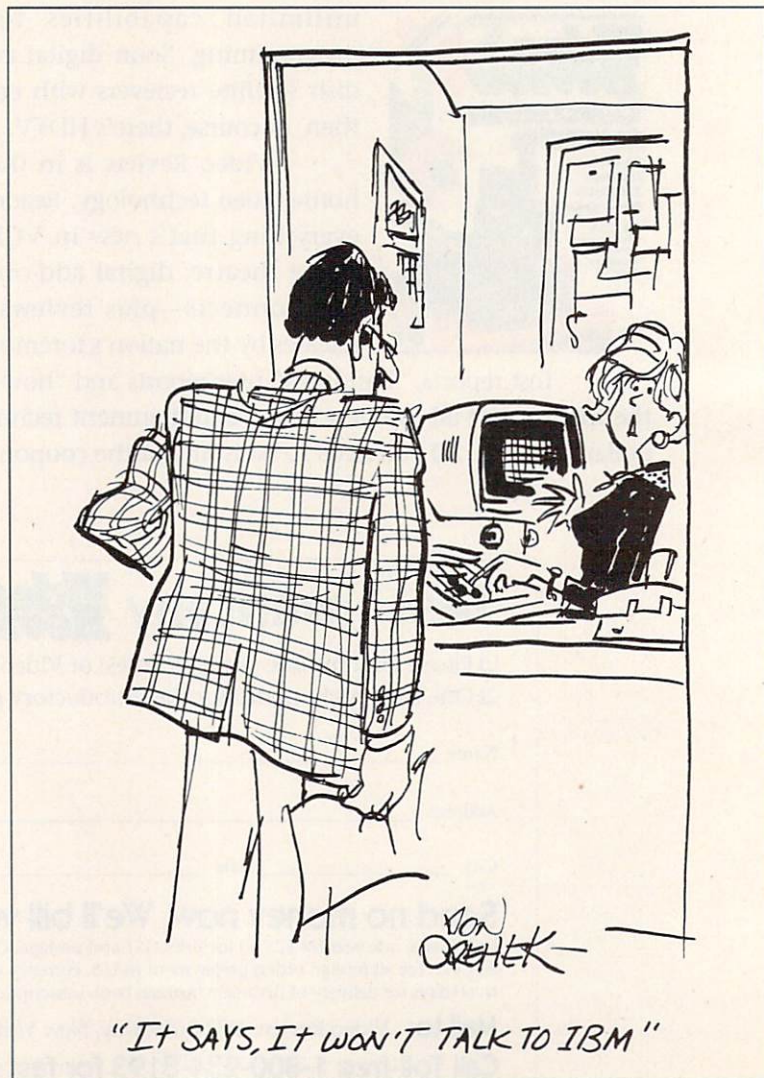
become part of the macro exactly as they appear in the file.

Here's the list of special commands and brief descriptions of what they do. A *k* stands for an ASCII character or a function-key number.

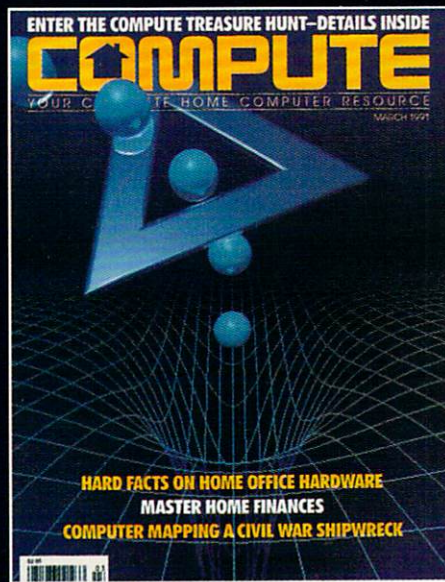
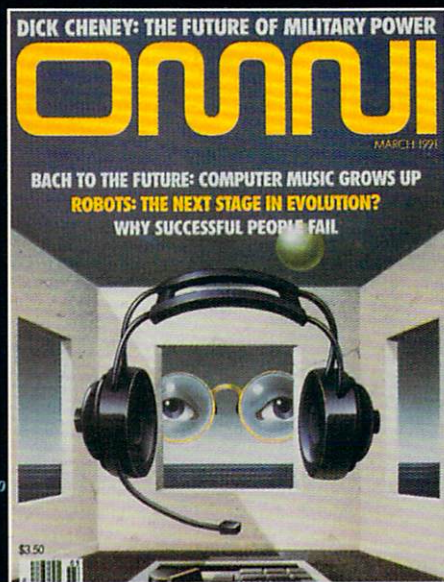
BEGDEF	Specifies the beginning of a macro definition
ENDDEF	Specifies the end of a macro definition
TIME	Inserts the current time into the macro definition
DATE	Inserts the current date into the macro definition
CTRLk	Specifies a Control character
ESC	Inserts an Escape character into the macro definition
ALTk	Specifies an Alt character
LEFTSHIFTk	Specifies a Left Shift character
RIGHTSHIFTk	Specifies a Right Shift character
ENTER	Inserts an Enter character into the macro definition
Fk	Specifies a function key
SHIFTk	Specifies a Shift character

Here's an example of a simple macro that gives a directory listing when you press Alt-1.

```
<BEGDEF><ALT1>DIR C:\DOS
<ENTER><ENDDEF>
```



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FEEDBACK

QUESTIONS FROM OUR READERS

Beyond Sweet 16

I need a ramdisk with unlimited capacity. Multisoft offers the largest one I am aware of, at 16MB. I'd like to be able to create 32MB, 64MB, or even 96MB drives. I also need a program that would trigger a number of attached tape players at programmed times. I would appreciate any help I can get.

GUY STULLEY
WEST ALLIS, WI

Early PCs and XT's were configured with an 8-bit bus with 20 lines for memory access, while AT's (16-bit with 24 memory access lines) can address 16MB of memory. If you want seemingly unlimited continuous memory, take a look at the new 80386 and 80486 systems. Their 32-bit buses are capable of addressing up to four gigabytes of RAM. Of course, DOS still has a 640K limitation, but some systems that run in protected mode, such as OS/2, Xenix, and UNIX, let you address the memory above 640K and even let you multitask (run more than one program at a time).

Another way to access more memory is through the LIM EMS system created in a cooperative effort by Lotus, Intel, and Microsoft. This system allows even a PC or XT to address up to 32MB of expanded memory (the memory above 1MB). On 286, 386, and 486 systems, LIM EMS treats extra memory as extended memory with the right drivers.

To be able to access the extra memory, you need software applications that check for additional memory. Multisoft's ramdisk limit is set by the software, not the hardware. Multisoft PowerPak version 1.59 contains the necessary code to access memory beyond 16MB on an i486 machine, but it hasn't been thoroughly tested yet, so any experimentation you do with it is at your own risk. Maybe someday software development will fall in step with the huge strides made recently in

hardware development.

In reply to your second question, in order to manage a number of tape players, you would have to use tape players equipped with control ports. Sony is one manufacturer of externally controllable videotape players equipped with 9-pin serial ports.

Each manufacturer of these devices has a unique protocol (sort of like a programming language) to use in controlling its equipment. For this reason, it would be wise to standardize, using one brand of machine. For more information, try calling your Sony regional office in Illinois at (708) 773-6000 (ask for the Professional Video Division).

Sony recommends that you use a dedicated audio tape controller (rather than a PC) for controlling banks of audio tape players. The tape players and controller should be the product of the same manufacturer to ensure compatibility.

On the Edge

I have an old Leading Edge Model D and am anxiously awaiting GEOS to be released. Why didn't Robert Bixby cover it in his GUI article (in the December 1990 issue of COMPUTE)?

JOSEPH A. BLIGH
LAKEWOOD, CA

Robert Bixby responds:

GEOS for the PC was thoroughly previewed in the October 1990 issue of COMPUTE. It was not released to the public until late fall of 1990 and was not yet available in usable form when my GUI article was written.

GEOS is specifically designed to multitask specially written GEOS programs at high speed on 8088 machines like yours (as well as 80286s and 80386s). The operating system shell comes with powerful utilities like a word processor, an object-oriented drawing program, a cardfile database, a telecommunications program, and several others.

Having worked with GEOS for the PC, I would rate it as highly as DeskMate for speed and compatibility, and more highly for intuitiveness. As far as appearance is concerned, GEOS looks considerably better than Windows 3.0 (and it's much faster). My only hesitation in recommending it for everyone is that, so far, it is very insular: No outside software has been written for it.

GeoWrite, the word processor shipped with GeoWorks Ensemble, is very intuitive and contains many features, but it lacks search and replace. GeoDraw is a very capable drawing program, but it can't create curves other than ellipses. The file switcher is fast and friendly, but it can't associate files (for example, there is no way to make it start up Microsoft Word when you click on a Word document icon). This indicates to me that GeoWorks (creator of GEOS) may be following the strategy of its progenitor, Berkeley Softworks, and a more fully functioning series of GEOS programs may be waiting in the wings. Many developers are interested in GEOS, so third-party software may also follow soon. In short, GEOS is very exciting and has tremendous potential. Look for a complete GEOS review in an upcoming issue.

Swede Inspiration

I am interested in learning Swedish. Do you know of any available software for learning Swedish? Please send me information on availability and pricing.

DANIEL R. PALMATEER
CANTON, NY

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FEEDBACK *continued from page 76*

however. Tracking down a program that would teach Swedish to an English-speaking person led us through software distributors and publishers across the country; the Swedish Embassy in Washington, D.C.; the Swedish School in Virginia; and the Swedish Trade Consul in Chicago. Unfortunately, our long and difficult search proved fruitless. We could find no such software, even in Sweden.

Remember that software isn't your only option. Berlitz is another resource. Berlitz publishes self-teaching books and tapes for many languages, including Swedish. The number to call is (212) 425-3866.

If any of our readers are aware of software that teaches Swedish, please write to us, and we'll pass the information on to Mr. Palmateer.

Medical Alert

I work in a medical office, and I need a word processor with a good medical spelling dictionary. I have a hard disk, so the size of the program isn't a consideration. Do you have any recommendations?

LAWRENCE NIGHTINGALE
GREENSBORO, NC

WordPerfect would be an excellent choice. Its base dictionary contains 20,000 medical terms. Because of the incredible popularity of this program, third-party developers have created extensions and add-ons that will provide virtually any capability. At least three specialized medical spelling dictionaries are available.

Hansen's Drug Dictionary provides a dictionary that contains 3,000 prescription and over-the-counter drugs; 1,000 psychiatric terms; hundreds of standard abbreviations; and about 40,000 other medical and pharmaceutical terms for \$55 (plus \$2 for postage and handling). You can order this product by writing to Hansen's Dictionaries, 1604 Maitland Court, Colorado Springs, Colorado 80919.

Spellex has created a medical dictionary containing more than 27,000 words, none of which duplicate the 20,000 words in the original WordPerfect speller, for \$59.95. The product also works with Microsoft Word. Contact Spellex Development, P.O. Box 271264, Tampa, Florida 33688.

Reference Software International has released Steadman's

Medical Dictionary, a 68,000-word medical dictionary that costs \$89.00 (plus \$8.50 shipping). It's updated every seven years. Since it's likely to become outdated over such a long period, a supplemental dictionary known as Grebin's Medical Dictionary Word List is released every six months for an additional \$89.00.

The latest update contains 15,000 words, and future updates will always contain at least 6,000 words. Purchase of Grebin's entitles the purchaser to receive two additional updates. Write to Reference Software International, 330 Townsend Street, Suite 123, San Francisco, California 94107.

Readers whose letters appear in "Feedback" will receive a free *COMPUTE*'s PC clock radio while supplies last. Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to *COMPUTE*'s PC Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We regret that we cannot provide personal replies to technical questions. □

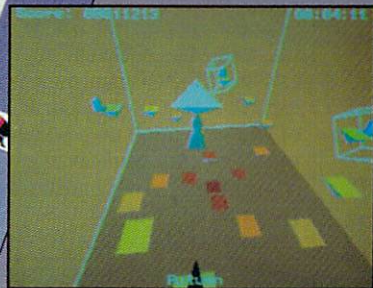
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HOT TIPS

H I N T S A N D T I P S F R O M O U R R E A D E R S

When I first installed an internal modem and started downloading programs from bulletin boards, more than 50 percent of my downloads were interrupted because of line noise. I tried building a filter and contacted the local telephone company about the problem. The phone company technician listened to my line, and sure enough, there was a lot of line noise. The culprit was a cordless telephone. After I unplugged the cordless phone, I was relieved to discover that most of my downloads were successful.

*David Eakins
Gozad, NE*

Taming TSRs

I'd like to pass along a technique I use in loading TSRs in my system. DOS passes a copy of the environment to every program it runs. To save RAM, try to load TSRs before using the PATH or SET commands. I've found only one TSR that requires the COMSPEC variable, so some experimentation may be required. If you use several TSRs, quite a bit of RAM will be saved for programs by using this method.

*Robert Parsons
Minneapolis, MN*

File-Finding Command

I have an interesting tip for users of PC- and MS-DOS version 3.3 or higher. The ATTRIB command can be used to find a file on a disk. For those of you who don't own a file-finding utility, this tip could prove invaluable if your hard drive contains a lot of directories and files.

To use the ATTRIB command to find a file, enter ATTRIB filespec /s at the DOS prompt. The space before the /s is required for the command to work properly. This command will find all occurrences of filespec in or below the current directory. In other words, if you want to search your entire hard drive, the root directory should be the current directory before you issue the command.

*Jeffrey Gorman
Sea Bright, NJ*

Repeat and Delete

To place a block of text in several locations in a document in *WordPerfect* 5.0, highlight the block by placing the cursor at the beginning of the text, and press Alt-F4. Save the block by pressing Alt-F10. Press Enter at the prompt instead of entering a filename. Next, position the cursor at the location where you want the text placed. Press Shift-F10 and Enter to retrieve the block.

You can delete a block of text in *WordPerfect* by highlighting the text block and pressing the Del or backspace key. Press Y to delete the highlighted block. This is easier and faster than using the Move menu to delete a block of text.

*Samuel Hampton
Asheville, NC*

Timesaver

Here's a trick I discovered while programming in Borland's *Turbo Pascal* 5.0. If you want to place one of the special characters like an ASCII 4 (the diamond symbol) in a WRITELN statement and you're not sure whether a CHR(x) will print it, or if you don't want to type CHR every time you need a special character, just hold down the Alt key and press 4 on the numeric keypad (the numbers at the top of the keyboard won't work).

You can also enter characters with a value of 255 which look like spaces. Copy a file and name the destination by holding down the Alt key and entering 255. The resulting file appears to have no name.

You can use this little trick any time you want to print a special character—in a word processor, at the DOS command line, or in a batch file.

*Shlomit Shaked
Hampton, VA*

Playing with DOS

Here's a DOS command line tip that's not widely known. Many people know you can repeat the last command entered on the DOS command line by pressing F3.

A less well known feature of edit-

ing commands on the command line is that you can bring up the last command one character at a time and use the Ins and Del keys to insert and delete characters.

DIR /W C:\WP\LETTERS*.LTR

This command produces a wide listing of the files that have an LTR extension in the LETTERS directory under the WP directory. If you decide you want more file information but you don't want to retype the command, press the right-arrow key three times to bring up DIR. Press the Del key three times to delete the space and /W. Then press F3 to finish the command.

DIR C:\WP\LETTERS*.LTR

This gives you a long listing of the files, but it may scroll off the screen if the directory contains a large number of files with an LTR extension.

You can insert the /P switch to pause the listing between screens by pressing the right-arrow key three times and then pressing the Ins key. Enter /P followed by F3. You'll get the following command.

DIR /P C:\WP\LETTERS*.LTR

Press Enter to invoke the new DIR command. These features come in handy if you don't use a command-retrieval program such as *Retrieve* or *Stack* (*COMPUTE's PC Magazine*, January 1989).

*Micah Voder
Salem, OR*

If you have an interesting tip that you think would help other PC users, send it along with your name, address, and Social Security number to COMPUTE's PC Hot Tips, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. For each tip we publish, we'll pay you \$25-\$50 and send you a COMPUTE's PC LCD clock radio while supplies last. □

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INTRODOS

T O N Y R O B E R T S

If you'd prefer having major dental work to doing battle with DOS's infamous FDISK, you're not alone.

From time to time, however, hard disks must be reformatted, and the task is not a heinous one if you approach it logically.

First, there are two levels of formatting for hard disks—low and high. To understand the difference, first imagine an empty field that's the future site for a football field. This is the physical hard disk. Second, contractors are hired, the field is cleaned up and leveled off, and a beautiful stand of grass is planted. This is the low-level format. Finally, a grid work of white lines is laid on the grass to indicate field position, fair territory, out of bounds, and end zones. This is the high-level format.

Several times a season, the field is relined so that the game can be properly contained. Every few years, however, hard play will have broken down the field, and a low-level reformatting will be required. The sod must be torn up, fresh soil added, and the surface rebuilt.

Occasionally, when working with floppy disks, you'll find a disk that doesn't hold data. You reformat it, and if that doesn't solve the problem, you toss the disk out with yesterday's junk mail. Hard disks are another story, though.

Because of the expense involved, trashing a hard disk is not a palatable option, but a low-level reformat can often return a flaky hard disk to full productivity.

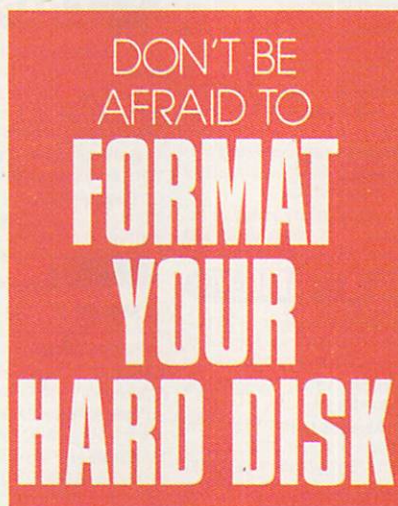
To format a hard disk from scratch, you must perform a low-level format, partition the disk with FDISK, and perform a high-level format (with /S if the hard disk is to be bootable). Obviously, reformatting a hard disk means that you'll wipe out all the data stored there. Make at least one full backup of your system, and have more than one copy of any irreplaceable programs or data.

To perform a low-level format, you'll need a special program, since DOS doesn't provide software to han-

dle this chore. The setup disk that came with your system may have such a program. If not, you may need a commercial or shareware utility.

When you perform a low-level format, you're asked to enter information about any known bad tracks. This information is provided by the disk manufacturer and is often taped to the top of the hard drive.

If you don't have this bad-track information, you can perform a surface analysis to locate physical defects



on the disk's surface and cordon them off. The surface analysis takes quite a while, but it gets the job done.

Next, proceed with the low-level format. When the low-level format is complete, reboot from a floppy containing the DOS version you want installed on the hard disk and run FDISK to set up your disk for use with DOS.

If you have a disk larger than 32 megabytes and you're using DOS 3.3 or lower, you'll have to partition your disk into two or more logical units. This is done with FDISK.

The first step is to create the DOS partition. Next, you'll add any extended DOS partitions. And finally, you'll need to assign drive letter names to the extended DOS partitions.

FDISK prompts you through this

process. With DOS 4.01, the 32-megabyte barrier was eliminated so larger hard disks can be set up in a single partition.

Once FDISK has done its work, the drive can be high-level formatted with the DOS FORMAT command. Each logical drive, or partition, is formatted separately.

Use FORMAT /S for the primary bootable partition and FORMAT for the others. Once the formatting is done, restore the data from your backups.

FDISK is a frightening command for many PC users because it can wipe out hard disks. But it shouldn't cause fearful reactions. After all, it's supposed to wipe out data. Just make sure everything is backed up properly before using FDISK to change the structure of your hard disks.

Many computer users first face FDISK when upgrading from DOS 3.3 to DOS 4.01 to take advantage of the feature allowing larger partitions. This process involves backing up each partition of the existing hard disk, rebooting from a floppy containing the new DOS, using FDISK to remove existing DOS partitions, using FDISK to create a new primary DOS partition, formatting the hard drive with FORMAT /S, installing the new DOS files on the hard disk, and restoring data from the backups, being careful not to overwrite the new DOS files with the old ones.

As in the case above, it isn't always necessary to perform a low-level reformat when changing the structure of a disk. If you question the disk's ability to hold data, though, I'd recommend it.

Hard disks have come down drastically in price in the last few years, and they are definitely becoming more common. In many systems, one hard disk isn't enough to handle today's huge programs and data files. These changes increase the likelihood that someday you'll be faced with reformatting a hard drive. There's nothing to fear; just back up your files, take your time, and work step by step. □

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BASIC TRAINING

T O M C A M P B E L L

Just a few years ago no serious microcomputer BASIC programmer would have been without a dogeared list of POKE and PEEK locations. Nowadays, POKE and PEEK commands are less often used, thanks to progress made by programming languages like *QuickBASIC*.

For those who aren't familiar with these commands, POKE writes a byte to memory, and PEEK returns the value of a byte in memory. POKE, as you might imagine, has the potential to crash a program with a single misstep. PEEK is harmless, but it's useful only if you know exactly what you're looking for. Both of these commands are complicated by the 8086's segmented addressing scheme.

As you probably know, the 8086 thinks in terms of 64K *segments*. You'll see the results of this everywhere. COM files, for example, must be 64K or less in size; until recently, *QuickBASIC* itself was limited to 64K of data, including strings; EMS memory can bank-switch only 64K of memory at a time; and so on. POKE and PEEK are no different. The statement

```
'Don't try this yet
POKE &H4F0,1
```

writes the value 1 to the memory location at offset 04F0h (don't try this POKE yet). Because POKE writes to a byte value, you can only poke a value of 0-255 into a single location. The PEEK function does the opposite: It lets you read the value of a byte in memory. This prints the value of the byte at offset 04F0h:

```
PRINT PEEK(&H4F0)
```

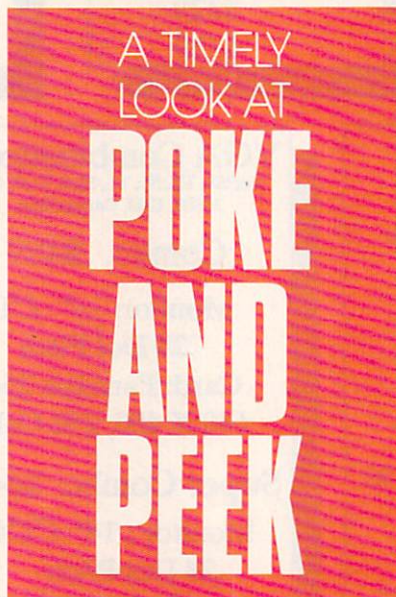
Early versions of BASIC had to fit into 4K, and a user was lucky to have 16K of RAM installed. Much of what we now take for granted in the BASIC language, like graphics and music, was unavailable. Users had to add to BASIC by writing machine-language routines with an assembler that would be poked into memory

and executed directly with CALL.

This practice is now discouraged because it almost guarantees that the program won't work on other computers—or even your own, if the operating system changes.

Many pokes are obsolete under OS/2, with the exception of video memory and some system variable locations.

With these caveats aside, there are still good reasons to use POKE and PEEK. One such reason is demonstrated in this month's program, which times the execution of programs from the DOS command line.



The timer program (which appears at the end of this column) has two parameters: START and STOP. TIMER START pokes the current time into a small section of memory called, with typical IBM grandiosity, the *Intra-Application Communications area*, or IAC, a scratch pad of 16 bytes for use in situations just like this one. I must warn you that all applications have equal access to this region of memory, so some programs will corrupt the IAC and make *Timer* fail by feeding it bad information.

Enter the command TIMER

START; then run whatever program (or programs) you wish to time. When the program has run, issue a TIMER STOP command at the DOS command line to retrieve those bytes; they're both converted to time values, and the difference (the elapsed time) is displayed onscreen. What's great about this method is that it requires zero bytes of your free RAM.

Note that the largest address you can POKE or PEEK is 0FFFFh, or 65,535 decimal. The 64K barrier strikes again. Limiting POKE to the first 64K of memory is unacceptable now, but back in 1980, when the PC's BASIC was being written, it made sense. The 64K POKE provided a certain measure of compatibility with existing BASIC programs. But earlier versions of Microsoft BASIC were for 8-bit machines with only 64K of address space, so how could the new BASIC address the PC's megabyte of RAM?

The solution was DEF SEG. The mysterious DEF SEG gives us a way to read or write anywhere in memory. On the 8086, an address always consists of a segment and an offset. The segment is a 16-bit value that you multiply by 16 and add to the offset. DEF SEG lets you set the segment to write to with POKE or read from with PEEK. This is easier to explain through examples.

In the first example, we'll set the segment address to 0B000h, which is the start of video memory for monochrome monitors, or 0B800h, the start of color memory. As you may know, video memory consists of a byte for each character on the screen plus a byte for its attribute (bold, blinking, colors, and so forth). The character bytes and attribute bytes alternate. The following will burn 80 happy faces directly into screen memory, using the current video attribute.

```
' (Change this to &HB800 for
' color systems.)
DEF SEG = &HB000
' Starting at the base of video
' memory,
```




BASIC TRAINING

FOR N = 0 TO 159 STEP 2

- ' Poke a happy face into
- ' each screen location,
- ' skipping every other
- ' byte, where the attribute
- ' appears.
- POKE N, 1
- ' Loop through the entire line.
- ' 0-159 represents 160 locations.
- ' 160/2 is 80, the number of
- ' columns across.

NEXT

To see PEEK in action, let's examine the date of your computer's ROM BIOS. All true compatibles put this date where IBM put it, which is in ASCII form in the eight bytes starting at segment 0F000h, offset 0FFF5h.

Such addresses are customarily written as two 16-bit numbers with a colon between them, as in F000:FFF5. Our program must convert these byte values to a string using CHR\$, which takes an ASCII byte and returns its character representation. Here's the program.

```
PRINT "The ROM date ";
PRINT "of this computer"
PRINT "is: ";
' The address to search starts at
' hex F000:FFF5, so set the segment
' accordingly:
DEF SEG = &HF000
' The offset is FFF5h; it's
' eight bytes' worth.
FOR N = &HFFF5 TO &HFFFC
' PEEK returns a number
' in the range 0-255 in
' memory location at
' F000h, with an offset of N.
' CHR$ makes it a character.
PRINT CHR$(PEEK(N));
NEXT
```

In the case of my ancient IBM AT, purchased in 1985, this program prints

The ROM date of this computer is: 01/10/84

On my trusty 386 clone, my 24th birthday appears

The ROM date of this computer is: 03/11/86

Back to *Timer*. Compile the program to an EXE file, and find a program whose execution you want to time.

TIMER

```
' TIMER.BAS -- Command line utility to time program execution
' Use this segment for POKES and PEEKs.
DEF SEG = 0
' Offset address of the Intra-Application Communications area--IBM's
' 16-byte scratchpad for programs like this.
CONST IAC% = &H4F0

' Force the command line to uppercase.
SELECT CASE UCASE$(COMMAND$)

' "START" means start the timer and poke the time into the IPC.
CASE "START"
' Strip the colons out of the time, which is in the format
' "HH:MM:SS". Leading 0s guarantee this format.
StartTime$ = LEFT$(TIME$, 2) + MID$(TIME$, 4, 2) + RIGHT$(TIME$, 2)
' Loop through the string, poking the ASCII values into the start
' of the IPC.
FOR Index = 0 TO 5
' ASC converts each letter in the string to a 1-byte value.
' Since strings start at index 1, not 0, add 1 to Index.
POKE IAC% + Index, ASC(MID$(StartTime$, Index + 1, 1))
NEXT Index

' "STOP" reads the starting value from the IPC back into a string
' variable, then splits out the hours, minutes, and seconds.
CASE "STOP"
' Capture the ending time of the program execution.
StopTime$ = TIME$
' Initialize the string to be built up from the poked ASCII values.
StartTime$ = ""
FOR Index = 0 TO 5
' PEEK gets each character of the string as a binary (ASCII) value.
' CHR$ converts it to a character so it can be concatenated to
' the string.
StartTime$ = StartTime$ + CHR$(PEEK(IAC% + Index))
NEXT Index

' Convert the starting and ending times to seconds, subtract,
' then convert to Hours, Minutes, and Seconds
BeginTime = VAL(LEFT$(StartTime$, 2)) * 3600 + VAL(MID$(StartTime$, 3, 2))
* 60 + VAL(RIGHT$(StartTime$, 2))
EndTime = VAL(LEFT$(StopTime$, 2)) * 3600 + VAL(MID$(StopTime$, 4, 2)) * 60
+ VAL(RIGHT$(StopTime$, 2))
Seconds = EndTime - BeginTime
Hours = INT(Seconds / 3600): Seconds = Seconds - Hours * 3600
Minutes = INT(Seconds / 60): Seconds = Seconds - Minutes * 60

' Only print hours if not 0.
IF Hours > 0 THEN
PRINT Hours;
' Make sure there's subject/verb agreement; avoid cases like
' " 1 hours".
IF Hours = 1 THEN PRINT "hour"; ELSE PRINT "hours";
END IF

' A little trickier: print a comma after the hours only if hours were
' printed. Then print minutes, if not 0.
IF Minutes > 0 THEN
IF Hours > 0 THEN PRINT ",";
PRINT Minutes;
IF Minutes = 1 THEN PRINT "minute"; ELSE PRINT "minutes";
END IF

' Again, use a leading comma only if a) there's not already a
' comma, and b) one is needed. If both hours and minutes are
' 0, no comma is needed.
IF Seconds > 0 THEN
IF NOT ((Hours = 0) AND (Minutes = 0)) THEN PRINT ",";
PRINT Seconds;
IF Seconds = 1 THEN PRINT "second" ELSE PRINT "seconds"
END IF

CASE ELSE
PRINT "TIMER by COMPUTE times a program's execution from the comand line."
PRINT
PRINT "Use TIMER START before running the program, and TIMER STOP after."
PRINT
PRINT "Example:"
PRINT
PRINT " REM First, initialize the timer:"
PRINT " C:\>TIMER START"
PRINT
PRINT " Next, run a program:"
PRINT " C:\>SORT < DATABASE.PRN > NEWBASE.PRN"
PRINT
PRINT " Finally, display the execution time:"
PRINT " C:\>TIMER STOP"
PRINT
END SELECT
```



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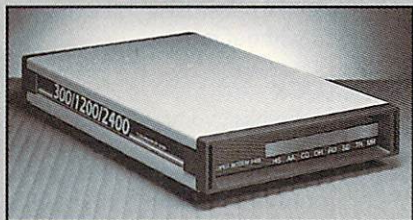
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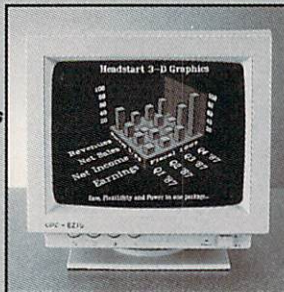
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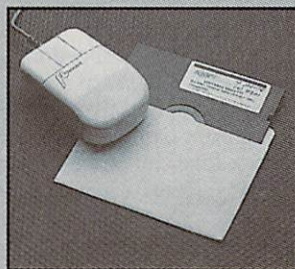
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ON DISK

G E O R G E C A M P B E L L

The IBM-compatible disk for this issue of *COMPUTE* contains an unbeatable collection of programs for every PC user. There's an excellent program for creating banners, signs, and calendars, plus a group of powerful utilities designed to make your PC more productive. We've also included a special bonus program that runs under *Microsoft Windows 3.0*.

If you received the disk with your copy of *COMPUTE*, you're already set up to try this issue's offerings. If you bought your copy of *COMPUTE* at a newsstand, you'll definitely want to order this disk. You can find ordering information in the third column of the second page of this article.

PrintPartner

Our featured application for this issue, *PrintPartner*, is a powerful, easy-to-use program that lets you create and print banners, signs, and calendars. Like similar commercial programs, *PrintPartner* combines text and graphics to help you produce attention-getting printouts on your dot-matrix printer.

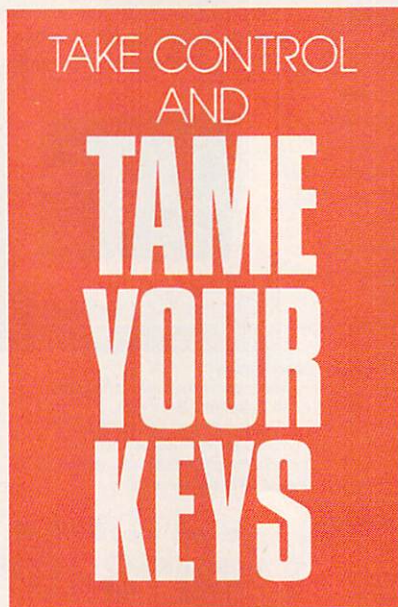
Written by California programmer Robert Bequette, *PrintPartner* uses simple menus for all its functions. You decide whether to create a banner, sign, or calendar; then the fun starts. Your creation can use any of 11 text fonts in three sizes. You then add your choice of exciting graphic images, which you can preview first on the screen.

If you're creating a sign, each line of type can appear in a different font, and you can use as many copies of the graphics as you like. Banners can have your choice of graphics at the beginning and end of your text. If you're creating a calendar, you can choose any year from 1980 to 2098 and select a font for the calendar's heading.

Once you've designed your production, *PrintPartner* can print it on just about any popular dot-matrix printer. The program's special smoothing features make the text and graphics attractive and easy to read.

PrintPartner includes a wide selection of graphic images, but you're not limited to just those included with the program. A separate program can convert graphics designed for the commercial *PrintMaster+* program for use with *PrintPartner*. Collections of graphics in *PrintMaster+* format are available on BBS's everywhere.

PrintPartner is a shareware program with a registration fee of \$20. If you use it regularly, you should register your copy. Registered users receive the latest version of the program, along with a collection of additional fonts and graphics.



KBD

The keyboard is your entry point into any PC. Without it, you're at a complete loss. Today's keyboards offer many options, but occasionally you need to automate some keyboard functions. Mark Perkel's *KBD* program is the only tool you need to customize the way your keyboard works.

Designed to be used at the DOS prompt or in batch files, *KBD* lets you turn the Caps Lock, Num Lock, and Scroll Lock keys on and off. You can also use *KBD* to alter the speed of

your keyboard's repeat rate or to send characters directly to the keyboard. A final feature allows you to lock the keyboard for security. When your keyboard is locked, only a complete reboot will unlock it.

All *KBD* commands are simple and easy to remember. For example, to shut off the Num Lock key, just give the command

KBD NumOff

You can combine multiple commands on a single line. By including a *KBD* command in your *AUTOEXEC.BAT* file, you can customize the way your keyboard works every time you boot up.

KBD is a shareware program with a low registration fee of \$10. Once you use it, you'll wonder how you ever managed without it.

SCROLOCK

Anyone who has ever used a PC for long has been frustrated by text scrolling off the screen before it can be read. While pressing Ctrl-S can stop the display, it's an inconvenient keystroke to use.

New York programmer Daniel Schwartz offers *SCROLOCK* as a solution to this persistent problem. This tiny memory-resident utility makes your Scroll Lock key work the way you always thought it should.

After you've loaded *SCROLOCK*, you can press the Scroll Lock key anytime to stop information from scrolling off the screen. Press the key again, and normal scrolling continues. It's that simple.

SCROLOCK is free, but if you use it, consider sending a contribution to its author. You'll encourage him to create other programs as useful as this one.

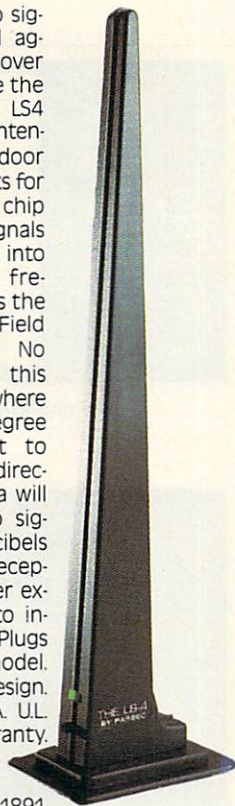
NewFiles

Searching for files is a common activity for every PC user, but finding just the file you want can take several minutes. Worse yet, DOS offers no way for users to locate files based on the date they were created. ▶

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Disks available only for IBM PC and compatible computers. Offer good while supplies last.

NewFiles, written by Georgia's Lawrence Spiwak, is the perfect solution. Using it, you can instantly find any file you've created within the past 30 days.

Suppose, for example, you wanted a list of files created today. Just give the command

NEWFILES 0

To see all the files created in the past week, enter the command

NEWFILES 7

Additional parameters let you look for files on other disk drives or just in the current directory and its subdirectories. You can even send your list to the printer.

NewFiles is a shareware program with a registration fee of \$20. Source code for the program is also available for a small additional fee.

File Hunter 1.9

Since we're featuring file-locating utilities on this issue's disk, we didn't want to leave out *Windows 3.0* users. *File Hunter*, a *Windows* application by Peter Eddy, is a full-featured file finder for that graphical interface.

File Hunter uses all the features of *Windows* to help you locate the files you need. It can find files on one or more disk drives, searching for a filename or for text within the file itself. *File Hunter* is fast and gives you a detailed listing of the files it locates.

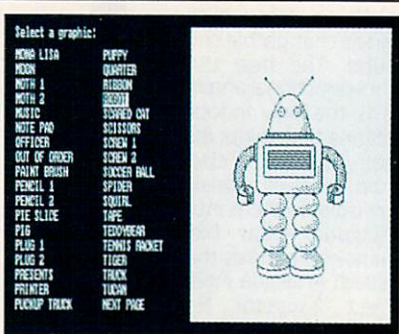
All instructions for using *File Hunter* can be read while inside the program, and its well-planned use of the mouse speeds your work.

A shareware program with a registration fee of \$30, *File Hunter* will quickly become one of your most-used *Windows 3.0* utilities.

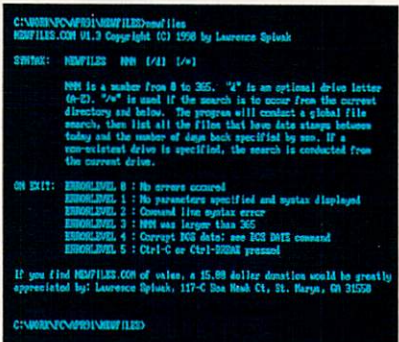
SuperMAC

The final program on this issue's disk is *SuperMAC*, written by *COMPUTE's* own Rick Leinecker. It's a powerful, commercial-quality keyboard macro program which can program your keyboard to convert long commands to a single keystroke. Best of all, *SuperMAC* stores your macros in easy-to-edit ASCII files.

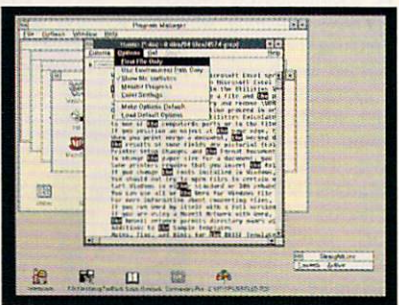
You'll find complete information on *SuperMAC* in "Keyboard Magic," elsewhere in this issue. □



PrintPartner



NewFiles



File Hunter



SuperMAC



64/128 VIEW

T O M N E T S E L

I have an important message for Commodore 64 and 128 owners who buy *COMPUTE* at the newsstand. This is the last issue in which the Gazette section will be packaged with *COMPUTE*.

Please note that this applies only to the U.S. newsstand edition of *COMPUTE*. The Gazette section will continue to be available with *COMPUTE* on newsstands in Canada and other countries.

This will not affect those who subscribe to the Gazette edition. Subscribers will still receive *COMPUTE* each month with its multiplatform coverage, including all the Gazette columns, features, type-in programs, and the latest information about the 8-bit Commodore market.

Despite the downturn in that market, we vow to continue serving our many loyal Gazette readers, most of whom already are subscribers. By targeting our coverage, we can better serve the needs of those readers. We know that this step will not be popular with those who buy the magazine at a newsstand, but it makes us more effective. So if you are not already a Gazette subscriber and you want to receive the best Commodore 64 and 128 information each month, subscribe now.

Fill out the subscription card found elsewhere in the magazine. Be sure to write *Gazette Edition* on the card and drop it in a mailbox. You can also subscribe by calling our subscription department; that toll-free number is (800) 727-6937. Tell the operator you want the Gazette edition, and you'll be billed \$12.97, which is a savings of 63 percent off the newsstand price.

While I hope everyone concerned will read this, I know we'll miss getting the word to some people. Since we can't contact those who buy the magazine from the newsstand, I hope some of you will post this information on your favorite BBS and share it with members of your user group.

Speaking of user groups, we'd like to hear from yours. We're in the process of updating our list of Commodore user groups. I know there have been some changes, what with new ones forming and old ones disbanding. We've sent letters to all the groups on our list, asking for address corrections and BBS information.

If your group does not return the letter we sent, we'll assume it has disbanded and drop it from our listing. Even if there have been no changes during the past year, you must return the letter to remain on our list. If we don't hear from you, your group will not be included in this year's listing. If

you are a member of a Commodore 64/128 user group and your group hasn't received a letter from *COMPUTE* Publications, contact us immediately with your group's name, mailing address, and BBS telephone number (if applicable). We want our list to include user groups in the U.S. and all other countries, and we want it to be as complete as possible.

User groups are an important resource for any Commodore owner, and if you don't belong to one, I strongly urge you to seek out one near you. Of course, if you don't know the name of your nearest group, check with *Gazette*. We'll print the complete list later this summer.

Due to a production error, the Gazette Readership Survey didn't appear in the issue when I announced it. Several of you felt strongly enough to write letters, voicing your opinions, likes, and dislikes about the magazine. Since the survey finally was printed in the February edition, your responses have been pouring in.

Our receptionist, Cynthia Giles, takes time out from greeting visitors and answering calls at her busy switchboard to compile your responses. She's doing an outstanding job. Just as soon as the replies stop coming in and we get the figures tabulated, I'll report the findings here.

I'd like to thank all of you who took the time to fill out the survey, write letters, and add additional pages of information. Your views help shape the magazine, and since we share this information with interested software companies, they also help influence the type of software that reaches the Commodore market. □



CMD

New! CMD / Dr. Evil Products New! Lower Hard Drive Prices

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HD Series Hard Drives

The New Standard in 64/128 Hard Drives



The CMD HD series of hard drives for the Commodore 64 and 128 have been designed to provide the highest level of compatibility and performance. These drives incorporate the latest in SCSI technology with advanced circuit design to bring you the most features at an affordable price. CMD drives allow you to achieve the higher level of productivity you require to get the most from your existing software - today!

- Compatible with GEOS™, CP/M™, BBS programs and most commercial software.
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- Built-in Commodore compatible DOS responds to all 1541, 1571 and 1581 commands.
- Up to 254 partitions in sizes ranging from 256 blocks to 65,280 blocks each.
- Built-in real time clock automatically time and date stamps all files.
- Compatible with Amiga, IBM and Macintosh systems for convenient upgrading.
- Connects easily to the serial bus, leaving ports open for use with cartridges, REU's and RAMLink.
- Supports all serial and JiffyDOS protocols, plus parallel interface for connection to RAMLink.
- Easy-to-use utilities allow backing up and copying files to and from 1541, 1571, or 1581 drives.
- Supports an unlimited number of true subdirectories which share all blocks within a partition.
- Built-in Q-Link software allows easy access to America's most popular 64/128 online service.
- External power supply avoids overheating and wear on computer power supply.
- Includes standard SCSI port and all utilities needed to expand the system (up to 4 Gigabytes).

HD-20 ~~\$599.95~~ NOW \$499.95 • HD-40 ~~\$799.95~~ NOW \$649.95
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 Plus New Prices on CMD SD Series Add-on Drives!
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More than a replacement for the deskTop, the gateWay offers a unique, streamlined approach to file management under GEOS. With a resizable Note Pad, proportional slider and fuel gauge, the gateWay makes it easier to get where you're going. In designing the gateWay, we took a good hard look at the deskTop to make sure that none of the functionality would be lost. Then we added feature after feature - capabilities that you, the serious GEOS user, have found lacking in the deskTop. At CMD, there's a lot more going on than powerful new hardware development - we're creating new ways to use it.

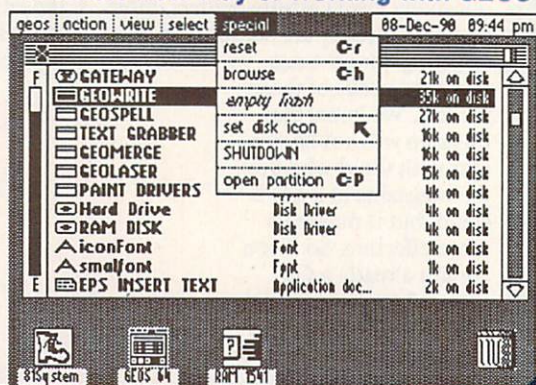
- Full three drive support, including auto-swapping for applications which will not allow use of drive C.
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- Full CMD device support for RAMLink, RAMDrive and HD hard drives allowing for partition sizes up to 16 Megabytes and Macintosh style folders.
- Supports using the CMD HD hard drive via parallel for faster hard drive access.
- RAM disk drivers allow use of as much available RAM as possible - no longer limiting you to a 1541 or 1571 sized RAM disk.
- Integrated Control Panel replaces the Preferences Manager and allows you to contour the gateWay to your choice of colors, screen pattern, printer driver and input driver.
- Task switching via our Switcher allows you to move instantly between two applications.
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gateWay 64 \$29.95 • gateWay 128 \$29.95 • Both \$39.95 • Shipping: UPS Ground \$5.00

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A Real RS-232 Serial Port for the Commodore 64 or 128

SWIFTLink-232 gives you a true RS-232 port with the ability to communicate at speeds from 300 to 38,400 bps, plus true 1200 and 2400 bps using Hayes compatible modems. Experience the power of high speed modems and fast data transfers directly to other computers. SWIFTLink plugs easily into your computer's expansion (cartridge port) and provides an industry standard IBM-AT style serial port. As an added bonus, SWIFTLink comes complete with file transfer software (FTP) plus many popular shareware terminal programs such as Desterm 128 and NovaTerm for the C-64. SWIFTLink is compatible with most hardware devices designed for the Commodore 64 and 128. Note: SWIFTLink serial Cable (DB-9 to DB-25) is required for use with most modems.

SWIFTLink-232 Cartridge \$39.95 SWIFTLink Cable \$9.95

Shipping: US: \$5.00 (Cartridge), \$3.00 (Cable), \$6.00 (Both). Canada add \$4.50.

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The STEREO SID Cartridge effectively adds a second complete SID chip to your Commodore 64 or 128, giving you a total of 6 separately controllable voices. SID SYMPHONY may be attached to your home stereo or most amplified speaker systems to provide you with whole new dimension in sound. Create your own stereo music using the Robert Stoerle's Stereo Editor (which we include free with *Computer's Enhanced SID Player* book), or just enjoy the many hundreds of available songs by using Mark A. Dickenson's Stereo Player software (included free with the SID SYMPHONY Cartridge). If you're interested in creating your own music files, be sure to get a copy of *Computer's Music System for the Commodore 128 and 64: The Enhanced SID Player*.

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RAMLink™

Power Backed REU Interface and Expandable RAM Disk



RAMLink is a multi-purpose hardware interface designed to overcome the limitations of existing RAM expansion units (REU's). RAMLink delivers the performance and compatibility lacking in past REU's by incorporating CMD's proprietary RL-DOS and advanced features into a compact unit which allows most software to utilize Commodore 1700 series REU's, GEORAM, PPI's RAMDrive, and CMD's RAMCard as if it were a disk drive. Optional RAMCard installs internally and can be used alone or in combination with the storage of an external REU for a maximum capacity of 16 Megabytes.

- Supports Commodore 1700, 1764, 1750, Berkeley Softworks GEORAM and PPI's RAMDrive.
- Optional RAMCard allows RAMLink to be used as a RAM Disk with or without a separate REU. User Expandable from 1 Mb to 16 Mb using standard SIMMs.
- Pass-Thru connector allows use of cartridge port peripherals such as utility cartridges.
- Reset, Disable, Direct Access mode and SWAP functions are all standard features.
- RAM port provides power back-up to REU's.
- Parallel port provides ultra-fast data transfer when connected to CMD HD series hard drives.
- Includes separate power supply - optional battery available to protect against power failure.

RAMLink (w/out internal RAM)	\$149.95	RAMLink Battery back-up unit	\$24.95
RAMLink w/ RAMCard (1 Mb)	\$259.95	Parallel Cable for CMD HD	\$14.95
RAMCard w/ 1 Mb (if purchased separately)	\$149.95		

*Add \$90.00 per Mb for additional RAM up to 4Mb. Higher capacities - CALL. Prices and specifications subject to change without notice.

Shipping: US: \$10.50 (UPS), \$18.00 (2nd day), COD add \$4.00. Canada \$20.00.

Both RAMLink and RAMDrive Include RL-DOS

- Allows commercial software to access all available RAM as a high-performance RAM Disk.
- gateWay software for GEOS use available at no additional charge.
- RL-DOS performs up to 20 times faster than Commodore RAMDOS, up to 400 times faster than a stock 1541 and provides full DOS command compatibility.
- Up to 31 1541/1571/1581 emulation or Native mode partitions, plus true subdirectories.
- Includes built-in JiffyDOS Kernel for high-speed access to JiffyDOS equipped disk drives.
- Software for copying files (FCOPY) and complete disks (MCOPY) included.
- Many other features, including CMD's exclusive device number SWAP functions.

RAMLink or RAMDrive - Which one is right for you?

Both RAMLink and RAMDrive give Commodore users powerful features never before available in a RAM expander. RAMDrive is intended mainly for those who do not require the high RAM capacity of RAMLink (up to 16 Mb), RAMLink's Pass-Thru port or the parallel port for communicating with the CMD HD Series of hard drives. RAMDrive is an excellent choice for those who desire portability since the internal battery pack can keep the contents of RAMDrive intact for several days. RAMLink is the perfect choice for GEORAM owners who want the ability to use that device with programs other than GEOS. RAMLink has a built-in RAM Port for easy use with a GEORAM or Commodore REU. No matter which CMD RAM device you select, you'll benefit from the fantastic capabilities of a high speed RAM disk equipped with RL-DOS and the outstanding value of CMD support.

RAMDrive - A High Performance Battery Backed RAM Cartridge

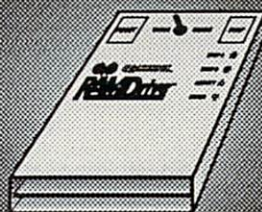
RAMDrive is a fresh new approach to RAM expansion for the Commodore 64 and 128. RAMDrive is a self contained battery backed cartridge with capacities of 512K, 1 Mb and 2 Mb. RAMDrive incorporates RL-DOS, an ultra-fast, easy-to-use operating system similar to the HD-DOS found in CMD HD Series hard drives. This DOS allows various types of partitioning along with compatibility and speed unsurpassed by previous RAM Expansion systems.

- Compatible with vast amounts of commercial software as an ultra-fast RAM disk.
- Power back-up eliminates the loss of files upon powering down the computer while the built-in battery protects data during transportation or power outages.
- Available in 512K, 1 Mb and 2 Mb models at incredibly low prices.
- DOS includes JiffyDOS Kernel routines for high speed disk access with JiffyDOS equipped disk drives.
- Software for copying and GEOS compatibility included.
- Reset switch allows computer reset without losing data in RAMDrive.
- Reset, Disable and SWAP functions are all standard features.

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NEWS & NOTES

Another Bell Online

D & D Services announces *Bell-Term* (\$29.95) for the 64. This full-featured terminal program, distributed by Parsec (P.O. Box 111, Salem, Massachusetts 01970-0111) offers an 80-column mode for the 64, Y-Modem for batch transfers, and ARC.MOD to unarc files during downloads.

Other features include compatibility with the SwiftLink-232 cartridge for transfer speeds up to 19.2K baud, a split-screen chat mode, and a hi-res viewer/printer.

A Shadow of Evil

The Death Adder is tyrannizing the people of Yuria. Only three heroes have the powers to stop this ruthless tyrant and regain the throne in *Golden Axe* (\$34.95). Tyris-Flare, a beautiful and powerful amazon, is empowered by a special magic fire. Gilius-Thunderhead has an astonishing combination of lightning power and gymnastics. The Axe-Battler has sharpened his giant sword for battle. You must chose which challenger to send into battle against the Death Adder.

Chose your weapons wizely. You'll face Skeleton Swordsmen, Twin Brutes, and Lizard Women as you attempt to undo the evil Adder. The fate of the people of Yuria depends upon your skills. Weapons range from razor-sharp swords to curtains of fire. You can even joust with your foes from the back of a bizarrian, stolen from an unsaddled Adder ally. Force alone may not be the answer, however; remember, one dose of magic can wipe out an acre of evil.

Electronic Arts (1810 Gateway Drive, San Mateo, California 94404) distributes this arcade hit from Sega of America.



Amish Road

Amish Road by Michael Juliano of Davie, Florida, is this disk's Picture of the Month.

Welcome to "Gazette Gallery." Each month *Gazette Disk* features a collection of the best 64/128 artwork submitted by our readers. We pay \$50 for each piece of art we accept and an extra \$50 for the one selected as Picture of the Month. Send your original artwork to Gazette Gallery, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

Industrial Might & Logic

Lucasfilm Games (P.O. Box 10307, San Rafael, California 94912) announced that *Night Shift* (\$29.95) will soon be available for the 64 market. This arcade-style simulation is about a toy factory called Industrial Might & Logic. Perhaps not too surprisingly, it makes Star Wars and Indiana Jones toys.

Demand for the toys is so great that the company hires a night-shift worker who must contend with ever-increasing quotas, equipment failures, lawyers, lemmings, and a surly boss. Things do not go well for the hapless hireling as he tries to turn industrial waste into baby Darth Vader dolls, C3POs, R2D2s, Indiana Jones, and Zak McKrackens.

The game's intricate engineering of the toy machine and its intensity and pressure should appeal to a broad audience. □

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C-128D w/Built-in Disk Drive
Includes 1 FREE Game
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- GEOS Program
- Quantum Link Software

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SEE OUR AD IN THIS MONTH'S AMIGA SECTION OF THIS MAGAZINE FOR GREAT AMIGA SPECIAL VALUES

Confess

of a Software Maniac

My name is Doug and I'm a software addict. There, I've said it. I'm a compulsive software consumer—helpless, spineless, capable of absolutely no self-control. Now that it's out in the open, maybe others will recognize themselves and find solace in the knowledge that they're not alone.

A Tale of Woe

I became aware of my problem back in 1982, shortly after purchasing my first computer, a trusty old 16K Radio Shack Color Computer. Of course, way back then, there wasn't the magnitude of software that exists today and, consequently, not nearly the temptation. What was available loaded and saved by a painfully slow (and sometimes less-than-perfect) process—the cassette recorder.

Of course, there were those elegant Program-Paks. But overall, software development for home computers was still in its infancy. So I learned BASIC and wrote most of what I needed. Because BASIC (and my own limitations) restricted the complexity of my programs, I immediately became infatuated with each and every packaged program. Even at this early stage of my zeal for computers, I could already recognize the hunger building for more and more software.

August 1983 found me in possession of my first 64—it was love at first sight. Imagine, a computer with 64K, one on which you could actually edit a line! In retrospect, I guess that was the genesis of my journey into software madness. Like all obsessions, it began deceptively, creeping slowly like a thief in the night. First, a couple of games to generate envy among my com-

puter compatriots for my state-of-the-art machine—*BeachHead* to flaunt its sound and graphics, *Jumpman* to solidify their covetousness. Next, a good word processor so I could watch them *oooh* and *aaah* while I deftly manipulated, inserted, and deleted expanses of data. Each time I braved a software boutique, I found something that I needed just a little more than the package I'd bought the previous month. I was on a quest for the perfect program—the ultimate union of bits and bytes. A simple trip to the computer shop took on the aura of a spiritual pilgrimage.

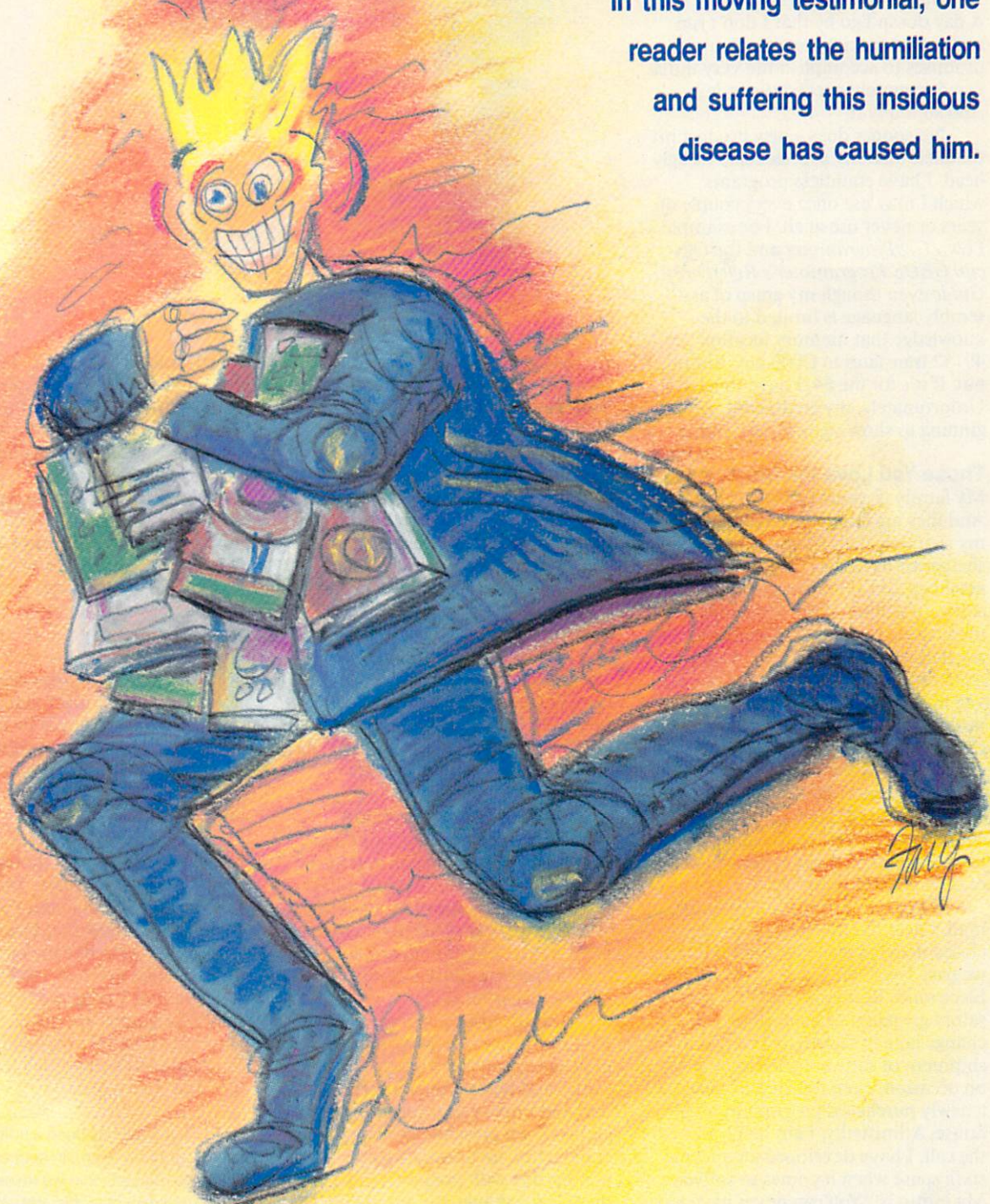
Before long, I was hanging out in department stores, cruising the aisles for any and all software. I would lurk for hours, waiting for stock crews to place the incoming packages on shelves. Whether or not I had a need for the software was inconsequential. Store clerks began eyeballing me suspiciously as if I were the carrier of some frightful affliction. Everywhere I looked I saw something I wanted. My passion for software became ravenous. I began frequenting user groups in the hopes of obtaining even outmoded, uninspired programs.

By 1984, everyone seemed to be writing programs for the 64. Software flowed in numbers I had never imagined possible. Software that would do anything and everything you could envision—and some things that you couldn't. I was hooked! As a member of the military community, my assignments took me to virtually every part of the U.S., Europe, and the Orient, affording me an anonymity which allowed me to keep my growing habit a secret. There were programs to do everything from personal finance to designing custom pinball games, and I had them all. Even though I'm not

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reader relates the humiliation
and suffering this insidious
disease has caused him.



JANICE R. FARY

a "gamer," nor have I ever been, my library consists of virtually every 64 game from *Aztec* to *Zork*.

My productivityware embodies virtually every database, spreadsheet, word processor, assembler, and graphics program that's been written. With these, I'm capable of publishing anything from a modest birthday card to a comprehensive, unabridged version of *War and Peace* (in Russian with illustrations!), and thanks to a second drive and an REU, I still have enough memory to operate the traffic lights for the town of Malone, New York.

But am I satisfied? Certainly not. A day doesn't go by that I don't run across that special program that promises to accomplish the very thing I so desperately needed yesterday. And so, I buy it.

No sooner does a new product hit the shelf than my avarice rears its ugly head. I have countless programs which I may use once every couple of years or never use at all. For example, I own *GeoProgrammer* and the *Official GEOS Programmer's Reference Guide* even though my grasp of assembly language is limited to the knowledge that memory location 49152 translates to C000 hex. Simply put: If it's for the 64, I have to have it. Unfortunately, my credit cards are beginning to show signs of early aging.

Those You Love the Most

My family is aware of my weakness. And they are supportive of me, but my shame is their shame. They try to shelter me as best as they can. When a neighbor asks if that was me in the software section of the local department store, my wife will invariably reply that it was probably Mr. Collins from down the block, who looks a lot like me from behind. But they all suspect the truth. (Mr. Collins doesn't even own a computer.)

Not being the 64 buff that I am, my family can't relate to my problem. To the unversed, the 64 is just another computer. It's hard to imagine civilized humans in the nineties capable of such gnarled thinking.

Whenever I hint at a trip to the mall, I hear the murmurs behind closed doors. I sense the foreboding as we pass Toys "R" Us or approach the Electronics Boutique. I feel the accusatory grimaces when our base exchange here in Germany receives a shipment of software goodies. I have, on occasion, even resorted to sneaking a newly purchased program into the house. Admittedly, I am helpless to the call. I have developed an uncanny sixth sense when it comes to software. My motto is "You can never have too many databases."



My craving is not limited to commercial software. In addition to my endless supply of program disks (which I would estimate to be somewhere around 3200 programs), I also own virtually every copy of *COMPUTE!'s Gazette* dating from the early 1980s and a healthy storehouse of other 64 publications and books. Much to my wife's dismay, I steadfastly refuse to allow even the oldest of these to be thrown out. After all, who knows when I'll want to read the article "GEOS Update: One Year Old and Growing Fast" from the July 1987 issue of *Gazette*? I guard my publications. I'm even considering a vibration alarm next to my library to thwart any attempts at unauthorized entry.

A Creeping Social Menace

I recognize from limited volunteer work that my compulsion will never be totally eradicated. And so, I live from day to day, constantly fighting it. With the assistance and encouragement of my friends and family, I may have a sporting chance. But the lure is still overwhelming.

And it's just so easy for anyone to obtain software. Everywhere, I see preteens openly buying adventure games and businessmen procuring new and improved recordkeeping programs. Even preschoolers are not exempt. They are unremittingly bombarded with programs to help them learn shapes and numbers. Where will it end? People from every

social stratum fall victim daily. Software madness doesn't respect race, religion, national origin, or financial status. It can strike anyone wherever software is peddled, seducing even the thriftiest of consumers.

What can be done to combat this newest social malaise? Perhaps a Software Compulsives Anonymous (SCA) could be formed to provide group support. At SCA, people with similar problems would be able to discuss their addiction openly, secure in the knowledge that they weren't alone. Members could monitor each other's progress using a buddy system. A 24-hour SCA hotline could be instituted for those whose self-imposed restraints are constantly tested by names like Electronic Arts, Abacus, and Mindscape.

I have a long way to go to recovery. But a journey of a thousand miles begins with a single step. Yes, I'm a software compulsive, but I've met the enemy and I know that I can lick this in time. If you're like me or know someone like me, I counsel you to remember that 1 program is too much and 50 programs are not enough. Once you give in, you open the floodgate. So hang tough and fight the urge. Just say *No!* □

Doug Buchanan has been a software "user" for many years. In deference to his family, he requests that we reveal nothing more about him than this. We wish Doug success in controlling his habit.

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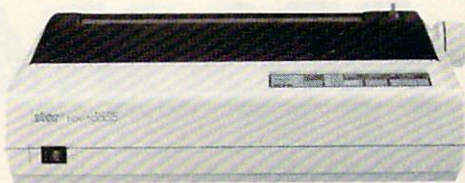
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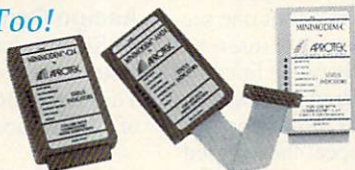
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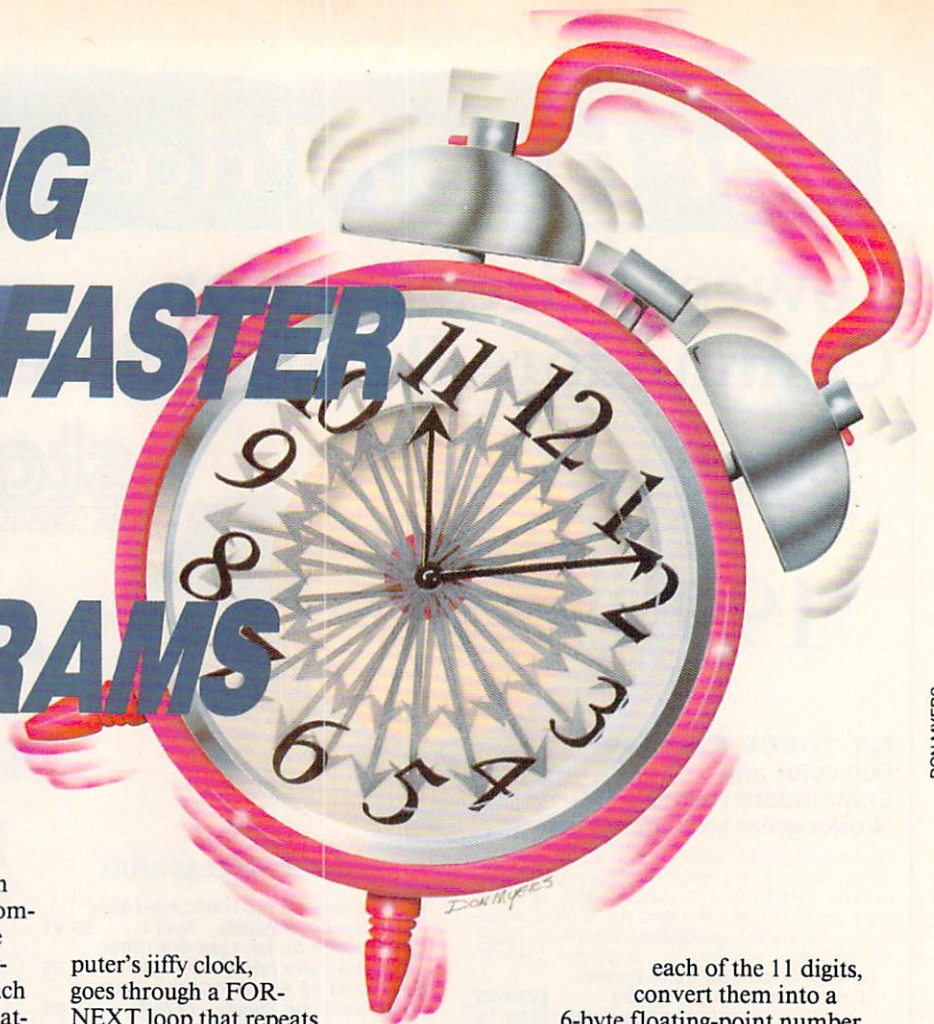
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WRITING

FASTER BASIC PROGRAMS



DON MYERS

Programs that are written in BASIC often run slowly compared to machine language programs. The BASIC interpreter has to spend time reading each line of the program and then translating it into the correct set of machine language codes for the computer to perform the instruction. If instructions have to be repeated many times (for example, inside a FOR-NEXT loop), the time delays add up and really become noticeable.

In this article, we'll discuss how you can write or even rewrite BASIC programs to make them run faster. To see how much time the different instructions take, enter the following simple timing program.

```
10 REM TIMETEST
100 A=1:B=2:C=3:D=4:E=5:F=6:G=7:H=8
110 I=9:J=10:K=11:L=12:M=13:N=14:O=15
120 P=16:Q=17:R=18:S=19:T=20:U=21
130 V=22:W=23:X=24:Y=25:Y%=26
140 Z=.00134796247
160 TS=TI
200 FOR I=1 TO 1000
300 NEXT
310 TF=TI:TT=INT((TF-TS)/6)/10
320 PRINT "TIME WAS";TT-1;"SECONDS"
330 LIST 200-300
```

After you've set up some variables, this test program reads the com-

puter's jiffy clock, goes through a FOR-NEXT loop that repeats itself a thousand times, and reads the jiffy clock again. The empty loop, without any instructions inside, takes about one second to run. There's room to insert additional instructions between lines 200 and 300, and the difference between the two clock readings minus one is the time it takes to repeat the inserted instruction 1000 times, or the time in thousandths of a second (milliseconds) to execute the instruction once.

This program uses the 64's TI function to read the start and finish times. For other models of computer, a different command may be required to access the internal clock.

Run the program, and you'll see the final message giving a time of 0 seconds. Now try adding a line inside the loop.

```
210 V=V+.00134796247
```

It takes 46.3 seconds to execute this statement 1000 times. (Your time may vary slightly.) Each time BASIC encounters the number in line 210, it has to read the decimal point and

each of the 11 digits, convert them into a 6-byte floating-point number (+1.34796247 E-3), and add that number to the value assigned to V.

Assign Constants to Variables

BASIC can handle variables much faster than it can handle numbers. This is the most important timesaver of all. Replace line 210 with

```
210 V=V+Z
```

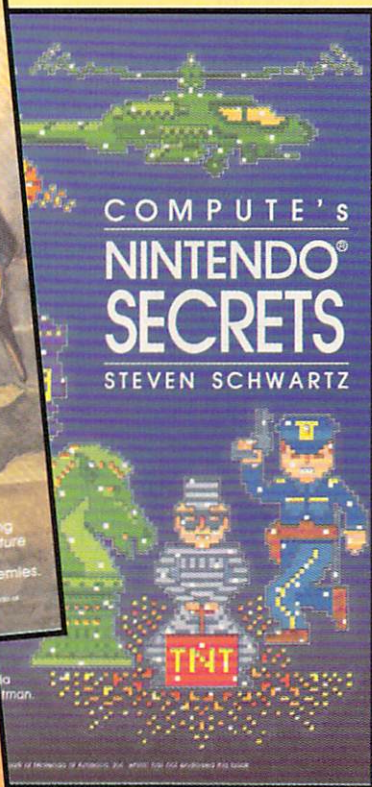
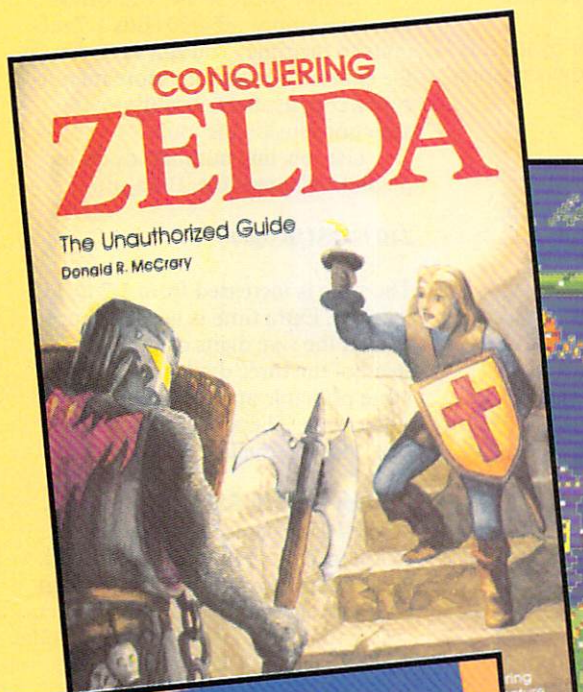
Because the variable Z has already been set to a value of .00134796247 in line 140, this new line performs the same operation. Running the program shows a time of 5.1 seconds—nine times faster.

When the variable Z was assigned in line 140, BASIC converted the value into a 6-byte floating-point number and stored it in a list of variables. Each time BASIC reads line 210, it has only to read one character, Z, instead of a decimal point and 11 digits. Having read Z, it then looks up the floating-point value directly from the list of variables. This avoids having to perform the cumbersome floating-point conversion 1000 times. ▶

ANTHONY CHANDLER

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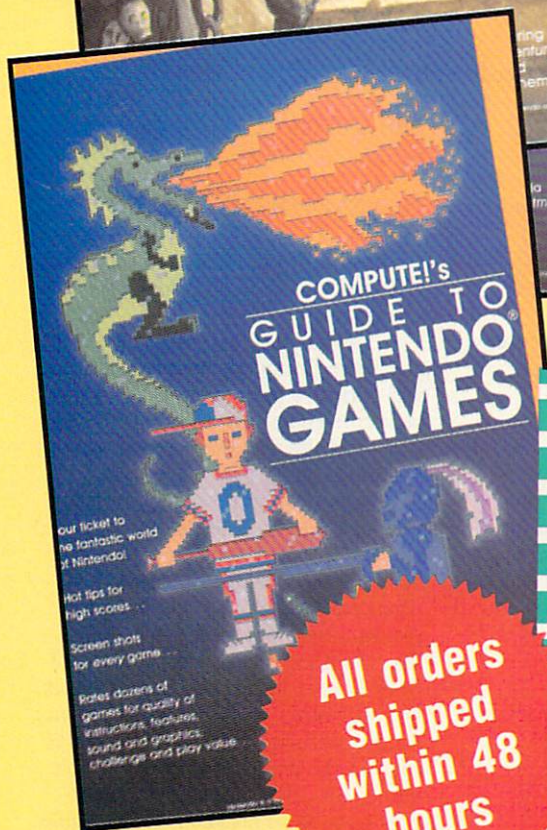
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Define Frequently Used Variables Early

The program will run even faster if you move the statement assigning a value to the Z variable from line 140 to an earlier point in the program, say line 90. When BASIC reads a variable name such as Z for the first time, it writes the name and its assigned value in a list. (A similar list is built up for string variables such as W\$).

The first variable encountered in the program is entered at the top of the list, followed by the next one, and so on. Z is the 27th variable in the list. When it appears in line 210, BASIC has to search through the other 26 variables until it finds the right one. Obviously, it's quicker to find a variable near the top of the list than it is to find one at the bottom. To test this, let's enter a new line.

```
90 Z=.00134796247
```

When the program is run, the variable Z will now be placed at the top of the list. The runtime will be reduced from 5.1 seconds to 4.1 seconds, the difference being the time taken by BASIC to search through the other 26 variable names in the list. Line 140 is now unnecessary, but its presence does not alter Z's position in the variable list.

Repeat the process with variable V by entering

```
95 V=22
```

This puts variable V in second place on the list. When the program is run, you'll find that the time is shortened to 2.7 seconds because both variables are now found quickly.

Omit the Count Variable from NEXT Statements

Whenever you have a single FOR loop, terminate it with the word NEXT instead of specifying the variable name, such as NEXTI. This saves time because BASIC does not bother to check that the count variable, I, is the same as that in the last FOR statement. To see how much difference this makes, change line 300 to

```
300 NEXTI
```

Running the program will show an increase in time from 2.7 seconds to 3.3 seconds.

If there's an inner loop nested inside an outer loop, it isn't always essential to specify the count variable. Enter the following lines, and note the differences in running times.

```
210 FOR J = 1 to 5
300 NEXTJ:NEXTI
```

With the count variable given for each loop, the time is 12.1 seconds. Line 300 can also be written this way:

```
300 NEXTJ,I
```

This cuts the running time by only 0.1 seconds. Now change line 300 again and notice the change.

```
300 NEXT:NEXT
```

At 8.3 seconds, this is decidedly faster than the alternatives NEXTJ,I and NEXTJ:NEXTI.

Multiplying a number by itself is faster than squaring it by exponentiation.

```
210 D=C*C
300 NEXT
```

This takes 3.8 seconds, but watch what happens when you square C.

```
210 D=C↑B
```

The processing time increases to 53.1 seconds.

Multiplying is faster than dividing.

```
210 A=B*C
```

This takes 3.5 seconds.

```
210 A=B/C
```

Now the computation takes 4.9 seconds. It's faster to multiply by 0.1 than it is to divide by 10.

Adding the same number twice is faster than multiplying by 2.

```
210 C=A+A
```

Adding the variables that represent 1 + 1 takes 2.4 seconds.

```
210 C=B*A
```

Multiplying the variables that represent 2 × 1 takes 3.5 seconds.

```
210 C=2*A
```

Using the number instead of a variable takes even longer: 3.8 seconds. Integer variables are faster than the integer function. If the number involved is less than 32,768, defining an integer variable takes less time than calculating an integer.

```
210 Y%=A
```

This takes 2.8 seconds.

```
210 Y=INT(A)
```

Writing it this way increases the time to 3.6 seconds.

Avoid Subroutines Within Loops

When you have a loop that repeats many times, try to avoid having a GOSUB inside the loop. Try the effect of adding the following statements.

```
400 RETURN
10000 RETURN
```

Then change line 210.

```
210 GOSUB400
```

Simply going to and returning from the empty sub 400 adds 1.7 seconds to the time. You can save this (at the expense of using up more memory) by copying the subroutine's instructions inside the loop.

Use low line numbers as far as possible. Change line 210 again.

```
210 GOSUB10000
```

The time is increased from 1.7 to 2.0 seconds. Extra time is needed simply to read the five digits of 10,000 instead of the three digits in 400. The same principle applies to GOTO statements. The fewer digits in the line number, the faster the program.

Remove REM Statements

While REM statements make it easier to follow a program and understand what's happening, programs will run faster if you eliminate them—particularly within loops. If you must include REM statements, keep them short.

```
210 REM
```

This adds 0.3 seconds to the loop without line 210.

```
210 REM THIS IS A TEST
```

Adding additional words to the REM statement doubles the time to 0.6 seconds.

You can use this test program to check the timing of other instructions and compare their speeds. You may be surprised at how different expressions and the way they're used affect running time.

When you write a program, do it in your usual way. Get all the bugs out and make sure it's running properly before you try to improve its speed. Then, take a look at it and see where you can make speed improvements. Start with the most-used and longest FOR-NEXT loops, replace constants with variables, and revise expressions, putting definitions of these variables early in the program. Reuse variable names for different purposes wherever possible. This keeps the variable list short and results in faster access times and more memory space. □

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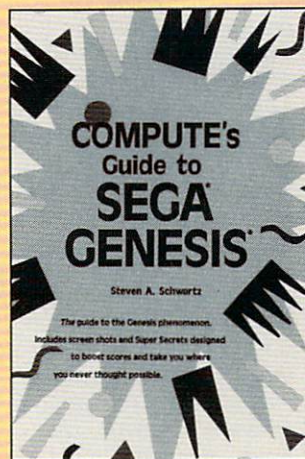


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FEEDBACK

EDITORS AND READERS

A Note from New Zealand

I enjoy your magazine, but it seems to cater more for the 64 than the 128, which is a much more versatile machine. I'm not really into games, so I would appreciate more utilities. More information on using the 128 as a controller of household functions would be of interest, as would a program that would let my printer print sideways.

Incidentally, I was struck with some problems with *Stars II* (COMPUTE!'s Gazette, August 1989). There was no way to produce a sky as seen from the southern hemisphere. Why is this?

NOEL RICKETTS
AUCKLAND, NEW ZEALAND

We try to supply a variety of programs for both computers in each issue, but we rely on submissions from our readers. Since we're always eager to publish good utility programs for both the 128 and the 64, we encourage programmers to send such programs to our submissions reviewer. Programmers have asked about resubmitting programs that we may have rejected in the past. If the program is fairly bug free and you feel it has merit, submit it again. It may have been rejected simply because it was similar to a program we had recently published. For example, in November 1990 we ran Right/Side, a printer program that does just what you ask. Therefore, if someone sends us a similar program tomorrow, chances are it won't get published. If a program is too large, that's also a strike against it—although we may offer it as a bonus program on disk only. Stars II had that problem. By including all the code needed to produce views in the northern skies, the program would've been much too large to offer as a type-in.

In response to your question about Stars II, author Robert A. Mulford says, "The east, south, and west views are calculated by the same subroutine. A north view would have required a separate one.

Since the planets are never seen in the northern sky by people in the northern hemisphere, I decided not to include a northern view to save a few lines of code." We apologize for the inconvenience this may have caused readers who live south of the equator; a new version of the program that should solve that problem is in the works.

Transformer Needed

My BMC monitor, model BM 919U, died recently, and a service technician told me it needs a new high-voltage flyback transformer. The schematic diagram with the monitor gives no information to help him in ordering a new one, and the company that sold me the monitor no longer handles computer hardware. Can anyone help me locate a replacement for this transformer?

KARL HALTNER
507 SMITHSON AVE.
ERIE, PA 16511

How about it, readers?

Anything but Games?

I have a 128 with a 1571 and an MPS-803 printer. I have noticed that Commodore software seems to be leaning more to games than to nongame programs. Do software companies plan on ignoring us nongame users? I would like to see more productivity programs such as *Fleet Systems*. Maybe they should survey us Commodore owners and ask us what we'd like to see in new releases.

ROLAND A. DUPONT
SUSANVILLE, CA

New software releases for the 64 or 128 have slowed dramatically, but software companies are still interested in what the market wants. That's one of the reasons why we published the readership survey in the February issue. In addition to helping us produce the kind of magazine you want, we share the results with software companies to help them in their marketing decisions.

So if you haven't responded yet, it's not too late to send it in and let your voice be heard. We'll also publish the survey results as soon as they are tabulated.

Some European software companies are introducing some of their hits to the U.S. market. One program that may interest you is from England's Database Software. Mini Office II is an integrated package for the 64 that contains a word processor, spreadsheet, database, graphics program, terminal program, and label maker—all in one package. We'll print a review of this product in an upcoming issue.

Fool Your 1571

I have a 128 with a 1571 disk drive. I have several programs that specify a 64 and a 1541 disk drive that are giving me problems. Is there some way I can fool the drive into thinking it's a 1541?

ROY N. KELLEY
HAMILTON, OH

After you've turned on your monitor and 1571, turn on your 128 while pressing the Commodore key. This boots the 128 in 64 mode, and it makes the 1571 think it's a 1541. Give this a try and see if it helps.

An Index and Show Schedule

I would like to see a yearly Gazette index in either the December or January issue. It would be helpful when looking for information on various subjects. Also, a column on future shows and seminars might be helpful. If it were published in a column, it would be quick and easy to review. That would give us a little advance notice, and I could possibly make plans to attend. I might have even made plans to vacation in Las Vegas to coincide with the Consumer Electronics Show.

FRED BLANCK
LANSING, MI

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years as well. It's now available through our Greensboro office for \$7.95 plus \$2.00 shipping and handling.

As for shows of interest to Commodore owners, we'd be happy to print such a listing for national or larger regional shows if we get the information in time. Our production deadlines require us to have the information three to four months prior to the event.

As for shows such as COMDEX or the Consumer Electronics Show, they are trade shows not open to the public. Entry is restricted to exhibitors, people in the industry, and the press, although there is some talk of opening such shows on at least one day to the public.

Missing SYS

I have a problem with one of my 64 programs. I have forgotten the SYS address needed to run it. How can I find it?

ELIUD CAMPOS RIVERA
ARECIBO, PUERTO RICO

The problem is simple to state, but the solution could be difficult. Begin, though, by assuming that the machine code loads to one of the common locations. They are the

cassette buffer at address 828 (\$33C), the upper 8K of BASIC RAM at 32768 (\$8000), the upper 4K of BASIC RAM at 36864 (\$9000), and the 4K RAM window at 49152 (\$C000). The most likely spot is the last listed. Simply load the machine code with a ,8,1 and SYS to these addresses. The computer may lock up, requiring you to turn it off and on again.

If none of these addresses produces results, either of two things are likely: The program doesn't load to that address, or the starting address of the load is not the starting address of the actual program.

In the first case, the disk itself must be examined for the load address. Several programs will do this for you, including MetaBASIC (COMPUTE!'s Gazette, February 1987). The alternative to running a load-address program is to use a disk editor to examine the directory for the starting track and sector of the program. You can then go to that sector and read the load address from the third and fourth bytes, where it will be in low-byte, high-byte order.

If the executable address isn't the load address, you'll need to examine the code with an assembler

program (once the location of the code has been determined). Sometimes the code resides beneath BASIC or Kernal ROM, and you'll need a separate machine code program to remove the ROM to run it. Less often, the code has a specific load address known only to a boot routine which, for whatever reason, you may not have. Occasionally, the program may make use of the CBM80 cartridge test during initialization. If so, a cold-start call may start the program. You can call the cold-start routine with a SYS 64738. Happy hunting!

Messed-Up Graphics

In 64 mode, I'm having problems with graphics in a lot of games on my 128. When I run a newer game, the graphics never show up, but a mess of characters fill the screen. The game works; the sound comes up; the demo still works. It's not the drive or the disk. Older games still work, though.

JASON FRITZ
LITTLETON, CO

From your description of the problem, it sounds as though your video interface chip (VIC) isn't creating a bitmapped screen. The "mess of characters" that you refer to are

symptomatic of a bad VIC because color information for bitmaps is stored in the same memory location as normal text. If the software thinks it's supplying color information to a bitmap, and the VIC actually hasn't left text mode, you wind up with a bunch of characters that make no sense. Go to 128 mode and type in the following program. When the program is run with a working VIC and a 40-column display, you will see a white spiral emerging from the center of a dark blue background. But with a bad VIC, the screen will instead be filled with strange characters.

```

10 POKE 53280,6:POKE 53281,6
20 GRAPHIC 1,1
30 COLOR 1,2
40 LX=160:LY=100
50 FOR X=0 TO 400
60 PX=160+X/4*COS(X/8):PY=
  100+X/4*SIN(X/8)
70 DRAW 1,LX,LY TO PX,PY
80 LX=PX:LY=PY
90 NEXT
100 GRAPHIC 0
    
```

To check the video interface chip in a 64, type in and run Chaos in the Program section of this issue. ☐

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D'IVERSIONS

F R E D D ' I G N A Z I O

Have you ever imagined what computers would be like if you lived inside them like rooms? You know what I'm talking about if you've been to a game arcade recently. It used to be that to play a game you'd walk up to a box, pop in a quarter or two, and stand in front of the box watching the display screen and pumping some buttons.

That's all changed. Now you don't walk up to a box, you climb inside! And when you do, you leave the game arcade behind, and you enter another world.

Recently my son, Eric, and I were in a shopping mall in Cheyenne, Wyoming. In the center of the mall was a vehicle that looked like a cross between a passenger van and an icebox. On closer inspection we discovered that this *box* was indeed a vehicle—a vehicle of the senses and the imagination, a vehicle without wheels.

Inside the vehicle were eight rows of seats, all equipped with shoulder harnesses. In the front was a projection screen that covered the entire wall. Spread evenly around the walls were surround-sound speakers. The motto of this vehicle was displayed on a sign hung over the narrow doorway. It read: "Swear You Are There!"

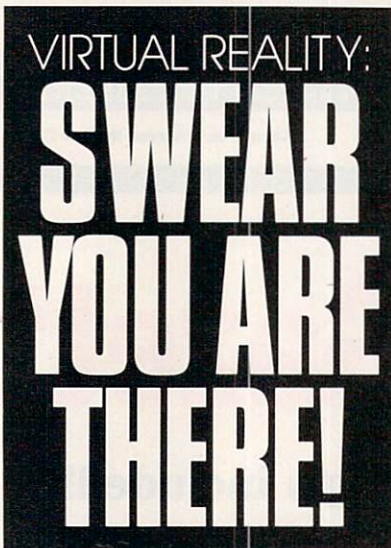
Eric and I were curious. We each paid our two-dollar entry fee and crawled into the vehicle. Once inside, we found two seats together and strapped ourselves in. We noticed that our armrests had handholds. All this seemed a little bit silly. After all, this vehicle had no wheels! It was stuck in the middle of a shopping mall. Where could we be going?

Suddenly the lights went out. We were in absolute darkness. Then the front screen lit up. It seemed to fill the room. We heard grinding noises, metallic scraping. Our seats began to rock.

We were on a roller coaster! Slowly, swaying side to side, the roller coaster left the station and began climbing a monster hill. It picked up speed. The people beside us began to moan in fear and anticipation. I found

myself clutching the handgrips as my seat tilted farther and farther back. Were we going straight up?

Inch by inch, foot by foot, we climbed that terrible hill. Finally we arced over the top and fell, down, down the other side, rapidly gaining speed. Now our seats were tilted forward. I felt like I was going to fall on my nose! Thank goodness for the security of my shoulder harness!



The wind whined past my ears. People screamed. I heard myself screaming. Beside me Eric sat, gritting his teeth, his eyes wide, a huge smile on his lips. "Awesome!" he said.

The roller-coaster box in Cheyenne was actually a NASA space-flight simulator that had been acquired secondhand by an entertainment company. The company converted the simulator into a ride that tours shopping malls around the far west. Eric and I went on the roller-coaster ride, but that was only one of the many "virtual experiences" that the simulator offered. At different times of the day you could ride dangerous white-water rapids, ski downhill, or jump out of an airplane with a dinky parachute in the middle of a typhoon. By playing a movie on the front

screen, immersing you in surround-sound, and tilting the box up to 45 degrees in any direction, the simulator could make your body and your imagination swear you were there. *There* was anywhere the game designer wanted you to be.

These days you hear how computers are getting smaller and smaller—so small, in fact, that pretty soon you won't even be able to see them. We all have visions of carrying around powerful laptop computers, pocket computers, and even wrist-top computers and playing games on increasingly powerful Game Boy-style arcade machines that fit into the palm of our hands.

Now take a second and turn this idea upside down. What if we don't end up carrying computers around? What if, instead, we go inside computer *rooms* where the entire room is a giant computer that can synthesize reality on walls covered with video wallpaper and surround-sound speakers that immerse us in a pine forest, a stormy sea, or a busy city street?

Computer *rooms* like the NASA simulator in the Cheyenne shopping mall aren't just science fiction. They're reality. The new theme parks now on the drawing boards for the twenty-first century will all have virtual reality environments controlled by multimedia computers.

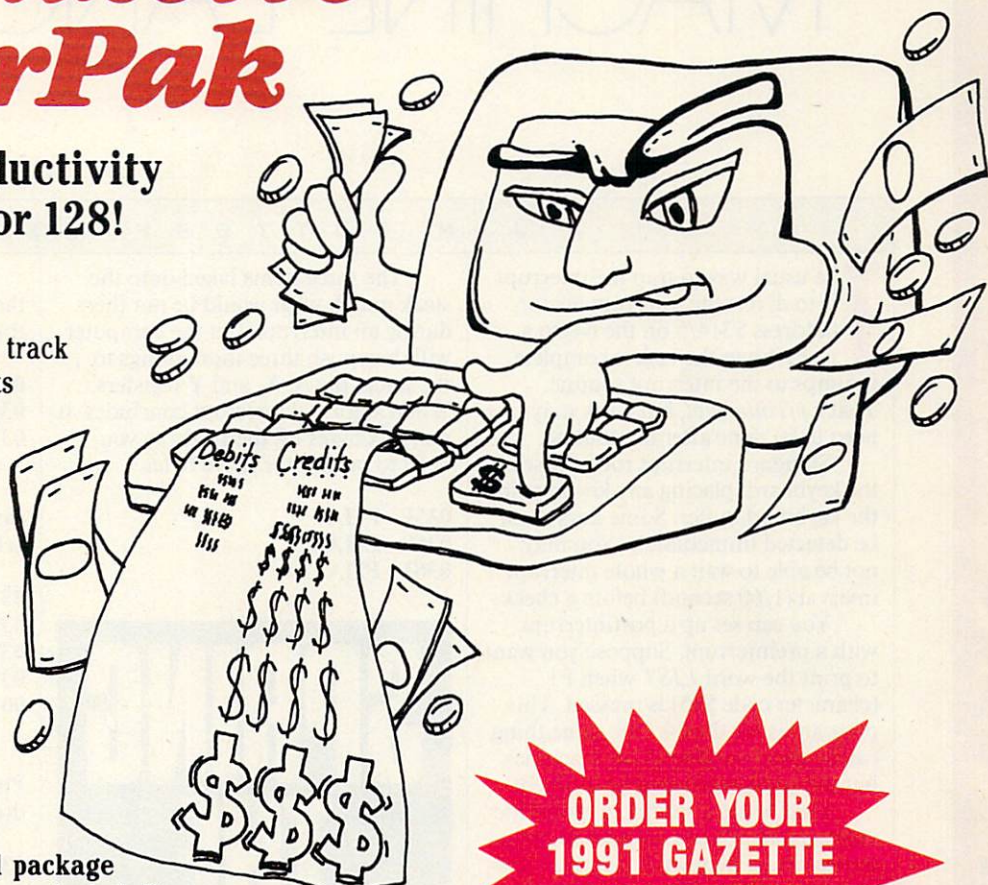
Classrooms, too, are under construction where the walls become the world. Students can watch wall-sized video projections of computer graphics and laser video and hear powerful micro-speakers recreate a moon launch, a civil rights march, a nuclear explosion, or a simulated voyage inside a DNA molecule. If your entire room is a computer vehicle, then you're inside a *Starship Enterprise* that can take you, via your senses and your imagination, to any place or any time. Classroom learning would no longer be a dry and dreary affair. Instead, you'd be an explorer, an eyewitness reporter, an adventurer. What you'd learn would seem so real, you'd swear you were there! □

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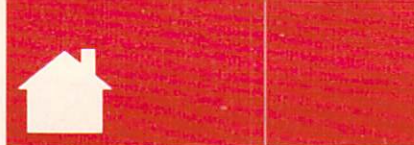
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MACHINE LANGUAGE

J I M B U T T E R F I E L D

The usual way to trap the interrupt is to divert the interrupt vector (address \$314/5 on the 64) to a task. When the task is complete, it jumps to the interrupt routine. That's *preinterrupt*, but work may need to be done after the routine.

Standard interrupt routines scan the keyboard, placing any keypress in the keyboard buffer. Some keys must be detected immediately. You may not be able to wait a whole interrupt interval (1/60 second) before a check.

You can set up a postinterrupt with a preinterrupt. Suppose you want to print the word *LIST* when F1 (character code \$85) is pressed. This program is for the 64. The same thing can be done on other 8-bit machines, but the addresses might be different.

First, write a routine to point the interrupt vector to your special preinterrupt code; then write a similar program to restore the interrupt vector, disabling the program.

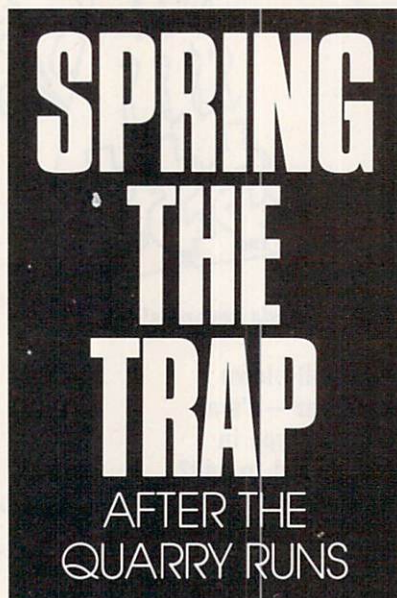
```
033C LDA #$56
033E LDX #03
0340 SEI
0341 STA $0314
0344 STX $0315
0347 CLI
0348 RTS
0349 LDA #$31
034B LDX #EA
034D SEI
034E STA $0314
0351 STX $0315
0354 CLI
0355 RTS
```

Next comes your preinterrupt program that sets up a postinterrupt. You'll fake an interrupt event on the stack to make the computer think it's executing a normal return from an interrupt: the postinterrupt program at \$0365 and a fake status register entry.

```
0356 LDA #$03
0358 PHA
0359 LDA #$65
035B PHA
035C LDA #$00
035E PHA
```

The three items faked onto the stack match what would be put there during an interrupt, but the computer will then push three more things to the stack: the A, X, and Y registers. When a normal interrupt concludes, it pulls six bytes off the stack, so you need to push three more bytes.

```
035F PHA
0360 PHA
0361 PHA
```



Now give control to the interrupt sequences (at \$EA31). When complete, that code will perform an interrupt-return sequence. Instead of returning to the interrupt point, the program will be switched to address \$0365.

```
0362 JMP $EA31
```

The code at \$0365 will be run postinterrupt. If the buffer count (held in address \$C6) isn't exactly one character, skip to the exit at \$0380.

```
0365 LDX $C6
0367 BEQ $0380
0369 DEX
036A BNE $0380
```

If the character that's detected in the keyboard buffer isn't F1, skip to the exit.

```
036C LDA $0277
036F CMP #$85
0371 BNE $0380
```

The X register has been set to 0 in earlier code, so we can copy the characters *LIST* into the keyboard buffer.

```
0373 LDA $0383,X
0376 STA $0277,X
0379 INX
037A CPX #$04
037C BNE $0373
```

The X register now contains a 4. Put this into the buffer count at address \$C6.

```
037E STX $C6
```

Now go to the ROM code in the 64 that will do the *real* interrupt exit and include the characters *LIST*.

```
0380 JMP $EA81
0383 4C 49 53 54 ; ASCII "LIST"
```

Here's the whole routine placed in a BASIC program.

```
10 REM POSTINTERRUPT DEMO
20 REM JIM BUTTERFIELD
30 DATA 169,86,162,3,120,141
40 DATA 20,3,142,21,3,88,96
50 DATA 169,49,162,234,120,141
60 DATA 20,3,142,21,3,88,96
70 DATA 169,3,72,169,101,72
80 DATA 169,0,72,72,72,72,76
90 DATA 49,234,166,198,240,23
100 DATA 202,208,20,173,119,2
110 DATA 201,133,208,13,189
120 DATA 131,3,157,119,2,232
130 DATA 224,4,208,245,134,198
140 DATA 76,129,234,76,73,83
150 DATA 84
200 FOR J=828 TO 902
210 READ X
220 T=T+X
230 POKE J,X
240 NEXT J
250 IF T<>8211 THEN STOP
300 PRINT "TO ENERGIZE F1:"
310 PRINT "SYS 828"
320 PRINT "TO RESTORE:"
330 PRINT "SYS 841" □
```



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BEGINNER BASIC

L A R R Y C O T T O N

Let's take a new look at how to handle BASIC's multidimensional arrays. As you may recall from an earlier column, an array is a flexible way of expressing and manipulating variables. I compared multidimensional arrays to pigeonholes, where numbers which represent colors or names or musical pitches can be stored, ready to use.

We'll begin a program with which you'll be able to point to a name in a directory of up to 22 names and then press Return to get the computer to actually dial your telephone for you! (The program works only with telephones that generate the 12 standard tone-dialing frequency pairs, such as AT & T's touch-tone.)

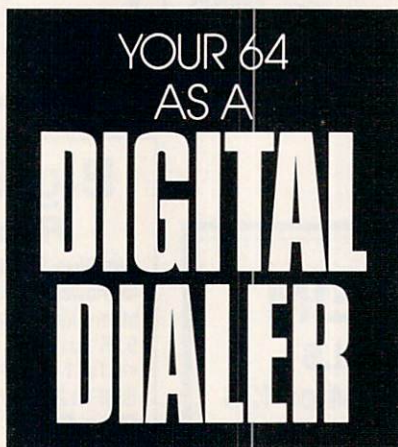
On a touch-tone telephone's keypad, each number key, when pressed, generates two accurately controlled tones. We can generate those same tones on the 64 by poking musical pitch values to each of the two frequency-control registers for the computer's first two voices. (See Figure 1.)

For example, when keypad 5 has been pressed, two tones with frequencies 770 and 1336 Hz (cycles per second) are "played" simultaneously by the phone. Equipment at the telephone company's central office decodes these tones and dials the phone you're calling.

These tones can be generated on the talented 64 by poking the numbers 87 and 49 into voice 1's frequency control registers and 156 and 85 into

voice 2's frequency control registers.

Where did these pokable values come from? As we've seen in previous columns, any tone—within limits—can be produced on the 64 as long as we know its decimal value. Appendix E of the *Programmer's Reference Guide* lists the decimal values (and pokable numbers) for a wide range of equal-tempered musical pitches, such as those produced by a piano.



Touch-tone frequencies, based on an internationally accepted standard, don't coincide with standard musical pitches. After a little detective work, I came up with a constant (slightly more accurate than recommended in the *Programmer's Reference Guide*) to calculate the decimal value for any musical frequency.

DECIMAL VALUE = FREQ IN HERTZ / .0609593

Round the result to the nearest whole number. The decimal value is then converted to pokable values as follows:

SECOND POKABLE VALUE = INT(DECIMAL VALUE / 256)

FIRST POKABLE VALUE = DECIMAL VALUE - SECOND VALUE * 256

Continuing with our example, we convert 770 to the decimal value 12,631 by dividing it by the constant .0609593 and rounding. Next, we convert 12,631 to pokable values 49 and 87 by first dividing it by 256 and then dropping the remainder, resulting in 49. Then we multiply 49 by 256 to get 12,544, which we subtract from 12,631, yielding 87. Likewise, 1,336 is converted to decimal number 21,916, then converted to pokable values 85 and 156. These numbers are reversed in the table because of the order in which they're poked.

We begin the program by setting up the screen with blue printing on a white background.

```
10 PRINTCHR$(147):POKE646,6:POKE53280,1:POKE53281,1
```

Next, we dimension two arrays to correspond to the number of names the program can handle and the number of digits in the longest phone number.

```
20 DIMNU$(22),DS$(14)
```

NU\$() will be the telephone number in string format. We'll use the first two of the 64's three voices to generate the tones. Define their frequency registers.

```
30 F(1)=54272:F(2)=54273:F(3)=54279:F(4)=54280
```

Define the memory registers that turn voices 1 and 2 on and off.

Figure 1.

Keypad Number	Frequency (Hertz)	Decimal Equivalents	Poke into Voice 1		Poke into Voice 2	
1	697 and 1209	11434 and 19833	170	44	121	77
2	697 and 1336	11434 and 21916	170	44	156	85
3	697 and 1477	11434 and 24229	170	44	165	94
4	770 and 1209	12631 and 19833	87	49	121	77
5	770 and 1336	12631 and 21916	87	49	156	85
6	770 and 1477	12631 and 24229	87	49	165	94
7	852 and 1209	13977 and 19833	153	54	121	77
8	852 and 1336	13977 and 21916	153	54	156	85
9	852 and 1477	13977 and 24229	153	54	165	94
0	941 and 1336	15437 and 21916	77	60	156	85

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40 G=54276:H=54283

The square waveform simulates the phone's dialing sounds. Define two constants to turn that waveform on and off.

50 VN=65:VF=64

Clear the sound chip, turn up the volume, and define the shape of the square wave.

60 FORL=54272TO54295:POKEL,0:NEXT
70 POKE54296,15 80 POKE54275,8:POKE54282,8

The envelope (how fast a sound begins and ends, among other things) was chosen by trial and error to emulate the sounds produced by a telephone.

90 POKE54277,20:POKE54284,20
100 POKE54278,192:POKE54285,192

Now for the tricky part. We'll fill a two-dimensional array with the pokable values from the chart above. The telephone keypad itself can help us fill the array: All of the three keys on any horizontal row share a common frequency, and all of the three keys on any vertical column share another common frequency. For example, the 1, 2, and 3 keys share frequency 697; the 1, 4, and 7 keys share frequency 1209.

Let's do the keypad rows first. Since phone keys 1, 2, and 3 share the first two pokable values 44 and 170, we can use a FOR-NEXT loop to simplify loading the array with charted values. N is the keypad number.

120 FORN=1TO3:W(1,N)=170:W(2,N)=44:NEXT

The two frequency-control registers for voice 1 are represented by the 1 and 2 inside the parentheses. After the FOR-NEXT loop has run, W(1,1), W(1,2), and W(1,3) will contain 170; W(2,1), W(2,2), and W(2,3) will contain 44.

Keys 4 through 9 are loaded similarly, but with another frequency.

130 FORN=4TO6:W(1,N)=87:W(2,N)=49:NEXT

140 FORN=7TO9:W(1,N)=153:W(2,N)=54:NEXT

The 0 key is a special case.

150 W(1,0)=77:W(2,0)=60

Now we'll load the frequencies that correspond to the columns of keypad numbers. The first column contains the keys 1, 4, and 7. Use STEP3 in the FOR-NEXT loop.

160 FORN=1TO7STEP3:W(3,N)=121:W(4,N)=77:
NEXT

The 3 and 4 inside the parentheses represent the third and fourth frequency-control values—the ones that control voice 2. The second and third keypad columns' frequency values are loaded into the array next.

170 FORN=2TO8STEP3:W(3,N)=156:W(4,N)=85:
NEXT

180 FORN=3TO9STEP3:W(3,N)=165:W(4,N)=94:
NEXT

Again, the 0 is a special case.

190 W(3,0)=156:W(4,0)=85

Figure 2 is a picture of the two-dimensional array, all loaded with pokable values.

Figure 2.

		W(1,1)	W(2,1)	W(3,1)	W(4,1)
Keypad No.	1	170	44	121	77
	2	170	44	156	85
	3	170	44	165	94
	4	87	49	121	77
	5	87	49	156	85
	6	87	49	165	94
	7	153	54	121	77
	8	153	54	156	85
	9	153	54	165	94
	0	77	60	156	85
		W(1,0)	To Voice 1	To Voice 2	W(4,0)

That's all we have space for this month. Next month we'll create the directory and dial the phone. □

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PROGRAMMER'S PAGE

R A N D Y T H O M P S O N

Did you know that the 64 doesn't care whether a number or a string is put between the parentheses in a PEEK function? Did you know that the test IF \$\$ will *not* produce a syntax error? Did you know that the INPUT statement can be used without an accompanying input variable?

Yes, it's time for more weird computer facts. All the following tips are not useful, but they are unusual.

DIM-Witted Programs

Did you know that you can dimension nonarray variables? The command DIM X, for example, is perfectly legal. So is DIM \$\$\$. In fact, you can sprinkle DIM X and DIM \$\$\$ all throughout your program without risking a REDIM'D error. The DIM statement doesn't affect the value of the variable being dimensioned.

Although it may appear as if nothing happens when you dimension a nonarray variable, BASIC does perform some elementary recordkeeping duties the first time a variable is used in a DIM statement (or any other statement, for that matter). Commodore BASIC keeps track of variable names and values using a table that's located just above the BASIC workspace. Every time you use a variable, BASIC searches this table for the specified variable. When BASIC can't find an entry for a variable, it creates one. This happens whenever a variable is referenced for the first time. So by placing the command DIM X as the first line in your program, you force BASIC to make room for the variable X in memory. Of course, you could just as easily use the command X = 0 to get the same results.

Now the obvious question: Why would you want to use DIM on anything other than arrays? There really is no good reason—unless your goal is to confuse anyone who might be peeking at your program listing.

REMLess Remarks

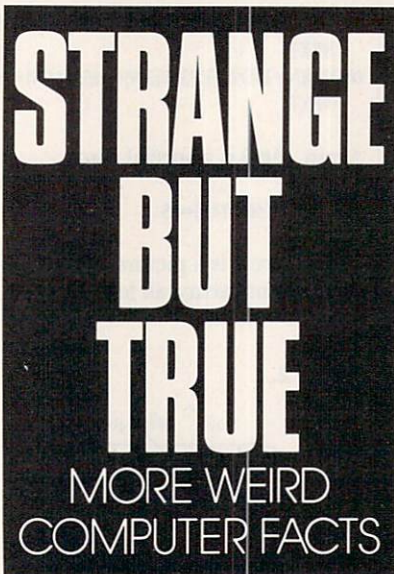
Not all program remarks have to be preceded by a REM statement. For example, you can type anything you

want after a GOTO command. Try it—BASIC won't mind. This little quirk comes in quite useful for inserting short comments about the destination of the preceding GOTO statement. For example,

90 GOTO 210 -> JUMP TO PRINT ROUTINE

makes for quite readable code.

The reason this works is simply because BASIC is never given the opportunity to evaluate the characters that follow a GOTO statement. For the same reason, you can dedicate an



entire BASIC line as a REMless remark as long as that line is never executed by the program. A good example of this would be a subroutine where the initial remarks appear in program lines that are skipped by the calling GOSUB statements.

Missing Parameter

The MID\$ function requires three parameters, or does it? Without the third parameter, MID\$ returns all the characters to the right of, and including, the character specified by the second parameter. In the example

```
LN$ = MID$("WALTER HEGO",7)
```

LN\$ is set equal to the last name HEGO.

This shortened version of MID\$ is useful when you want to perform a RIGHT\$ and know only where in the string the characters begin, not how many characters you need.

Dead End

You've heard of the CONT statement: You use it to restart a BASIC program after a STOP command or after you've hit Run/Stop. As you might expect, CONT was designed to work from immediate mode only (that is, from the READY prompt). Surprisingly, you *can* use CONT from within a program, if you want to.

When used within a program, CONT is what you might call a *dead end* command. As soon as BASIC encounters this statement, the program hangs. It's the same as if you ran the line 10 GOTO 10. You can still press Run/Stop to abort the program, but if you then enter CONT to continue running it, your program will go right back into its blind alley.

Commodore Slang

If you learned BASIC by taking a class or reading a book, you probably use a lot of IF-THEN statements that look like this:

```
100 IF YN$="Y" THEN GOTO 10
```

There's an easier way to do this on the 64 and 128, however: Simply remove the THEN.

```
100 IF YN$="Y" GOTO 10
```

Or, if you prefer, put THEN back in and remove the GOTO. Now we're left with the following:

```
100 IF YN$="Y" THEN 10
```

By using one of the contracted forms of IF-THEN, your program is made shorter and slightly faster. □



PROGRAMS

D A N N Y E N G L I S H

The crew of the *Starship Explorer* has been stranded on a distant planet, and you're in charge of a rescue mission. You must pilot your ship beneath the planet's surface, through an underground alien stronghold. Try to rescue all nine crew members as you dodge lasers, crushers, and force fields.

That's only half the danger, however; you'll also have to deal with the aliens. You won't be able to find all the men and win the game until you've met the mother alien.

Getting Started

Stronghold is written entirely in machine language, so you'll need to use *MLX*, our machine language entry program, to type it in (see "Typing Aids" elsewhere in this section). When *MLX* prompts you, respond with the values given below.

Starting address: 0801

Ending address: 1D00

Although *Stronghold* is written in machine language, it loads and runs like a BASIC program. When you're ready to play, plug a joystick into port 2, load the program, and type RUN. The title and a list of options should appear in a few seconds.

The Options

Play options are displayed on the title screen. The first one allows you to choose normal, high, or low gravity. If you're a beginner, low gravity is recommended; for more of a challenge, try high gravity. Press f1 to change gravity conditions.

The second option is to choose the number of aliens you'll encounter; press f3 to make your selection. You can choose normal, fewer, or many aliens. You should choose fewer aliens until you gain more experience as a pilot.

After all the options have been set, you must press the fire button to start the game. At any time during the game, you can press f5 to pause and f7 to quit and start a new game.

The Fortress

You begin the game with four pilots. You'll lose one pilot every time you crash, and you'll restart from the beginning or from the last platform you landed on. Every 1000 points, you'll be awarded a bonus pilot. When all of your pilots have been lost, the game is over. Press the fire button at this point if you want to begin a new game.

STRONGHOLD
THIS RESCUE GAME
FOR THE 64 TAKES
YOU THROUGH
DANGEROUS
CAVERNS ON AN
ALIEN WORLD.
JOYSTICK REQUIRED.

The stronghold is a made up of two levels with 32 screens on each level. You must navigate through many tunnels and caverns and over rocky terrain. Maneuver your ship in all directions by using the joystick. Press the fire button to shoot.

When you fly to the edge of one screen, the next screen will appear. As you explore the stronghold, you'll encounter many objects. Some of these will be white platforms. These are the only places where you can land your ship. As explained earlier, it's a good idea to land on these from time to time as you move deeper into the fortress.

You'll also encounter lasers and crushers, which, respectively, fire and open and close at regular intervals. Watch their timing to pass by safely.

You'll also find colored security boxes. To take advantage of these color codes, gently touch the box with your ship. You'll notice a security dis-

play at the lower right side of your screen. This indicates your security clearance. Many times during the game, you'll find that your path is blocked by a colored security barrier. You may pass through a barrier only when the color of your security clearance matches that of the barrier. If you do not have the proper security clearance, you must search for a security box of that color.

The stranded crew members are scattered throughout the two levels of the stronghold. When you locate a man, gently touch him with your ship, and he'll be rescued. In the lower center of the screen, a display shows how many men are yet to be rescued. A rescued man gives you 250 points. If you accidentally shoot a man, no points will be awarded.

Sooner or later, you'll discover an alien that resembles a jellyfish digging through the ground beneath you. It may enter your cavern. If you shoot the alien, it will collapse and die, and you'll be awarded 50 points.

The Ice Stronghold

Complete the first level, and you'll enter the ice stronghold. Here, the graphics become more detailed and the maze of catacombs more complex. When you enter this level, your security clearance is reset. When you leave the ice level, it will be restored to its original color.

The ice level is very difficult to complete. The passageways are narrow, and the men are lost deep in the ice caves. When you've found all six security codes, you'll reach the final screen and possibly find the wreck of the *Starship Explorer*. The huge mother alien will be moving from side to side, guarding the last man. It will require careful timing to avoid her. You may find that violence is not always called for when dealing with aliens.

By this time, if you haven't located all nine men, you must go back and search for the rest. Once you've rescued them, fly back to the start of the first level and land on the platform to win the game. >



PROGRAMS

STRONGHOLD

```

0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 96
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 EF 85 2D A9 26 85 DF
0839:2E 4C 00 01 15 60 01 EF 9F
0841:26 73 1B B9 6E 09 99 EF 8F
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 F5 65 A6 85 F7 5F
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 0B 20 34 BF
08D1:03 E6 A7 4C 5C 01 E8 20 AF
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 D0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
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0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 72
0959:A9 F0 0A B1 F7 C6 ED C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 8B 08 73
0971:0A 00 9E 32 30 38 38 00 52
0979:26 08 14 00 8F 20 44 41 E9
0981:4E 4E 59 20 31 31 2F 39 61
0989:1B 7C E4 20 20 20 20 20 C8
0991:20 E8 CF 0C 08 6A 85 FB 99
0999:69 85 85 25 A9 1E 85 FC 92
09A1:69 08 85 26 18 A9 EA 9F 5A
09A9:FB 85 27 A9 3C 65 FC 85 91
09B1:28 A2 FF C8 FD 01 08 8C 9D
09B9:02 08 F0 04 B1 25 91 27 99
09C1:C6 25 E4 25 4B F4 83 26 CA
09C9:C6 27 E4 27 D0 02 C6 28 5C
09D1:C6 FB E4 FB D0 E6 C6 FC 4F
09D9:E4 FC D0 E0 A5 28 C9 A0 C7
09E1:B0 0A 85 34 85 38 A5 27 42
09E9:85 33 85 37 4C BC 52 A2 4C
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09F9:59 20 F9 C1 50 B1 8F 6A EE
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0A09:9F 28 05 1F 01 19 89 65 6E
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0A19:A9 55 3F FF E8 00 1C 23 9D
0A21:C6 E3 20 04 48 8D 87 40 91
0A29:21 EE D0 A0 E4 97 F8 44 69
0A31:7D 78 C0 07 C9 A3 25 C3 95
0A39:FF C7 24 C6 03 21 8E 90 7A
0A41:42 A0 05 41 1E B1 70 E1 CD
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0A69:A2 33 28 03 08 8F 0B CD 33
0A71:56 23 04 02 85 15 55 B0 F5
0A79:16 21 B0 00 0B 14 11 C5 87
0A81:42 C6 15 38 14 08 02 4D A0
0A89:4E 21 50 A8 08 88 50 31 D5
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0AA9:22 68 23 A2 84 22 08 67 9B
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0ACL:80 40 80 80 20 C0 80 C0 04
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0AE1:11 E3 B1 90 E1 51 10 87 B2
0AE9:40 21 20 D0 08 30 08 FC 85
0AF1:81 78 00 80 7C FF FF BC 06
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0B19:40 21 7A AA AD 7F FF FD FA
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0C39:08 CA E7 DB 0A 0B CF 8D 6C
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0C49:12 D4 F2 D4 4B B0 80 A1 0B
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0C69:06 08 8C FA E4 38 14 1E B5
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0CD9:86 DC 8D 05 C0 AA 8A 29 5D
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0CE9:22 E9 04 20 96 62 C0 1C EB
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0CF9:88 99 85 40 C0 44 1C FF C0
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0D91:1B 77 83 C3 A6 A2 1E CA 8A
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0DD9:EE 96 AD 02 00 4D 90 38 75
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0DF9:AD 83 25 00 69 01 53 62 C8
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0E29:C9 60 98 AA 20 3C 42 8A 01
0E31:A8 E2 F0 35 C0 C9 09 88 93
0E39:8A B2 DD AA 4C 0E 44 92 63
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0EB9:4C 46 44 A9 06 D1 0B F1 30
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0EC9:F5 60 05 75 05 46 CB 1C E5
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0ED9:42 97 E3 47 20 98 6B 6F 9F
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0EE9:40 DB 80 11 9E 4B E1 C2 E6
0EF1:23 E2 C2 4F 50 EB 0E 1A 0E
0EF9:BE 17 1E 68 50 93 81 9E EF
0F01:11 31 23 31 9F CD 13 56 1C
0F09:49 54 59 C8 98 38 16 21 8B

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G A Z E T T E C O M M O D O R E 6 4 / 1 2 8



PROGRAMS

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0F21:9F	B9	49	90	4D	53	3A	1A	F5	1181:5E	07	75	0C	64	04	00	FF	37	13E1:51	0A	13	B5	8C	89	E2	A5	E6
0F29:1F	91	03	46	45	57	53	D8	07	1189:9A	C1	8D	18	03	4C	12	52	E3	13E9:0B	79	22	69	60	D3	76	18	26
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0F69:38	36	2A	E0	02	CE	20	2E	3E	11C9:82	80	05	28	51	14	EE	06	2F	1429:6C	FC	CC	4A	23	53	38	17	F2
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10D9:FC	9F	AD	DD	21	F9	F6	F0	03	1339:86	F8	84	F9	58	B1	FA	A6	37	1599:0D	C1	A4	82	15	11	01	0B	71
10E1:98	F6	86	14	A9	C7	64	F1	06	1341:F8	4A	F9	20	9E	4A	46	9C	95	15A1:A3	03	13	60	AA	20	63	A1	05
10E9:60	35	86	D8	45	C9	41	90	4A	1349:F8	69	0A	85	F8	A5	F9	01	33	15A9:23	59	C8	28	C8	07	4E	20	76
10F1:03	38	E9	40	A2	38	06	81	66	1351:38	43	F9	18	A5	FA	69	01	12	15B1:31	4E	4C	0F	E0	3C	C0	27	



PROGRAMS

G A Z E T T E COMMODORE 64/128

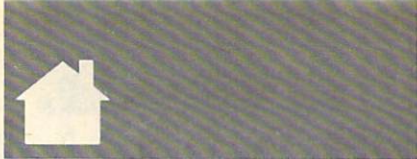
1631:E9 D2 05 CF CE 0A 43 8A 54
 1639:4E A9 40 20 7D 34 01 9E 5E
 1641:F8 84 EE E9 0C 52 4B 85 4D
 1649:10 01 0F A2 00 8E 82 25 2E
 1651:86 50 60 EE A2 87 82 01 09
 1659:46 04 1A 84 60 A9 08 8D 7C
 1661:20 CF AD 1F 86 97 02 F0 C0
 1669:1C 98 3B 88 01 01 F0 11 B8
 1671:53 0D 6B A4 09 1A AD 05 53
 1679:60 CE 05 D0 B6 CD 41 26 CC
 1681:41 A1 20 01 B0 0D 85 0C 9B
 1689:E9 3A 6E AD 45 CD 0A CF 27
 1691:F0 05 B0 03 0C 78 71 D1 B4
 1699:2C D4 08 00 0A 07 0B D0 65
 16A1:A2 14 4C 4E 77 AD 1E 68 A9
 16A9:41 F0 4F C9 81 F0 21 C9 15
 16B1:21 F0 D2 C9 11 F0 61 C9 7A
 16B9:12 F0 48 C9 09 F0 3E C5 1F
 16C1:05 AF 0C 3D C9 05 F0 A2 98
 16C9:C9 22 F0 A4 C9 0A F0 AB CF
 16D1:60 AD A2 47 C9 F0 10 5F F3
 16D9:8D E7 DB A2 64 CB 93 F0 D6
 16E1:F3 D0 AD 0B CF 80 0D AE EB
 16E9:18 CF E0 20 B0 04 21 B8 C4
 16F1:41 60 98 82 10 5A 5D 51 08
 16F9:4C 9D 50 4C A8 C0 53 20 91
 1701:E3 C3 A0 04 B8 A6 A2 C8 6B
 1709:20 83 8C FF 8D FC B3 1F A0
 1711:20 08 12 22 09 09 82 50 77
 1719:A9 FA 4C 53 22 AC 17 E2 6E
 1721:01 99 0C CF 41 9E CE 46 1D
 1729:AD 40 06 20 A0 02 4C 05 AB
 1731:44 AD 19 07 77 87 5A B0 BF
 1739:B9 4F A2 01 20 E0 43 A9 31
 1741:F5 8D FA 2F B9 50 A5 F0 6B
 1749:C4 04 23 05 20 58 CF A9 3B
 1751:32 20 AB 60 A9 B6 43 4C 17
 1759:26 42 A9 79 80 0F A9 0A 95
 1761:8D 27 95 12 02 C2 20 48 97
 1769:4A A9 96 D1 3E 14 02 45 A2
 1771:44 46 02 64 14 0C 19 19 F5
 1779:40 EE D1 30 82 5A 89 CE 20
 1781:68 22 A9 0C 8D E6 90 0F 97
 1789:8D 25 D0 00 35 36 6E 31 72
 1791:51 B2 8A 80 9F 51 A9 27 2B
 1799:03 A9 00 20 FB 72 4C 62 5A
 17A1:52 AD FF 9F C9 81 BB 80 AA
 17A9:CE 82 08 AD 48 C9 2F 02 85
 17B1:09 30 8D DB 07 A9 E8 8D 1E
 17B9:67 F0 5E 20 0F 48 33 DC 82
 17C1:29 10 C9 00 D0 F7 01 4E 78
 17C9:AD 0D D0 18 69 06 8D 5B 87
 17D1:70 0D AD 01 DE AD 04 2A 21
 17D9:00 62 AD F1 8D 97 60 AD AE
 17E1:00 2A 00 60 AD 01 52 84 3B
 17E9:DF 01 26 A8 20 21 4A AD 5F
 17F1:D4 C9 04 A4 83 AD D1 07 45
 17F9:C9 30 56 AD 4C 2D 48 8B F1
 1801:03 6A 04 07 44 06 40 04 FC
 1809:02 44 08 40 04 1C 44 09 72
 1811:40 04 17 44 19 1C 04 21 7C
 1819:44 1B 40 04 1D 44 1E 40 F0
 1821:04 1F 44 2A 40 04 2B 44 F2
 1829:2C 40 AA 2D CF 60 4C 22 62
 1831:F0 05 6B A4 19 19 81 8B 8E
 1839:EE 1C 05 A0 06 D0 F2 E8 D4
 1841:2A 8A 10 80 4C 10 C9 63 CC
 1849:A6 B1 A5 C5 09 03 F0 01 87
 1851:60 E0 3C 15 CD 10 D0 02 15
 1859:19 80 20 9F 51 8D 20 D5 0B
 1861:21 D0 23 60 99 0C CF C8 26
 1869:C0 09 D0 F8 A9 04 E3 4F 5A
 1871:8D 4D 20 58 40 A0 7F A2 6B
 1879:E0 8C 92 F0 19 8E 9A 69 7E
 1881:84 8D 31 20 A9 8E 8D 0B 31
 1889:82 A4 1A 46 2E 40 04 2F 75

1891:E4 30 CF A9 0B 8D 86 02 72
 1899:A9 93 20 D2 04 B9 1A 8B 7B
 18A1:08 3C 42 20 C5 E1 50 42 C7
 18A9:AE 25 CF AC 26 CF 8E 04 D0
 18B1:CF 8C 05 CF AD 29 91 74 34
 18B9:04 18 CF 20 52 4B AD 27 30
 18C1:E0 05 00 D0 AD 28 CF 8D EB
 18C9:01 D0 A9 FF C6 3D A9 00 62
 18D1:8D 1E D0 8D 1F D0 20 D4 94
 18D9:3A 5E AE 4D 20 68 43 20 B2
 18E1:48 00 5C A1 41 20 DC 42 62
 18E9:A9 02 20 4A 40 20 F4 40 C4
 18F1:B9 86 4F 20 D8 51 4C 99 CA
 18F9:52 FF 00 FF 00 72 08 50 7D
 1901:85 FB 69 19 85 25 A9 07 CE
 1909:85 FC 69 53 85 26 18 A9 3E
 1911:BC 65 FB 85 27 A9 7F 65 11
 1919:FC 85 28 A2 FF A0 00 8C 69
 1921:A7 02 8C A8 02 F0 04 B1 51
 1929:25 91 27 C6 25 E4 25 30 DA
 1931:FC 41 26 C6 27 E4 27 D0 4F
 1939:02 C6 28 C6 FB E4 FB D0 CB
 1941:E6 C6 FC EA FC D0 E0 A5 19
 1949:28 C9 A0 B0 EA 35 34 85 75
 1951:38 A5 27 85 33 85 37 4C B0
 1959:00 40 02 53 78 8B 0C 91 AC
 1961:60 4C 80 43 0B 8E 41 30 60
 1969:5E 83 07 07 87 B2 01 B9
 1971:08 D2 D4 83 35 30 3A E2 F0
 1979:78 00 49 60 DC 09 8E DE 1E
 1981:0C EA 62 E2 8E B9 3A DE 9D
 1989:E2 78 02 1C 33 45 0B 80 92
 1991:78 40 03 38 C3 8E 39 10 CE
 1999:21 20 EE 0A 50 C0 F1 1A 66
 19A1:0D 85 E2 29 C3 26 63 0C 2E
 19A9:74 F8 76 78 FC 76 78 28 85
 19B1:00 83 21 C3 21 8E 8F 3A C1
 19B9:7E 41 70 C4 A1 14 8C 47 93
 19C1:D8 31 1B 0C 0F 36 C0 41 26
 19C9:3F 87 50 1C F9 01 08 5B 88
 19D1:35 0A 42 16 62 23 8E 4B D2
 19D9:10 92 0A 0B A1 1C 36 9E 33
 19E1:A1 31 00 6D 70 0D 39 1E 50
 19E9:EA 30 03 C6 02 88 C9 39 69
 19F1:22 0B 86 0C 8D 38 A4 82 A2
 19F9:21 17 38 1E 7E 70 2C 18 15
 1A01:E6 A0 88 1D BE 73 DC 07 38
 1A09:EE 4C 03 23 D0 36 32 5C B6
 1A11:E3 88 CC D8 04 34 D0 E1 F4
 1A19:02 2A 81 F0 02 3A 7C E3 ED
 1A21:E0 2B 64 E7 F8 07 1C 78 30
 1A29:20 6E A0 E1 97 71 90 F1 D0
 1A31:0E 3A 30 22 C7 18 30 DE 01
 1A39:2B 3C 14 60 7F 8E A5 82 9E
 1A41:05 C4 EA 06 77 D1 3D 47 AB
 1A49:43 1C DA 1B 1A 19 0D 01 83
 1A51:39 0C B0 00 83 D0 78 C8 54
 1A59:C0 81 87 62 6F 8E 87 0D 37
 1A61:BF 42 A0 78 03 47 10 6F 66
 1A69:0B 39 03 0A 32 90 71 B7 E0
 1A71:41 91 31 9A A1 90 F1 93 41
 1A79:41 B9 01 78 08 CF 40 C6 2B
 1A81:5E 06 8E 5D F1 10 C7 40 AD
 1A89:C6 00 1C 04 36 01 D0 00 3C
 1A91:13 90 63 01 1A CF 71 5C 3F
 1A99:C5 F1 57 07 52 0C 13 0A 7B
 1AA1:0B 40 3D 19 7F A0 59 0C E1
 1AA9:02 05 05 74 30 0B B2 00 1B
 1AB1:AF 15 1E ED 05 4C 06 E8 F3
 1AB9:1C 94 71 9C C4 06 73 5B 99
 1ACL:C7 D3 C6 E8 C6 E5 06 50 60
 1AC9:C6 41 C6 0B 78 DD E1 90 CA
 1AD1:F1 3A C7 41 06 06 01 11 F5
 1AD9:1D 14 67 C5 C3 1C 27 F0 B8
 1AE1:70 E1 E1 51 3C 14 0E 70 D6
 1AE9:95 11 09 09 40 0F F0 57 56

1AF1:30 14 3A 30 00 56 F0 17 DF
 1AF9:C7 5D 06 C4 1C 37 19 0F 75
 1B01:19 1E 28 85 49 C6 53 1C D0
 1B09:1A 04 0D 01 86 3C C4 B1 5F
 1B11:53 10 64 3C 04 34 0F 75 C9
 1B19:B8 02 04 04 04 09 B4 2E C8
 1B21:1B 03 02 0A 01 01 28 0A EC
 1B29:0B 09 60 01 06 52 09 18 E6
 1B31:01 39 0D 09 C2 50 18 00 EF
 1B39:43 C6 08 08 00 0D 0C 0C 9C
 1B41:01 58 02 02 02 12 88 7D 55
 1B49:85 82 C8 9C 99 89 B9 96 C2
 1B51:60 98 80 F4 2B 80 8A 69 17
 1B59:B8 55 BA 96 1A 30 90 84 39
 1B61:E8 A9 1E 9A A9 E9 3F 00 57
 1B69:BF AF B6 A5 D0 30 FE FA DC
 1B71:D0 42 5A A5 A5 A5 AF BF 29
 1B79:7D 5A 5A 5A 5A FE 00 C9
 1B81:00 59 59 69 65 55 64 5F
 1B89:54 18 18 14 2C D0 76 10 D5
 1B91:30 30 14 A5 4C F4 05 50 59
 1B99:2B 80 00 90 98 28 AE 6D BE
 1BA1:29 B8 00 01 06 10 01 29 46
 1BA9:E6 84 96 20 F8 86 DC 10 F4
 1BB1:10 60 4C 22 23 04 10 06 03
 1BB9:02 03 2A FC A0 46 DD DD 7B
 1BC1:00 15 42 CF A3 22 18 19 71
 1BC9:D0 51 54 CC 11 51 08 84 76
 1BD1:D0 4F 68 7E 0B 01 98 07 CD
 1BD9:01 91 F1 05 4F 86 01 4D 67
 1BE1:0C 1D 30 0A 0A C8 8C D9 72
 1BE9:0D 53 68 E0 C1 4E 94 C7 CE
 1BF1:01 64 6D D4 14 05 19 01 A4
 1BF9:4E 4F 4F C6 B5 B1 BD E4 56
 1C01:21 00 DF C5 4C A1 84 4E 62
 1C09:37 27 75 4C A4 71 06 C2 D4
 1C11:0D 72 4C 41 48 0E 08 D6 6B
 1C19:8D A3 4F 9C 84 3B 8C A0 7F
 1C21:4F F3 5A 0C 64 BC 14 39 81
 1C29:85 C5 41 4E 03 78 C0 C4 E2
 1C31:43 4E 43 83 14 44 34 02 5B
 1C39:45 46 95 03 14 14 02 42 BF
 1C41:47 48 56 50 8C 65 44 14 95
 1C49:76 19 62 05 5D 46 14 4C 18
 1C51:41 57 44 A3 06 07 4A 22 C5
 1C59:4D 4E 4E D0 A5 40 C8 23 85
 1C61:01 38 1E 07 1B 76 4D F2 9C
 1C69:5B B4 65 54 14 09 90 9B EF
 1C71:01 06 35 A0 53 08 00 01 18
 1C79:88 41 4B D1 51 E1 B1 9B DD
 1C81:E2 41 B0 11 50 50 50 60 67
 1C89:60 45 00 04 42 08 58 A1 08
 1C91:73 C7 42 1D 1D 19 49 30 9F
 1C99:12 41 42 43 42 A7 05 5C BE
 1CA1:41 4D 01 E4 F5 14 2F B0 4B
 1CA9:41 20 03 4C 4D A4 44 4C 81
 1CB1:4C 62 57 4D F7 34 CD 4C EC
 1CB9:93 10 07 44 1C 39 19 10 EC
 1CC1:41 4C 74 00 2C 4D F2 43 FB
 1CC9:44 43 4D 4E 4D 4C 41 58 F9
 1CD1:44 4D 80 3C 43 41 41 49 3E
 1CD9:44 40 13 4B 9A 01 4B 20 EA
 1CE1:12 49 49 A0 03 49 39 28 80
 1CE9:04 4A 44 A0 4A 79 08 F1 83
 1CF1:38 AB 63 20 23 20 FF B8
 1CF9:C0 00 00 00 00 00 00 92

Coming Next Month . . .

Commodore graphics guru Paul Hughes takes readers on a roundup of some of the exciting drawing and painting programs available for the 64. We'll also look at video digitizers.



PROGRAMS

K E I T H G R O C E

Devices to time and activate alarms for multiple events can be costly. Why buy one when your 64 can do the job, plus provide features to make things even easier?

AlarmCALC can monitor up to five events, each with different starting and stopping times. These times are displayed in a table along with the duration of each event. This program is a useful timer for general use, such as cooking or photographic processing.

The display table also contains a memo area where text may be entered to describe or name each event. Alarms can be enabled for the starting and/or stopping time for any event. Each alarm is announced by a bell and/or the flashing memo.

Getting Started

AlarmCALC consists of a BASIC program and a machine language subroutine. To help eliminate typing errors, enter the BASIC program with *The Automatic Proofreader* and the machine language program with *MLX* (see "Typing Aids" elsewhere in this section). When *MLX* prompts you, respond with the values given below.

Starting address: C083

Ending address: C47A

The BASIC program loads the machine language program, so be sure to save the latter with the filename *ALARMCALC.ML*.

Using AlarmCALC

When you load and run *AlarmCALC*, you'll be asked to enter the current time. Enter the time in HH,MM,AM/PM format. For example, 10:35 in the evening would be entered as 10,35,PM. After the time has been entered, a table of alarm settings and memos will appear. The active cell in the table is highlighted in light green. Use the cursor keys to move the highlight.

Any of the three categories for an event (starting time, stopping time, or time difference) can be set. Use the plus (+) or minus (-) key to change

the minutes; press the plus or minus key while holding down the Shift key to change the hours.

Enable the alarms by moving to the asterisk (*) column next to the Start or Stop times. Press the F key to enable a flashing alarm, or press the B key to enable a flashing alarm with a bell. Type any short message you want in the memo column, and in any other column, press the Q key to stop the program.



AlarmCALC automatically sets the duration of an event whenever you set the starting and stopping times. Conversely, if you enter any two events, such as a stopping time and the duration, *AlarmCALC* will automatically calculate the third event. In this case, the starting time. This allows you to enter times in the most meaningful way. For example, suppose you want to have dinner at 6:18 p.m., and your roast needs to bake for an hour and 12 minutes. You would enter 6:18 p.m. for the stopping time and 1:12 for the time of duration. The starting time would be set automatically at 5:06 p.m. Enable the Start Alarm option and make a memo, and you'll be reminded to put the roast in on time. Enable the Stop Alarm option, and you'll be reminded when to take it out.

ALARMCLAC PROGRAM 1

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```
AP 10 IFA=0THENA=1:LOAD"ALARMCALC.ML",8,1
KG 20 POKE53280,0:POKE53281,0
RB 30 TT$="{CLR}ALARMCALC (C)1991 COMPUTE PUBLICATIONS {DOWN}"
EP 40 PRINTCHR$(14);CHR$(154);TT$
FS 50 INPUT"hour,minute,am/pm";H,M,A$
DQ 60 H%=H/10:HH=H%*16+H-H%*10-128*(LEFT$(A$,1)="P"):IFH=12THENHH=164-HH
KQ 65 POKE56331,HH
EJ 70 M%=M/10:POKE56330,(M%*16+M-M%*10):POKE56329,0:POKE56328,0
PA 80 PRINTTT$:PRINTTAB(3);"USE CRSR KEYS TO MOVE HIGH LIGHT,{DOWN}"
SP 85 PRINT"Q TO QUIT/RESET, + - SHIFT TO SET TIMES {DOWN}"
GC 90 PRINTTAB(14);"{A}***** **{S}"
AM 100 PRINTTAB(14);"-00:00:00 A-"
HF 110 PRINTTAB(14);"{Z}***** **{X}"
FQ 120 PRINT"{A}*****{R}*** **{R}*****{R}***** **{S}"
RC 130 PRINT"- START *-TIME - {SPACE}STOP{2 SPACES}* - {4 SPACES}MEMO {5 SPACES}="
AC 140 PRINT"{Q}*****{R}***** **{R}***** **{W}"
RK 150 FORR=1TO9
ME 160 IF(RAND1)THENPRINT"-12:00A-X-00:00-12:00A-X- {13 SPACES}=":GOTO180
XC 170 PRINT"{Q}*****+***** **{W}"
MR 180 NEXT
GJ 190 PRINT"{Z}*****{E}*{E}* **{E}*****{E}*{E}***** **{X}{DOWN}"
CG 200 PRINT"{2 SPACES}* X=OFF , F=FLASH, B=BELL AND F LASH"
DS 210 POKE650,128:SYS49365:POKE650,0
```

ALARMCLAC PROGRAM 2

```
C083:12 20 20 20 20 20 20 20 FD
C08B:20 20 20 20 20 5F 92 00 CE
C093:43 53 63 73 83 03 03 03 60
C09B:03 03 03 03 03 03 03 00 1A
C0A3:03 02 01 00 02 01 02 00 5F
C0AB:00 01 00 00 01 00 01 0C 83
C0B3:0E 10 12 14 01 08 0A 10 10
```



PROGRAMS

C0BB:17	19	42	01	01	46	01	00	8A	C203:A4	FD	C0	05	D0	02	A9	99	3E	C34B:BD	C0	48	C8	B9	BD	C0	48	06	
C0C3:58	00	00	2B	2D	DB	DD	00	B8	C20B:20	D2	FF	BD	B2	C0	AA	A0	BF	C353:A4	FE	B9	CA	C0	A8	E0	04	3F	
C0CB:03	06	09	0C	91	12	01	11	1A	C213:19	18	20	F0	FF	A4	FB	B9	82	C35B:D0	01	C8	68	99	2D	C0	68	96	
C0D3:92	81	A2	4F	A0	3F	BD	43	09	C21B:93	C0	A0	C0	20	1E	AB	A6	32	C363:99	1E	C0	4C	2E	C2	A0	03	DC	
C0DB:C0	99	43	C0	CA	88	10	F6	28	C223:FB	E8	E0	05	90	D2	60	A9	87	C36B:D9	C6	C0	F0	04	88	10	F8	14	
C0E3:A9	00	A2	3C	9D	00	C0	CA	8B	C22B:9A	D0	02	A9	99	48	A6	FE	47	C373:60	84	FB	BD	A2	C0	85	FC	C7	
C0EB:10	FA	A9	12	A2	00	9D	0F	E9	C233:BD	B2	C0	AA	A4	FD	B9	B7	4F	C37B:8D	3C	C0	20	D2	C3	A4	FE	E0	
C0F3:C0	E8	9D	0F	C0	E8	E8	E0	11	C23B:C0	A8	18	20	F0	FF	68	20	C8	C383:B9	98	C0	C5	FC	D0	03	B9	6D	
C0FB:0F	90	F3	A2	18	9D	00	D4	DD	C243:D2	FF	A4	FE	A6	FD	E0	05	AA	C38B:9D	C0	AA	A8	B9	CA	C0	18	84	
C103:CA	10	FA	A9	2A	8D	01	D4	48	C24B:D0	08	B9	93	C0	A0	C0	4C	02	C393:65	FC	A8	B9	A6	C0	85	FC	FD	
C10B:A9	F7	8D	06	D4	A9	0F	8D	6C	C253:1E	AB	A4	FE	B9	CA	C0	A8	7A	C39B:E0	01	D0	06	A5	FB	49	01	FE	
C113:18	D4	A9	01	8D	3E	C0	A9	AD	C25B:E0	01	F0	05	E0	04	D0	16	CE	C3A3:85	FB	A4	FE	B9	98	C0	CD	F0	
C11B:00	8D	3D	C0	85	FE	85	FE	E6	C263:C8	B9	2D	C0	D0	08	B9	1E	A5	C3AB:3C	C0	F0	09	99	9D	C0	AD	A2	
C123:20	2E	C2	C0	34	C1	20	86	0C	C26B:C0	D0	06	A9	D8	2C	A9	C2	6E	C3B3:3C	C0	99	98	C0	20	D2	C3	36	
C12B:C1	20	A2	C2	C9	FF	D0	F3	FB	C273:2C	A9	C6	4C	D2	FF	E0	02	71	C3BB:A6	FD	8E	3C	C0	A6	FC	BD	04	
C133:60	A0	03	B9	08	DC	99	3F	31	C27B:D0	10	C8	C8	B9	0F	C0	29	C7	C3C3:A2	C0	85	FD	20	2A	C2	AE	3B	
C13B:C0	88	10	F7	18	A2	07	A0	BC	C283:7F	20	74	C1	B9	0F	C0	4C	17	C3CB:3C	C0	86	FD	4C	2E	C2	A4	97	
C143:0F	20	F0	FF	A9	9A	20	D2	3F	C28B:6D	C1	E0	03	D0	01	C8	20	C0	C3D3:FE	B9	CA	C0	18	65	FC	A8	A7	
C14B:FF	AD	42	C0	29	7F	20	74	8A	C293:7F	C2	B9	0F	C0	30	03	A9	28	C3DB:F8	A6	FB	F0	7F	CA	F0	69	8A	
C153:C1	AD	41	C0	20	6D	C1	AD	3F	C29B:C1	2C	A9	D0	4C	D2	FF	20	1D	C3E3:CA	F0	31	B9	0F	C0	A6	FC	94	
C15B:40	C0	20	6D	C1	AD	42	C0	14	C2A3:E4	FF	D0	01	60	C9	11	D0	E2	C3EB:E0	02	F0	1E	A2	05	DD	CF	19	
C163:30	03	A9	C1	2C	A9	D0	4C	07	C2AB:11	20	2A	C2	A6	FE	E8	E0	17	C3F3:C0	F0	10	CA	E0	03	D0	01	7C	
C16B:D2	FF	48	A9	3A	20	D2	FF	F3	C2B3:05	90	02	A2	00	86	FE	4C	AE	C3FB:CA	E0	00	D0	F1	38	E9	01	73	
C173:68	48	4A	4A	4A	4A	09	30	E8	C2BB:2E	C2	C9	1D	D0	11	20	2A	49	C403:4C	47	C4	CA	BD	CF	C0	4C	C4	
C17B:20	D2	FF	68	29	0F	09	30	12	C2C3:C2	A6	FD	E8	E0	06	90	02	E4	C40B:47	C4	38	E9	01	10	35	A9	6B	
C183:4C	D2	FF	AE	3D	C0	E8	8E	1A	C2CB:A2	00	86	FD	4C	2E	C2	C9	BD	C413:23	4C	47	C4	B9	0F	C0	A6	A8	
C18B:3D	C0	E0	2D	B0	01	60	A9	C0	C2D3:91	D0	0F	20	2A	C2	A6	FE	E2	C41B:FC	E0	02	F0	1E	A2	00	DD	04	
C193:00	8D	3D	C0	AD	3E	C0	49	5F	C2DB:CA	10	02	A4	D0	86	FE	4C	B9	C423:CF	C0	F0	10	E8	E0	02	D0	83	
C19B:01	8D	3E	C0	A0	00	A2	00	21	C2E3:2E	C2	C9	9D	02	A0	FE	20	2A	71	C42B:01	E8	E0	05	D0	F1	18	69	C3
C1A3:06	FC	A9	00	85	FB	BD	0F	85	C2EB:C2	A6	FD	CA	10	02	A2	05	BB	C433:01	4C	47	C4	E8	BD	CF	C0	24	
C1AB:C0	CD	42	C0	D0	16	BD	00	B1	C2F3:86	FD	4C	2E	C2	A6	FD	E0	36	C43B:4C	47	C4	18	69	01	C9	24	DD	
C1B3:C0	CD	41	C0	D0	0E	BD	1E	97	C2FB:05	D0	2D	C9	20	90	08	C9	97	C443:D0	02	A9	00	99	0F	C0	D8	E4	
C1BB:C0	F0	09	85	FB	BD	2D	C0	47	C303:81	90	05	C9	A0	B0	01	60	D6	C44B:60	B9	00	C0	D0	08	A9	59	D2	
C1C3:F0	02	85	FC	E8	AD	3D	C0	F9	C30B:48	A4	FE	B9	93	C0	85	FB	02	C453:99	00	C0	4C	E6	C3	38	E9	27	
C1CB:49	01	8D	3D	C0	D0	F7	A5	58	C313:A9	C0	85	FC	A0	02	B1	FB	8C	C45B:01	4C	71	C4	B9	00	C0	C9	0C	
C1D3:FB	F0	08	AD	3E	C0	F0	03	47	C31B:88	91	FB	C8	C8	C0	0D	90	4B	C463:59	D0	18	CA	E0	00	90	C0	90	
C1DB:A9	12	2C	A9	92	99	43	C0	1B	C323:F5	88	68	91	FB	4C	2E	C2	1E	C46B:4C	17	C4	18	69	01	99	00	7D	
C1E3:18	98	69	10	AC	E8	E0	0E	80	C32B:C9	51	D0	03	A9	FF	60	E0	25	C473:C0	D8	60	00	00	00	00	00	9F	
C1EB:90	B8	A5	FC	F0	05	AD	3E	9F	C333:04	F0	04	E0	01	D0	2F	A0	D1										
C1F3:C0	09	10	8D	04	D4	A2	00	AD	C33B:00	D9	BD	C0	F0	08	C8	C8	FE										
C1FB:86	FB	A9	9A	E4	FE	D0	08	6D	C343:C8	C0	09	90	F4	60	C8	B9	FD										

M I L T O N J O H N S O N

Word Find 3D is a word puzzle-generator capable of creating two- and three-dimensional puzzles. These puzzles print the words horizontally, vertically and diagonally, hiding them within a matrix of random letters. They're in plain sight, but they're hard to spot.

Depending on the level of difficulty you select, *Word Find 3D* can handle between 15 and 150 words, with words up to 15 characters in length. You've probably seen this kind of puzzle in books or magazines.

At level 1 the program creates a puzzle 20 columns wide by 20 rows high and can handle up to 15 words. At this level words are stored in one of eight directions: up, down, left, right, and diagonally up and to the right, down and to the right, up and to the left, and down and to the left.

At level 2 you can create a three-dimensional puzzle consisting of ten separate 20 x 20 puzzle layers. The ten separate layers are stacked one on

WORD FIND 3D

GENERATE WORD
PUZZLES WITH THIS
OUTSTANDING
PROGRAM FOR
THE 64

top of each other like a layer cake, with layer 1 on top and layer 10 on the bottom. Up to 150 words may be en-

tered. They'll be scattered across the ten layers in the eight directions mentioned above.

On level 3 the program creates a ten-layer puzzle similar to that on level 2, and it, too, can handle up to 150 words. Things get really tough here. Level 3 words are placed in the basic eight directions mentioned above plus two more directions, ascending and descending.

Words that are stored in the ascending direction start at a lower layer and work their way to an upper layer. For example, if the word *cake* were entered in an ascending direction on layer 10 (the bottom layer) with the letter *C* at column A, row A, then the letter *A* would be found at column A, row A on the next layer up (layer 9), and so on.

The descending direction is just the opposite; words start at an upper layer and work their way straight down. In all levels, the direction of each word is chosen randomly.



PROGRAMS

Getting Started

Word Find 3D is written entirely in machine language, but it loads and runs like a BASIC program. Enter the program with *MLX*, our machine language entry program; see "Typing Aids" elsewhere in this section. When *MLX* prompts you, respond with the values given below.

Starting address: 0801

Ending address: 1900

Be sure to save a copy of the program before exiting *MLX*.

When the program begins, the opening screen appears with the three difficulty levels explained. Select a difficulty level by pressing 1, 2, or 3. You'll then be prompted to enter a word. At this prompt, type in a word up to 15 letters in length, ending with a return. Words may contain only the letters A-Z, with no spaces or punctuation marks.

When you've entered all the words you want, press the Return key again. At this point, the screen will blank briefly while your puzzle is being generated.

Starting to Play

After your puzzle has been created, you'll be presented with the main screen. On the bottom two lines, you'll find the status of your puzzle, indicating the number of words you've entered, the number of words you've found, the current layer of the puzzle you're viewing, and the difficulty level you've chosen.

In the upper left corner of the screen, you'll see a list of eight options. More about these later.

In the upper right portion of the screen, you'll see a 20 x 20 matrix of letters in black. Surrounding this matrix will be the letters A-T in blue. These letters indicate the columns (across) and rows (down) and are used to solve the puzzle when you locate hidden words.

About Those Options

Access the first option, Print, by pressing P. This will send to the printer all ten layers of the puzzle followed by a complete list of the words you've entered. This listing will take two sheets of paper. Make sure your printer is on before you start to print. A number will be printed after each word. This

number indicates in which layer the word appears in the puzzle. Each layer is also numbered. *Word Find 3D* will always print a ten-layer puzzle, even on difficulty 1.

The second option, Give Up, may be accessed by pressing G. You'll be prompted to press G again if you really want the program to solve the puzzle for you. All the words in the puzzle will then be highlighted.

The third option, Help, may be accessed by pressing H. This prints a list of all the words that can be found on the current puzzle layer.

Press U to move up a layer. This option only works on levels 2 and 3 and is used to move up from a lower layer to an upper layer. For example, if you were currently on layer 6 and you pressed U, layer 5 would appear on the screen.

The fifth option, Layer Down, may be accessed by pressing D. This option moves you down a layer.

Access the sixth option, Solve Word, by pressing the S key. Use this option when you've located a hidden word. You'll be asked to enter the starting row of the word you've found. This is the letter on the right side of the puzzle. You'll then be asked to enter the starting column of the word. This is found at the bottom of the puzzle. If you're correct, the word will be highlighted in the puzzle. Also, words found in the status section will be incremented by 1. If you were not correct, the program will inform you. Press any key to continue.

The seventh option, Restart, may be accessed by pressing R. Use this to start the program over.

The last option, Quit, may be accessed by pressing Q. This option will reset the computer.

WORD FIND 3D

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0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 4C 6A 0A A9 7B
0811:80 85 FE A9 00 85 FD 85 D4
0819:83 85 74 85 79 A8 91 FD C2
0821:C8 D0 FB E6 FE A6 FE E0 29
0829:A0 F0 02 D0 F1 60 A0 00 65
0831:84 7A 20 E4 FF A4 7A C9 C5
0839:00 F0 F7 C9 0D F0 1B C9 4D
0841:14 F0 1A C9 41 30 EB C9 E3
0849:5B A4 7A 91 B4 20 D2 FF 64
0851:C8 84 7A C0 0F F0 03 4C D0
0859:33 08 84 7A 60 A4 7A C0 88
0861:00 F0 08 88 20 D2 FF A9 2D
0869:00 91 B4 84 7A 4C 33 08 30
0871:A9 00 85 B4 A9 80 85 B5 62
0879:A9 F8 85 FD A9 8E 85 FE BE
0881:A2 18 A0 26 18 20 F0 FF 82

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0889:A9 C2 85 C3 A9 08 85 C4 49
0891:20 79 12 20 2F 08 C0 00 6F
0899:F0 26 98 A0 00 91 FD E6 F1
08A1:74 A5 74 C5 86 F0 19 A5 10
08A9:B4 18 69 10 85 B4 90 02 6A
08B1:E6 B5 A5 FD 18 69 01 85 25
08B9:FD 90 02 E6 FE 4C 89 08 DF
08C1:60 FE 30 14 0D 45 4E 54 77
08C9:45 52 20 41 20 57 4F 52 78
08D1:44 20 2D 3E 20 00 93 8E 4C
08D9:08 90 FF 10 D7 58 4F C6 98
08E1:58 4F 58 4F 0D FF 10 58 D2
08E9:CF 58 C9 58 4F B3 C4 0D 96
08F1:FF 10 58 4F D2 CE 58 4F D7
08F9:58 4F 0D FF 10 58 4F 58 84
0901:C4 58 4F 58 4F 0D FF 10 B9
0909:58 4F 58 4F 58 4F C2 4F EF
0911:0D FF 10 58 4F 58 4F 58 04
0919:D9 58 4F 0D FF 10 58 4F 29
0921:58 4F 58 4F 58 CA 0D FF 3B
0929:10 58 4F 58 4F B3 C4 0D 96
0931:CF 0D FF 10 58 4F 58 4F 6F
0939:58 4F 58 C8 0D FF 10 58 C3
0941:4F CD C9 CD C4 CF CE 0D 05
0949:FF 10 58 4F 58 4F 58 4F 5F
0951:58 D3 0D FF 10 58 4F 58 FE
0959:4F 58 4F 58 CF 0D FF 10 5B
0961:58 4F 58 4F 58 4F 58 CE F2
0969:0D 0D FF 0B 1E 44 49 46 D0
0971:46 49 43 55 4C 54 59 20 3D
0979:4C 45 56 45 4C 53 0D FF EB
0981:12 1F 4C 45 56 45 4C 20 C2
0989:31 0D 1E 55 53 45 20 4F CF
0991:4E 4C 59 20 54 48 45 20 79
0999:54 4F 50 20 4C 41 59 45 15
09A1:52 20 4F 46 20 54 48 45 5B
09A9:20 50 55 5A 5A 4C 45 0D CB
09B1:FF 0A 28 4D 41 58 20 31 FC
09B9:35 20 57 4F 52 44 53 29 C1
09C1:0D FF 12 1F 4C 45 56 45 F7
09C9:4C 20 32 0D 1E 55 53 45 53
09D1:20 41 4C 4C 20 54 45 4E BD
09D9:20 4C 41 59 45 52 53 20 07
09E1:42 55 54 20 4B 45 45 50 41
09E9:20 45 41 43 48 20 57 4F 7A
09F1:52 44 0D 20 4F 4E 20 4F 25
09F9:4E 45 20 4C 41 59 45 52 99
0A01:0D FF 12 1F 4C 45 56 45 39
0A09:4C 20 33 0D 1E 55 53 45 B4
0A11:20 41 4C 4C 20 54 45 4E FE
0A19:20 4C 41 59 45 52 53 20 48
0A21:41 4E 44 20 41 4C 4C 4F 17
0A29:57 20 57 4F 52 44 53 0D 28
0A31:20 54 4F 20 41 53 43 45 79
0A39:4E 44 20 41 4E 44 20 44 A5
0A41:45 53 43 45 4E 44 0D 1F 46
0A49:50 4C 45 41 53 45 20 53 98
0A51:45 4C 45 43 54 20 41 20 BD
0A59:4C 45 56 45 4C 00 A9 D7 91
0A61:85 C3 A9 08 85 C4 4C 79 30
0A69:12 20 10 08 A9 5B 8D 11 F7
0A71:D0 A9 01 85 84 8D 20 D0 3C
0A79:A9 0F 8D 21 D0 A9 0E 8D C0
0A81:23 D0 A9 FF 8D 06 DD A9 7A
0A89:01 8D 0F DD 20 5F 0A 20 F3
0A91:E4 FF C9 0F F0 F9 38 E9 1B
0A99:30 C9 01 30 F2 C9 04 10 32
0AA1:EE 85 73 C9 01 F0 07 A9 1D
0AA9:96 85 86 4C B3 0A A9 0F 28
0AB1:85 86 A9 F0 85 C3 A9 0A 07
0AB9:85 C4 20 79 12 20 71 08 59
0AC1:20 DE 0C A5 73 C9 03 30 72
0AC9:07 A9 0B 85 85 4C D5 0A 98
0AD1:A9 09 85 85 20 9E 0C 20 B9
0AD9:F4 0C 20 1B 13 20 2B 0C 9C
0AE1:A9 0F 8D 21 D0 20 E9 0C 39

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PROGRAMS

GAZETTE COMMODORE 64/128

0AE9:A9	FF 85 83 4C 9A 13 FE AD	0D51:AC	0E C9 04 D0 03 4C 26 10	0FB9:76	20 7B 0C 91 AA 20 E4 A7
0AF1:78	14 FE 50 14 FE 50 14 7D	0D59:0F	C9 05 D0 03 4C 9C 0F AC	0FC1:12	A0 00 B1 B4 F0 03 4C E7
0AF9:FE	50 14 FE 50 14 0D 00 01	0D61:C9	06 D0 03 4C 17 10 C9 D4	0FC9:2F	0D C6 7F F0 0E A5 B4 53
0B01:13	1F 57 4F 52 44 20 46 72	0D69:07	D0 03 4C 8F 10 C9 08 B8	0FD1:38	E9 13 85 B4 B0 02 C6 74
0B09:49	4E 44 20 33 44 FF 1A A6	0D71:D0	03 4C 0F 11 C9 09 D0 C1	0FD9:B5	4C C2 0F A5 7C 85 B4 0E
0B11:41	0D 05 20 4F 50 54 49 5B	0D79:03	4C 7F 11 4C F8 11 E6 78	0FE1:A5	7D 85 B5 A0 00 84 7F CB
0B19:4F	4E 53 FF 1E 1F 42 0D D3	0D81:7A	CA D0 AA 60 84 7A C8 23	0FE9:A4	7F B1 B2 F0 20 48 A5 D9
0B21:05	50 20 1F 50 52 49 4E 70	0D89:A9	F0 85 B2 A9 7F 85 B3 9A	0FF1:83	F0 06 68 09 80 4C FB 34
0B29:54	FF 1F 43 0D 05 47 20 AC	0D91:18	A5 B2 69 10 85 B2 A5 AF	0FF9:0F	68 A0 00 91 B4 E6 7F 7A
0B31:1F	47 49 56 45 20 55 50 DC	0D99:B3	69 00 85 B3 88 D0 F0 92	1001:A5	B4 38 E9 13 85 B4 B0 8F
0B39:20	20 FF 1B 44 0D 05 48 C1	0DA1:A9	00 85 B4 A9 90 85 B5 DC	1009:2C	C6 B5 4C E9 0F A5 83 B1
0B41:20	1F 48 45 4C 50 FF 20 50	0DA9:A4	7A B1 F9 A8 88 F0 12 E5	1011:D0	03 4C 80 0D 60 20 86 9C
0B49:45	0D 05 55 20 1F 4C 41 92	0DB1:E6	B5 18 A5 B4 69 90 85 FB	1019:0D	A9 01 85 76 B1 FD 85 9E
0B51:59	45 52 20 55 50 FF 1C B9	0DB9:B4	A5 B5 69 00 85 B5 4C B2	1021:81	A9 15 38 E5 81 85 75 48
0B59:46	0D 05 44 20 1F 4C 41 12	0DC1:AE	0D A4 7A 60 20 86 0D 50	1029:20	7B 0C 91 A8 20 7B 0C 9B
0B61:59	45 52 20 44 4F 4C 41 92	0DC9:B1	FD 85 76 A9 15 85 75 76	1031:91	AA 20 E4 12 A0 00 B1 DB
0B69:FF	1A 47 0D 05 53 20 1F 94	0DD1:20	7B 0C 91 A8 A9 01 85 E8	1039:B4	F0 03 4C 2F 0D C6 7F CF
0B71:53	4F 4C 56 45 20 57 4F 9C	0DD9:76	20 7B 0C 91 AA 20 E4 C3	1041:F0	10 A5 B4 18 69 15 85 F3
0B79:52	44 FF 1A 48 0D 05 52 3E	0DE1:12	A0 00 B1 B4 F0 03 4C 04	1049:B4	A5 B5 69 00 85 B5 4C 48
0B81:20	1F 52 45 53 54 41 52 CE	0DE9:2F	0D C6 7F F0 0E A5 B4 6F	1051:36	10 A5 7C 85 B4 A5 7D D4
0B89:54	FF 1D 49 05 52 05 51 CE	0DF1:38	E9 14 85 B4 B0 02 C6 B0	1059:85	B5 A0 00 84 7F A4 7F A8
0B91:20	1F 51 55 49 54 FF 20 BA	0DF9:B5	4C E2 0D A5 7C 85 B4 0E	1061:B1	B2 F0 22 48 A5 83 F0 18
0B99:4A	05 4F 1F FF 26 4B 05 26	0E01:A5	7D 85 B5 A0 00 84 7F E8	1069:06	68 09 80 4C 71 10 68 80
0BA1:57	1F FF 26 4C 05 53 1F C9	0E09:A4	7F B1 B2 F0 20 48 A5 F6	1071:A0	00 91 B4 E6 7F A5 B4 94
0BA9:FF	26 4D 0D FF 26 4E 0D 06	0E11:83	F0 06 68 09 80 4C 1B 70	1079:18	69 15 85 B4 A5 B5 69 0C
0BB1:FF	26 4F 0D FF 26 50 0D 52	0E19:0E	68 A0 00 91 B4 E6 7F 17	1081:00	85 B5 4C 5F 10 A5 83 88
0BB9:FF	26 51 0D FF 26 52 0D 9E	0E21:38	A5 B4 E9 14 85 B4 B0 C8	1089:D0	03 4C 80 0D 60 20 86 15
0BC1:FF	26 53 0D FF 26 54 0D EA	0E29:02	C6 B5 4C 09 0E A5 83 C2	1091:D0	A9 01 85 76 B1 FD 85 17
0BC9:FF	12 41 42 43 44 45 46 AC	0E31:D0	03 4C 80 0D 60 20 86 B8	1099:81	A9 15 38 E5 81 85 75 C0
0BD1:47	48 49 4A 4B 4C 4D 4E DF	0E39:0D	A9 01 85 76 A9 15 85 C8	10A1:20	7B 0C 91 A8 A9 15 85 E6
0BD9:4F	50 51 52 53 54 0D 05 06	0E41:75	20 7B 0C 91 A8 B1 FD 0E	10A9:75	B1 FD 85 76 20 7B 0C B4
0BE1:FF	18 43 4F 4C 55 4D 4E FB	0E49:85	7F A9 15 38 E5 7F 85 6C	10B1:91	AA 20 E4 12 A0 00 B1 5C
0BE9:53	0D FF 26 0D 20 57 4F 36	0E51:75	20 7B 0C 91 AA 20 E4 BC	10B9:B4	F0 03 4C 2F 0D C6 7F 50
0BF1:52	44 53 20 45 4E 54 45 FF	0E59:12	A0 00 B1 B4 F0 03 4C 7D	10C1:F0	10 A5 B4 18 69 13 85 70
0BF9:52	45 44 FF 05 57 4F 52 89	0E61:2F	0D C6 7F F0 09 E6 B4 57	10C9:B4	A5 B5 69 00 85 B5 4C C8
0C01:44	53 20 46 4F 55 4E 44 29	0E69:D0	02 E6 B5 4C 5A 0E A5 34	10D1:B6	10 A5 7C 85 B4 A5 7D 95
0C09:0D	20 43 55 52 52 45 4E 22	0E71:7C	85 B4 A5 7D 85 B5 A0 2C	10D9:85	B5 A0 00 84 7F A4 7F 29
0C11:54	20 4C 41 59 45 52 FF 7D	0E79:00	84 7F A4 7F B1 B2 F0 0A	10E1:B1	B2 F0 22 48 A5 83 F0 98
0C19:05	44 49 46 46 49 43 55 85	0E81:22	48 A5 83 F0 06 68 09 27	10E9:06	68 09 80 4C F1 10 68 03
0C21:4C	54 59 20 4C 45 56 45 0B	0E89:80	4C 8E 0E 68 A0 00 91 03	10F1:A0	00 91 B4 E6 7F A5 B4 15
0C29:4C	00 A9 01 85 C3 A9 0B 46	0E91:B4	E6 7F A5 B4 18 69 01 E5	10F9:18	69 13 85 B4 A5 B5 69 4C
0C31:85	C4 20 79 12 A9 1F 20 6E	0E99:85	B4 A5 B5 69 00 85 B5 C1	1101:00	85 B5 4C DF 10 A5 83 0E
0C39:D2	FF 18 A2 17 A0 0F 20 61	0EAL:4C	7C 0E A5 83 D0 03 4C D0	1109:D0	03 4C 80 0D 60 20 86 96
0C41:F0	FF A9 00 A6 74 20 CD 1C	0EA9:80	0D 60 20 86 0D B1 FD 21	1111:0D	B1 FD 18 69 01 85 76 38
0C49:BD	A2 17 A0 1F 18 20 F0 60	0EB1:85	7F A9 15 38 E5 7F 85 D4	1119:A9	15 85 75 20 7B 0C 91 F5
0C51:FF	A9 00 A6 79 20 CD BD E3	0EB9:75	A9 01 85 76 20 7B 0C AA	1121:A8	20 7B 0C 91 AA 20 E4 2C
0C59:A2	18 A0 0F 18 20 F0 FF F0	0ECL:91	A8 A9 15 85 75 20 7B 15	1129:12	A0 00 B1 B4 F0 03 4C 53
0C61:A9	00 A6 84 20 CD BD A2 C1	0EC9:0C	91 AA 20 E4 12 A0 00 58	1131:2F	0D C6 7F B0 0E A5 B4 BE
0C69:18	A0 24 18 20 F0 FF A9 2A	0ED1:B1	B4 F0 03 4C 2F 0D C6 42	1139:38	E9 15 85 B4 B0 02 C6 20
0C71:00	A6 73 20 CD BD 20 44 8D	0ED9:7F	F0 0E A5 B4 18 69 14 FA	1141:B5	4C 2A 11 A5 7C 85 B4 86
0C79:13	60 38 AD 06 DD 85 A2 6A	0EE1:85	B4 90 02 E6 B5 4C CF 96	1149:A5	7D 85 B5 A0 00 84 7F 37
0C81:A5	78 65 77 85 78 A5 A2 AA	0EE9:0E	A5 7C 85 B4 A5 7D 85 1B	1151:A4	7F B1 B2 F0 20 48 A5 45
0C89:C5	76 30 07 85 75 10 03 BF	0EF1:B5	A0 00 84 7F A4 7F B1 98	1159:83	F0 06 68 09 80 4C 63 07
0C91:85	77 60 E6 78 69 05 38 70	0EF9:B2	F0 22 48 A5 83 F0 06 97	1161:11	68 A0 00 91 B4 E6 7F E6
0C99:E5	78 4C 89 0C A9 A0 85 B2	0F01:68	09 80 4C 08 0F 68 A0 58	1169:A5	B4 38 E9 15 85 B4 B0 0A
0CAL:F9	A9 8C 85 FA A6 74 A0 07	0F09:00	91 B4 E6 7F A5 B4 18 A4	1171:02	C6 B5 4C 51 11 A5 83 5F
0CA9:00	A5 73 C9 01 D0 0A A9 3F	0F11:69	14 85 B4 A5 B5 69 00 BB	1179:D0	03 4C 80 0D 60 20 86 07
0CB1:01	91 F9 C8 CA F0 25 D0 AF	0F19:85	B5 4C F6 0E A5 83 D0 3F	1181:0D	A9 01 85 76 A9 15 85 17
0CB9:F8	A9 01 85 76 A9 0B 85 27	0F21:03	4C 80 0D 60 20 86 0D 52	1189:75	20 7B 0C 91 A8 20 7B 89
0CC1:75	20 7B 0C A0 00 A6 74 93	0F29:A9	01 85 76 A9 15 85 75 96	1191:0C	91 AA 20 E4 12 A4 7A A8
0CC9:A5	77 91 F9 E6 77 A5 77 3C	0F31:20	7B 0C 91 A8 A4 7A B1 57	1199:B1	FD C5 84 10 06 A0 00 EE
0CD1:C9	0B 30 04 A9 01 85 77 AB	0F39:FD	18 69 01 85 76 20 7B 5B	11A1:B1	B4 F0 03 4C 2F 0D C6 18
0CD9:C8	CA D0 EC 60 A9 01 8D 2B	0F41:0C	91 AA 20 E4 12 A0 00 D1	11A9:7F	F0 10 C6 B5 A5 B4 38 1C
0CE1:30	D0 A9 0B 8D 11 D0 60 DE	0F49:B1	B4 F0 03 4C 2F 0D C6 BB	11B1:E9	90 85 B4 B0 02 C6 B5 B9
0CE9:A9	00 8D 30 D0 A9 5B 8D FC	0F51:7F	F0 0E A5 B4 38 E9 01 E2	11B9:4C	9F 11 A5 7C 85 B4 A5 6F
0CF1:11	D0 60 A9 A0 85 F9 A9 26	0F59:85	B4 B0 02 C6 B5 4C 47 8A	11C1:7D	85 B5 A0 00 84 7F A4 7A
0CF9:8C	85 FA A9 36 85 FB A9 1D	0F61:0F	A5 7C 85 B4 A5 7D 85 15	11C9:7F	B1 B2 F0 22 48 A5 83 7E
0D01:8D	85 FC A9 F8 85 FD A9 01	0F69:B5	A0 00 84 7F A4 7F B1 12	11D1:F0	06 68 09 80 4C DA 11 87
0D09:8E	85 FE A9 C8 85 AD A9 BD	0F71:B2	F0 20 48 A5 83 F0 06 D0	11D9:68	A0 00 91 B4 E6 7F C6 78
0D11:8D	85 A9 A9 62 85 AA A9 4B	0F79:68	09 80 4C 80 0F 68 A0 94	11E1:B5	A5 B4 38 E9 90 85 B4 B3
0D19:8E	85 AB A9 0A 85 2D A9 56	0F81:00	91 B4 E6 7F A5 B4 38 3D	11E9:B0	02 C6 B5 4C C8 11 A5 66
0D21:8C	85 2E A0 00 84 7A A5 5F	0F89:E9	01 85 B4 B0 02 C6 B5 A9	11F1:83	D0 03 4C 80 0D 60 20 48
0D29:83	F0 01 60 A6 74 A5 85 3F	0F91:4C	6E 0F A5 83 D0 03 4C 5F	11F9:86	D0 A9 01 85 76 A9 15 56
0D31:85	75 A9 01 85 76 20 7B 72	0F99:80	0D 60 20 86 0D B1 FD 13	1201:85	75 20 7B 0C 91 A8 20 1D
0D39:0C	A4 7A 91 FB C9 01 D0 C4	0FA1:18	69 01 85 76 A9 15 85 A8	1209:7B	0C 91 AA 20 E4 12 A9 2D
0D41:03	4C C6 0D C9 02 D0 03 94	0FA9:75	20 7B 0C 91 A8 A9 15 52	1211:0A	E5 84 85 81 A4 7A E6 17
0D49:4C	37 0E C9 03 D0 03 4C 63	0FB1:38	E5 76 85 75 A9 01 85 66	1219:81	B1 FD C5 81 10 06 A0 7F



PROGRAMS

1221:00	B1 B4 F0 03 4C 2F 0D 0C	1489:31	85 C3 A9 15 85 C4 20 27	16F1:20	FF 16 A4 7A A9 01 91 49
1229:C6	7F F0 10 E6 B5 A5 B4 BD	1491:79	12 A2 00 BD 4E 15 95 36	16F9:2D	E6 79 4C B1 16 A4 7A 14
1231:18	69 90 85 B4 90 02 E6 F8	1499:F9	E8 E0 06 D0 F6 20 1C 34	1701:B1	FB C9 01 D0 03 4C FD 79
1239:B5	4C 20 12 A5 7C 85 B4 4F	14A1:18	A9 0D 20 D2 FF 20 A3 5E	1709:0D	C9 02 D0 03 4C 70 0E B5
1241:A5	7D 85 B5 A0 00 84 7F 31	14A9:18	A9 0D 20 D2 FF 20 E7 AA	1711:C9	03 D0 03 4C EA 0E C9 23
1249:A4	7F B1 B2 F0 22 48 A5 47	14B1:FF	20 CC FF 4C 16 18 13 79	1719:04	D0 03 4C 62 0F C9 05 8A
1251:83	F0 06 68 09 80 4C 5B F8	14B9:FE	16 11 1C 43 48 45 43 D3	1721:D0	03 4C DD 0F C9 06 D0 5C
1259:12	68 A0 00 91 B4 E6 7F 61	14C1:4B	20 50 52 49 4E 54 45 38	1729:03	4C 53 10 C9 07 D0 03 66
1261:E6	B5 A5 B4 18 69 90 85 73	14C9:52	2C 50 52 45 53 53 20 93	1731:4C	D3 10 C9 08 D0 03 4C EE
1269:B4	90 02 E6 B5 4C 49 12 3E	14D1:50	20 54 4F 20 50 52 49 D9	1739:45	11 C9 09 D0 03 4C BC FF
1271:A5	83 D0 03 4C 80 0D 60 72	14D9:4E	54 00 4C 41 59 45 52 4F	1741:11	4C 3D 12 60 13 FE 16 37
1279:A9	01 85 82 8A 48 A0 00 42	14E1:20	31 30 FF 16 4C 41 59 2A	1749:11	1C 45 4E 54 45 52 20 11
1281:B1	C3 F0 1D C9 FF F0 1C AB	14E9:45	52 20 39 FF 17 4C 41 17	1751:53	54 41 52 54 49 4E 47 37
1289:C9	FE F0 37 20 D2 FF 18 48	14F1:59	45 52 20 38 0D 00 FF 5A	1759:20	52 4F 57 20 28 41 2D DC
1291:A5	C3 69 01 85 C3 A5 C4 02	14F9:0A	00 4C 41 59 45 52 20 69	1761:54	29 20 00 13 FE 16 11 D9
1299:69	00 85 C4 E6 82 4C 7F C8	1501:37	FF 17 4C 41 59 45 52 BA	1769:45	4E 54 45 52 20 53 54 BA
12A1:12	68 AA 60 C8 B1 C3 AA 83	1509:20	36 FF 17 4C 41 59 45 A1	1771:41	52 54 49 4E 47 20 43 07
12A9:A9	20 20 D2 FF CA F0 03 EB	1511:52	20 35 0D 00 4C 41 59 F0	1779:4F	4C 55 4D 4E 20 28 41 66
12B1:4C	AB 12 A5 C3 18 69 02 D6	1519:45	52 20 34 FF 17 4C 41 F7	1781:2D	54 29 20 00 13 FE 16 E2
12B9:85	C3 A5 C4 69 00 85 C4 AD	1521:59	45 52 20 33 FF 17 4C A9	1789:11	4E 4F 20 4D 41 54 43 1B
12C1:4C	7F 12 C8 B1 C3 AA C8 75	1529:41	59 45 52 20 32 0D 00 FB	1791:48	20 20 20 20 50 52 66
12C9:B1	C3 20 D2 FF CA F0 03 F8	1531:FF	1E 4C 41 59 45 52 20 25	1799:45	53 53 20 41 4E 59 20 C1
12D1:4C	C9 12 A5 C3 18 69 03 7F	1539:31	0D 00 10 9E 80 9C F0 61	17A1:4B	45 59 20 54 4F 20 43 57
12D9:85	C3 A5 C4 69 00 85 C4 CD	1541:9A	60 99 D0 97 40 96 B0 AC	17A9:4F	4E 54 49 4E 55 45 00 84
12E1:4C	7F 12 A4 7A B1 A8 A8 2D	1549:94	20 93 90 91 00 20 00 0E	17B1:A9	CD 85 C3 A9 17 85 C4 8E
12E9:88	F0 10 18 A5 B4 69 14 F8	1551:90	00 20 A9 8C 85 C3 A9 0E	17B9:20	79 12 20 E4 FF C9 00 55
12F1:85	B4 A5 B5 69 00 85 B5 22	1559:15	85 C4 20 79 12 20 E4 43	17C1:F0	F9 C9 52 D0 03 4C 6A DA
12F9:4C	E9 12 A4 7A B1 AA 38 73	1561:FF	C9 00 F0 F9 C9 47 F0 83	17C9:0A	4C 16 18 13 FE 16 11 26
1301:E9	01 18 65 B4 85 B4 A5 80	1569:03	4C 16 18 20 F4 0C 84 DD	17D1:1C	50 52 45 53 53 20 52 3B
1309:B5	69 00 85 B5 A5 B4 85 EF	1571:7A	B1 2D D0 09 20 86 0D DA	17D9:20	54 4F 20 52 45 53 54 BB
1311:7C	A5 B5 85 7D B1 FD 85 22	1579:20	E4 12 20 FF 16 A4 7A 4D	17E1:41	52 54 00 A9 01 85 C3 EF
1319:7F	60 A9 41 85 76 A9 5B 15	1581:A0	01 91 2D C8 C4 74 D0 D8	17E9:A9	18 85 C4 20 79 12 20 1B
1321:85	75 A9 00 85 B4 A9 90 7F	1589:E6	F0 DE 13 FE 16 11 1C FE	17F1:E4	FF C9 00 F0 F9 C9 51 20
1329:85	B5 A0 00 20 7B 0C B1 4C	1591:50	52 45 53 53 20 47 20 20	17F9:D0	03 4C E2 FC 4C 16 18 66
1331:B4	D0 04 A5 77 91 B4 C8 F4	1599:54	4F 20 47 49 56 45 20 88	1801:13	FE 16 11 1C 50 52 45 5A
1339:D0	F2 E6 B5 A5 B5 C9 A0 F4	15A1:55	50 00 A9 A0 85 F9 A9 DD	1809:53	53 20 51 20 54 4F 20 E1
1341:D0	EA 60 4C 74 13 A2 00 90	15A9:8C	85 FA A0 00 84 7A A9 95	1811:51	55 49 54 00 20 2B 0C 90
1349:86	7C A6 7C E0 14 10 22 08	15B1:01	85 C3 A9 16 85 C4 20 41	1819:4C	9A 13 A2 00 A0 00 B1 D6
1351:A0	12 18 20 F0 FF A0 00 1A	15B9:79	12 A4 7A B1 F9 C5 84 E6	1821:F9	20 87 18 C8 C0 14 D0 0B
1359:B1	C3 20 D2 FF C8 C0 14 33	15C1:D0	21 20 86 0D A5 B2 85 F2	1829:F6	A9 F8 85 C3 A9 14 85 29
1361:30	F6 E6 7C A5 C3 18 69 D7	15C9:C3	A5 B3 85 C4 20 79 12 B9	1831:C4	20 79 12 A0 00 B1 FB 80
1369:14	85 C3 90 02 E6 C4 4C FD	15D1:C6	82 A5 82 F0 08 A9 9D 75	1839:20	87 18 C8 C0 14 D0 F6 D9
1371:4B	13 60 A5 84 8D 20 D0 D3	15D9:20	D2 FF 4C D1 15 A9 11 D4	1841:A9	F8 85 C3 A9 14 85 C4 DE
1379:AA	A9 70 85 C3 A9 8E 85 2D	15E1:20	D2 FF E6 7A A5 7A C5 64	1849:20	79 12 A0 00 B1 FD 20 17
1381:C4	A9 90 20 D2 FF E6 C4 B1	15E9:74	D0 CF A9 3C 85 C3 A9 40	1851:87	18 C8 C0 14 D0 F6 E8 2B
1389:A5	C3 18 69 90 85 C3 90 BF	15F1:16	85 C4 20 79 12 20 E4 5C	1859:FF	14 D0 06 A9 D0 20 D2 0E
1391:02	E6 C4 CA D0 F0 47 E1	15F9:FF	C9 00 F0 F9 4C 16 18 EA	1861:FF	60 A5 F9 18 69 14 85 12
1399:13	20 E4 FF C9 00 F0 F9 18	1601:13	05 11 FF 06 48 45 4C 42	1869:F9	90 02 E6 FA A5 FB 18 E7
13A1:C9	41 30 F5 C9 56 10 F1 1C	1609:50	0D FF 11 FE 11 9D 11 3A	1871:69	14 85 FB 90 02 E6 FC 23
13A9:A8	E9 40 C9 10 D0 03 4C 21	1611:FF	11 FE 11 9D 11 FE 11 B4	1879:A5	FD 18 69 14 85 FD 90 D8
13B1:E7	13 C9 07 D0 03 4C 54 B9	1619:FE	11 9D 11 FF 11 FE 11 21	1881:02	E6 FE 4C 1E 18 48 29 1C
13B9:15	C9 08 D0 03 4C A4 15 92	1621:9D	11 FF 11 FE 11 9D 11 F9	1889:80	F0 05 A9 12 20 D2 FF 28
13C1:C9	15 D0 03 4C 5B 16 C9 22	1629:FF	11 FE 11 9D 11 FF 11 CC	1891:68	48 29 7F 20 D2 FF 68 D9
13C9:04	D0 03 4C 66 16 C9 13 7D	1631:FE	11 9D 11 FF 11 13 11 61	1899:29	80 F0 05 A9 92 20 D2 97
13D1:D0	03 4C 77 16 C9 12 D0 EE	1639:11	1F 00 13 FE 16 11 1C 75	18A1:FF	60 A0 00 84 7C 84 FB 19
13D9:03	4C B1 17 C9 11 D0 03 73	1641:50	52 45 53 53 20 41 4E F3	18A9:A9	80 85 FC A9 A0 85 F9 24
13E1:4C	E5 17 4C 9A 13 A9 20 E3	1649:59	20 4B 45 59 20 54 4F 2B	18B1:A9	8C 85 FA A4 7C B1 F9 AE
13E9:85	FA A0 00 84 F9 91 F9 CE	1651:20	43 4F 4E 54 49 4E 55 E6	18B9:D0	01 60 A0 00 B1 FB D0 38
13F1:C8	D0 FB E6 FA A6 FA E0 E7	1659:45	00 A5 84 C9 01 F0 02 5B	18C1:02	A9 2E 20 D2 FF C8 C0 0E
13F9:22	D0 F3 A9 B8 85 C3 A9 8B	1661:CF	84 4C 16 18 A5 73 C9 05	18C9:0F	D0 F2 A9 28 20 D2 FF 16
1401:14	85 C4 20 79 12 20 E4 68	1669:01	F0 08 A5 84 C9 0A 10 1D	18D1:A4	7C B1 F9 C9 0A F0 08 A9
1409:FF	C9 00 F0 F9 C9 50 F0 3B	1671:02	E6 84 4C 16 18 20 F4 F3	18D9:4A	A9 00 AA 20 CD BD 68 5F
1411:0F	4C AA 14 A9 01 A2 04 FE	1679:0C	A9 46 85 C3 A9 17 85 AF	18E1:AA	A9 00 20 CD BD A9 29 B5
1419:A0	00 20 BA FF A9 00 20 08	1681:C4	20 79 12 20 B7 16 85 F9	18E9:20	D2 FF E6 7C A9 20 20 38
1421:BD	FF 20 C0 FF A2 01 20 E4	1689:87	A9 65 85 C3 A9 17 85 61	18F1:D2	FF A5 FB 69 10 85 FB 92
1429:C9	FF A9 DC 85 C3 01 14 DB	1691:C4	20 79 12 20 B7 16 85 0A	18F9:90	02 E6 FC 4C B5 18 00 09
1431:85	C4 20 79 12 A2 00 BD C1	1699:88	20 C6 16 B0 15 A9 86 FF		
1439:3C	15 95 F9 E8 E0 06 D0 BE	16A1:85	C3 A9 17 85 C4 20 79 21		
1441:F6	20 1C 18 A9 0D 20 D2 86	16A9:12	20 E4 FF C9 00 F0 F9 AD		
1449:FF	A9 FB 85 C3 A9 14 85 26	16B1:4C	16 18 4C E5 16 20 E4 FD		
1451:C4	20 79 12 A2 00 BD 42 07	16B9:FF	C9 41 30 F9 C9 55 10 35		
1459:15	95 F9 E8 E0 06 D0 F6 F6	16C1:F5	38 E9 40 60 A0 00 B1 6F		
1461:20	1C 18 A9 0D 20 D2 FF CC	16C9:F9	C5 84 F0 07 C8 C4 74 5D		
1469:A9	16 85 C3 A9 15 85 C4 4A	16D1:D0	F5 18 60 B1 A8 C5 87 30		
1471:20	79 12 A2 00 BD 48 15 11	16D9:D0	F3 B1 AA C5 88 D0 ED 2C		
1479:95	F9 E8 E0 06 D0 F6 20 97	16E1:84	7A 38 60 A4 7A B1 2D 9B		
1481:1C	18 A9 0D 20 D2 FF A9 B9	16E9:D0	11 20 86 0D 20 E4 12 F3		

Attention Software Programmers
 Gazette wants to buy your best games, utilities, and productivity programs for the 64 or 128. Submit them with the documentation on disk to our Greensboro office.



PROGRAMS

DAVID WILLIAMS

This popular pencil-and-paper game has been adapted several times for computers, but *Hangman 128* provides a few twists. It automatically keeps count of how many games you've won and how many the computer's won. You can easily update and increase its vocabulary, and it incorporates a large variety of background graphics that change with each game you play.

Typing It In

Hangman 128 is written entirely in BASIC 7. To avoid typing errors when entering the program, use *The Automatic Proofreader* (see "Typing Aids" elsewhere in this section). When you've finished typing in the program, be sure to save a copy of it.

Guess My Word

When you run the program, it picks a word at random from its vocabulary. An asterisk appears in the place of each letter in the word. Whenever you guess a correct letter, that letter takes the place of the asterisk representing it. Guess all the correct letters, and the complete word appears along with a message from the computer asking if you'd like to play again.

If you guess an incorrect letter, the hangman's gallows appears. Continue to guess incorrectly, and parts of the unfortunate victim appear. After eight incorrect guesses, you lose the game. When you've had enough, the computer announces how many games it won and how many times you cheated the hangman.

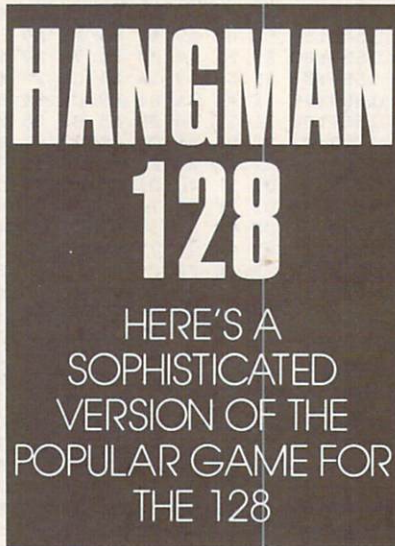
The program puts its more than 400 words into an array and selects them at random for each game. The program is dimensioned for 500 words (see DIMB\$ in line 20), but you can use more if you like. Simply increase this figure to a number higher than the actual number of words in your vocabulary. Continue to add words as DATA statements. Just be sure that your last piece of data is -999-.

If you don't wish to type in all the words in this listing, you can quit at any time, and the program will work

just as well. Just be sure that your last data statement is -999-.

If you examine the program, you may notice a few interesting items. For one thing, many CHAR and CIRCLE commands start with a comma. In line 70, for instance, you'll see CIRCLE,58,158,11,9. This is an accepted syntax. What I'm doing is leaving the first parameter unchanged. To leave it at its default value, you can either type the default or simply skip over it by entering a comma.

In line 20, however, you'll see COLOR.,12. Why the period? Well, I wanted COLOR 0,12. BASIC interprets a period or decimal point as a 0, but it does it slightly faster than with the number itself.



HANGMAN 128

```
DB 10 REM COPYRIGHT 1991 COMPU
TE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
AG 20 COLOR4,14:COLOR.,12:CLR:
PRINT "{6}{CLR}PLEASE WAI
T!":DIMB$(500):I=0
RB 30 READ B$(I):IF B$(I)="-99
9-" THEN N=I-1:Z=RND(-TI
):ELSE I=I+1:GOTO 30
HQ 40 IF I=0 THEN PRINT "{CLR}
{5 DOWN}":A$="NO WORD DA
TA YET!":FOR X=1 TO (20-
```

```
LEN(A$)/2):PRINT " ";:NEX
T:PRINTAS:END
FS 50 E=.:XR=E:COLOR1,11:GRAPH
IC1,1:Z=INT(RND(1)*(N+1
)):X=INT(RND(1)*50):IFX=.
THENFORL=250TO1STEP-2:CI
RCLE1,160,100,L,L,0,360,
L,90:NEXT
FG 60 IFX>1THENI=INT(RND(1)*25
0)+1:A=INT(RND(1)*359)+1
:R=INT(RND(1)*9)+2:V=INT
(RND(1)*15):DOUNTILXR>10
0:XR=XR+R:A=A+V:CIRCLE1,
160,100,XR,,,,A,I:LOOP
PH 70 IFX=1THENBEGIN:CIRCLE,58
,158,11,9:CIRCLE,111,158
,11,9:CIRCLE,162,158,11,
9:DRAW,49,153TO180,60TO2
73,60TO151,154:DRAW,174,
160TO273,80TO273,60
FK 80 DRAW,70,160TO184,75TO234
,75TO123,160:DRAW,100,15
3TO184,90TO184,75:DRAW,1
84,90TO215,90:BEND
XB 90 COLOR1,16:Z$=B$(Z):CHAR,
0,0,"HANGMAN{8 SPACES}CO
MPUTE PUBLICATIONS 1991"
,1:A$=STR$(LEN(Z$))+ " LE
TTERS":CHAR,0,5,A$:FORA=
1TOLEN(Z$):CHAR,A-1,7,"*
":NEXT
JS 100 CHAR,0,23,"INCORRECT LE
TTERS USED":POKE208,.
BX 110 GETKEYA$:IFASC(A$)<65OR
ASC(A$)>90THEN110
GG 115 A=INSTR(B$(Z),A$):IFA=.
THENBEGIN:E=E+1:CHAR,AS
C(A$)-64,24,A$:ONEGOSUB
140,160,170,180,190,200
,210:IFE=8THEN220:ELSE1
10:BEND
SE 120 CHAR,A-1,7,A$:PRINT "{G
}":MID$(Z$,A,1)="*:FORX
=1TOLEN(Z$):IFMID$(Z$,X
,1)<>"*THEN130:ELSENEX
T:GOTO250
BE 130 A=INSTR(B$(Z),A$,A+1):I
FA=.THEN110:ELSE120
SF 140 COLOR1,1:FORA=3TO5:CHAR
,26,A," ",1:NEXT:CHAR,2
7,3,"{11 SPACES}",1:FOR
A=3TO18:CHAR,37,A," ",1
:NEXT
XK 145 CHAR,25,18,"{13 SPACES}
",1:V=32:FORA=18TO15STE
P-1:V=V+1:CHAR,V,A," ",
1:NEXT
RS 150 COLOR1,16:RETURN
DX 160 COLOR1,2:CHAR,25,6,"E
{SPACE}{*}",1:CHAR,25,7
,"{3 SPACES}",1:CHAR,25
,8,"{*} E":CHAR,26,8,"
",1:COLOR1,16:RETURN
PF 170 COLOR1,13:CHAR,26,9," "
,1:FORA=10TO12:CHAR,25,
A,"{3 SPACES}",1:NEXT:C
```



PROGRAMS

BS 180	OLOR1,16:RETURN COLOR1,13:FORA=.TO2:CHAR,22+A,8+A," ",1:NEXT:COLOR1,16:RETURN	SP 310	CROLL,NUMBER,ADDRESS,VERTICAL,HORIZONTAL,SUPPLY,PARTS,WALL,MEN DATADESTROY,DEEPER,LABEL,EXAMINE,INTERACTIVE,DISK,TAPE,OPTIONS,MENU,FILEREPEAT,MESSAGE,INVERSE,PORTION,PERSON,PERSIAN,POUND,SCALE,SPACE,WASTE,FIELD	MQ 420	WORLD,GLOBE,PRESS,FOLLOW,STEPS,LADDER,BENCH,TABLE,WIDTH,PEN,LIGHT,DARKNESS,RESERVED,WORD,SENTENCE,PARAGRAPH,STORY,SHORT,TALL,LONG DATAAPPENDIX,LIVER,TYPEWRITER,ARTIST,AUTHOR,SERIAL,AUTOMOTIVE,INDUSTRY,TROUGH,TOUGH,BOAT,WRECKED,CRASHEDED,SMASHED,BAshed,BLUDGEONED,HIT,HURT,BANGED
ES 190	COLOR1,13:FORA=.TO2:CHAR,28+A,10-A," ",1:NEXT:COLOR1,16:RETURN	RR 320	DATAAUTOMATIC,MANLY,COWBOY,MANIAC,LEPER,CARDIAC,TALK,NEVER,DREAMED,DRESSED,STRONG,WEAK,WARNING,WOMAN,OPENED,EDGE,EXISTENCE,LAUGH,HAPPEN,DANCED,SPEEDING	MJ 430	DATARETURN,ENTER,SHIFT,LOCK,RUN,STOP,CONTROL,DISPLAY,RESTORE,CLEAR,DELETE,INSERT,CAPITAL,COMPLETE,ILLUSTRATED,EDITION,PERSONAL,PRIVATE,CAPTAIN,MASSIVE
EP 200	COLOR1,5:CHAR,25,13,"{3 SPACES}",1:FORA=14TO16:CHAR,27,A," ",1:NEXT:FORA=.TO2:CHAR,25-A,14+A," ",1:NEXT:COLOR1,16:RETURN	DB 330	DATAIMAGINE,ENEMY,SAINTS,TELEVISION,DRILL,HOUSE,MANSION,HOMESTEAD,HUT,SHED,BOX,DESTRUCTION,MORE,ROME,HAIR,GIRL,FOOD,PHONE,FARM,SHOT,HOUSE,GRASS,DATE,YOUNG	EG 440	DATALARGE,HEATER,COOLER,TECHNICAL,GIFTED,RESEARCH,GREAT,SOFT,HARD,EASY,GROUP,ULTIMATE,BEST,GREATEST,ATTENTION,CHANGING,PERFECT,ELEMENT,ANIMATION,ROBOT
DA 210	COLOR1,13:CHAR,27,17,"{2 SPACES}",1:CHAR,22,16," ",1:CHAR,23,17," ",1:COLOR1,16:CHAR,0,3,"THIS IS YOUR LAST CHANCE!",1:RETURN	DM 340	DATATIE,THEATER,WATCH,VIEW,FOUND,POND,POUND,HORSE,RADIO,DOOM,PAPER,NEWS,DEATH,KILL,CLASS,BURN,HANDS,FEET,PRIZE,EDIT,PEEK,CHROMOSOME,DECOMPRESSION,NUMERICAL	GJ 450	DATAACCUMLATE,REGISTER,INDEX,LOGARITHM,TRIGONOMETRY,ABSEIL
MM 220	CHAR,0,19,"IT WAS "+BS(Z),1:Q=Q+1:CHAR,10,20,"TOO BAD - YOU DIED!!",1:CHAR,11,21,"PLAY AGAIN,{2 SPACES}(Y/N)?:POKE208,..:COLOR1,15:CHAR,19,4,"CHOKE!!	QM 350	DATASECURITY,APPRECIATION,NUMERATE,HORIZONTAL,ENTERPRISE,REGISTRATION,CONVENTIONAL,BOOMERANG,RIFLE,SPRAY,TORCH,FIRE,MATCH,TILT,WILT,AMPLE,REALM	BF 460	DATA -999-
JJ 230	GETKEYAS:IFAS<>"Y"ANDAS<>"N"THEN230	DC 360	DATAMOUSE,APPLE,JUICE,HOUSE,BANANA,POEM,VERSE,ROYAL,TURN,NORTH,SPINNING,SOUTH,WEST,EAST,UP,DOWN,COMPASS,PRINCE,KING,QUEEN,PRINCESS,SHRED,CORNER,UNICORN		
PD 235	IFAS="Y"THEN50:ELSEGRAPHICCLR:PRINT"{CLR}YOU WON"AND I WON"Q:PRINT"SO THAT MAKES ";:IFQ>WHENPRINT"ME";:ELSEIFW>QTHENPRINT"YOU";	QX 370	DATASQUARE,CLIMATE,PARAGRAPH,ROSTER,RATIO,SOLID,ISOLATE,TRIPOD,HYMN,BUTTON,PIGLET,COW,RAKE,SHOVEL,HOB,SPADE,BRANCH,TOUCH,SMASH,LAWN,FEASIBLE,MINUTE		
SB 240	IFQ=WHENPRINT"IT A TIE!":NEW:ELSEPRINT"THE WINNER!":NEW	SM 380	DATACOMMA,CLUB,COMPRESS,REPLENISH,MINE,DIRT,CAR,COMPUTER,RISE,DAMP,SECONDD,HOURL,FALL,SINK,DRY,WARM,DILUTE,SYSTEM,TERMINATE,MAP,BICYCLE,PUZZLE,RULER,BOUGH		
EM 250	W=W+1:CHAR,13,20,"YOU ARE FREE!",1:CHAR,11,21,"PLAY AGAIN{2 SPACES}(Y/N)?:POKE208,..:GOTO230	AC 390	DATAJUDGE,MUSIC,HOSPITAL,VIOLIN,FILE,CASSETTE,AXIOM,BOOK,SUPERMARKET,REWARD,COVER,GRAPH,LINE,CIRCLE,SPIRAL,HANGMAN,ENCYCLOPEDIA,DICTIONARY,VERBOSE,AMUSE		
PA 260	DATAXAMPLE,CHAIR,HIPPOTOTAMUS,ELEPHANT,TABLE,SOFT,STICK,DESK,POSTER,SHIRT,PANTS,HOSE,GRAPPLER,SHORT,SMART,SCOUT,CHILDREN,CHEEK,GOOD,COUCH,TOYS,NOVEL,CHURN	CF 400	DATADRAW,RECORD,DISK,COMPACT,CUSTOMER,STATEMENT,BANK,WITHDRAWAL,DEPOSIT,INTEREST,COMMAND,VERSION,KEY,LOCK,RHYTHM,OPEN,CLOSE,ORGANIZATION,FORMAT,STRUCTURE		
DQ 270	DATANZZLE,ZEBRA,CHUNK,SLOW,SLIP,REST,WRETCH,OBJECT,ODDS,INSIDE,HAND,HOOK,HOOKED,PIPE,HOPE,FAT,FREE,FLASH,FLANK,FLAME,FLARE,COIN,BLANK,METAL,INSANE,FLOWER	XH 410	DATAWINDOW,MAP,COUNTRY,		
GQ 280	DATABEACH,COURT,BASKET,BEAM,DATA,AWFUL,AWOKE,SPPEAK,AXIS,BABY,KNACK,NOTCH,NOTE,PARENT,ROCKET,SKATE,STRIKE,NECK,ROMAN,RODENT,ROGUE,ROCK,MUTANT,TRAUMA,TRAVEL				
RC 290	DATATRAPEZE,TREAD,TRAY,TRAWL,TRAIL,CIVIL,UNCIVIL,ETHICAL,DOUBT,UNDER,ATTACK,SUSTAIN,DECAY,RELEASE,UNDO,WEATHER,WEEK,WHALE,WHACK,WENCH,CELL,WEPT,YOUR,YACHT				
GJ 300	DATALOCAL,TOURIST,LOADED,SAVED,INTERIOR,EXTERIOR,HIGHER,LOWER,HIMSELF,YODEL,DOUBLE,NOTHING,S				

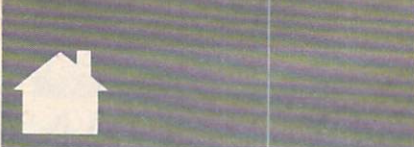
ONLY ON DISK

There's something new on the *Gazette Disk*. In addition to the type-in programs found in every issue of the magazine, we're putting more features and programs on the *Gazette Disk* each month. Often, these programs would be too large for readers to type in. Check out the original 64 and 128 artwork on display in "Gazette Gallery," and look for our bonus programs as well. These programs and their instructions appear only on disk. Here's a description of this month's bonus program.

Typing Tutor

David M. Williams

This useful tutorial for the 128 in 80-column mode is designed to help you improve your typing speed and accuracy. Try to type the sentences exactly as they are presented; a bell will alert you if you've made a mistake. Select from a variety of difficulty levels. The program also rates your typing speed.



PROGRAMS

R O B E R T C . T R A I N

What is the nature of the universe? We've all wondered about how we got here and what our purpose is. Is everything chaotic, or is there order in the universe?

Answers have been suggested by both science and religion, so don't expect your 64 or 128 to answer these for you. Whatever your particular preference, however, the recent theory of chaos suggests some interesting possibilities. Public television's critically acclaimed TV series "NOVA" recently ran a program about this theory and how it affects modern thought.

One of the more intriguing ideas presented on the program was that order and organization can be produced out of chaos by the repetition of a simple but constant rule. The implication is that our present universe may have arisen out of nothingness as a result of a few simple rules.

So far, our best scientific information to date indicates that our universe consists of chemical elements, each of which has certain properties predisposing it to behavior of one kind or another. Iron, for example, has an affinity or fondness for oxygen. Other elements have similar characteristics. At the beginning of our present universe, some rules prevailed over others, producing what we now know as the world around us.

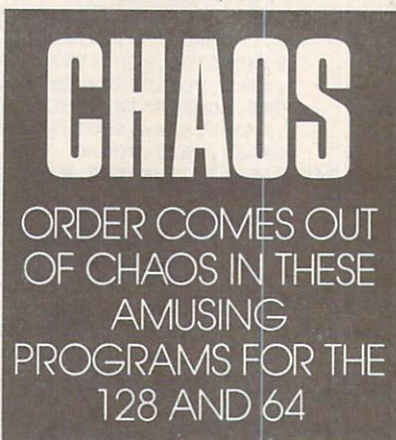
About the Program

To illustrate the above point, take a plain sheet of paper and place six dots on it anywhere you like. For best results, place them near the four edges of the paper. Then roll a die twice to select any two of the points. Place a ruler between them, and halfway between them draw another point. From that point roll a die to select any other point and repeat the process. Continue this for about 24 hours. What emerges is phenomenal to behold.

If you don't want to spend all that time drawing lines to illustrate this point, there is another way. Let your computer do the work for you.

Typing It In

Chaos is written entirely in BASIC for the 128. (There's also a version for the 64.) To help avoid typing errors, enter the program with *The Automatic Proofreader* (see "Typing Aids" elsewhere in this section).



For my program, I've set up the graphic screen on the 128 and then implemented the above procedure except I've used only three dots. The loop (lines 100-270) identifies the endpoints of a line, interpolates half the distance between them, and then draws a dot. As the program repeats, patterns will emerge from the seemingly random dots.

Feel free to experiment further by changing the number of dots or the position at which the dot is placed along the line.

This simple program demonstrates that order can come from a seemingly chaotic sequence. Now if I could just figure out a way to pick the correct six lottery numbers. . . .

CHAOS 128

```
DB 10 REM COPYRIGHT 1991 COMPU
TE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
RE 30 COLOR0,1
KK 40 POKE 53280,0
EJ 50 AX=1:AY=1:BX=319:BY=1:CY
=160:CY=199
EJ 80 COLOR1,2
JX 90 GRAPHIC1,1
BG 91 X=INT((RND(TI)*319)+1)
```

```
PR 92 Y=INT((RND(TI)*199)+1)
CK 100 FORI=1TO10000
SR 110 DRAW1,AX,AY:DRAW1,BX,BY
FB 130 DRAW1,CX,CY
MB 140 IFI>1THENX=KX
BE 150 IFI>1THENY=KY
HH 160 P=INT((RND(TI)*6)+1)
QB 190 IF P=1THENDX=AX:DY=AY
RB 200 IF P=2THENDX=AX:DY=AY
DQ 210 IF P=3THENDX=BX:DY=BY
XS 220 IF P=4THENDX=BX:DY=BY
RM 230 IF P=6THENDX=CX:DY=CY
PB 240 KX=(DX+X)/2:KY=(DY+Y)/2
HF 260 DRAW1,KX,KY
QX 265 IF I=10000THENEND
JH 270 NEXT I
```

CHAOS 64

```
KH 0 REM COPYRIGHT 1991 COMPUT
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PB 100 POKE 53280,0:POKE 53281
,0
SS 110 PRINT"{CLR}{8}{4 DOWN}"
:A$="CLEARING THE BITMA
P...":A=LEN(A$)
JQ 120 FOR X=1 TO 20-A/2:PRINT
" ";NEXT:PRINTAS
QC 130 FOR X=8192 TO 16192:POK
E X,0:NEXT
GA 140 AX=1:AY=1:BX=319:BY=1:C
X=160:CY=199
JM 150 POKE 53265,(PEEK(53265)
OR 32)
CC 160 POKE 53270,((PEEK(53270
) AND 223) OR 16)
CC 170 POKE 53272,((PEEK(53272
) AND 240) OR 8)
RE 180 PRINT"{CLR}":FOR X=1024
TO 2024:POKE X,255:NEX
T
FH 190 X=INT((RND(TI)*319)+1)
QS 200 Y=INT((RND(TI)*199)+1)
BS 210 FORI=1TO10000
QP 220 P1=AX:P2=AY:GOSUB360:P1
=BX:P2=BY:GOSUB360
EH 230 P1=CX:P2=CY:GOSUB360
FJ 240 IFI>1THENX=KX
QS 250 IFI>1THENY=KY
QJ 260 P=INT((RND(TI)*6)+1)
BR 270 IF P=1THENDX=AX:DY=AY
RX 280 IF P=2THENDX=AX:DY=AY
DM 290 IF P=3THENDX=BX:DY=BY
AM 300 IF P=4THENDX=BX:DY=BY
XH 310 IF P=6THENDX=CX:DY=CY
JQ 320 KX=(DX+X)/2:KY=(DY+Y)/2
JA 330 P1=KX:P2=KY:GOSUB360
ED 340 IF I=10000THENEND
PQ 350 NEXT I
AQ 360 BT=8192+INT(P2/8)*320+I
NT(P1/8)*8+(P2 AND 7)
SF 370 POKE BT,PEEK(BT) OR 2↑(
7-(P1 AND 7))
HS 380 RETURN
```

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How to Type In COMPUTE's Gazette Programs

Each month, Gazette publishes programs for the Commodore 128 and 64. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We regularly publish two programs designed to make typing easier: *The Automatic Proofreader*, for BASIC programs, and *MLX*, for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements, as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off and then on, erasing what was in memory. This could cause you to lose valuable data, so be sure to *save a program before you run it*. If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from Gazette, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor-down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be shifted (hold down the Shift key while pressing another key), the character is underlined. For example, A means hold down the Shift key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight shifted A's).

If a key is enclosed in special brackets, [], hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the Ctrl key while typing the letter in braces. For example, {A} means to press Ctrl-A.

The Quote Mode

You can move the cursor around the screen with the Crsr keys, but you may want to move it under program control, as in examples like {LEFT} and {HOME} in the listings. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote key, you're in quote mode, which can be confusing if you mistype a character and cursor left to change it. You'll see a graphics symbol for cursor left. Use the delete key to back up and edit the line. Type another quotation mark to get out of quote mode. If things get too confusing, exit quote mode by pressing Return; then cursor up to the mistyped line and fix it. If the mistake involves cursor movement, you must press the quote key to reenter quote mode. □

When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL 9	
{OFF}	CTRL 0	
{BLK}	CTRL 1	
{WHT}	CTRL 2	
{RED}	CTRL 3	
{CYN}	CTRL 4	

When You Read:	Press:	See:
{PUR}	CTRL 5	
{GRN}	CTRL 6	
{BLU}	CTRL 7	
{YEL}	CTRL 8	
{F1}	f1	
{F2}	SHIFT f1	
{F3}	f3	
{F4}	SHIFT f3	
{F5}	f5	
{F6}	SHIFT f5	
{F7}	f7	
{F8}	SHIFT f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT ↑	

For Commodore 64 Only

[1]	COMMODORE	1	
[2]	COMMODORE	2	
[3]	COMMODORE	3	
[4]	COMMODORE	4	
[5]	COMMODORE	5	
[6]	COMMODORE	6	
[7]	COMMODORE	7	
[8]	COMMODORE	8	

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Thirteen of *Gazette's* best 128 programs, including utilities, games, and applications. Titles: *MetaBASIC 128*, *RAMDisk 128*, *80-Column Disk Sector Editor*, *MultiSort*, *Block Out*, *Miami Ice*, *The Animals' Show*, *Cribbage*, *XPressCard*, *Sound Designer*, *Video Slide Show*, *Math Graphics*, and *3-D BarGrapher*.

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THE AUTOMATIC PROOFREADER

P H I L I P I. N E L S O N

The *Automatic Proofreader* helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in the *Proofreader* exactly as listed. Because the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy before running it.

Next, type RUN and press Return. When the program displays the message *Proofreader Active*, you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, the *Proofreader* displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, it's almost certain the line was typed correctly. If not, check for your mistake and correct the line.

When using the *Proofreader* with another utility, disable both programs before running a BASIC program.

```

0 CLR
10 VE=PEEK(772)+256*PEEK(773):LO=43:HI=44:PRINT"
{CLR}{WHT}AUTOMATIC PROOFREADER FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=46:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+6:FOR J=SA TO SA+166:READ B:POKE J,B:CH=CH+B:NEXT
50 IF CH<>220570 THEN PRINT{SPACE}"*ERROR* CHECK TYPING IN DATA STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:RS=SA+RF:HB=INT(RS/256):LB=RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,LB:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT{SPACE}"*ERROR* RELOAD PROGRAM AND CHECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14,22:POKE SA+18,23:POKE SA+29,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE SA+150,PEEK(773):PRINT"{CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:POKE(PEEK(LO)+256*PEEK(HI))-1,0:NEW
    
```

```

120 DATA20,169,73,141,4,3,169,3,141,5,3,88,96,165,20,133,167
130 DATA165,21,133,168,169,0,141,0,255,162,31,181,199,157,227
140 DATA3,202,16,248,169,19,32,210,255,169,18,32,210,255,160
150 DATA0,132,180,132,176,136,230,180,200,185,0,2,240,46,201
160 DATA34,208,8,72,165,176,73,255,133,176,104,72,201,32,208
170 DATA7,165,176,208,3,104,208,226,104,166,180,24,165,167
180 DATA121,0,2,133,167,165,168,105,0,133,168,202,208,239,240
190 DATA202,165,167,69,168,72,41,15,168,185,211,3,32,210,255
200 DATA104,74,74,74,74,168,185,211,3,32,210,255,162,31,189
210 DATA227,3,149,199,202,16,248,169,146,32,210,25,5,76,86,137
220 DATA65,66,67,68,69,70,71,72,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,116,117,151,128,129,167,136,137
    
```

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REVIEWS

RELATE DATA • CONQUER KINGDOMS GET READY FOR THE KICKOFF

PERSONAL R:BASE

Fase of use and power in an inexpensive relational database? That's what *Personal R:Base* promises, but is that advertising hype or a home office dream come true?

Personal R:Base is, in fact, a powerful, functional program. It's got the features you'd expect any topflight database to have, including mouse support, a multitude of functions, and the ability to handle existing *R:Base*, *dBase*, or *Lotus 1-2-3* files. It's upwardly compatible to regular *R:Base*, too. And perhaps best of all, it's not impossibly difficult to use.

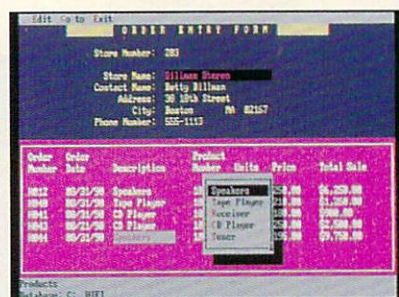
Databases come in two flavors, flat-file and relational. A flat-file database can be thought of as a giant blackboard; if you want to put something on a particular part of the board (that is, add something to the database), then you've got to write it there manually, by hand. A relational database, on the other hand, is like a stack of blackboards that can talk (and write) to one another. In practice, a relational database can eliminate a lot of duplicate inputting.

Take a simple example: filling in someone's address. With a flat-file database, you type the entire address every time you enter it. But with a relational database, you enter it once (in what's called a *table*) and then have the program look it up in the table whenever you need it.

Like its big brother regular *R:Base*, *Personal R:Base* is a relational database. It stores data in tables that can be linked (related) to one another. An interface with intuitive pull-down menus greatly simplifies use, and if you get lost, context-sensitive help is just a keypress away.

Installation involves not only transferring the program files but decompressing them, too. It went quickly on a 386 machine, but on an XT the decompression was slow. One oth-

er thing to keep in mind is the sheer size of the program. Although you can run it on machines with 640K of RAM, it takes up far more than 640K of your hard drive space. To install it all—the program, the tutorial, and the bundled applications—you need a whopping six megabytes of available space, four megabytes for just the program.



Pop-up windows make *Personal R:Base* forms easy to create and to use.

When you install *Personal R:Base*, you may notice some notable omissions on the printer setup list—no Panasonic printers, for instance. This won't trouble seasoned veterans, but the less-seasoned user may be thrown for a loop when the family printer doesn't show up in the list. Such unfortunates are advised to check their printer manuals or contact their printer manufacturers for compatibility details.

Once installed, *Personal R:Base* is fairly easy to use. You start by naming the database. Next, define each table that the database will include and assemble the columns that the table contains; each column gets a name and, if you desire, a description. Then you're prompted to enter the data type (currency, text, time, date, various numeric formats, and so on) or specify if the column is to be a computed column.

How big can your *R:Base* database be? There are limits—80 tables

and 800 columns—although for most personal or small business applications that's more room than you'll ever need.

How could I put this thing to use doing some real work? As it happened, I needed an invoicing application for a small home business. I had been preparing invoices on a word processor, creating each invoice manually. That involved not only manually typing every customer's name and address but also manually typing complete entries for each and every item ordered. Then I had to figure subtotals and sales tax. Could *Personal R:Base* make invoicing quicker and easier? I decided to give it a shot.

I first designed my database on paper. It would initially include three tables: one holding customer data, one holding pricing data, and one holding individual invoices.

I set up my database and defined the three tables. All went smoothly. My customer info table included columns for first and last names, addresses, phone numbers, and date of last order. The stock info table included product stock numbers, descriptions, and wholesale and retail prices. Then I set up the invoice table so it would look up info from the other two. It worked—and I found it remarkably satisfying to enter a customer name (or stock number) and then watch as the complete address (or product info) was automatically filled in. Using computed fields, I even convinced the program to figure sales tax and totals.

The last step was to design a report—that is, set up the invoice-printing routine. The so-called Quick Report option would've yielded a basic report with only a few keystrokes, but I opted for building a custom report instead. *Personal R:Base* allowed me to position various fields wherever I wanted, making it easy to create a truly custom invoicing form. In addition, its drawing option al-

MS-DOS

lowed me to include boxes and rules for further clarity and a nicely finished look.

Of course, I also needed mailing labels. *Personal R:Base* includes more than a dozen predesigned templates for a variety of labels, one of which I used. I could've easily customized my own format, however.

It worked fine, and now I'm thinking enhancements. An early project is to use *Personal R:Base's* sorting capabilities to create alphabetical and chronological customer-activity reports. Next will come scrolling data regions to simplify data entry, and I'd like to add autonumbering of invoices.

Except for the absence of explanations for the included applications, the documentation for *Personal R:Base* is lavish. It's divided into topical sections, with each section indexed and a glossary and appendices at the end of the book. There's an interesting onscreen tutorial, too.

Initially, being the determined sort, I spent only a few minutes with the manual and the tutorial before jumping into the program—and I was able to make a little progress anyway. But I'd have felt better (and made a heck of a lot faster progress) if I'd at least taken time to go all the way through the tutorial. For, despite its "personal" qualifier, *Personal R:Base* is a powerful package that you won't conquer in a day.

But as you work with it, you'll learn its features. You'll use it, and you'll like it. And once you do, your approach to data management may never be the same.

STEVE HUDSON

Ease of Use	★★★★
Documentation	★★★★
Features	★★★★
Innovation	★★★★

IBM PC and compatibles; 640K RAM for total package including tutorial and applications, 450K RAM for program alone; DOS 3.1 or higher for 5¼-inch version, DOS 3.2 or higher for 3½-inch version, DOS 3.3 for IBM PS/2; 6MB of hard disk space; color monitor recommended—\$149.95

MICRORIM
15395 SE 30th Pl.
Bellevue, WA 98007
(800) 248-2001
(206) 649-9500

WILLPOWER 1.0

What will happen to your assets after you die? A good will can ensure that you control the disposition of your assets. And *WillPower* is designed to help you put your estate in order without spending megabucks on professional attorney's fees.

This program cuts through the legal mumbo jumbo, offering valuable advice on how to provide for your spouse, children, and other beneficiaries. There are provisions to name an executor for your estate, nominate a trustee to handle assets earmarked for a trust, and print a customized will that can be updated easily if circumstances change.



WillPower takes you step by step through the process of drawing up a will.

To prepare an accurate will, you enter information on five separate data screens: General Information, Valuing Your Estate, Leaving Your Property, Nominations, and Estate Liabilities. Each screen helps you gather data about yourself and your property. *WillPower* compiles data from each screen to generate a will.

For example, General Information asks where you live and if you're married. You also enter data about your living children, dependent children, and the living children of your deceased children (your grandchildren). Valuing Your Estate helps you calculate the net value of your estate in order to determine what you'll be left after you've subtracted liabilities. As you fill in the program's worksheet, *WillPower* automatically totals your assets, subtracts your liabilities, and comes up with a figure for your net estate. The program tailors its pro-

visions to the state in which you live.

To help you enter data more easily, every screen lists important keys and their functions. If you need more information than what appears on a particular screen, you'll find references to relevant pages in the text. Additional online help and an electronic glossary of important legal terms are accessible via the function keys.

WillPower is simple to use and quite straightforward. The manual is well written and easy to follow.

Despite the program's ease of use, keep in mind that *WillPower* is no substitute for professional legal advice. The program provides valuable background information, but it does not provide for all contingencies. For example, *WillPower* makes no provision for setting up a living will. Also, you may want to consider that generally the big dollar fees for lawyers come from handling the estate after you die, not from drafting your will.

WillPower is just a first step. It can't let you know if you've handled all the important details. To ensure that your affairs are in order and to guard against improper disposition of assets, you should consult a lawyer. Moreover, if your taxable estate is larger than \$600,000, you should also obtain the advice of a tax-planning advisor, who can help you deal with federal estate taxes. In some states, you should consult a tax advisor if your taxable income is much lower.

While *WillPower* cannot really replace a lawyer, it can help you ask the right questions and do the groundwork necessary to come up with a thorough and adequate will, saving you time and expense when you do consult a lawyer.

CAROL HOLZBERG

Ease of Use	★★★★
Documentation	★★★★
Features	★★★★
Innovation	★★★

IBM PC and compatibles, 512K RAM, comes with both 3½- and 5¼-inch disks, hard disk—installable—\$49.95

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and WillWare
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If you are beginning to lose hair or already have a bald spot—*Hair Dynasty has the solution!* You will always feel comfortable whether you're swimming, jogging, skiing or even closing that *big deal.* And when you're sharing your most intimate moments with your loved one or you're surrounded by thousands of people—*only you will know—you owe your self-confidence and great appearance to Hair Dynasty.* But don't take my word for it—

YOU RISK NOTHING!

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Using only the latest technology — with our Computer Imaging Machine you can:

- **Design your own hair replacement system!**
- **You select the hair length, hair style and hair color!**
- **See what you will look like before you buy!**
- **Select from hundreds of hair styles!**
- **See yourself with new hair again!**
- **There is no cost or obligation!**

FREE Computer Imaging Session



These pictures were created from our computer. It demonstrates 3 — different hair replacement systems designed on a picture of this client. You can choose from more than 200 styles! See below for an actual computer imaging session:

SEE YOURSELF WITH HAIR AGAIN ON OUR COMPUTER!

Using the latest technology — you can select how you want to look!



Actual Computer Imaging Session

Choose how you want to look! We'll take your picture and then design a new hair replacement system on your image. You choose and design your hair line, hair style and hair length. We will then give you, a color picture of the *new you!*

This is a major breakthrough! **You no longer have to wonder what you will look like with new hair again! You chose how you want to look!**

"TO EVERY MAN LOSING HAIR"



by Daniel R. Trimper, President of Hair Dynasty for Men

In announcing Hair Dynasty I said:

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Hair Dynasty for Men®

MS-DOS

CARD GAMES

Computer card games tend to be odorless and tasteless. Not so with *Ante-Up at the Friday Night Poker Club*, *Video Poker a la Carte*, and *Edward O. Thorp's Real Blackjack*. These three games up the ante on computerized card playing and whet your appetite for challenging, instructive, and visually stimulating entertainment.

The most addictive of the trio is *Video Poker a la Carte*, which includes six video poker machines. The differences among them are stylistic, and it takes no effort at all to learn them. Deposit your bet, and you're dealt five cards from an antique deck so splendid that anything less than the required EGA graphics couldn't do it justice. You can discard up to all five cards, and the machine pays off after the draw. The better the hand, the richer the pot.

In addition to excellent graphics, effortless play, and seductive appeal, *Video Poker* is an effective trainer. Able to keep up to ten histories for each machine, it can help you develop profitable playing strategies. It's possible to win more than you lose; you'll learn, but it isn't easy.



In *Video Poker a la Carte*, you're dealt five cards from a splendid antique deck.

EGA graphics aren't necessary to enjoy *Ante-Up at the Friday Night Poker Club*. The text version plays well on any system. The graphics version offers both an appealing look and mouse support.

You're treated graciously at the *Friday Night Poker Club*. If you're new to poker, the club pro teaches the mechanics of draw poker, 5- and 7-card stud, and a game called Texas hold 'em. He can also coach you as

you play, but don't bank on his advice. I wager that an uncle on the club's board, not skill, got him his job.

When you're ready to play, four of the club's eight members join you. The game lasts till you go broke or they do, but if you lack a poker player's stamina, you can save a game in progress. Each player has his or her own personality, consistent throughout the game. Players' differences are more pronounced at the pot-limit table than at the \$5 table, and they play better when the stakes are higher, too.

Ante-Up at the Friday Night Poker Club is a great place to learn poker, practice, and sharpen your skills. The atmosphere is informal, the play is spirited, and the money isn't yours.

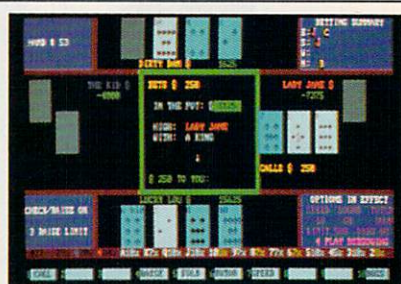
In contrast, blackjack is serious business to Edward O. Thorp, who made his reputation and several fortunes winning at cards and beating the stock market. So while *Edward O. Thorp's Real Blackjack* is as much the tireless dealer as a hundred other blackjack programs, it's also an instructor, a trainer, and a fascinating system for developing strategies for the game of 21.

Play up to six hands yourself or set any of them to play automatically. Five value tables control the way an automatic hand plays, another controls the way it bets, and you control every aspect of all six tables. In addition, you control the way the dealer plays and can vary the house rules to match your favorite casino.

Searching for the perfect blackjack strategy, you'll first try out your ideas by playing manually. The documentation includes descriptions of several card-counting schemes, and the program tracks details like the distribution of cards left to deal and your chances of improving your hand.

When you've found a strategy that may work, you can modify a set of tables and save it. To test your theories, assign different styles to automatic players and play enough hands to see a trend. The program can run through thousands of hands unattended and report the results in detail.

When you've discovered the ultimate blackjack system, you'll want to learn it. *Real Blackjack* becomes your coach. If you're unsure how to play, or think you've lost count, ask for help. When you're done, the program rates your performance within your system.



Test different blackjack systems in *Edward O. Thorp's Real Blackjack*.

Edward O. Thorp's Real Blackjack doesn't look as slick or play as simply as card games that focus on entertainment. It's substantial enough to take as lightly or seriously as you like.

HARRY BEE

Video Poker a la Carte

Playability ★★★★★
Documentation ★★★
Originality ★★★★★
Graphics ★★★★★

Ante-Up at the Friday Night Poker Club

Playability ★★★★★
Documentation ★★★
Originality ★★★★★
Graphics ★★★

Edward O. Thorp's Real Blackjack

Playability ★★★★★
Documentation ★★
Originality ★★★★★
Graphics N/A

Video Poker a la Carte: IBM PC and compatibles, 256K RAM, DOS 2.11 or higher, EGA or VGA, mouse optional—\$49.95

Ante-Up at the Friday Night Poker Club: IBM PC and compatibles, 256K RAM, DOS 3.0 or higher, 3 1/2-inch or 5 1/4-inch floppy drive with a hard drive; 512K, EGA or VGA, and mouse required for graphics version—\$39.95

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Edward O. Thorp's Real Blackjack: IBM PC and compatibles, 384K RAM, DOS 2.1 or higher, color monitor—\$49.95

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- Takin' Care of Business (192-197)** - A fully integrated menu-driven accounting system. (6 disks)
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- As-Easy-As (255)** - A fantastic Lotus 1-2-3 compatible spreadsheet program.
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- Pivot! (282)** - Print your spreadsheets sideways. Dot-matrix printer needed.

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UTILITIES

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- Googol Math (629)** - A math learning system with great graphics and several levels of difficulty. **CGA**
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- Our United States (677)** - A fun U.S. trivia game with questions about each state.
- Animated Alphabet (685-688)** - These colorful animations teach children the alphabet. (4 disks) **EGA**
- World (690)** - A fascinating electronic database of world geography.

APPLICATIONS

- Trip Planner (765)** - Plan a detailed trip with this fantastic computerized road map.
- PC-Musician (789)** - Compose, edit, and play back your musical creations.
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- Cartoon Characters (482)** - Your favorite cartoon and comic strip characters in .GIF format. **EGA or VGA**
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- Planes (493)** - Several pictures of planes (mostly warplanes) in .GIF format. **EGA or VGA**
- VGA Collection I (495-499)** - A great collection of .GIF pictures for VGA systems only. **VGA**
- VGA Collection II (475-479)** - More beautiful pictures for those of you with VGA systems. **VGA**

HOME & FAMILY

- Brother's Keeper (702,703)** - Document your family's history with this genealogy program. (2 disks)
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- PRK - Personal Record Keeper (723)** - A system that tracks a variety of your personal info. **CGA HD**
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- Cash Control (728)** - Manage your checking, savings, or charge accounts the fast and easy way. **320K**
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- Pyramid Solitaire (920)** - Two nice solitaire games: Pyramid Solitaire and Accordion Solitaire.
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- Pig (929)** - This simple game is guaranteed to drive you nuts, but you will be determined to beat it.

EGA GAMES

- SuperFly (962)** - An arcade game with multiple rounds of play. This clever game is lots of fun! **EGA**
- Klondike/Keno (963)** - Two gambling games with excellent graphics. A mouse is recommended. **EGA**
- Solitaire (964)** - A solitaire game like Mah Jongg with westernized pictures and new starting layouts. **EGA**
- Bass Tour (981)** - An incredible fishing simulator with great graphics. **EGA**
- Captain Comic (984)** - Thrill to the commercial quality graphics of this FANTASTIC game. **EGA**
- EGA Coloring Book (989)** - Kids really love to use this coloring program! **EGA**
- EGA Golf (995)** - A game of skill, strategy, and reflex. Great graphics and realism. **EGA**
- Snarf (969)** - Run through the mazes while avoiding the Snarfs. **EGA**

VGA GAMES

- VGA Sharks (983)** - An underwater action arcade game. Avoid the sharks as you collect treasures. **VGA**
- Bananoid (988)** - The VGA graphics are outstanding in this great Arkenoid-like game. **VGA**
- Catch 'Em (991)** - Catch the falling pieces with your paddle. Many levels; great graphics! mouse **VGA**
- Beyond Tetris/Joust (993)** - A great Tetris-like game with a twist. **VGA**
- Shooting Gallery (994)** - Put your aiming skills to the ultimate test. Incredibly good! mouse **VGA**
- VGA Jigsaw (998)** - Uses beautiful pictures to create puzzles for you to put back together. **VGA**

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Amiga

BANDIT KINGS OF ANCIENT CHINA

One of the earliest computer games was *Hamurabi*, which put you in charge of a kingdom and let you try to win your subjects' loyalty by balancing the resources in your land. *Bandit Kings of Ancient China* takes this concept several steps further. Based on a historical Chinese novel, *Shui Hu Zhuan*, *Bandit Kings* takes place in the twelfth century just as the Song Dynasty was on the verge of collapse. Imperial Minister Gao Qui has wrestled control from the Emperor. As one of the remaining heroes of the land, it's your job to build up strength and loyalty among your followers, awaiting the Emperor's edict to seek out and crush Gao Qui.



Can you take control of 49 prefectures and help the Emperor crush Gao Qui?

Before you get started, you must choose your character, called a *Good Fellow*. There are ten Good Fellows in the Dynasty, and you can choose to play from one to seven of them, depending upon which of the four scenarios you choose. As you settle a land, you can recruit Bandits residing in your territory, each of whom can direct up to 100 men. You can assign tasks to your Bandit and use him to defend or attack your enemies. In all there are 255 characters, each with different attributes, giving you a wide variety from which to choose.

Bandit Kings' main screen is divided into four sections. One section displays a picture of your Good Fellow, along with the amount of gold,

men, food, and a number of other statistics about your prefecture (province). Another displays a map of China divided into the 49 prefectures, all color-coded to show which Good Fellow is in control of that area. As the game progresses, prefectures will change owners several times. A small portion of the screen is devoted to messages, while humorous animations and pictures depicting moves and interactions with other characters are shown below your prefecture data. These animations can vary from hunting a boar to sending your men off to war. Several sampled sounds and many catchy tunes add to this already elaborate simulation.

Bandit Kings does have a few minor problems. Messages sometimes disappear before you have a chance to read them. An option in the menu allows you to set the delay time between messages, but even the longest delay time seems too fast. Occasionally the pull-down menus became transparent, making the menus difficult to read. Another annoyance is the manual. While it's well written and full of historical notes and character information, it's obviously not written for the Amiga. Instead, a six-page Amiga reference leaflet is provided.

These minor problems aside, *Bandit Kings of Ancient China* is still one of the most complete and entertaining role-playing simulations available. From the detailed drawings of each of the characters to the colorful hexagon battlefield, you'll be captivated for many hours. The game is sure to become another must-have among strategy game and role-playing game lovers. *Bandit Kings* isn't copy-protected and requires 1.6MB of hard disk space to install.

ROBERT DU GAUE

Playability:	★★★
Documentation:	★★
Originality:	★★★★
Graphics:	★★★★
Sound:	★★★★

Amiga—\$59.95

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PROFESSIONAL DRAW 2.0

The first thing you notice about *Professional Draw 2.0* is that its interface looks virtually identical to the original *Professional Draw*, with the addition of some new menu items. These new selections are what brings *Professional Draw 2.0* in league with the midrange structured drawing programs available at much higher prices on other computers.

A major enhancement to *Professional Draw 2.0* is a separate program called *Trace*. *Trace* converts an IFF bitmap file into a structured clip suitable for import into *Professional Draw*. Experimentation is the key here, as it's easy to create absolutely enormous clips that take forever to load. (The updated *Professional Draw* is much faster than 1.0, but many operations are still sleep-inducing.) Simple IFFs using very few colors will convert best.

With *Professional Draw 2.0* you can take one object, say a circle or a square, and blend or *morph* it into another object. *Professional Draw* will calculate and display all the intermediate-step objects for you very quickly. Morphing objects will also blend their colors, if different, so a yellow star can be morphed into a blue planet over a number of steps, with each transitional object changing both shape and color along the way.

You can now control how *Professional Draw* operates on your particular display hardware. Depending on whether you have a flickerFixer board, you can choose between Smooth (best colors for flickerFixer and 3000 owners), Non-Interlace (for using the program in 640 × 200 mode), or Flicker-Free (a special palette designed to minimize interlace flicker) modes.

Professional Draw 2.0 now offers a menu item that easily aligns text with curves, a task that was sheer torture with the original program. This was a sorely needed feature. The program comes with two specially prepared outline fonts: Times (serif) and Triumvirate (sans serif). These typefaces can be treated as objects when typed onto the screen: Scale, twist,



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skew, rotate, and color them in a multitude of ways, and wrap letters or text on arbitrarily curved paths with ease. If you want a wider variety of outline fonts, you'll have to invest in one of Gold Disk's Compugraphic outline fonts packages, which come with a utility called *CreateFont* that converts Compugraphic into a format acceptable to *Professional Draw*.

Professional Draw 2.0 can import Encapsulated PostScript files and IFF bitmaps, and can output to Postscript and dot-matrix printers or plotters that speak HPGL. Gold Disk's *Professional Page* and Softlogik's *PageStream 2.1* software will both import clips created with *Professional Draw*.

The 158-page paperback manual does a decent job as both a tutorial guide and a working reference.

HARV LASER

Ease of Use	★★★★
Documentation	★★★
Features	★★★★
Innovation	★★★

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MicroLeague Sports has, once again, granted the wish of many sports fans. *MicroLeague Football, The Coach's Challenge* is a truly amazing and realistic sports simulation that places you in control of an NFL team.

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There is one situation missing from the program that real coaches must face. The realism stops short of your having to deal with an irate owner should your team find itself in a losing season.

Two coaches, in charge of opposing teams, may meet for judgment on the gridiron. Each may place his or her prime players in their most effective positions, determine strategy, and choose offensive and defensive postures. Once selected, the computer animates each play and displays the positive or negative gains on the field.

I found the game to be a great way to settle a longstanding dispute with my dad and brothers, regarding which of us possesses the coaching talent in the family. You can also go toe to toe with the computer as your side-

line nemesis across the field.

Picking offensive and defensive alignments and sending in plays from the bench are only part of this complex simulation. How will you react if the opposing team continues to blitz or an injury takes out one of your star players? The coach with the ability to think on his or her feet will be able to compensate for these surprises and adapt the game plan accordingly.



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MicroLeague Football begins by asking the coaches to select 2 of 20 clubs as the home and visiting teams. The choices available are a who's who of championship ball clubs, past and present. If you've always wanted to coach Johnny Unitas and the 1958 Baltimore Colts, here's your chance. Or how about coaching the 1977 Dallas Cowboys, the 1986 Cleveland Browns, or the 1983 Miami Dolphins?

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A Quik-Play option allows you to move quickly through a game for speedy results. This is particularly handy when the outcome of a game is obvious and a quick end is desired. It's also handy when the end result of

a certain game is needed for documentation or statistical purposes.

Knowing a lot about the game of football is not a requirement to play *MicroLeague Football*, but it helps to have a working knowledge of the sport if you want to win. This is because *ML Football* is a true simulation of the rather complex sport. Fortunately for novices—and for those who know the game well—the documentation is clear, concise, and written especially for the Commodore 64 and 128. Also included is a listing of football plays and terminology to provide a better understanding of the game.

After the game, a complete box score can be printed. This is where a coach can review the strengths and weaknesses of the ball club and adjust accordingly. The Stat Compiler manages and saves the statistics for you.

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STEVE HEDRICK

Playability	★★★★
Documentation	★★★★
Originality	★★★★
Graphics	★★★
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Please note: Volume 2 for **GW-BASIC** is near the finishing stages and will be available in June.

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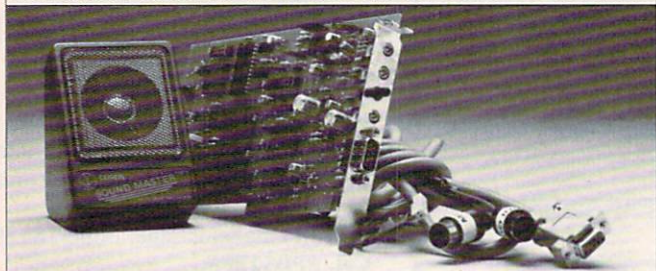
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Allocate your income.
MECA
Apple II, IBM, Macintosh

HOME ENTERTAINMENT

1. Entertainment Pack for Windows

Open new windows on fun.
Microsoft
IBM

2. SimCity

Run the world's first simulated city.
Maxis
Amiga, Commodore 64/128, IBM, Macintosh

3. King's Quest V

King Graham returns to the Land of Daventry.
Sierra On-Line
IBM

4. Flight Simulator Aircraft & Scenery Designer

Design your own plane.
Microsoft
IBM

5. Flight Simulator

Head for the wild blue yonder.
Microsoft
IBM, Macintosh

6. Quest for Glory II

Prove your worth and attain glory.
Sierra On-Line
IBM

7. SimCity Graphics

Create cities in other times and places.
Maxis
Amiga, IBM, Macintosh

8. SimEarth

Design, modify, and manage your own planet.
Maxis
IBM, Macintosh

9. Jack Nicklaus' Unlimited Golf and Course Design

Play the Bear's favorite courses.
Accolade
Amiga, IBM, Macintosh

10. ChessMaster 2100

Board strategy that isn't boring.
Electronic Arts
Apple II, Apple IIGs, Commodore 64/128, IBM

HOME LEARNING

1. Where in the World Is Carmen Sandiego?

Chase Carmen around the world.
Broderbund
Amiga, Apple II, C64/128, IBM, Macintosh

2. Super Solvers Treasure Mountain!

A fantasy exploration.
The Learning Company
IBM

3. Where in Time Is Carmen Sandiego?

Can you find Carmen in time?
Broderbund
IBM

4. The Playroom

Kids explore and learn on their own.
Broderbund
IBM

5. Where in the USA is Carmen Sandiego?

The chase moves to the USA.
Broderbund
Amiga, Apple II, C64/128, IBM, Macintosh

6. Mavis Beacon Teaches Typing

Learn to touch-type.
Electronic Arts
Amiga, Apple II, Apple IIGs, C64/128, IBM, Mac

7. Super Solvers Outnumbered!

Super Solvers is back!
The Learning Company
IBM

8. Children's Writing & Publishing Center

Newsletter and story designer.
The Learning Company
Apple, IBM

9. New Math Blaster Plus!

Teaches basic math concepts.
Davidson & Associates
Apple II, Apple IIGs, IBM

10. Super Solvers Challenge of the Ancient Empires!

Challenges the mind as you explore.
The Learning Company
IBM



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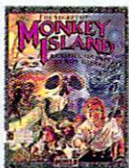
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System Requirements: IBM® PC, XT, AT, 386, 486 or compatible with 256K RAM, DOS 2.0 or higher, CGA, EGA, VGA or MGA, and headset or external speaker.
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