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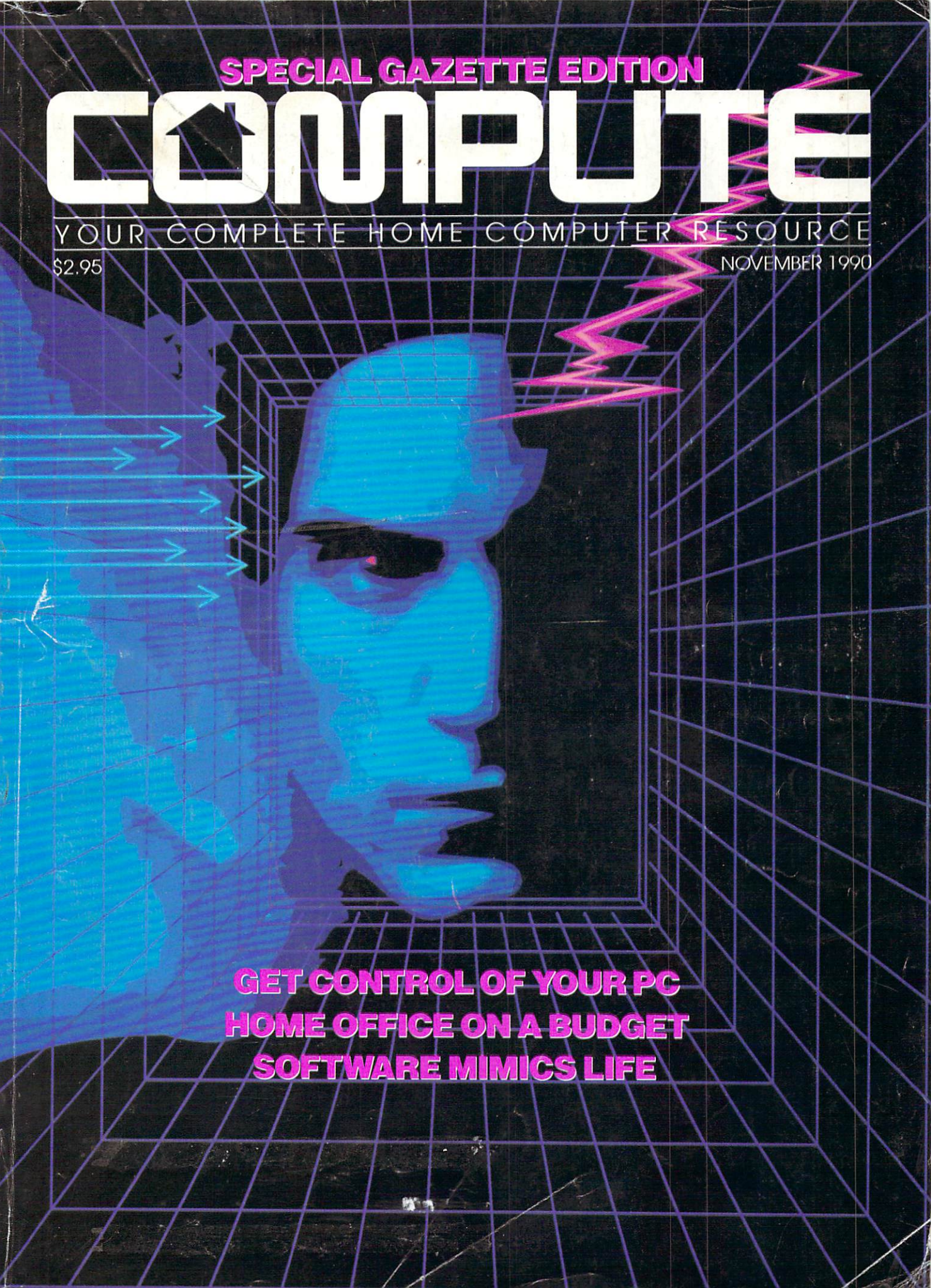
NOVEMBER 1990



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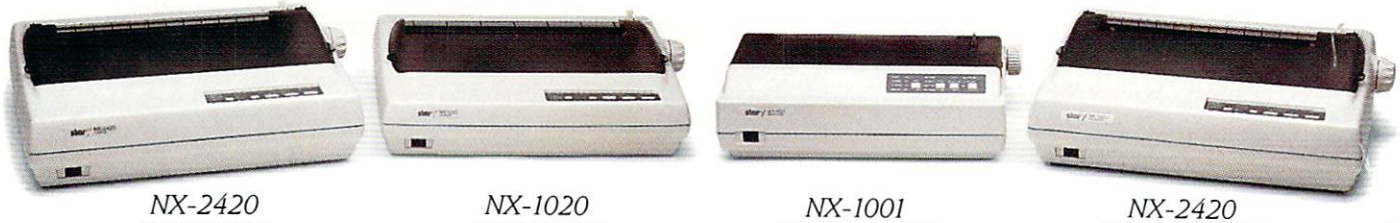

NX-2420 RAINBOW | *NX-1020 RAINBOW* | *NX-1001 MULTI-FONT* | *NX-2420 MULTI-FONT*

For a while there, it was beginning to look like there would never be a dot matrix printer versatile enough to be a real jack-of-all-trades. But no more. Now, for the first time ever, there's a new series of printers designed to bring you big-business performance at a small-business price.

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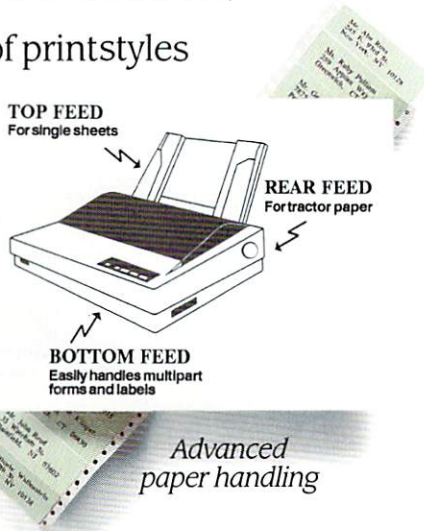

Advanced paper handling

COMPUTE

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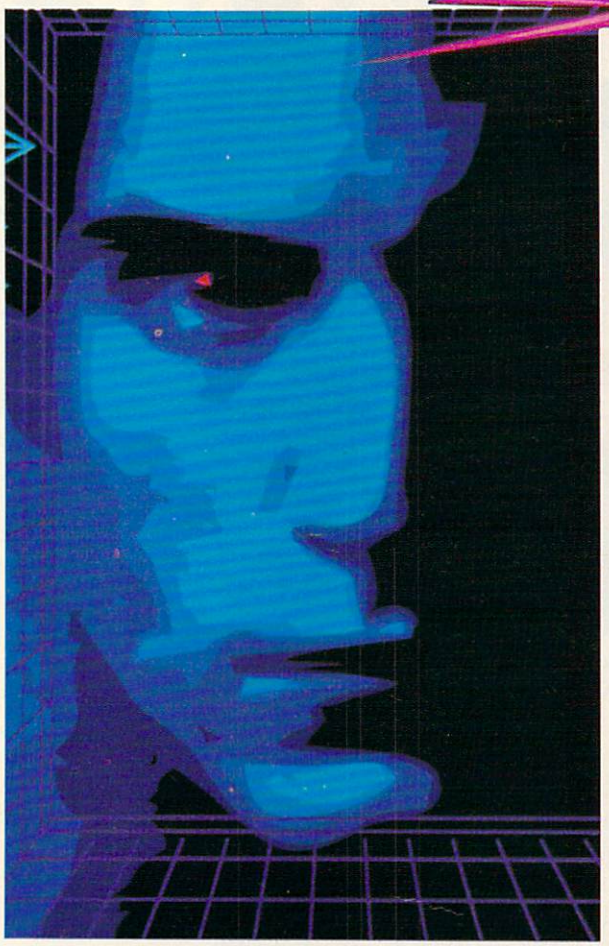

ON THE COVER

Computer-generated illustration by Schuster/SUPERSTOCK

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Dungeons & Dragons: A Simulated Fantasy 64
BOB GUERRA
Dungeons & Dragons started in a small game shop in Lake Geneva, Wisconsin, and grew into a pop phenomenon. Here's a look at the stuff dreams are made of.

DISCOVERY

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The arrival of affordable CD-ROM drives opens up new vistas on home computing.

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LESLIE EISER
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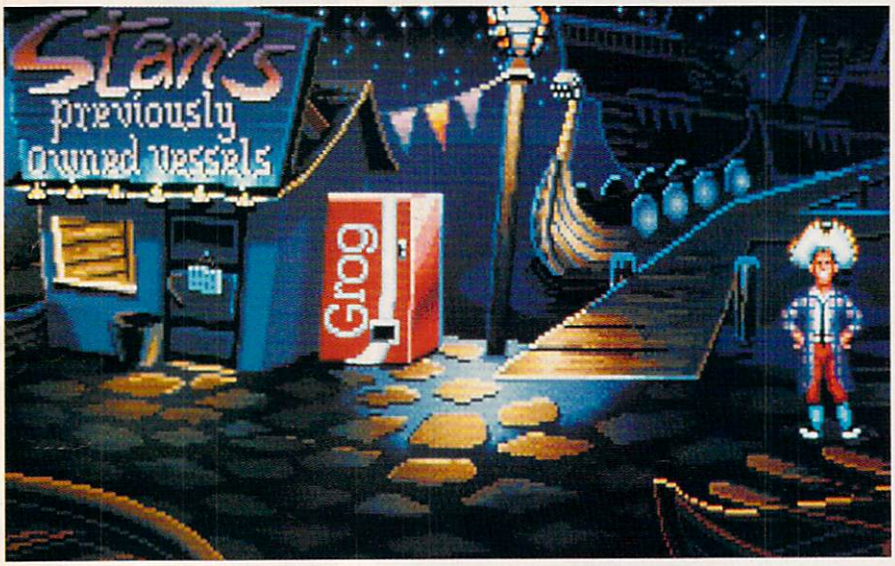
THESE PIRATES HAVE TONGUES AS SHARP AS THEIR SWORDS.



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 Mêlée 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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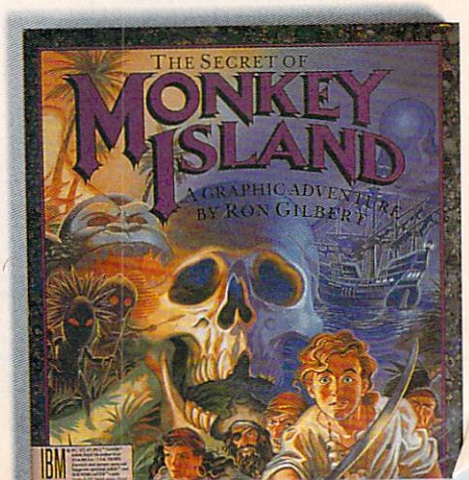

The Secret of Monkey Island is available for IBM and 100% compatibles in 16-color EGA and 256-color VGA versions. Visit your retailer or order directly with Visa/MC by calling 1-800-STARWARS (in Canada 1-800-828-7927). ™ and © 1990, LucasArts Entertainment Company. All rights reserved. IBM is a trademark of International Business Machines, Inc. 3M is a trademark of 3M Corp. AdLib is a trademark of AdLib, Inc. Cruise prize arranged with the "Fun Ships" of Carnival Cruise Lines, The Most Popular Cruise Line In The World; ship's registry: Bahamas and Liberia.

COMPUTE

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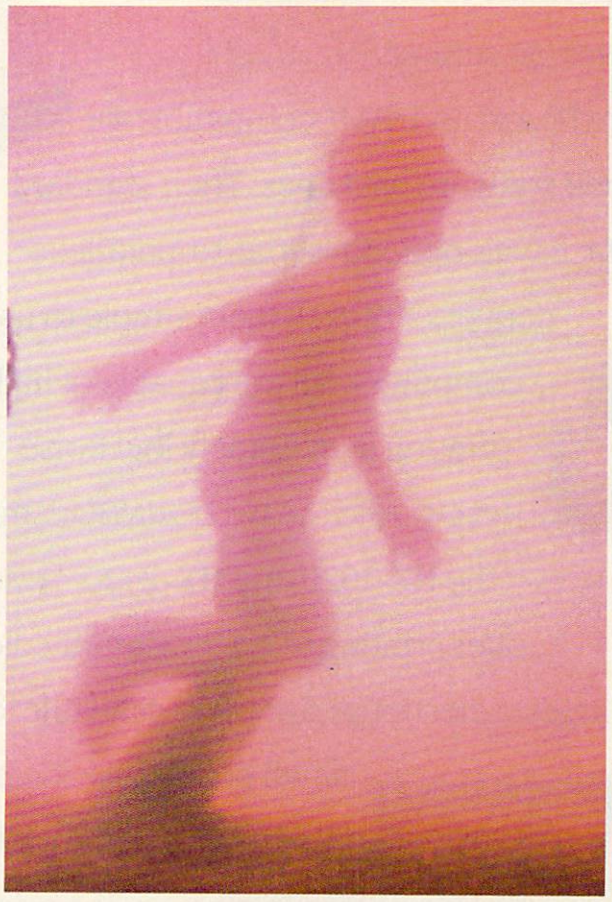

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Playing with the Big Boys: A Hard Drive for the 64/128 G-6
MORTON KEVELSON
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ROBERT COOK
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Caveman G-33
MIKE SEDORE
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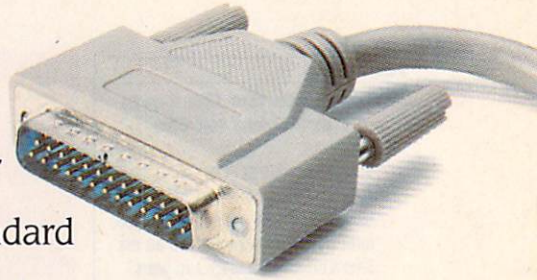
Tank Shootout G-36
HUBERT CROSS/LIGIA LATINO
Call out the infantry! Send in the tanks! Prepare to launch missiles! Capture your opponent's command post in this two-player war game for the 64 or 128.

are standard with Star. The switchable push/pull tractor makes changing paper paths a snap—a feature that's especially handy when you're printing a lot of hard-to-manage forms. Plus, convenient paper parking lets you feed single sheets through at the touch of a button—without removing or wasting continuous-feed paper.

User-friendly control panel

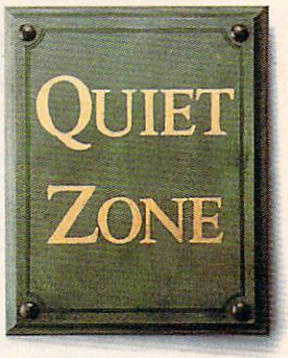
NX printer control panels are designed for the ultimate in user-friendliness. You can easily select up to 14 of the most commonly used functions. And an Electronic Dip Switch Mode lets you customize the control panel with up to 15 of your own power-on settings.



Compatibility

Star's NX printers are Epson and IBM* compatible for use with most off-the-shelf software packages. Their standard parallel centronics interface with optional serial-to-parallel converter makes them simple to use with most personal computers. All are capable of high-speed, bi-directional printing at extremely low noise levels. And the two *RAINBOW* models—the NX-1020 and NX-2420—even offer printing in seven vibrant colors.

Color printing



Low noise level

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PC Magazine, Best of 1989 Awards
January 16, 1990 issue

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PETER SCISCO

These are exciting times in the world of home computers. The technologies of the last decade, from computer chips to video displays, are coming together and giving new meaning to the term *desktop fusion.* Nowhere is this more apparent than in Japan, where a combined effort of government direction, controlled competition, and state-of-the-art engineering have created a late-twentieth-century electronic playland. This month, Senior Editor Keith Ferrell takes us on a tour of that silicon wonderland in "The Japan Factor."

Americans usually think of entertainment when they think of Japanese electronics. But Japanese electronics affect business too, with products like notebook computers, handheld information managers, color LCD screens, and stylus-based input devices.

The move from toys to tools presents formidable challenges even to a quick-moving techno nation like Japan. But it's happening, and we'll certainly feel the impact and influence of Japanese engineering in our home computing devices in the coming decade, as we have over the last five years or so.

Japan is a world leader in electronics engineering, miniaturization, and production. This is a country that took a palm-size camcorder (the new Sony Handicam) from schematic drawing to finished product in six months. Most American companies would take six months to develop a survey for conducting market research into the profitability of such a camera.

But for all of its technological wizardry and innovation, there lies at the heart of Japan a puzzle: How is it that a country so attuned to the marvels of electronics and computing fails to embrace personal computers on a national scale? In Japanese businesses, it's common for several workers to share a computer or a dedicated word processor. At home, except for products like Famicom (what we call Nintendo) and PC Engine (what we call TurboGrafx-16), personal computers are as rare as hen's teeth. In schools, the much-admired Japanese educational system does mostly without technology, relying instead on memorization and discipline.

Likewise, attempts to link Japanese citizens through communications networks have yet to take hold. Designed to make possible those "cities of tomorrow" we all remember from countless Walt Disney newsreels, Japanese telephone and data networks designed for consumers have fallen victim to the very human trait of inertia. To update an old adage, you can teach an old dog new tricks, but that doesn't mean you'll get a spot on "David Letterman."

Some industry sages link Japan's lackluster acceptance of home computers to cultural factors. The Japanese respect group effort over individual achievement, for example. If that's true, then sharing one computer among several workers seems a logical way of conducting business—one tool that enhances a the group effort.

Despite America's emphasis on teamwork, we are a country of individuals. We drive to work one to a car. We stress the *personal* in personal computer. We dream of the big play at work and at school, that moment when we're singled out from our peers as having made a significant contribution. Anyone who thinks American work groups would be happy to share personal computers has never stood in line at the fax machine.

The lagging home computer community in Japan has probably as much to do with the Japanese language as it does with cultural perogatives. Translating keyboard commands from kanji to computerspeak is a formidable challenge. Innovative solutions like handwriting recognition and touch screens lead the new wave of Japanese computers.

Japan's focus on group effort, and a sizable contribution from its government, have fueled that country's technological rise. Its fusion of consumer electronics with telecommunications and computers promises to reinvent the way we work with our machines. In the end, it may redefine the way we work with each other. ⊡

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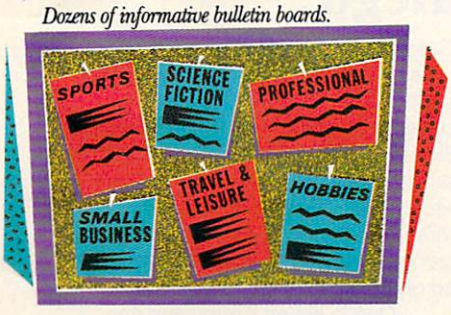

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NEWS & NOTES

DELPHI Discounts

Telecomputing enthusiasts can now dial up great savings with DELPHI's new 20/20 Advantage Plan. Designed for the most active users, the plan offers the first 20 hours of evening access each month for only $20 and additional time for $1.20 per hour. DELPHI's Basic Plan offers less active members a $6.00 hourly rate, and the $5.95 monthly fee covers the first hour. According to spokeswoman Merriam Sarcia, these plans are part of a larger trend toward lower online costs for all telecommunicators. For more information, contact DELPHI at 3 Blackstone Street, Cambridge, Massachusetts 02139; or phone (617) 491-3393.

—MIKE HUDNALL

Watch the Birdie

Wish you could play a competitive round of golf but can't afford the expensive membership fees? Computer Sports Network (CSN) offers weekly online golf tournaments for owners of Accolade's *Mean 18 Ultimate Golf.* Electronic duffers download the course pins and tees, play each round offline, and upload their score cards back to CSN. Top players receive points that can be used to buy a variety of computer- and sports-related products. On Thanksgiving weekend, you can download and compete on the Autumn Leaves golf course from COMPUTE's own *Mean 18 Course Disk.* For more information about CSN, call (800) 727-4636.

—DAVID ENGLISH

Solid Ghoul

Who says Halloween has to be just one night of the year? Accolade has signed an agreement with Horror Soft, a British-based software developer, to distribute Horror Soft's newest computer game, *Elvira, Mistress of the Dark.* The game leads players on a ghostly and grisly role-playing adventure through a demon-filled medieval castle. *Elvira, Mistress of the Dark* is scheduled for release in North America during the first quarter of 1991 for the IBM PC, Commodore Amiga, and Atari ST.

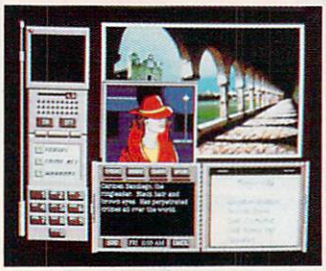
—DAVID ENGLISH

Elvira terrorizes the neighborhood in her new adventure game.

Where in *TV Guide* Is Carmen Sandiego?

That dastardly international thief, Carmen Sandiego, is back. But don't look for her in your local software store; she was most recently spotted hiding out near Mr. Rogers' neighborhood.

Starting in the fall of 1991, Carmen will have her own television show on PBS, developed by WGBH of Boston, WQED of Pittsburgh, and Brøderbund. In this educational game show, three teams will race to recover an exotic treasure swiped by the infamous Carmen Sandiego and then to catch Carmen herself. To locate Carmen and the loot, the detective teams must answer geography-related questions and deduce locations from clues disclosed on an electronic game board.



You've chased Carmen across Europe; now you have to figure out what channel she's on.

"One in seven Americans cannot locate the Soviet Union or Pacific Ocean on a map of the world," explained Kate Taylor, WGBH's co-executive producer of children and family programs. " 'Where in the World Is Carmen Sandiego?' will make geographic information exciting through the engaging game-show format."

Carmen's half-hour game show will be seen Monday through Friday on most PBS affiliates. Meanwhile, the Carmen Sandiego series of educational computer games, introduced in 1985, has sold nearly 2 million copies. Brøderbund isn't saying where Carmen's next computer caper will take place, but industry talk has it that Carmen's next heist may take place in outer space.

—DENNY ATKIN

continued on page 16

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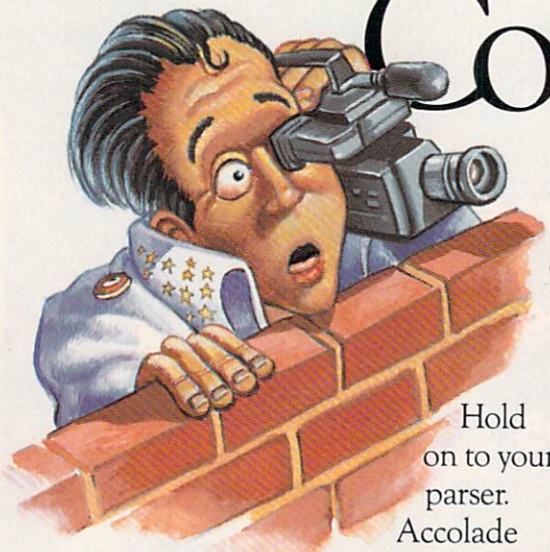
"He Ain't Nothing But a Corn Dog." Can a man who wears polyester slacks and "Alf" pajamas impress the stunning Stella Hart?

"Heartbroke Motel?" Help Les Manley solve engaging puzzles. See genuine felt paintings. Animation so real your hips will gyrate.

CAUTION: The Contain Gra



Hold on to your parser. Accolade is about to redefine the world of animated graphic adventures with two phenomenal new games.

"I Can't Help Falling In Holes For You." Hot music. Hot colors. Hot dang. Search for The King recognizes over 1500 words.

First, meet a hero who finds his clothes at K-Mart and his dates at Radio Shack. *Search for The King*™ places you on the heels of Les Manley as he rocks 'n rolls across America in

search of beautiful babes, big bucks and the greatest entertainer of all time...The King. Then join P.J. Barrett on a fantastic voyage through time and space in *Altered Destiny*.™

"I Want a Hunk Of Burnin' Les." Just one of the beautiful babes our hero Les Manley could stumble upon. Got any cocoa butter?

"Lift Me Tender." Want more? Get Les. Over 70 bit mapped screens make Search for The King one heavy animated graphic adventure.

Actual game screens from IBM PC/MCGA
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One minute you're a guy eating nacho-avored popcorn. The next, you're sucked ough your TV into a fantastic alien world.

Welcome, fellow traveler, to the Canyons of Fear. Put away the reality you've known. You won't be needing it on this trip.

Following Scenes phic Material.

"...products which will push the envelope of adventure gaming." —COMPUTER GAMING WORLD

looking for high adventure, Accolade has two graphic examples. How to order: Visit your favorite retailer or call 1-800-245-7744.

Altered Destiny was written and designed by Michael Berlyn, creator of Infidel™ and Suspended.™ Author of "The Eternal Enemy."

Enter a marvelous universe teaming with wraiths, fluboxes and exotic creatures and landscapes. There's a deep mystery here—and only you can help P.J. solve it.

Fresh. Surprising. Shocking. Always entertaining. If you're

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Discover the Boiling Pits. Altered Destiny immerses you in a realm of incredible landscapes. This definitely isn't Kansas.

Meet Alnar the Metal Shaper. Altered Destiny surrounds you with unimagined lifeforms. It's like no game you've ever seen.

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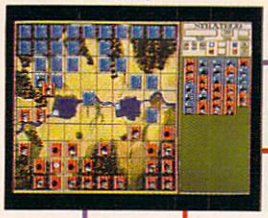
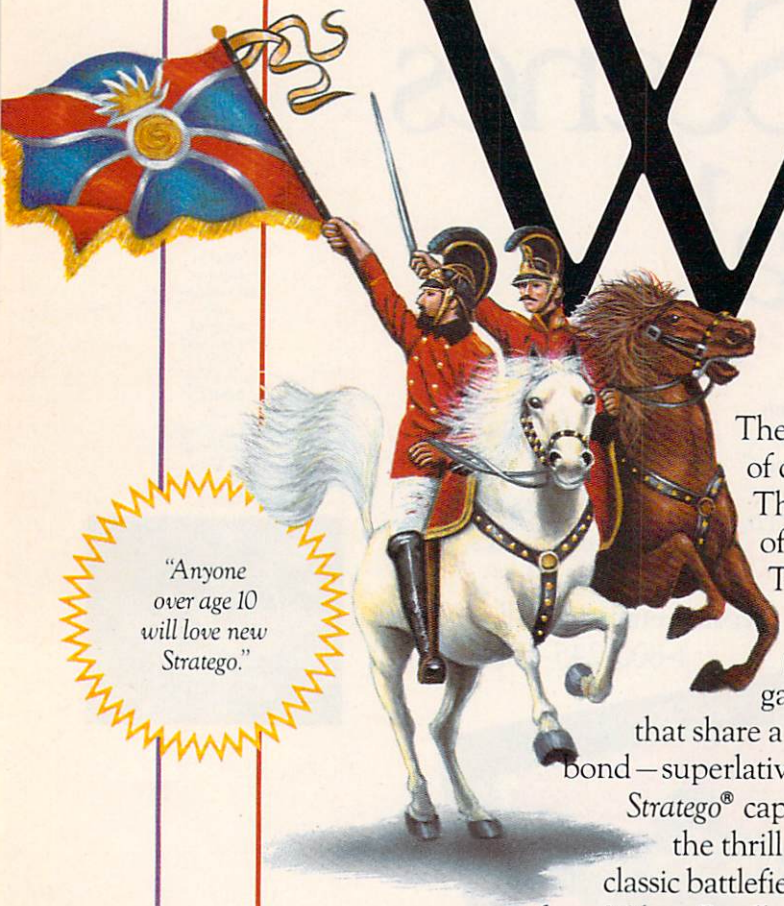
IBM PC



Enjoy three game boards: original, classic and modern. Stratego has single battle or 5-battle campaigns – even digitized sounds.

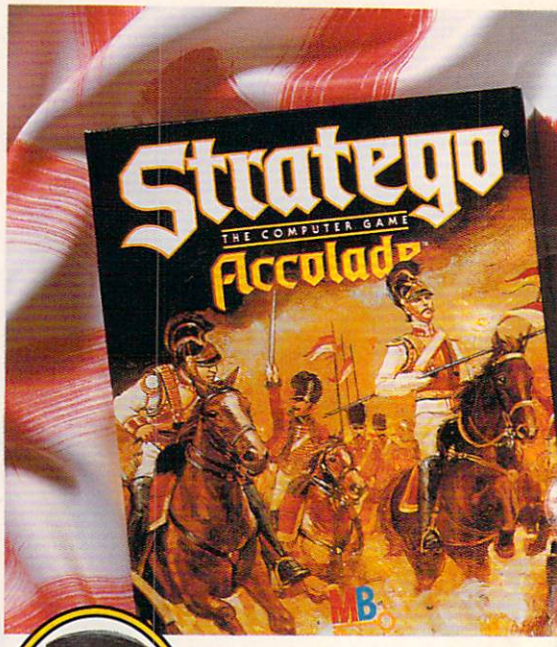
"The greatest battlefield strategy game of all time."

War &



"Anyone over age 10 will love new Stratego."

The intensity of combat. The serenity of stones. Two diverse philosophies of gameplay that share a common bond—superlative strategy. *Stratego*® captures all the thrill of the classic battlefield board game from Milton Bradley. Now, there are more options, choices and features. Deploy your army, plan your advance, attack and capture the enemy flag. One match against the computer, and you'll see why *Stratego* is called "the greatest battlefield strategy game of all time."



Ishido™ summons forth *The Way of Stones* and returns it to the world after thousands of years. This ancient game and beautiful puzzle recalls

Play Traditional and Tournament rules, including Silent Defense, Aggressor Advantage and Rescue. Comes with multiple piece sets.

MAC II

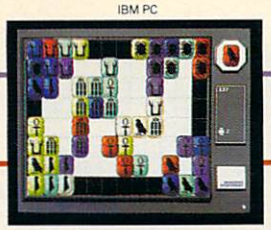
Play the computer with 5 levels of ability from sergeant to field marshal. Select from a library of battle formations or make your own.

MAC II

Actual game screens from IBM PC and M

Stratego © 1990 Milton Bradley
Hausemann & Hotte

IBM PC



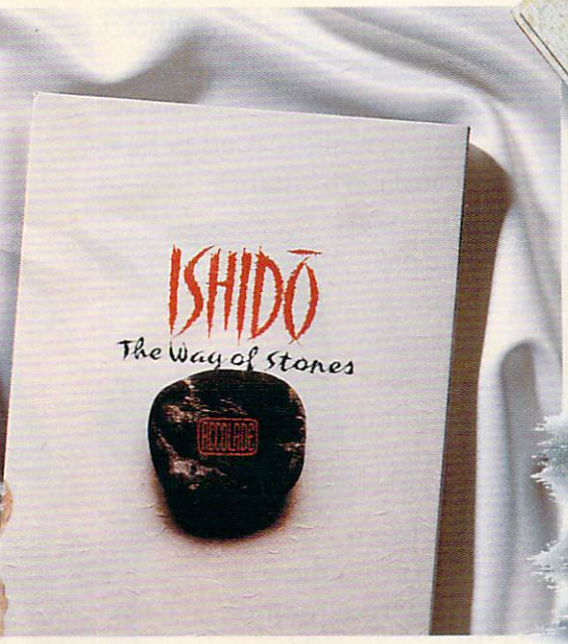
Play a power game to amass points and compete against the clock. Play for elegance, meditating over each move like a true master.

MAC II

See if you can empty the pouch and discover the secret of 4-Ways. Let the oracle reward you with answers to your innermost questions.

Peace

an uncommon bond—Accolade. How to order: Visit your favorite retailer or call 1-800-245-7744.



"...a first-class strategy game in the 'minute to learn, a lifetime to master' tradition."
—MACUSER

the depth of chess and the simplicity of Go. Call upon your deepest powers of concentration to match 72 stones on a board of 96 squares.

Stratego and *Ishido*. The finest strategy games the world has ever known, brought together by quite

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The best in entertainment software.™

"It is the very simplicity of this game that makes it so powerful."
—PC GAMES

As you merge with Ishido's many possibilities, you'll discover why, to some, The Way of Stones is more than just a game.

MAC II

Circle Reader Service Number 239

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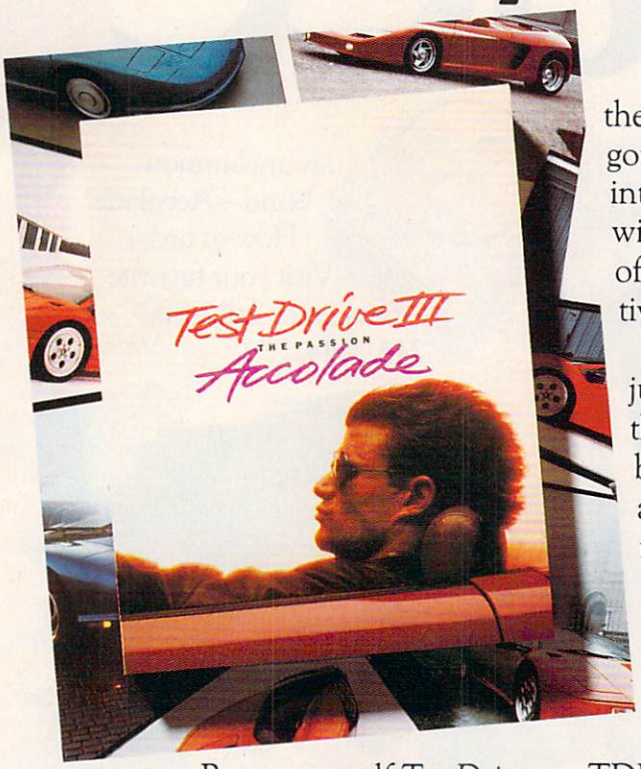
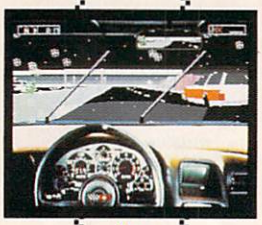
...sterdam, Netherlands.

"The third in the trilogy of Test Drive products is finally here—and it's tougher, faster and flashier than ever before!"

Futuristic and fast. Chevrolet's prototype CERV III is packed with down-the-road engineering and punch. 0 to 60 mph in 3.9 sec.

Hurry. They'





New features include night driving, bad weather, working headlights and wipers, Instant Replay and a 360-degree Chase Car view.

Brace yourself *Test Drive* fans. *Test Drive III: The Passion*™ is unleashed.

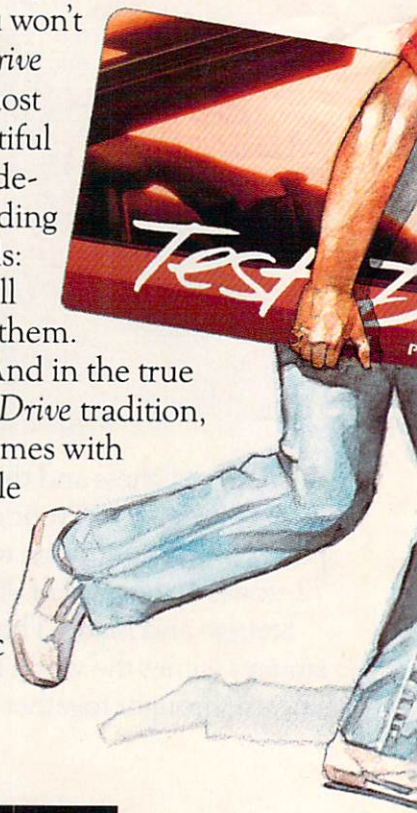
It's totally new. Totally hot. And it'll totally blow the doors off of any driving simulation on the market.

Test Drive III's advanced synthesis of bit-mapped and polygon-fill graphics, plus digitized interiors, provides the racer with an unprecedented sense of speed, realistic road perspective and performance.

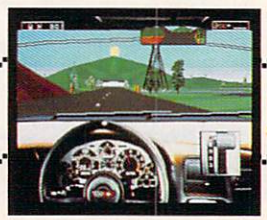
You won't just *drive* the most beautiful and demanding roads: You'll *feel* them.

And in the true *Test Drive* tradition, TDIII comes with incredible cars.

Settle into the futuristic cockpits



Race head-to-head against the computer on branching roads that offer cross traffic, long tunnels and ocean straightaways.



Digitized dreams. Race sleek and sexy prototype sports cars through the most detailed and graphically "real" world of any driving game

Actual game screens from IBM PC/VGA

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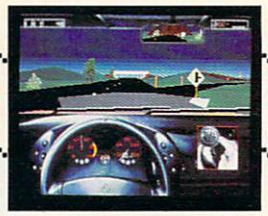
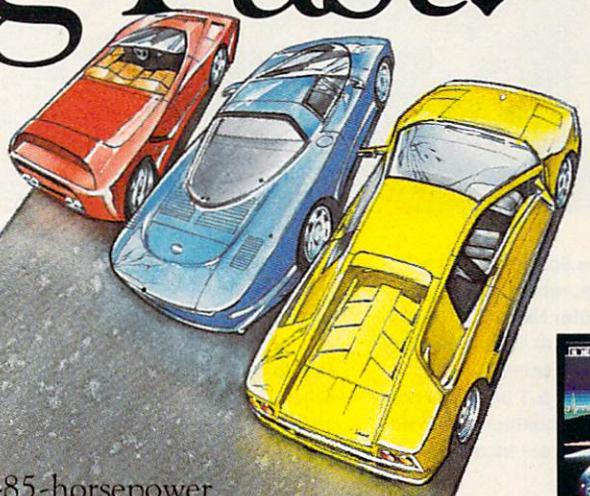


Unmatched realism. TD III allows you to throw your car in reverse, drive back the way you came, take multiple routes – explore!

COMING SOON! TDIII add-on disks, containing both scenery and cars.

e Going Fast.

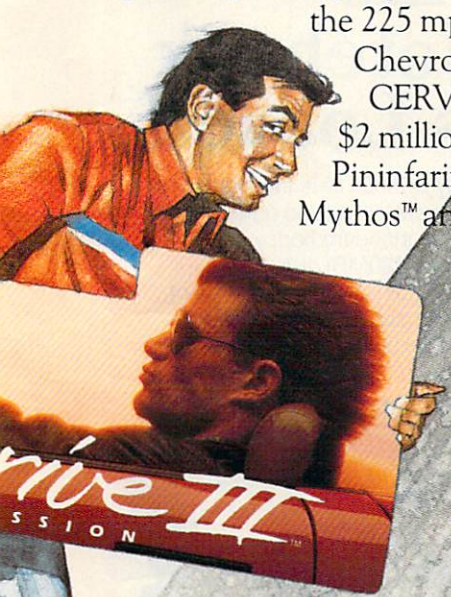


of three exclusive and ultra-expensive prototype sports cars—the 225 mph Chevrolet CERV III,™ $2 million Pininfarina Mythos™ and the 485-horsepower Lamborghini Diablo.™

The Passion is hot. So hot that for a limited time, Accolade will give a free *Test Drive III* Dashboard Sun Shade for your own dream machine with every TDIII game purchased. See your participating retailer for details.

Test Drive III: The Passion. The fastest-selling driving games of all time just got faster.

How to order: Visit your favorite retailer or call 1-800-245-7744.



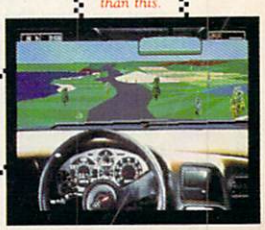
Better move fast. These free Test Drive III Dashboard Sun Shades won't last forever.

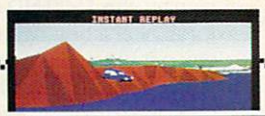
ACCOLADE™

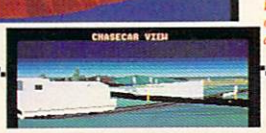
The best in entertainment software.™

Complete sound and music support on all leading sound boards throughout the game. Add-on disks contain both scenery and cars.

Blow by some oceanfront property at 200 mph plus. Feel the CERV III hug the highway. It just doesn't get any better than this.







Relive your greatest crashes on Instant Replay or check out your driving situation on the 360-degree Chase Car view with variable Zoom.

version of the game. Other versions may vary.
produced under license from their respective owners.

Circle Reader Service Number 107

The Collegiate Schools of Richmond, Virginia, recently won the 1990 Texaco Star National Academic Championship at Rice University in Houston. Each team member took home an AT & T personal computer and a gold championship ring. In addition, the team as a whole received a $50,000 scholarship from the Texaco Foundation. Watching as teammate Billy Braoddus *(seated)* tests one of the new PCs are *(left to right)* team members Eric Biber, Peter Hopewell, Joann Chan, and AT & T Computer Systems Area Manager Larry Yocum.

STRIKE THREE

If you've been waiting with bated breath for *TV Sports Baseball,* you might want to give it up and switch to ESPN. Although the program has been advertised for months, Cinemaware says it won't be on retail shelves for a while yet.

"We've pulled development back in-house so that we can make enhancements to the program," said Sam Pool, a Cinemaware spokesman. He said the company wants to add a number of features to the program to ensure that it meets the standards set for the TV Sports line. Cinemaware currently plans to release Amiga and MS-DOS versions of the program in April 1991.

Meanwhile, Beyond Software, an independent game developer that did early work on *TV Sports Baseball,* filed a $20 million lawsuit against Cinemaware last July. Beyond Software claims that Cinemaware relinquished its rights to the baseball game when it canceled Beyond's development contract.

"In the end, we know we're the ones who designed the game and that we own the rights to publish it. We need the help of the legal system to get the truth out in the open," said Beyond's Don Daglow.

Pool said that the dispute between the two companies is currently being handled through contract arbitration, and he doesn't anticipate that it will delay the release of *TV Sports Baseball.* Maybe we'll see it by spring training.

—DENNY ATKIN

Food for Thought

Kids can combine hunger for learning with hunger for snacks, thanks to Del Monte's Simon Says: Get Smart program. Proof-of-purchase labels will entitle kids to discounts of up to 50 percent on more than 60 products, including computer programs that help children develop math and reading skills.

—MIKE HUDNALL

This Notebook Is Loaded

Tandy's 1500 HD is the industry's first under-six-pound notebook PC with standard floppy (1.44MB) and hard (20MB) disk drives. Sporting an internal modem slot, a 25-pin parallel printer port, a 9-pin serial port, a full-size 84-key

The 1500 HD keyboard has 12 function keys and an embedded numeric keypad.

keyboard, and a high-definition blue-on-white backlit liquid crystal display, the 1500 HD still fits comfortably in a briefcase. For $1,999, you get these features plus 640K RAM, a 10-MHz V-20 microprocessor, and Tandy's Power View battery gauge.

—MIKE HUDNALL ⊡

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Need a break from Tetris™? Come home to **PUZZNIC**™. Crammed with **288* vivid puzzles**, this brain-buster bends your mind through a labyrinth of logic. It's **deceptively simple** and **dangerously addictive**: move and match geometric shapes to explode puzzle pieces before time runs out. If you're not a master strategist, you'll wind up with straggler shapes that block your brilliant progress. Grapple with moving cubes that test your megafast reflexes and timing. Then design elegant puzzles of your own with the **Puzznic Construction Set**™. The choices are endless. So get **PUZZNIC** now, before you have to wait in line.

Don't let nasty elevator cubes squeeze you into a corner!

TAITO™

Look for this Taito hit at your local retailer, or call 1-800-688-2486 for further information.

*For IBM/Tandy/Compatibles. Other formats may vary.

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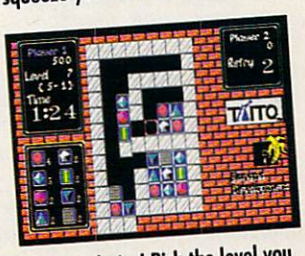
Plan carefully or you'll be caught with extra shapes.



It's your choice! Pick the level you want to play next.

LETTERS

Ultima Sound

In the April 1990 issue of *COMPUTE!*, in the review of *Ultima VI* (p. 84), I found a statement to be confusing. Shay Addams states that when a spell is cast, the player will hear the spell names spoken aloud as digitized voices. Also, according to the review, there are amazing sound effects and music to be heard if the user has a Roland MD-32 or an Ad Lib sound board. I own an IBM compatible (AT) and have a Sound Blaster music card by Creative Labs, which it claims is Ad Lib–compatible. When playing *Ultima VI*, I hear plenty of music but no digitized voices when casting spells. Additionally, the only sound effects I hear are through my PC speaker. I called Origin, and the reps stated that there were not any digitized voices to be heard when a spell was cast. Thus, my question is *Are there or are there not any digitized voices to be heard when a spell is cast?* I would appreciate a brief reply if at all possible.

KEVIN M. CODLIN
NEWARK, OH

Shay Addams responds:
Yes, you can hear dozens of digitized voices when casting spells in Ultima VI*—if your computer has 50 megs of extended RAM, a 20,000-meg hard disk and a Rad Lib sound board. But since these peripherals are unavailable outside my own twisted imagination, I may as well reveal the true reason my review alleged the presence of said digitized voices: I made a mistake. True, it is the first one in my career, but embarrassing nonetheless. So embarrassing, in fact, that I feel compelled to elaborate. The myth of digitized voices in* Ultima VI *emerged during a private showing of a beta version of the game at Origin headquarters in Austin, Texas. While casting a slew of spells, I did indeed hear unerringly similar names shouted aloud—but learned only after writing the review that the voice I'd heard was none other than that of* Ultima VI*'s creator, Richard Garriott, who was conducting Origin's Latin classes in an adjoining office. His teaching methods involve shouting Latin phrases and then their English equivalents. The lessons are required training for all employees working at adventure game companies. There, it's all out in the open and I feel much better. Now can I go home?*

On or Off?

Is it really preferable to leave my computer on all of the time? I have been using my home system daily for 2 to 5 hours; then I turn it off until the next time I use it. But I've read that the strain of starting up is actually worse than allowing continued operation. Since the life of my hard disk is finite, with a printed lifespan given as MTBF, I'm confused as to what I should do.

Your magazine hits the spot with me. I've been using a computer for only six months and still stumble over the basic concepts of day-to-day computing. Your articles are written just for me. Thanks!

GREG HUBBARD
ARLINTON, TX

Actually, your question can be answered a variety of ways, depending on whom you ask. Even though flipping the power switch on and off can shorten the life of a system, most computer users fear power surges that can lead to lost data. Therefore, they turn off their computers at the end of the day.

We know a few brave souls who never turn off their systems and haven't suffered any disastrous consequences. But we don't take chances where our hard drive data is concerned—even though it's backed up.

No matter which path you choose, occasionally a system locks up and must be restarted. To avoid flipping the power switch, use the reset button if you have one. If you don't have a reset button, you can press Ctrl–Alt–Del to reboot. If that

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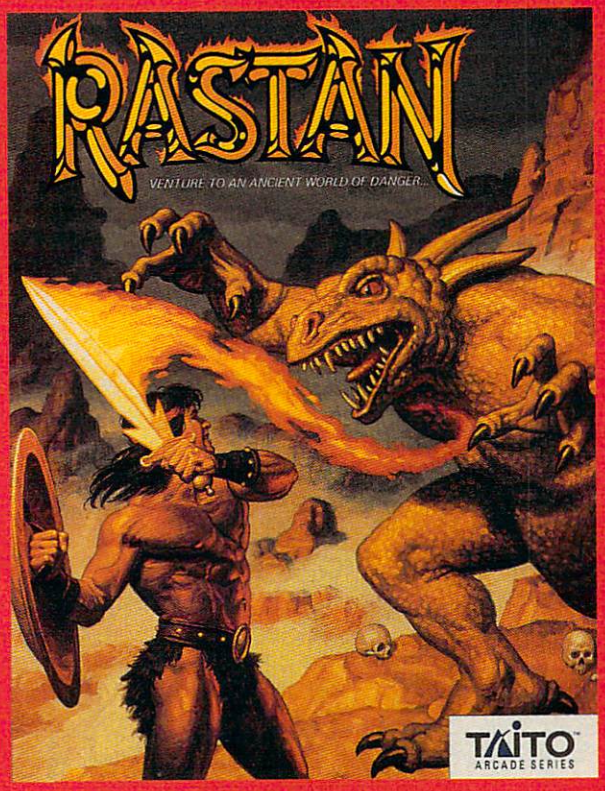

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Circle Reader Service Number 191

LETTERS

doesn't work, turn off the power switch and wait until the hard drive stops turning completely before restarting the system. If you turn on the system while the drive is spinning, it may damage the heads on your hard drive.

Historical Simulations

I am a relatively inexperienced IBM PS/2 computer owner. Because of my clear lack of knowledge, I subscribed to your magazine and have enjoyed every informative issue. I especially enjoy your consistent reviews of new software and hardware. As fast as the market changes, your magazine manages to keep abreast of the most recent technology.

I am very interested in the United States' Civil War. Would you please tell me how, and from whom, I might be able to get some quality simulation games on the military aspects of the Civil War? Last, would you be so kind as to inform me of any other simulations on nineteenth-century American history—such as the cultural, social, economic, or political aspects of the War Between the States?

MARK C. BARLOON
IOWA CITY, IA

Senior Editor Keith Ferrell responds:
The Civil War has proved a fertile area for software development, with dozens of good historical simulations available. Notable among these are a series from SSI and another from SSG. My personal favorites include SSI's Rebel Charge at Chickamauga, *and the first volume of SSG's* Decisive Battles of the American Civil War. *Many of these games are available from mail-order companies or through software retailers.*

These are primarily battlefield simulations; as far as I know, no one has as yet focused on the economic and social sides of the conflict. Developers, how about it?

Selling Your Computer

I recently bought an ALR powerflex to replace the 6-year-old Texas Instruments Professional Computer I had been using. The TI is still a fully functional 8088 with a 14-inch color monitor and graphics capability. It's still useful, but with the ALR around, the TI is just an oversized paperweight.

I know some people give their old stuff away or donate it to charity. But since my budget allowed only the rock-bottom ALR, I have to at least try to squeeze the price of a few options out of the old TI.

The number of old machines must be growing rapidly. Is there a real market for old equipment, and, if so, where?

JOHN ADAMS
BATON ROUGE, LA

Alas, with the rapid advances in computer technology, depreciation is rapid, and it's difficult to get the price you might like for your older computer. But it's certainly not impossible to sell it, and you have a number of options. Remember that plenty of computer users can manage very well with an 8088 machine, especially if they use it primarily for text-based word processing that doesn't make great demands on memory. And such a machine might be great for someone's children to use for homework and games.

If you have access to a modem, a bulletin board system is a great place to advertise your older computer. Computer user groups also bring your offer to the attention of a lot of computer enthusiasts. In some areas of the country, swap meets offer you just the opportunity to make the money you need—if you can avoid the temptation to spend it on other equipment. Don't overlook good old-fashioned cork-and-thumbtack bulletin boards where you work, at the laundromat, in apartment complexes, and at other locations where a lot of people might see an ad. The option that comes to mind most readily but which offers perhaps the least potential is classified advertising.

Whichever options you choose, be realistic about what you can get and start out just a little high to leave room for dickering.

Do you have comments or questions? Send your letter—with your name, address, and daytime phone number—to COMPUTE Feedback, 324 West Wendover Avenue, Greensboro, North Carolina 27408. ⊡

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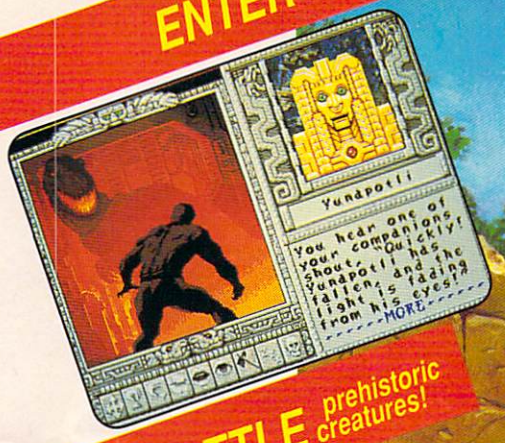

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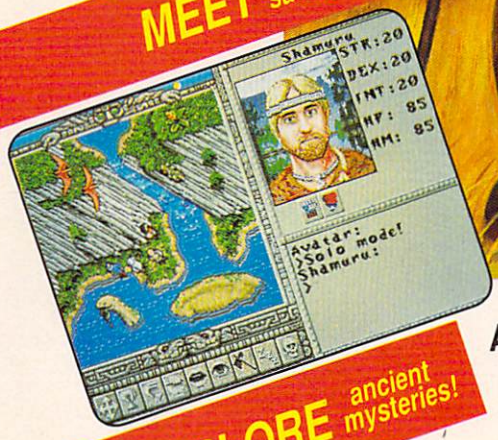

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Thinner, shorter, smaller, lighter. The four words that guided the Japanese consumer electronics revolution are now being applied to computers, with startling results. Other adjectives applicable to Japanese computers include *faster, cheaper,* and *different.*

The Japanese, having committed themselves to the creation of an information-based society, are ringing changes on the nature, purposes, and goals of computing. Data is the coin of the realm, knowledge the currency, and computer power the raw material on which the Japanese economy increasingly rests.

THE Japan FACTOR

JAPAN IS REINVENTING THE COMPUTER—AND MAYBE THE FUTURE

KEITH FERRELL

As a result, Japanese companies, trade associations, and government ministries are shepherding a national move toward industries and endeavors far removed from the traditional manufacturing on which so much of Japan's growth has been based. Lacking ready supplies of raw materials or easily exploited energy, Japan is turning inward, seeking to exploit mental rather than physical resources.

This shift is inevitable as manufacturing moves offshore in search of cheaper labor. The transition is a response to competitive pressure from other Pacific Rim nations that are taking their turn in the manufacturing spotlight.

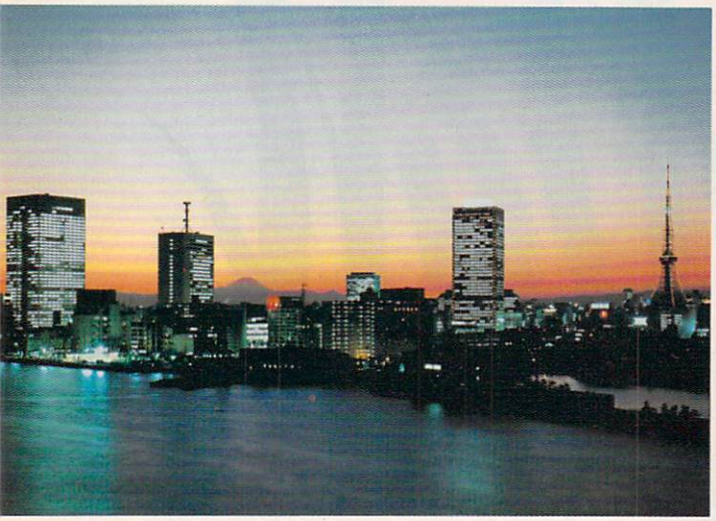
But the transition also reflects the Japanese character. Pragmatic and poetic at the same time, the Japanese are evolving a vision of the future with, characteristically, Japan at its center. At the heart of this new future stands Japanese computer technology.

Such a future doesn't exclude the rest of us. Instead, it radiates outward, touching and affecting the way we use computers, the way computers are designed, the way we interact with them.

Over the next few years, as Japanese research and innovation bear productive fruit, we'll see computers that call for a whole new generation of adjectives—*subtler, softer, fuzzier, friendlier.*

NEC

NEC's new office building is one of the most striking in Tokyo—and one of the most "intelligent" buildings in the world.



Tokyo—by night or day—is an electronic wonderland.

FUJITSU

Fujitsu's FM Towns machine is a good example of the Japanese fusion of consumer electronics with information processing.

First Impressions

At first glance, Japan appears to be the most computerized nation on earth. I mean, it *has* to be. . . .

Stroll down any street in any major Japanese city. Glance in any direction and you can tell that this is an electronics- and information-oriented society. Not even New York has as many newsstands and bookstalls, not even Los Angeles as many billboards pushing electronics on consumers.

"Be a Laptopper!" urges a poster common on Tokyo's subways and trains. *OA,* for Office Automation, are common initials in store windows. NEC has for years endorsed C & C—Computers and Communications—as its corporate watchwords. Perhaps in imitation, other companies employ slogans like Think & Link. An impressive number of technology malls showcase the latest in information technology.

A whole area of Tokyo—Akihabara—glows with VDT light; here you can find desktop and laptop computers of all different shapes and sizes, along with dedicated word processors, printers, and all manner of peripherals and software.

NEC's new headquarters dominates a portion of Tokyo's skyline. Noticeable at first for the great gap in its middle—a hole that allows air to flow through the building rather than pushing around it—it's also one of the "smartest" buildings in the world. Information systems and conduits were built into the structure from its conception.

CD-ROM discs nestle next to Nintendo and other game cartridges in toy stores. As many as half of the world's CD-ROM drives are in Japanese homes, connected to PC-Engine game consoles.

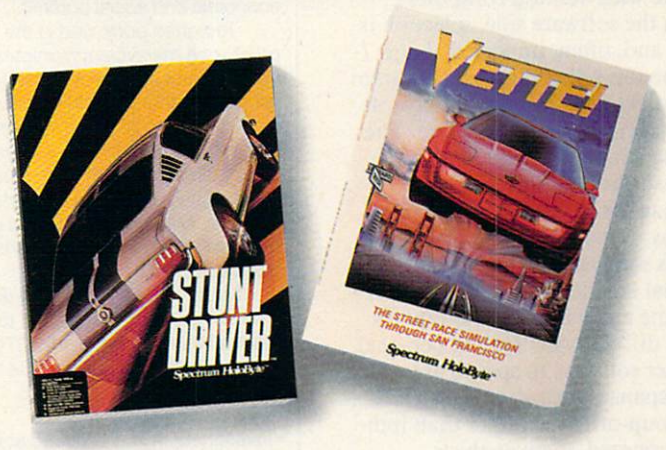
The Japanese have, over the last decade, come to dominate most of the subsystems that make up desktop computers—from silicon chips to drives, from floppy disks to monitor technology. Increasingly, the world of computers moves to a Japanese beat.

Where Are All the Computers?

Fewer than one-third of Japanese businesses have computers. It's not uncommon even in large corporations for dozens of employees to share access to a single computer or, just as likely, a single dedicated word processor.

Home computers are equally rare. Despite a booming economy, a high level of education, and access to technology, the Japanese haven't invited the computer into their homes. After an initial flurry of interest in machines such as NEC's MSX, Japanese consumers shifted their purchas-

DRIVE IT



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Interactive Playland

Mention Japanese software to average Westerners, and their first response is likely to be *Games!*

With good reason. Nintendo is arguably the most notable Japanese triumph in the American computer market. Certainly it's the largest Japanese success in software marketing, with its American arm generating revenue that dwarfs that of its Washington-state neighbor, Microsoft.

It's not hard to see why. The Japanese are the absolute masters of arcade game design and implementation. Coin-op parlors can be found on virtually every block, although it must be admitted that there are still more pachinko—Japanese pinball—parlors than video arcades. Some analog games take awhile to die.

But pachinko, despite its shiny balls and constant clatter, can't compete with the ferocious speed, captivating colors, and superb sound of Japanese coin-op games. They look different from ours and, indeed, must sometimes be altered a bit for foreign export. Japanese arcade players prefer more stylized characters, for instance. Japan also favors games that are, believe it or not, more violent than ours. Nudity and sex are more common in Japanese arcade games than those in the United States.

Although arcades are the most popular Japanese software games, the nation does produce—and import—its share of more sophisticated interactive entertainment. Role-playing games are particularly popular here. Origin's *Ultima,* for example, is imported by Pony Canyon, a division of Fujisankei, the conglomerate that also imported Ronald Reagan to Japan. Something of a cult hit in Japan, *Ultima* has sold more than 300,000 copies in Nintendo format and close to 100,000 in various computer formats.

Such figures are high for disk-based computer entertainment. "It's ironic," says Yoichi Erikawa, president of Koei, publisher of *Nobunaga's Ambition* and other software games, "but the PC entertainment market is about the same size in Japan as in the United States. You have 25 million home computers, we have about 3 million, but in both countries sales of 50,000 to 100,000 copies of a disk-based game make it a major hit."

ing power to dedicated game machines like Nintendo's Famicom, NEC's PC-Engine, and SEGA's Genesis.

While some of these consoles have sprouted computerlike peripherals, including floppy disk drives, CD-ROM drives, and modems, they lack the power and flexibility Americans associate with desktop computers.

On the software side, selection is eclectic and, often, imported. *Lotus 1-2-3* is the top-selling business program in Japan. Ashton-Tate and Microsoft also boast strong presences here. The Japanese Personal Computer Software Association (JPCSA) boasts more than 300 member companies, yet many of those members turn to overseas sources, notably China, for the actual creation of programs.

Some analysts attribute Japan's reputed difficulty at creating personal computer software to special aspects of the Japanese character. The country is group-oriented rather than individual-oriented, these analysts observe, and writing software is traditionally an individualistic, entrepreneurial endeavor.

It's different at the mainframe level. Japan's successes and innovations with large undertakings such as the Fifth Generation Project (see sidebar) represent software ambition and achievement on world-class levels.

MITI and an Information-Based Japan

Japan understands the importance of goals, of setting them and working to achieve them. The Ministry of International Trade and Industry (MITI) plays an important role in establishing those goals and has helped keep a substantial portion of industry, education, and commerce focused on the information industry and its economic and social potential.

Too often portrayed in the Western press as a malevolent manipulator exerting complete control over the Japanese economy, MITI is in reality something more complex. While its influence can't be doubted, the Ministry serves more as coordinator than controller, cajoling and encouraging Japanese industries and institutions to pursue the unified paths that have led to Japanese dominance of various industries.

Many of those paths are aimed at smoothing Japan's transition to an information-based economy. A MITI project in the early seventies defined the nation's industrial goals for the decade:

- Investment in R & D aimed at increasing Japanese capabilities in computers, aerospace products, robots, nuclear power, ocean exploitation, and chemicals
- Development of "high processing" industries (OA, communications, numerical control machine tools, educational equipment)
- Expansion of the fashion industries (clothing, furniture, electronics)
- Development of knowledge industries, including information management, information supply, and education, from software and video products to consulting

MITI laid out the thrust of those goals in 1971 with a statement from its Industrial Structure Council. Every effort must be made, the Council urged, to move Japan from the pursuit of industrial and economic growth to more fully utilizing the informational tools that made that growth possible. Guiding all of the effort would be the goal of an economy built upon mental resources rather than on natural ones.

Two decades later, the achievement of those goals can be witnessed in stores, office buildings, banks, and institutions throughout the world. But even as the seventies unfolded, MITI and other Japanese organizations had their eyes on the eighties—and beyond.

By March 1980, MITI had codified a new vision. More ambitious, the Ministry addressed four major areas: energy conservation, improvement of living conditions and social stability, development of new technologies, and the nurturing of creative and knowledge-based industries.

As the nineties unfold, MITI will once more unveil its goals for the nation and its economy. There is little doubt that those goals will be even more information and computer related, designed to lay the groundwork for a twenty-first-century Japan.

Quick Change

Japan's transition to an information-based society has come quickly, moving in four decades from essentially a postwar standing start to near leadership in heavy manufacturing such as automobiles, and to global dominance in silicon chip technology (Matsushita, Hitachi, and Toshiba all introduced powerful 16-megabit DRAM chips before their American competitors), consumer electronics (Sony, Panasonic, JVC, and Sharp), international banking (Dai-Ichi Kangyo is the world's largest bank; in 1988, nine of the world's ten largest banks were Japanese), and a myriad of other aspects of the information revolution.

How the Japanese have achieved these business successes remains one of the most hotly debated issues in international trade. You can't open an American newspaper or turn on a television without encountering an editorial or advertisement that attributes Japanese success to unfair trade practices or government bogeymen such as the Ministry of International Trade and Industry (MITI).

Equally prevalent is the myth that the Japanese don't innovate, that their phenomenal success is a result of their ability to copy or synthesize the achievements of other nations. In debating the accuracy or inaccuracy of such charges, it's helpful to look at some points related to the computer industry.

- NEC was building electronic computers in Japan as early as 1958. The company was marketing transistorized computers in Japan a year before American companies entered the Japanese computer market.
- In 1971, Japanese plants were producing 1K DRAM chips only a few months after Intel began production in the United States.
- Japan invested more heavily in CMOS (Complimentary Metal Oxide Silicon) technology than did the United States, perceiving the benefits of such technology to creating those thinner, smaller, shorter, and lighter consumer electronics products that lay at the heart of Japanese industrial strategy.
- As a result of Japan's CMOS expertise, Tandy turned to the Japanese in 1981 for the technology that made possible the Tandy 100, the first laptop computer.
- LCD technology, which is bringing ever sharper and more effective screens to laptop computers, found its first real market in Japan, where it was used for watch displays.

No one who's bought a Walkman can say that the Japanese aren't innovative. *Fusion,* rather than synthesis, more accurately describes the Japanese melding of technologies into new products, which in turn create new markets.

Keyboards and Kanji

Consumer electronics is one thing, consumer computers quite another. In Japan, personal computers face one large hurdle: the Japanese written language. Even the typewriter never found great success in Japan for the simple reason that the character-based Japanese language doesn't lend itself easily to keyboards.

In the West, technology capable of manipulating the alphabet and the numeric system proved relatively simple to develop: 26 letters, ten digits, and handful of grammatical and other symbols.

Our alphabet was fairly simple for typists to master the familiar QWERTY or less familiar Dvorak keyboards. Conversion of the alphabet to microcomputers was likewise a relatively simple matter. The American Standard Code for Information Interchange (ASCII) accommodates 128 characters and symbols, handling them in as many bytes. (Extended

ASCII, developed by IBM, offers 256 symbols.)

Written Japanese is complex and multilayered. The Japanese have literally thousands of characters that any keyboard or software program must accommodate. Depending on which expert you listen to, there are between 3,000 and 4,000 kanji symbols, requiring memory on the order of half a megabyte just for the character set.

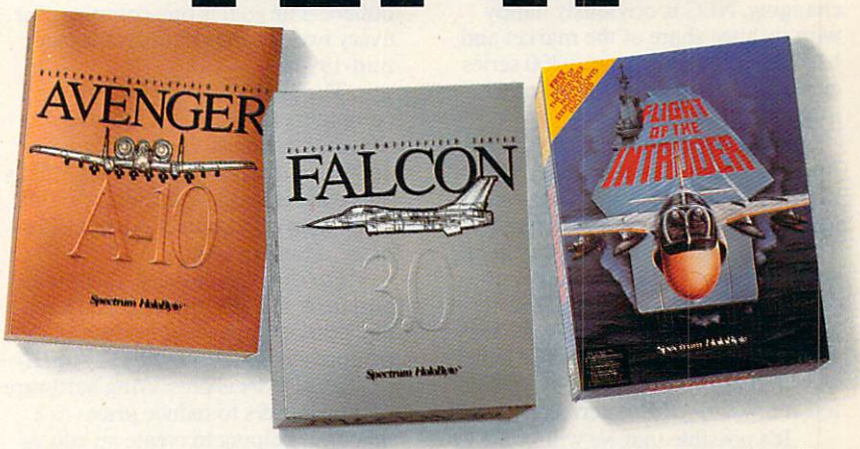
Most Japanese keyboards include both Roman and kana alphabets. Kana is a phonetic lettering system that's simpler than kanji but requires conversion into the larger character system.

But even that system has its drawbacks. One Japanese editor demonstrated for me the dilemma of typing in Japanese. After typing a Roman or kana character, he was presented with a choice of kanji characters, from which he selected the one most suited to his meaning. Then he entered the next character and made his next selection. It takes several operations to enter a fairly simple word.

Japanese word processing software is faster than Japanese typewriters—but not by much. The subtleties of Japanese script are beautifully adopted to brush strokes and paper, where nuance and style color each character. Keyboards, by definition, eliminate nuance and replace it with a rigid structure that's in some ways most un-Japanese.

These aspects of Japanese considered, is it any wonder that the fax machine, which was after all Western technology, took off in Japan before it did here? With a fax, Japanese businesspeople could send handwritten correspondence electronically—the best of both worlds.

FLY IT



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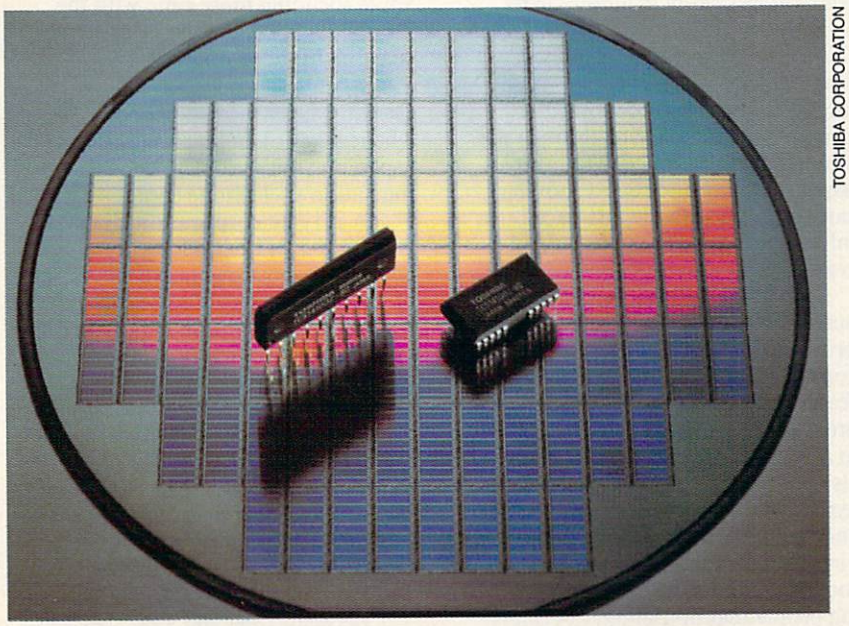
It should come as no surprise that handwriting and voice-recognition technologies are the beneficiaries of large-scale R & D efforts in Japan. It should be only slightly less surprising that the Macintosh, with its graphical, mouse-driven interface, has captured several percentage points of the Japanese microcomputer market.



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Chips, circuits, and microprocessors have powered Japan's economic ascent.

An Elusive Standard

Despite keyboard and software dilemmas, there are millions of PCs in Japan. The country produces about 2.5 million PCs each year, about 1.5 million of those for its domestic market.

NEC dominates the Japanese microcomputer market in a way that not even IBM dominates the American market. With more than 50 percent market share, NEC's 9800 series of PCs have become the de facto Japanese standard.

Still, a standard such as MS-DOS eludes the Japanese. Whereas IBM's chief competitors produce microcomputers that run the same software as Big Blue's, each of NEC's competitors markets its own proprietary BIOS (Basic Input/Output System, that part of the computer's operating system that communicates directly with the hardware). ▷

As a result, there are over 100 different BIOSs in Japan. Software written for one must be at the least tweaked—and in some cases sharply modified—to run on another. Japanese computer makers resolve these differences by including software with their machines.

The system shows little sign of changing. NEC is obviously happy with its huge share of the market and has worked to discourage 9800 series clones and compatibles from other manufacturers.

Still, other standards are springing up. Fujitsu, Japan's second largest microcomputer manufacturer, has enjoyed moderate success with its FM-Towns machine, a 386-based system with a built-in CD-ROM drive. Although originally aimed at the entertainment audience, FM-Towns has lately been repositioned to take better advantage of the growing business interest in CD-ROM materials.

It's possible that we will in the future see a more unified computer standard in Japan. TRON (The Real Operating Nucleus) for example, is a joint venture of NEC, Matsushita, Fujitsu, NTT, Toshiba, Hitachi, Mitsubishi, and Oki Electric, aimed at creating an open computer architecture that accommodates Japanese needs and requirements.

Announced in 1986, TRON is intended to bring various electronic devices and appliances together. This includes not only business computers, but also smart copiers and fax machines, as well as household appliances such as VCRs and telephones. The goal of TRON is nothing less than the unified linking and automation of every electronic aspect of Japanese life.

But despite increased microcomputer power and the promise of projects such as TRON, Japanese computers still haven't come home. Many opinion shapers feel that they won't until prices come down and perceived need goes up. And for that to happen, there will need to be a revolution in Japanese computer education.

Matters of Education

Few nations take the matter of education as seriously as does Japan. The country's educational successes, test scores, and overall literacy are frequently cited as playing an inestimably large part in honing the nation's competitive edge.

(At the same time, the uniformity of basic education throughout Japan is invoked by some observers as an explanation for the country's failure to produce as many first-rate software designers and programmers as the United States produces.)

According to Yozo Shimizu, executive director of the JPCSA, personal computers have only lately been perceived as vital to basic education. Shimizu and his organization are lobbying hard for a massive government investment in computer hardware and software. If fully undertaken, the investment would require billions of dollars. The goal is one computer for every two Japanese students by the mid-1990s.

The JPCSA's plan calls for the computers to be phased into the schools starting at the lowest grades and with the youngest students. "This approach is the fastest route to a full generation of computer-literate Japanese," Shimizu says.

For the plan to work, there must be a decline in PC prices. PCs in Japan cost perhaps twice as much as comparable models in North America. The JPCSA is pressuring hardware manufacturers to reduce prices as a means of helping to create an education market for computers. If that market comes to life, and the number of computers in schools does increase, Shimizu feels certain that Japanese parents will prove more willing to purchase computers for the home.

OH, OA!

The other great spur to increased numbers of home computers in Japan is the country's current awareness of the benefits of OA.

OA is perhaps the most common acronym in Japan. You see it everywhere, on billboards and magazine covers, in store windows, and on subway and train placards. Having developed the technology and products that play so vital a part in automating offices throughout the world, Japan seems at last ready to automate its own.

Part of this readiness is sheer pragmatism. As Japan moves to the forefront of a world economy, the amounts of data moving through the nation have multiplied. Traditional paper shuffling and report moving can't keep up with the fast-paced information age Japan has helped create.

There's a cultural aspect at work here as well. Judging by television and print ads in Japan, mastery of OA is considered a boon to a career. OA ads feature sharply dressed, obviously prosperous young people. OA is a key to a better future, a future that may also embrace the home. A recent Tokyo computer show featured a large and well-attended exhibit extolling the virtues of that most Western of rooms, the home office. By persuading people that household OA offers the chance to get more work done while spending more time with the family, Japanese computer makers may sell more computers.

The Next Generation

Among the most ambitious and well-known of Japan's computer research undertakings is the enormous Fifth Generation Project.

Launched in the early 1980s, Fifth Generation is nothing less than the attempt to create software and hardware that will permit natural language—Japanese or English—communication and interaction with computers.

A joint venture of the Japanese government and leading Japanese computer and electronics companies, the Fifth Generation Project is coordinated through the Institute of Next-Generation Computer Technology (ICOT.)

There are three basic thrusts to the Fifth Generation Project:

- Creation of a huge knowledge base on which Fifth Generation computers can draw in order to reason their way through queries. While this reasoning takes the form of if/then statements familiar to expert systems and artificial-intelligence programmers, the Japanese knowledge base is designed to include graphics, video, and audio information, all of it linked and accessible to users of Fifth Generation computers.
- Development of problem-solving software capable of humanlike reasoning. Using the Prolog computer programming language, ICOT's researchers are seeking to create intelligent systems capable of making a billion logical inferences per second.
- Design and manufacture of the hardware necessary to make the system effective. This includes a new generation of terminals capable of accepting voice, handwritten, touch, and other types of commands. While there doubtless will be keyboards for Fifth Generation computers, they're likely be severly outnumbered.

Getting Connected

The real key to an information-based Japan may well prove to be NTT—the nation's telephone company.

A private corporation since April, 1985, NTT has long been among the most aggressive advocates of information technologies. Unlike American telecommunications giants, most notably AT&T, NTT is unfettered by restrictions on delivering information as well as providing communications services. And information may prove to be NTT's number-one product.

Among the most ambitious of the telephone corporation's projects is INS (Information Network System), that's aimed, like TRON, at *all* users.

Between 1984 and 1987, NTT established prototype INS communities

in Musashino and Mitaka, suburbs of Tokyo. The systems offered home shopping with both department store and grocery services, teleconferencing capability, telecommuting for those whose jobs were geared to it, government services, as well as facsimile services that would serve educational needs. One can imagine Japanese students offering hypermodern excuses to their teachers: "The fax ate my homework."

Admittedly optimistic, NTT sees revenues from combined phone, fax, data, telex, and video throughput on INS reaching hundreds of billions of dollars by the mid-1990s.

It's one thing to plan for such a society-wide embrace of new technologies, and quite another to make it come true.

Hi-Ovis (Higashi-Ikoma Optical Visual Information System) was a prototype home information network developed in the late 1970s and early 1980s. Created in partnership with MITI, Fujitsu (which provided computers), Sumitomo (optical fiber), and Matsushita (audio/visual equipment), Hi-Ovis promised to deliver 2-way interactive communications with video, digital data, and audio capabilities.

In household tests, however, the promise of Hi-Ovis seemed to far outweigh the public's desire to use the system. While 30 percent of the test subjects watched the introductory program telling how the system could be used, less than 5 percent actually took advantage of the system's interactive services.

The Japanese, though, have a tendency to learn from their prototypes, assimilate what they've learned, and move beyond them to the next level. INS is a step beyond Hi-Ovis. It may be that another step—or several—is required before a truly consumer-friendly, consumer-useful information system is developed.

Rising Sun

The nineties could well be the Japanese decade in computing. Certainly that's been the national goal.

Projects such as TRON and Fifth Generation are the most dramatic manifestations of Japan's pursuit of that goal but, like the tip of an iceberg, they represent only a fraction of the exciting computer-related research, development, and product design going on in Japan. Lessons learned in decades of consumer electronics manufacturing and marketing are generating products and approaches that are

Smaller. A whole new generation of "intelligent" cards is being developed by companies like Maxell. These cards, barely larger than a credit card, can hold reams of data and are finding applications as varied as maintaining individual health records and employment histories.

Thinner. The latest laptops are nothing if not Japanese in design and construction. With sharper color monitors, more processing and storage power, and more responsive keyboards, notebook-size laptops will soon make "luggables" and even traditional laptops a memory.

Lighter. A big hit at a recent Tokyo technology show was Sony's Data Discman. This is a truly portable CD-ROM reader with built-in screen and cursor controls. Although not planned for wide release at the moment, Data Discman is a classic example of Japanese fusion.

Shorter. The latest high-definition television sets take up barely half the space of last year's models. Aware that HDTV and CD-ROM have not caught widespread consumer awareness, several Japanese companies have joined together to increase the technology's visibility. CD-ROM displays—using HDTV—are appearing at art museums and exhibitions throughout Japan.

Beyond Tomorrow

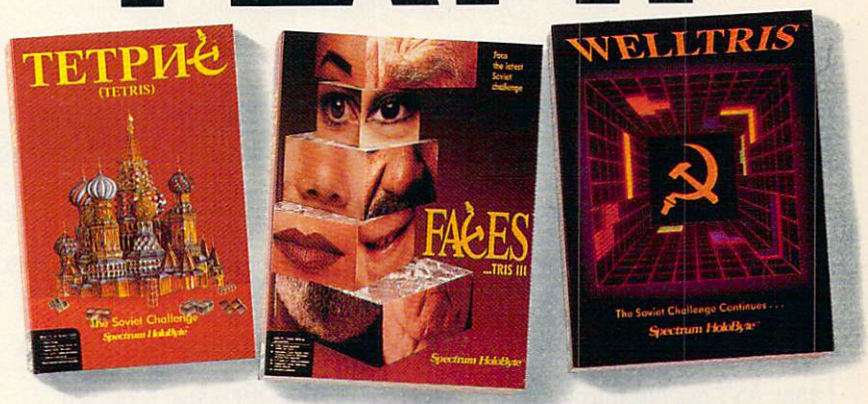
Poised on the cusp of the next millennium, the Japanese seem to have it all. They own the chip market, are dominant in display technology, and are exploring new ground in artificial intelligence and parallel processing.

What's happening to the computer is classic Japanese fusion. Ideas and innovations are being born, nurtured, modified and melded. New computers, new approaches to software, new products, and new areas of products are coming to life.

The result? No single result. Evolution doesn't end, it branches. We'll see the Japanese approach to computing absorbed into the approaches other nations take toward computing, even as Japan absorbs other approaches.

On and on—unto the fifth and sixth and all the subsequent generations, Japanese and otherwise, that give gradual, constant rise to a new, multifaceted and multinational, *world* of computing. ⊡

PLAY IT



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CONVERSATIONS

KEITH FERRELL

Some companies thrive by swimming against the stream. Consider AST. Even as Japan and other Pacific Rim nations are making great strides in marketing their electronics and other high-tech equipment to the West, AST is selling its computers in the East. More than that, AST has just introduced a computer in Japan that offers compatibility with the dominant Japanese PC standard.

"We've always felt that the Pacific Rim provided an opportunity," says Jim Ashbrook, the company's vice president for product marketing. "Although that opportunity trails the U.S. in terms of PC penetration, it's still a very large market with great growth potential."

The company identified the Pacific Rim as a target several years ago and has taken the time to build the infrastructure necessary to succeed in business there. Take, for example, one of the key rules of global competition: Don't put too much distance between your manufacturing facilities and your marketing efforts. It's a rule AST follows closely.

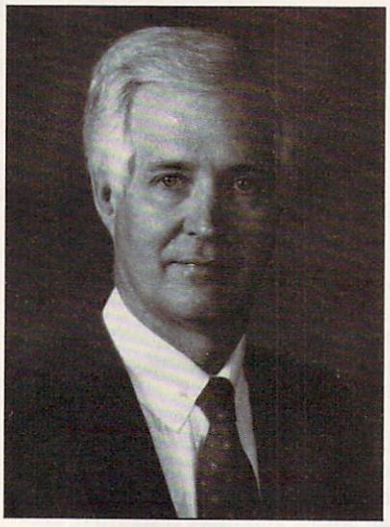
"We started in Hong Kong, but we also put a factory there," Ashbrook says. The company opened a Hong Kong sales office at the same time. The investment has paid off. "That particular segment of our business has grown very rapidly," he says. AST has since expanded into Taiwan, Australia, and Japan.

The Japanese market presents several challenges to a PC manufacturer. Unlike in the United States, there exists no single PC standard (such as MS-DOS).

"The PC AT MS-DOS standard dominates in the U.S. to the exclusion of almost everything else other than Apple," Ashbrook points out. "In Japan, the NEC 98 standard has over 50 percent of the market, and the rest of the market is fragmented to the point where no one else has more than 5 percent. So there are more standards, but there is still a dominant player, which is what we have focused in on."

NEC's standard is not as open as IBM's. Companies can't simply duplicate the NEC BIOS and market NEC-compatible computers. Nor does NEC license its BIOS. In order to produce an NEC-compatible computer, AST spent two years working with a Japanese company to develop an NEC-compatible BIOS that respected NEC's proprietary technology.

Then, AST went one step farther. In addition to offering NEC compatibility, the AST Dual SX/16 is fully MS-DOS compatible.



Jim Ashbrook

"Our position is that [this approach] gives you the best of both libraries," Ashbrook says.

The dual system is already garnering some interest in Japan. Ashbrook met recently with representatives of a Japanese software association. "They were very interested in our PC," he says. "They felt the Dual SX/16 would be a perfect tool to train people on their de facto standard, as well as offering access to the world standard." AST should continue to find market potential for the Dual as a training tool as well as a productivity tool. Ashbrook believes that Japanese businesspeople age 30 and older are less computer literate than their United States counterparts and therefore present a sizable opportunity for AST.

Will Japan continue to offer large opportunities to Western companies willing market computers there?

"We think it will," Ashbrook says. "If you look at Japan on a PC per capita basis, they have less than half of what we have in the U.S. But what that says is that Japan is a tremendously technologically advanced country, but that there's still a tremendous opportunity to grow the PC business. Certainly they want to increase productivity in their offices."

AST believes that the Japanese computer market can best be approached from the high end. "American computer companies have the ability to keep product development on the leading edge. There are a great number of people in Japan who want to have leading-edge products and will, in fact, take advantage of American products. There's a market there, and people are hungry to get the kind of capabilities that we have."

AST, in fact, has for some time sold its standard line in Japan. The Dual SX/16 is an addition to its Japanese line, rather than the launch of an entire new line.

"We sell a number of computers in Japan," Ashbrook says. "Typically, these are high-performance 386s and 486s, using American CAD packages."

Ashbrook attributes the market for MS-DOS computers and American software to the delays required in translating software to the NEC standard. "People want the power and the design tools, so they're buying standard products in order to run CAD packages, development packages, and databases."

What are the cultural differences facing American computer companies seeking to do business in Japan?

"By American standards, it takes a long time to finalize the details of an agreement. There's an inertia, a time barrier in trying to finalize agreements," Ashbrook says. "There's a positive aspect, though. Normally, once you get an agreement put together, it stays together." ⊡

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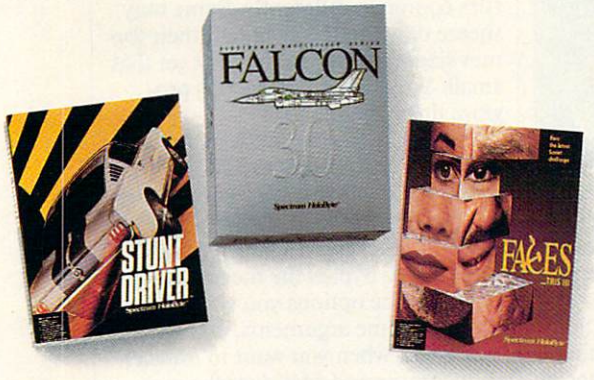

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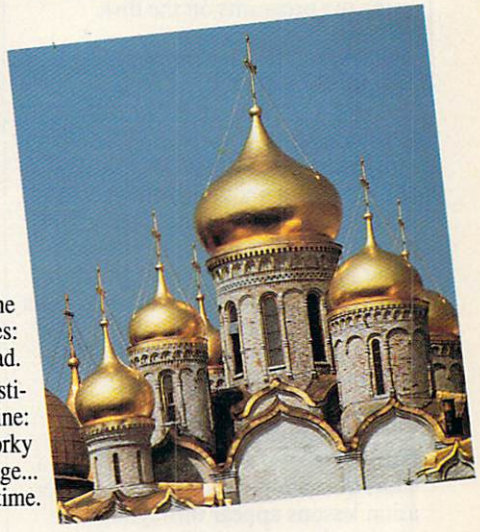

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SHAREPAK

RICK LEINECKER

Japan has for centuries fascinated us with its beauty, culture, and ingenuity. This month's *SharePak* lets you explore these qualities in three great programs: a language and culture tutor, a Japanese puzzle game, and a Japanese compression program.

With the *SharePak*, you get value in every byte. We screen hundreds of programs and choose only the very best. Since the online services have an average hourly charge of about $12, obtaining these programs yourself would cost many times the price of the disk. And that's not even considering the time you'd have to spend running the programs and sorting through them.

There's also a money-back guarantee: If you buy one of our *SharePak* disks and aren't satisfied, just return it for a refund. You can also call us for technical support if you have trouble using the programs on the disk.

Japanese for Business and Travel Version 1.1

Imagine a gentle, patient, and pleasant teacher willing to spend hours helping you learn. That's what this tutorial software is all about. Fifteen lessons bring you through a basic course covering language, social customs, and other information. And the program is easy to use. There are simple menus to select the lessons and options, and most questions have multiple-choice answers requiring only a single keypress.

Pronunciation is the very first lesson. General rules are given with a short quiz afterward. These pronunciation lessons appear throughout the course when new word categories and concepts are introduced.

The tutor also helps with usage, verb tenses, cases, and negatives.

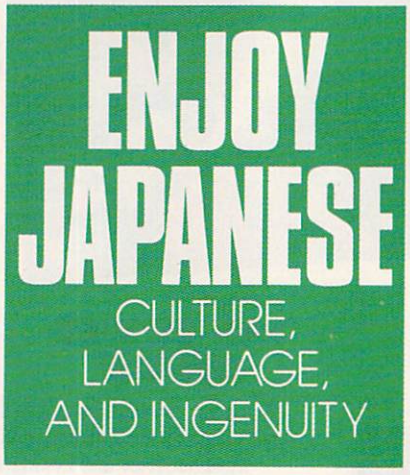
Lessons throughout the program illustrate problems that could lead to social blunders. Learning to recognize and avoid these should give you greater assurance as you interact with Japanese culture.

Vocabulary drills give you the essence of the language. In spite of their drill format, they're fun. You go from English to Japanese and from Japanese to English, and you work on your spelling as you go. The step-by-step progression from easy to hard simplifies learning and builds your confidence.

If you're planning a trip to Japan, if you have Japanese business contacts, or if you just want to prepare yourself for international competition, this program is for you.

Jigsaw

The Japanese are famous for their puzzles and games of logic. This program follows that tradition and presents a variety of challenges in the form of jigsaw-puzzle variations. And with the Japanese art that's included, you'll imagine yourself in an Oriental garden alongside other puzzlemasters.



This program is easy to use. Simple menus help you select the game type and set your options. And there's mouse support if you have a Microsoft-compatible mouse. Colorful backgrounds and attractive screens make this a commercial-quality product with a value far greater than the price of the disk alone.

Puzzle variations will give you hours and hours of challenging stimulation. You can set the puzzle-piece size to one of a dozen different choices. Of course, the smaller the pieces, the more difficult the task. You can also race against a timer and try to qualify for the high-score hall of fame. If that's not enough, you can reload the same puzzle and have your friends try to beat your time.

Any of the puzzles can be saved and finished later.

For die-hard puzzle fans, the fun doesn't end with the four that are included. You can load in any GIF, PCX, or IFF picture that's in 320 × 200 resolution. And the program runs on almost any video card. Support for Hercules, CGA, EGA, MCGA (VGA), and Tandy 16-color is provided. Puzzle buffs and avid jigsaw players won't be able to turn their computer off once they have this challenging and graphically impressive program.

LArc Version 3.33

If you send files over the modem or store them on floppies for later use, this program will save you time, money, and disks. It's a utility that compresses disk files. So programs that were 100K will now occupy only about 50K of disk space. Of course, all files compress differently. Some may sqeeze down to less than half their former size while others may not get that small. Whatever the case, this program does a great job.

It's easy to use, too. All you have to do is type LARC at the DOS prompt and a menu of options comes up. Pressing H for help gives you a synopsis of all of the commands. If you want to bypass the menu, you can just enter the options you want as command line arguments.

Then, when you want to transfer your compressed files over the modem, your connection time is reduced. If the connection is long distance, that means you'll save money. When, on top of long-distance expenses, you're paying an online service for connect time, you'll save even more. And if you're saving files to floppies, compression lets you cut your space requirements about in half. ⊡

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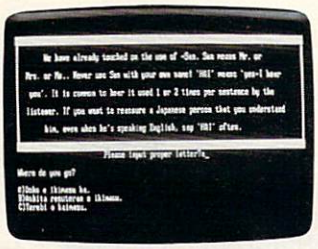
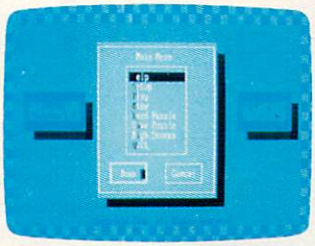


Japanese for Business and Travel Version 1.1



Jigsaw

LArc Version 3.3

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HOME O

COMPUTE CHOICE

CANON COMBINES A PC, TOUCHSCREEN, FAX MACHINE, PRINTER, AND PHONE TO CREATE THE SWISS ARMY KNIFE OF HOME OFFICE EQUIPMENT

DEE SCHNEIDERMAN

There are several essential elements in the modern office, whether that office is in a high-rise downtown building or in an extra room in your home: a computer, a printer, a fax machine, a copier, a telephone, and an answering machine. Canon has managed to incorporate all of these features into a single office appliance: the Navigator.

The Navigator's all-in-one construction answers the important need for elbow room not just on a desk, but in the entire office. Almost everyone would like more work space in the office. Consider a building contractor whose on-site office may be a 10-foot-wide trailer. There always seems to be a need to rearrange objects to free up desk space or floor space. That big CPU is always going to be in the way, and the fax machine may end up sharing a storage closet with shovels and buckets.

These problems are only a memory with the Navigator. If you place the machine on a swing-away stand with the keyboard tucked away under the desk top, you have an electronic office at your fingertips without having a crowded desk. Since most of the phone and fax functions are activated by touching icons on the screen, you won't even need the keyboard unless you're entering data. You can even disconnect or disable the keyboard and use an onscreen software keyboard. The thermal printer is built into the top of the Navigator, saving even more space.

FFICE

MARK WAGONER © 1990

The computer, printer, fax, and phone are housed in a sleek gun-metal-gray unit, 14½ × 12¾ × 13¾ inches—not much larger than the average monitor. It has an 8086 processor, 640K of RAM, and two 1.44MB 3½-inch disk drives. The keyboard uses the familiar 101-key IBM Enhanced Keyboard layout. There are ports for an external printer and modem. The integrated 10-inch monochrome monitor sports 640 × 350–pixel (EGA) resolution. An expansion box is available which allows you to use two full-size XT expansion cards. With a list price of $2,995, this machine will save any home business money as well as space.

As this article went to press, COMPUTE *learned that Canon was replacing the Navigator with an enhanced model. The new system will include a 40-megabyte hard drive, one 3½-inch 1.44-megabyte floppy drive, and eight additional software packages. Canon will also bundle the Navigator with a plain paper printer in addition to the built-in thermal printer. The basic system unit remains similar in appearance with the exception of the expansion box, which is no longer needed. The photos accompanying this article portray the original model; Canon would not release the new unit for photographs and would say only that it would retail at about $2,500. — Ed.*

The Navigator weighs in at 39.6 pounds, not exactly a portable computer. However, the two-piece construction (main unit and keyboard) makes it fairly easy to take the machine home at night. So while our contractor's workmen are hauling the compressor up out of thieves' reach on the crane, he could pick up his "Swiss Army" Navigator computer and put it in the car. Try doing that with your usual fax, telephone, copier, and computer.

In its standard two-floppy, 640K configuration, the Navigator can run most popular productivity software. I ran my favorite word processor, database manager, and spreadsheet on it without a hitch. A hard drive is available that will speed access time and improve the computer's ease of use, but the Navigator is a very impressive tool even in its basic configuration.

The Navigator is bundled with a number of useful office utilities. The phone book program can store up to 300 names with telephone and fax numbers in each data file. Entering these numbers is a simple matter of touching the phone book icon, touching a blank phone card, and then entering the data. You can also import numbers from a *dBase III*–format database file. Numbers can be brought up to the screen at any time, even in the middle of a word processing job, by picking up the telephone handset or touching an onscreen switch. Just touch the desired number and the Navigator dials for you. Touch the exit button and you're back in your document or spreadsheet. You can ▷

monitor the dialing procedure on the Navigator's speaker and pick up the handset when your party answers. Numbers not included in the phone book files can be dialed by calling up the Navigator's dial panel and touching the numbers on the screen. Other features include automatic redialing and an on-hold melody (so you can instantly annoy your clients, I suppose).

The Navigator includes a full-featured answering machine that allows you to record two different outgoing messages and save them on disk. You can select one or the other at the machine or from a remote phone. Incoming messages, which are also saved on disk, can be played back or deleted from a remote phone, or selected by a touch of the screen. The wake-up call function allows you to program the machine to call another number at a preset time.

The Navigator's G3 fax is loaded with handy features, too. Because the fax is integrated with the computer, you can transmit a document without printing it out first. Say, for example, you want to send a copy of a solicitation letter you've been working on to your office in another city. Simply tap the Fax switch at the top of the screen, select Functions, then select WP Trans. Dial the recipient's number either from the phone book or on the screen. Then tap the exit switch twice to go back to your word processor. Issue your standard print command, and your document is sent to the destination fax. Not only do you not have to print out the document, you also don't have to run it through the fax machine multiple times if you're sending it to many different locations.

You can receive faxes directly to disk and then display them in one of two magnifications or print them out. You can also transmit and receive faxes in the usual manner, reading from or printing directly to paper. And you can use your fax machine as a copier. Just insert the sheet into the feeder, tap the Dial switch, and then press the Start switch. Thermal paper isn't my favorite print medium, but it's certainly serviceable.

You can send documents to groups of fax numbers listed together in your phone book files. The delayed transmission feature lets you save on long-distance charges by transmitting during reduced-rate hours. You can even send or receive delayed confidential documents if the recipient also has confidential communication capabilities. The fax can even be set up for polling, allowing it to automatically send a document upon request from someone else. It can also be instructed to automatically attach a cover letter. Other features include automatic redialing, talk reservation, and one-touch speed dialing. The fax functions don't take over the computer—you can fax something at the same time you're working with the computer.

An interesting technological note is what I call the Navigator's "graphical batch file" function. By building Program Controller Files (PCFs), you can run applications from the Navigator's main menu. The PCF editor lets you write batch files that it stores in a directory on the applications disks. Then you can place icons for those applications on the main screen. This process takes a little knowledge of DOS, but it isn't too tricky.

Other functions included in the Navigator's integrated software package are a memo pad, a message board, a digital clock, an alarm function, a file manager utility, and a cute little screen sweeper. The memo pad's buffer is limited to the size of the screen, so it's useful for quick notes but not as a word processor replacement.

THE CANON NAVIGATOR IS AN ALL-IN-ONE HOME OFFICE SOLUTION

The screen sweeper disables all but one of the screen switches and displays a little window-washer who moves around the screen while you wipe off the fingerprints. When you've finished cleaning, you touch the little fellow twice. He bows politely, and the main screen reappears.

The manual is a convenient handbook size, with clear and concise instructions that progressively walk you through all of the Navigator's functions. It's well illustrated and thoroughly indexed.

It only took me about ten minutes to get the machine up and running. This included making the system disk. Learning time was also short. I had very little trouble finding my way around the various features. The icons are simple and distinct, and the menus proceed in a very logical order.

There is some room for improvement. The biggest problem is the lack of a hard drive. Also, the 8086 processor is outdated—I'd really like to see this machine brought up to AT standards. These obstacles can be overcome with the addition of the expansion box, but it would be nice if they were built in. The expansion box is almost the size of a standard AT case, so adding it negates some of the compactness of the machine.

The touch-sensitive screen may be a little hard to adjust to for those who are at home on a keyboard, but it will make the machine very appealing for those who don't like to type. However, the 2mm touch area around the icons may be too small for some larger fingers. In the manual it cautions never to press the screen with any object other than a finger, but a pencil eraser will probably do fine if used gently. Tapping the screen is much simpler than moving a mouse, and it eliminates the need to find space for the mouse pad.

While the Navigator is easy to use, you'll need to read the manual to understand some functions that might be less than intuitive. For example, I had problems receiving faxes on disk, because when any of the expanded functions or an application is in operation, it automatically disables the disk receive function. No error message came up—it just didn't work. I had to wade through the advanced facsimile instructions to find this little tidbit.

Watch out for typos in the manual, too. For example, there were transposed letters: .DFB for .DBF when referring to the database file extensions. This might be confusing to some novices. I hope Canon corrects these problems in future printings of the manual.

In general, though, this is a wonderful machine for any business or home office user who likes to save both space and money. Why buy a PC, a fax machine, a printer, a phone, and an answering machine when you can get an entire office in a box?

Ease of Setup/Installation	★★★★
Documentation	★★★★
Features	★★★★★
Compatibility	★★★★★

Canon Navigator
System with 640K RAM and 3½-inch floppy drives—$2,995

Canon
One Canon Plaza
Lake Success, NY 11042
(516) 488-6700

Power Computing For The 90's?

Only Northgate™ Makes Sense Of It All!

Don't be puzzled about computing for the 90's... call the company who speaks your language: Northgate. We're your problem-solving partners. We listen to your needs, analyze options, then recommend solutions.

We use a "modular systems" approach that allows us to custom configure your system to meet your current and future needs.

Now, let's shatter a few myths...

Northgate is a true manufacturer of computing systems ... not an assembler. Our R&D Department works day in and day out, developing new technologies to keep Northgate on the cutting edge of high performance computing.

We design and manufacture our own motherboards in the U.S.A. If you hear otherwise, hang up ... you deserve the truth!

A word about price. Northgate is the performance/price leader in systems for home and office. No, Northgate computers aren't the cheapest. Why? Because we don't take shortcuts in technology to get performance gains and hold prices down. Some companies cut corners to get speed improvements. Shadow RAM is one such technique.

Shadow RAM sets aside room in RAM for temporary storage of system and video I/O instructions normally stored in system ROM. By running these routines in RAM, instructions can be executed at the microprocessor's fastest speed.

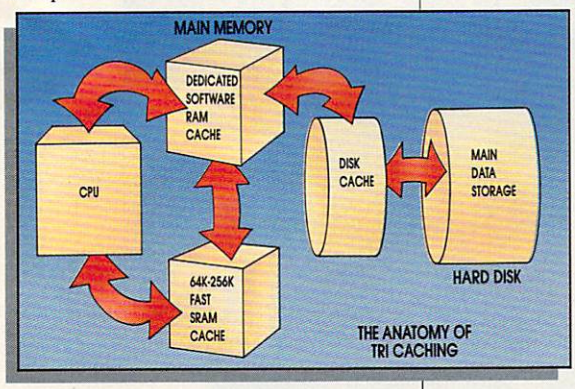
However, this RAM is best used for extended memory needs like disk caching, RAM disk, and spoolers. When Shadow RAM eats up this space, you can experience software compatibility and operating problems. You'll never experience shortcut-related problems with a Northgate system. Call toll-free **800-548-1993.**

Northgate™ Brings It All Together And Puts Power For The 90's In Your Hands!

Northgate exemplifies power! IBM! Compaq! Dell! All the others! The unquestioned industry leader is Northgate! Why? Only Northgate solves the puzzle! Nowhere else can you get the blistering combination of triple caching power ... industry's fastest components and peripherals ... performance boosting software ... power services and technical support ... all for incredible factory-direct prices!

Tri-Caching technology breaks performance barriers!

Caching guarantees power computing into the 90's! Northgate uses three types of caching technology to extend total system performance. Each system has a minimum of 64K SRAM memory cache, 32K-64K cache hard disk controllers and caching software—all for enhanced performance and speed.



SRAM Memory Cache! Northgate uses high-speed 64K-256K static SRAM cache to buffer frequently requested data from slower memory storage areas. RAM cache reduces the main processor's idle time (wait stage) while data is transferred to and from main memory. Our external 486 SRAM cache operates in true burst mode for 33Mb/second execution of instructions. Boosts the hit rate for data finding to 99%!

Hard Disk Caching Controllers! Disk caching improves performance by relieving the bottle neck caused by hard drives. When reading and writing to hard disk, the information passes through a RAM cache buffer. This buffer retains data after it has been sent to its destination. If the same data is needed again, it is drawn from the cache instead of the disk. Result? Accelerated I/O transactions!

Caching Software! Northgate uses disk caching software for enhanced performance. Here's how it works. During a session the software "learns" to anticipate what data you'll need next and brings it into the cache for quick retrieval.

Industry's most powerful components and peripherals!

System speed is not based on the CPU alone. Hard drives, floppy drives, video cards and other peripherals all play a part in enhancing overall performance. One slow element slows the whole system down. Northgate solves this problem by using the latest in AT interface technology to maximize system performance.

Hard disks made just for Northgate customers—fastest in the world! For Northgate (and you!) only the fastest hard drives will do. Our complete selection of hard drives—featuring our exclusive Maxtor 200Mb—use AT technology with disk caching controllers for fast, efficient throughput.

Fastest video combinations on the market—screens appear almost before you release "Enter"! Northgate's 16-bit Super VGA lets you zip through desktop publishing, windowing and other bit-mapped graphics operations. Select from our broad range of high performance monitors and video cards to meet the most demanding design and engineering applications!

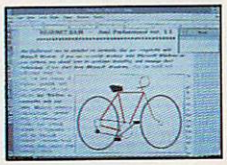
Now ... performance software unleashes the power of your Northgate!

To make the most of our awesome power, we're including FREE performance software with our Elegance™ 386™ and 486™ Power User's systems. This $1139.00 suggested retail value includes Microsoft® Windows™ 3.0, Samna® Ami™ Professional word processing and Informix® Wingz™ graphics spreadsheet.

Microsoft® Windows™ 3.0!

You've heard about the point-and-click ease of Apple computing. Now Windows brings it to the DOS world! Windows speeds through even the most demanding 32-bit software ... makes program operation and multi-tasking a breeze!

AmiPro™—word processing and desktop publishing in one!



You get sophisticated word processing features including 130,000 word spell check, dictionary, thesaurus, search and replace, editable page views, multiple fonts, integrated graphics and more! And you get the look and feel of expensive desktop publishing packages!

Wingz™—powerful graphics spreadsheet and database program!

Wingz for Windows 3.0 is the first spreadsheet program that lets you take full advantage of today's powerful windows/graphics based environments. You get unsurpassed number-crunching power and page perfect presentations.

FOR MORE INFORMATION,
CALL TOLL-FREE 24 HOURS EVERY DAY

800-548-1993

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NORTHGATE COMPUTER SYSTEMS *"We hear you!"*

7075 Flying Cloud Drive, Eden Prairie, MN 55344

Circle Reader Service Number 246

Northgate® Elegance™ 386™/33 System...

"...combines top performance, good components and aggressive pricing... excellent performer all around."

PC Magazine
October 31, 1989

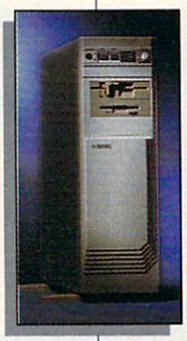
Award winning 386 performance! Sizzling Northgate Elegance 386/33 and 386/25 systems both won *PC Magazine* Editor's Choice awards, been rated #1 and #2 products (respectively) in *InfoWorld* AND received *Computer Shopper* "Best Buy" recognitions. No other company can make that claim! Here's how we did it!

Elegance 386's high performance motherboard is designed and manufactured by Northgate. With a 16Mb 32-bit DRAM capacity, it's consistently rated in the top 1% of performance — at 25 and 33MHz, Elegance 386 is the fastest in its class!

Tri-caching started here! Elegance was Northgate's first triple caching machine. It comes with 64K read write-back SRAM cache to accelerate the execution of instructions. And, as your needs increase you can expand Elegance's SRAM to a Northgate exclusive 256K! A 32K hard drive cache controller accelerates I/O transactions while Smartdrive DOS disk caching software increases overall system throughput.

Zip through demanding programs. Multi-stage caching easily handles even a heavy overhead of video programs, I/O intensive tasks, network servers, large data bases and advanced desktop publishing programs.

Desktop or tower. . .your choice! Elegance 386 comes standard in our elegant five bay desktop case. Our popular seven bay tower case is also available. Either way, you get plenty of room for all kinds of I/O boards, and internal/external peripherals.



Start with our base system! Northgate's base system includes 1Mb of RAM, a 40Mb fast access hard drive, 1.2Mb 5.25" and 1.44Mb 3.5" floppy drives, a 14" high resolution monochrome monitor and our exclusive *OmniKey*®/PLUS keyboard.

Tell us what you need. . .we'll build your system! Performance options include: hard drive options up to 1.2 gigabytes with 15ms access; VGA and SVGA color cards and monitors; Intel and Weitek math coprocessors; CD ROM and optical drives; tape backups; printers and a host of others!

Or select our Power System with 4Mb of RAM, a 200Mb Maxtor hard drive with 15ms access, 1.2Mb 5.25" and 1.44Mb 3.5" floppies, a 14" Super VGA color monitor and an *OmniKey* keyboard. Comes complete with Microsoft® Windows™ 3.0, Samna®Ami™ Professional word processing software, Wingz™ graphics spreadsheet and database software and a mouse. This $1139.00 suggested retail value software is yours at NO EXTRA CHARGE!

Elegance 386 Base System Features:

- 25 or 33MHz Intel® 80386DX processor
- 1Mb of 32-bit RAM (expandable to 8Mb on motherboard; total system RAM of 16Mb with optional 32-bit memory card)
- Proprietary, U.S.-made motherboard
- 40Mb fast access hard drive; 16-bit controller with 1:1 interleave; 32K disk read-look-ahead cache buffer
- 64K SRAM memory cache; read/write-back caching
- High density 1.2Mb 5.25" and 1.44Mb 3.5" floppy drives; also read/write low density disks
- Eight expansion slots; one 32-bit slot; six 16-bit and one 8-bit slot
- Weitek math coprocessor support
- One parallel and two serial ports
- Hercules compatible video adapter
- Clock/calendar chip rated at 5 years
- 200 watt power supply (220 watt power supply in tower case)
- Optional seven bay upright Tower case; room for three exposed and four internal half-height devices or desktop case with room for three exposed and 2 internal half-height devices
- Front mounted reset and high/low speed controls
- Exclusive Northgate *OmniKey*/ULTRA keyboard
- 14" high resolution monochrome monitor
- MS-DOS 4.01 and GW-BASIC software installed
- On-line User's Guide to the system and MS-DOS 4.01
- QA Plus Diagnostic and Utility software
- 1 year warranty on system parts and labor; 5 years on keyboard
- FCC Class B Certified

Industry's finest 24-hour toll-free technical support! Your Elegance 386 is backed by expert technical support any time you need it. Call toll-free, 7 days a week, 24 hours a day. PLUS, free on-site next day service to most locations if we can't solve your problems over the phone.

Elegance 386 is backed by a one year warranty on parts and labor; five years on the *OmniKey* keyboard. If a part fails, we'll ship a replacement to you overnight at our expense — before you return your part!

Use Elegance 386 25 or 33MHz RISK FREE for 30 days! If it fails to meet your expectations, return it. No questions asked.

ORDER TODAY! Call toll-free 24 hours every day.

25MHz Base System Model

$2999.00

Power User's System $4699.00

33MHz Base System Model

$3499.00

Power User's System $5199.00

Delivered to your home or office

EASY FINANCING: Easy payment options. Use your Northgate Big 'N', VISA, MasterCard. . .or lease it. Up to five-year terms available.

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800-548-1993

Fax your order. (612) 943-8338

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Northgate® Announces ...

SlimLine™ 386/25-

First time ever! Now you can have Northgate Elegance™ power, speed and performance in our popular space-saving SlimLine case! Elegance 386 computers shocked the industry with a #1 and #2 sweep of *Infoworld's* 1989 best product awards; AND three Editors' Choice awards from *PC Magazine*.

Cache! Cache! Cache! Like our powerful Elegance systems, SlimLine 386 features 64K SRAM cache to zip through the execution of instructions. For even faster speed, we've added a hard drive cache to make quick work of I/O transactions. To top it off, SlimLine 386 comes with Smartdrive DOS disk caching software that anticipates the information you'll need next and brings it into the cache for fast access.

Better features across the board! SlimLine's motherboard is highly integrated, allowing maximum system features in the smallest possible space. It includes space for up to 8Mb of 32-bit RAM, one parallel and two serial ports, fully integrated floppy disk controller and IDE hard drive controller. Plus an integrated SVGA with 512K Video RAM to speed up bus throughput — makes the system faster and more reliable! And there is still room for expansion with five open slots.

Three speeds! SlimLine 386 comes with your choice of 386DX 25 or 33MHz processors. For faster math-based applications — budgets, forecasts, spreadsheets and databases — all models feature 80387 coprocessor support to allow you to easily add floating point unit (FPU) performance.

33 Cache Systems!

All purpose systems! SlimLine Cache is the perfect network workstation or stand-alone unit for business and home use. It provides excellent support for advanced desktop publishing and graphics.

Base system includes 1Mb of RAM (expandable to 8Mb on the motherboard), a 40Mb fast access hard drive, 1.2Mb 5.25″ and 1.44 3.5″ floppy drives, a 12″ VGA monochrome monitor and our exclusive *OmniKey*®/PLUS keyboard.

You name it, we'll build it! Performance options include hard drives up to our super-fast 15ms 200Mb Maxtor hard drive, monitors and video display cards, math coprocessors, tape backups, printers and a host of other choices.

Or select our Power System with 4Mb of RAM, a 200Mb fast access hard drive, 1.2Mb 5.25″ and 1.44Mb 3.5″ floppies, a 14″ Super VGA color monitor and an *OmniKey* keyboard. Comes complete with Microsoft® Windows™ 3.0, Samna® Ami™ Professional word processing software, Informix® Wingz™ graphics spreadsheet and database software and a mouse to maximize system performance. This $1139.00 suggested retail value software is yours at NO EXTRA CHARGE!

Industry's finest 24-hour toll-free technical support! Your SlimLine 386 Cache is backed by expert technical support any time you need it. Call toll-free, 7 days a week, 24 hours a day. PLUS, free on-site next day service to most locations if we can't solve your problems over the phone.

Slimline 386 Base System Features:

- 25 or 33MHz Intel® 80386DX processor
- 1Mb of 32-bit DRAM (expandable to 8Mb on motherboard)
- Down-scaled, proprietary, U.S.-made motherboard
- 40Mb fast access hard drive; AT bus interface; 1:1 interleave; 32K or 64K look ahead disk caching
- 64K SRAM memory cache; read/write-back caching
- High density 1.2Mb 5.25″ and 1.44Mb 3.5″ floppy drives; also read/write low density disks
- Five open expansion slots; three full length 16-bit and 2 half length 8-bit
- 25 or 33MHz 80387 or Weitek coprocessor support
- One parallel and two serial ports
- Built-in 16-bit SVGA with up to 1024 x 768 resolution; 512K video memory
- Clock/calendar chip rated at 5 years
- 100 watt power supply
- Small footprint SlimLine case with room for two exposed and 1 internal half-height devices
- Front mounted reset and high/low speed controls
- Exclusive Northgate *OmniKey/PLUS* keyboard
- 12″ VGA monochrome monitor
- MS-DOS 4.01 and GW-BASIC software installed
- On-line User's Guide to the system and MS-DOS 4.01
- QA Plus diagnostic and utility software
- Smartdrive caching software
- 1 year warranty on system parts and labor; 5 years on keyboard

More great support! Your new SlimLine 386 Cache comes with a one year warranty on parts and labor; five years on the *OmniKey* keyboard. If a part fails, we'll ship a replacement to you overnight at our expense — before you return your part!

Use SlimLine 386 Cache RISK FREE for 30 days! If it fails to meet your expectations, return it. No questions asked!

ORDER TODAY! Call toll-free 24 hours every day.

25MHz Base System Model

$2999.00

Power User's System $4499.00

33MHz Base System Model

$3499.00

Power User's System $4999.00

Delivered to your home or office

EASY FINANCING: Easy payment options. Use your Northgate Big 'N' VISA, MasterCard… or lease it. Up to five-year terms available.

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Fax your order. (612) 943-8338

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New From Northgate®... 20 MHz Powered Up

Yes, we're a bit late to the party with SX systems. How come? We just couldn't bring ourselves to market another ho-hum SX.

So we put our research and development team on it. Boy, did they rise to the challenge! Now you can get an SX 16 or 20 MHz machine with the power to run Microsoft® Windows™ and other 32-bit software at flashing cache-enhanced speeds. And, they packaged all this power and performance into our exclusive space-saving case—a favorite of Northgate customers!

The secret to SlimLine's space-saving design? A fully integrated motherboard designed and manufactured by Northgate! This design reduces bus load—makes the system faster and more reliable!

Motherboard features include a built-in VGA adapter (with 512K Video RAM), parallel and two serial ports, fully integrated floppy disk controller and IDE hard drive controller. Motherboard integration also makes it easier to install modems or add-in cards.

Triple cache boosts performance to zero wait state! You get a built-in 64K memory SRAM cache to accelerate the execution of instructions; hard drive caching accelerates I/O transactions; and disk caching software speeds the movement of data to and from the CPU.

SlimLine™ 386SX™ 16 Or With 64K Cache!

SlimLine 386SX is perfect for office environments and home use. It handles word processing, spreadsheet, database management and most graphics applications with ease.

Slimline 386SX base system includes 1Mb of RAM (expandable to 8Mb) on the motherboard, a 40Mb fast access hard drive, 1.2Mb 5.25″ and 1.44Mb 3.5″ floppy drives, and a 12″ VGA monochrome monitor. Plus, you get Northgate's award-winning *OmniKey*®/102 keyboard.

Or, we'll build your system to your specs! There's room for three half-height devices including floppy drives, hard disk or tape backup. Choose from 80, 100, or our 200Mb hard drive with 15ms access. And, you still have five open expansion slots (3 full-length 16-bit, and 2 half-length 8-bit) for all of your peripherals.

Exceptional support! SlimLine 386SX is backed by expert technical support any time you need it. Call toll-free, 7 days a week, 24 hours a day. PLUS, free on-site next day service to most locations if we can't solve your problems over the phone. Of course, you get a one year warranty on parts and labor; five years on the *OmniKey* keyboard. If a part fails, we'll ship a replacement to you overnight at our expense before you return your part.

Use a SlimLine 386SX RISK FREE for 30 days! If it fails to meet your expectations, return it!

Order Today! Call toll-free 24 hours every day. Ask about custom configurations, leasing and financing programs.

SlimLine 386SX System Features:

- 16 or 20MHz Intel® 80386SX processor
- 1Mb of 32-bit DRAM (expandable to 8Mb on motherboard)
- Down-scaled, proprietary, U.S.-made motherboard
- 40Mb hard drive; AT bus interface; 1:1 interleave; DisCache: 64K look ahead disk caching; 19ms access
- 64K SRAM memory cache; read/write-back caching
- High density 1.2Mb 5.25″ and 1.44Mb 3.5″ floppy drives; also read/write low density disks
- Five open expansion slots; three full length 16-bit and two half length 8-bit
- 16 or 20MHz 80387SX or Weitek coprocessor support
- One parallel and two serial ports
- Built-in 16-bit SVGA with up to 1024 x 768 resolution; 512K video memory
- Clock/calendar chip rated at 5 years
- 100 watt power supply
- Small footprint SlimLine case with room for two exposed and one internal half-height devices
- Front mounted system reset and high/low speed controls
- Exclusive Northgate *OmniKey*/102 keyboard
- 12″ VGA monochrome monitor
- MS-DOS 4.01 and GW-BASIC software installed
- On-line User's Guide to the system and MS-DOS 4.01
- QA Plus diagnostic and utility software
- Smartdrive disk caching software
- 1 year warranty on system parts and labor; 5 years on keyboard
- FCC Class B Certified

16 MHz Base System Model **$1999.00**

20 MHz Base System Model **$2199.00**

Delivered to your home or office.
Call for other configurations and pricing.

EASY FINANCING: Easy payment options. Use your Northgate Big 'N', VISA, MasterCard ... or lease it. Up to five-year terms available.

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Order Your Northgate® Computer Today, Make No Payments For 90 days!*

Just say "charge it" to your Big 'N' credit card!

Get your new Northgate without spending a penny this year!

Simply fill in the Big 'N' information form and send it to Northgate. You'll get prompt attention! Once you're approved, call our systems consultants, toll-free, to select the Northgate configuration that perfectly matches your needs!

You'll free your other credit cards! Big 'N' lets you easily increase your credit power. Best of all, you'll make no payments for your new computer for 90 days after shipment! But, don't delay, computers must be ordered by December 31, 1990 to qualify for deferred billing!

Northgate leases systems too! Choose from flexible terms up to five years in length. It's never been easier to get Northgate computer systems than it is now!

Call Northgate Now!

800-548-1993

HOURS: Monday - Friday 7 a.m. - 8 p.m. CST

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7075 Flying Cloud Drive, Eden Prairie, MN 55344

Circle Reader Service Number 250

OPEN YOUR CREDIT CARD ACCOUNT BY FILLING OUT THE APPLICATION BELOW.

Please complete all appropriate sections, providing at least two years residence and employment history. If you are self-employed, please be sure to complete section d. **THIS IS NOT A CREDIT AGREEMENT!** One will be sent to you upon authorization of an account. (This Form Must Be Signed To Process Your Order.) All Financed Purchases Are Subject To Credit Approval. **If You Have Any Credit Questions, Please Call For Assistance.** Thank You!

A married person may apply for individual credit. I am applying for (check one box, please):
☐ JOINT CREDIT with another person. Complete entire application.
☐ INDIVIDUAL CREDIT complete only individual section.
☐ INDIVIDUAL CREDIT but rely on income of another. Complete entire application.
*If you are a married Wisconsin applicant, you must provide your spouse's information as indicated, even though your spouse may not be signing the contract.

NOTICE TO WISCONSIN APPLICANTS
You must disclose your marital status:
☐ married
☐ unmarried
☐ legally separated

a. Personal Information

NAME _____ HOME PHONE (___) _____
SOCIAL SECURITY NUMBER _____ DATE OF BIRTH ___/___/___
PRESENT ADDRESS _____ CITY _____ ST _____ ZIP _____
DATE OF RESIDENCE MO. _____ YR. _____ BUY☐ RENT☐ OTHER☐ _____
PREVIOUS ADDRESS _____
EMPLOYER _____ DATE OF EMPLOYMENT MO. _____ YR. _____
MONTHLY GROSS SALARY $ _____ BUSINESS PHONE (___) _____
PREVIOUS EMPLOYER _____ DATES OF EMPLOYMENT _____ TO _____

Income from alimony, child support or separate maintenance payments need not be disclosed if you do not wish to have it considered as basis for repaying the obligation.

ADDITIONAL MONTHLY INCOME $ _____ SOURCE _____

b. Credit Information

PLEASE TELL US IF YOU HAVE: CHECKING ACCOUNT (Y/N) _____ SAVINGS ACCOUNT (Y/N) _____
BANK LOAN (Y/N) _____ HOW MANY? _____ VISA (Y/N) _____ HOW MANY? _____
MASTERCARD (Y/N) _____ HOW MANY? _____ FINANCE COMPANY LOAN (Y/N) _____ HOW MANY? _____
DEPT. STORE CHARGE CARD (Y/N) _____ HOW MANY? _____ CREDIT UNION ACCOUNT (Y/N) _____ HOW MANY? _____
OTHER MAJOR CHARGE CARDS (Y/N) _____ HOW MANY? _____

c. Joint Applicant's Personal Information

JOINT APPLICANT'S NAME _____ HOME PHONE (___) _____
SOCIAL SECURITY NUMBER _____ DATE OF BIRTH ___/___/___
ADDRESS _____ CITY _____ ST _____ ZIP _____
DATE OF RESIDENCE MO. _____ YR. _____
JOINT APPLICANT'S EMPLOYER _____ DATE OF EMPLOYMENT MO. _____ YR. _____
MONTHLY GROSS SALARY $ _____ BUSINESS PHONE (___) _____
NAME AND ADDRESS OF NEAREST RELATIVE NOT LIVING WITH YOU _____
_____ RELATIONSHIP _____

d. Self-Employment Information

BUSINESS NAME _____ BUSINESS PHONE (___) _____
TYPE OF BUSINESS ☐Proprietorship ☐Partnership ☐Corporation IN BUSINESS SINCE _____
YOUR ANNUAL INCOME FROM BUSINESS Gross $ _____ Net $ _____
PERSONAL BANKER'S NAME _____ BANKER'S PHONE (___) _____

e. Customer Authorization

I authorize Northgate Computer Systems or its assignees to investigate credit records and to report my performance hereunder to credit agencies. I hereby certify that the following information is furnished to you for the purpose of obtaining credit and is true and correct of the best of my knowledge and belief. There are costs associated with the use of this credit card. To obtain more information about these costs, call us at 1-800-548-1993 or write to P.O. Box 59080, Minneapolis, MN 55459-0080.

NY—A consumer credit report may be requested in connection with this application or in connection with updates, renewals or extensions of any credit granted as a result of this application. If I subsequently ask for this information, I will be informed whether or not such a report was requested and, if so, the name and address of the agency that furnished the report.

OH—THE OHIO LAWS AGAINST DISCRIMINATION REQUIRE THAT ALL CREDITORS MAKE CREDIT EQUALLY AVAILABLE TO ALL CREDIT-WORTHY CUSTOMERS AND THAT CREDIT REPORTING AGENCIES MAINTAIN SEPARATE CREDIT HISTORIES ON EACH INDIVIDUAL UPON REQUEST. THE OHIO CIVIL RIGHTS COMMISSION ADMINISTERS COMPLIANCE WITH THIS LAW.

APPLICANT'S SIGNATURE _____ DATE _____

JOINT APPLICANT'S SIGNATURE _____ DATE _____

FOR MARRIED WISCONSIN APPLICANTS:
I acknowledge that the obligation described herein is being incurred in the interest of my marriage or family.

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DANIEL JANAL

RAISE YOUR REVENUE

Want to double your income in six months? Double your rates.

That answer isn't as smug as it seems. Home-based business people who have been wage slaves for big companies can't believe that they can charge big bucks—and get them.

Let's look at how the real world sets rates. Remember when you were a $40,000-a-year big shot for a service company? You were paid $20 an hour.

Meanwhile, your time was billed to the client at $60 an hour—three times as much. That allowed the capitalists who paid you to split the amount equally to cover salary, overhead, and profit.

Many companies that charge by the hour for such services as legal advice, accounting, and public relations have used this rule of thirds for generations to justify their fees, meet their obligations, and laugh all the way to the bank.

One possible drawback to this strategy is that your clients can't pay those rates and they'll find someone who charges less.

Don't fret. There are several strategies that you can employ to boost your bucks. Each will work. Choose the one that meets your special situation.

The first strategy is to raise your rates. I know, I know. We just said that many clients might not be able to afford double rates. But we didn't say they could not afford *higher* rates.

Many home-based business people are shy about asking for money. In fact, some are downright bashful. They think that it's close to criminal larceny to ask for the kind of money they really deserve to make.

However, the guy working out of his house down the road, doing the same work as you, might charge $25 an hour more than you, and his work might not even be as good. Why is he making more money?

Because he *asked* for it!

Find out what the going rate is for services in your area. If your competitor charges $100 an hour and you're asking for only $50, then you can make a lot more just by meeting his rates.

You might say "That's stupid. I have time on my hands. I can attract many smaller clients and make up the difference in volume." That kind of thinking is flawed, and here's why.

With a limited number of hours to sell, you have to sell twice as many hours at $50 to earn $100.

The person who charges less is perceived as less qualified than the person who charges more. Strange, but that's how some people think. If we're offered a bargain, we wonder what's wrong with the product or person. Perception is everything, as Tom Peters said.

More clients means more paperwork (read *unbillable time*). Writing invoices. Collecting late debts. Marketing for new clients. All this downtime costs you money in the long term.

You won't have time for the big project when FatCat, Inc., asks for your services.

The moral: It is better to have fewer clients who pay high rates than it is to have many clients who pay less.

The second strategy is to get bigger, better clients.

Small companies should do business only with large companies. Why? Because big ones have money and don't mind spending it.

When a company is big, $3,000 for a project doesn't seem like a lot of money. When a company is small, $3,000 is a big sum, indeed.

A corporate mindset is in play here. When you say to a big company, "That project will cost $2,500," it says, "Great. That's less than we spent on lunch to recruit our new marketing director."

When you tell a small company the project will cost $2,500, it might balk. If you negotiate and lower the price, the small company will wonder how many corners you'll cut. You can't win.

The third strategy is to work efficiently. Plan your income, expenses, and time.

Never do something once if you can't sell it twice or use it twice. There are exceptions, of course, but here are a few ideas.

If you create a newsletter, you might be able to use the same basic layout for another client in another industry or geographic location.

A proposal or budget might work for several prospects. Create a boilerplate and save time. Change only what is needed.

Create boilerplates for your invoices, monthly reports, form letters, envelopes, and marketing materials.

Sell to your existing customers. They're your easiest sales because they know that you exist, that you're credible, and that you charge a fair price. Since existing customers might not be aware of all your services, make sure you discuss these benefits at your next meeting.

One way to turn dead time into productive time is to make a list of mindless tasks, like formatting disks, filing correspondence, and sorting file folders. Place the memo near your phone. Take care of those tasks when a telephone operator puts you on hold. You'll be surprised how much can be accomplished.

If you work smart, not hard, you'll increase your income. ⊡

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(Drive Plus Controller)

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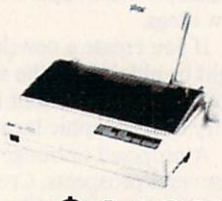

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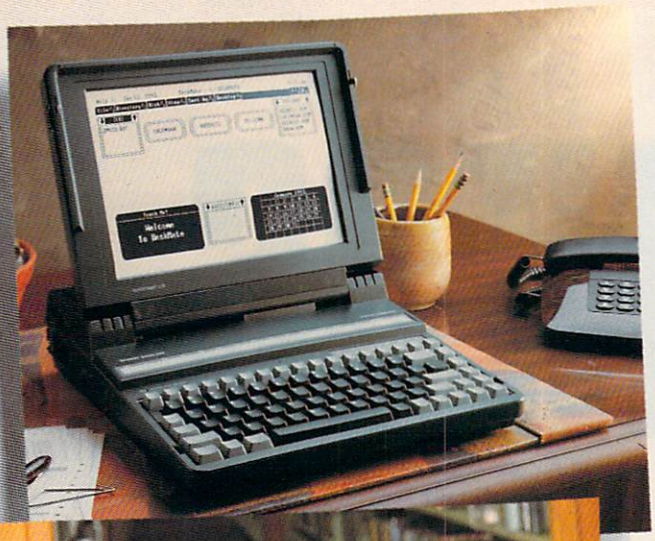
Not quite. To turn that PC into your personal bookkeeper, secretary, file clerk, forms maker, and more, you'll need software.

But one trip to the store can shock your wallet. It's going to cost a lot to fill your computer's hard disk, especially if you're set on buying the big-name products. *Lotus 1-2-3* runs $695 a copy, *WordPerfect* costs $495, and *dBase IV* . . . well, you don't want to know. ▷

GREGG KEIZER



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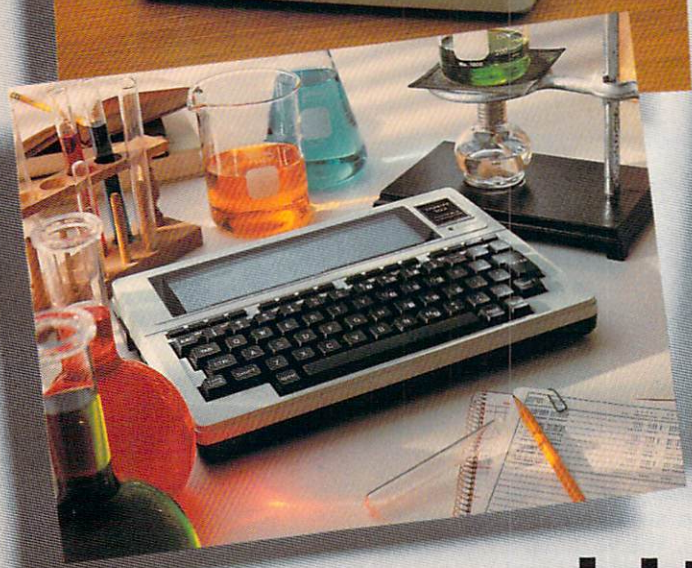

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Reader Service Number 104

continued from page 51

You can put together a complete set of home business software tools for a lot less. For as little as $100, you can collect the essential elements you'll need to start up your home business and keep it running.

The Essential Elements

All businesses spend their time getting, doing, and keeping business. Your home-based venture won't be much different. Every business communicates with customers, tracks finances, records information, predicts profits, fills out forms, and schedules time. But your home business must do all these things more efficiently than your competition. As a startup, you have to make every contact count.

Put it in writing. No matter how much time you spend on the phone, you'll still have to write to your customers, suppliers, and creditors. To communicate effectively on paper, you need a *word processor.*

Watch your money. Put some *accounting software* on the job and you'll be able to track income and expenses to the last penny.

Play with numbers. A *spreadsheet* helps you calculate loans, figure out how to squeeze more profit out of your operation, and even predict success or failure.

Know your customers. You need a *database* to record information about customers, orders, and inventory.

Budget company time. Your time is the company's time, so you'll want *time management* software to turn your computer into a scheduling secretary.

Do the paperwork. Put a *form-making* program on your hard disk and toss out those generic forms.

The $100 Startup Kit

If you only have $100, start out simply. The cornerstone of your $100 kit should be *Eight-in-One,* an integrated package that combines many essential business tools into one. Its word processor is the package's strongest module. It's easy

continued on page 56

Price Lists

The $100 Kit	
Eight-in-One	$ 45
My Advanced MailList	27
MenuWorks	16
My Checkbook	12
Total	$100
The $500 Kit	
Galaxy	$ 99
Microsoft Works	95
PC Tools Deluxe 6.0	85
PC File 5.0	76
Top Priority	57
Formtool	52
Quicken	36
Total	$500
The $1,000 Kit	
Quattro Pro	$291
Q & A	223
XyWrite III Plus	206
PC Tools Deluxe 6.0	85
Top Priority	57
Formtool	52
Quicken	36
Total	$950
Optional	
Express Publisher	$79
Procom Plus	51
Simply Ingenious	40

Shop Smart

The cost of these three startup software kits was based on street price, not suggested retail price. I consulted a number of mail-order software sellers and a major software superstore chain and averaged their quoted prices.

Buying direct is your best bet. PC Connection, at (800) 243-8088, is one well-known mail-order software supplier. It had everything in the $500 and $1,000 kits in stock (though nothing from the $100 kit), with the exception of *Top Priority, PC File* 5.0, and *Galaxy*. MicroWarehouse, at (800) 367-7080, had all of the software in the $100 and $500 kits except *Galaxy*.

Wherever you shop for your startup software, make sure you make a list. It might be tough staying within your budget if you don't.

Advertorial

What to Look for In a Home PC

If you're in the market for a home computer, here are some helpful guidelines to getting the most out of your investment.

The Right Software

Look for software that is already set up and ready to use. After all, you don't want to have to learn how to use a database just to catalog your stamp collection or set up a spreadsheet to figure interest charges. Software should be easy to use and designed specifically for the home. So you can, for instance, keep an inventory of your possessions for insurance purposes. Or make a detailed schedule for a vacation or business trip, with a list of things to bring along. Or plan meals—selecting recipes, then making a grocery list based on the number of people you're serving.

And, of course, you'll want software to help you manage your finances. Like an automatic checkbook register to do all the math for you, and then itemize your expenses for easy budgeting. And a program to manage your stock portfolio. And when you're thinking about a new house or car, you'll want a loan scheduler to find out exactly what your payments will be. Essentially, you need easy-to-use software to help you manage your finances now, so you can plan ahead for your financial future.

Of course, your home computer should be PC compatible, so you can run programs from the office as well as tens of thousands of other personal, entertainment and home education programs.

Getting Up and Running

The right computer should be so convenient that you'll use it all the time. And your system should be compact and quiet to fit well into any home environment. A definite plus is a feature that turns off the screen when not in use, keeping the computer both energy efficient and ready to use with the touch of a key.

Plus, you need to consider the keyboard. A top-of-the-line business system keyboard will make for easier, effective entry of information.

Stretching Out

Finally, you need to be able to expand whenever you're ready. Look for built-in digital audio and joystick ports so you can take advantage of a wide range of game and home education software.

Fortunately, there is a computer that meets all these requirements: the new Tandy® 1000 RL home computer. To learn more about home computing, plan to attend one of the special Open Houses being held every Friday at Radio Shack. Call any participating Radio Shack store, dealer or Computer Center for times, or to set up your own personal demonstration.

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*BYTE Magazine, May 1990. Jerry Pournelle holds a doctorate in psychology and is a science fiction writer who also earns a comfortable living writing about computers present and future.

continued from page 53

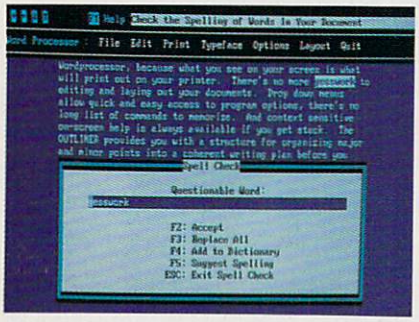
to learn and has features, such as a spelling checker and a thesaurus, that you wouldn't expect in a program at this price.

Eight-in-One also contains spreadsheet and time-management software. The spreadsheet offers mathematical and financial functions to project costs. *Eight-in-One*'s calendar and to-do list track appointments and priorities.

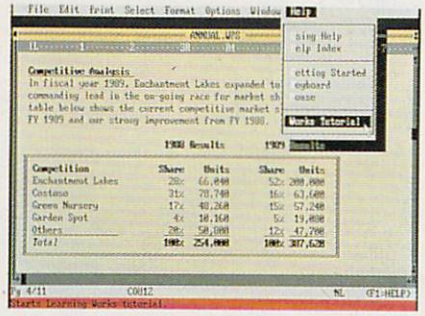
My Checkbook can handle simple accounting chores. It's a checkbook-writing and -register program that you'll be using a minute or two after installation. You can categorize expenses, do some elementary budgeting, and reconcile the account. Its biggest drawback is that it handles only one account.

Although you could use *Eight-in-One*'s database, I recommend a specialized program like *My Advanced MailList* instead. Don't underestimate this name-and-address list program—customer and contact information are vital resources.

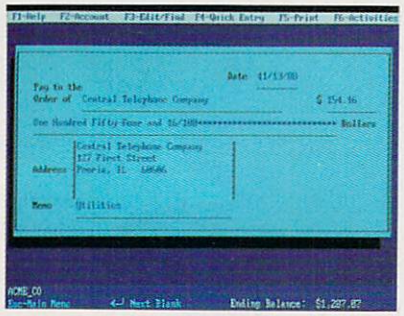
To make your PC easier to use, install *MenuWorks*. It's an inexpensive program launcher and DOS substitute that automatically creates menus for you. You simply select from a menu and press a key to start up a program, load a file, or call a DOS command.



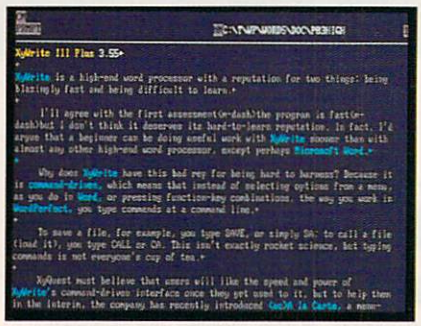
***Eight-in-One* is an economical integrated package. Its word processor features a dictionary and a thesaurus.**



***Microsoft Works* is a more advanced integrated package with a powerful spreadsheet and a helpful tutorial *(shown)*.**



***Quicken* will keep your books for you, writing and recording checks and even paying bills electronically.**



***XyWrite* has a complete set of formatting features. The fastest word processor around, it's the pick of many professionals.**

The $500 Startup Kit

The linchpin of the $500 kit is another integrated package: *Microsoft Works*. It costs more than twice as much as *Eight-in-One*, but it's easier to use and more smoothly integrated. Its spreadsheet is its strongest feature.

Though you can get by with *Works*' word processor, I'd recommend you try *Galaxy* instead. It has multiple windows, mouse support, menus, and a gigantic thesaurus, but it's still easy to operate. Plus, it's distributed as shareware, so you can try it out before you buy it.

You can afford more versatile, powerful software with this kit, so pick *Quicken* for your accounting software. It writes checks, tracks jobs, and follows taxable expenses. *Quicken* works from a familiar checkbook interface, though it's much more sophisticated than a simple checkbook program. *Quicken* lets you pay your bills through CheckFree, an electronic payment service.

You can also afford to upgrade

Home Office Startup Software

Eight-in-One
Spinnaker
201 Broadway
6th Floor
Cambridge, MA 02139
(617) 494-1200

Express Publisher and Top Priority
PowerUp Software
2929 Campus Dr.
San Mateo, CA 94403
(415) 345-5900

Formtool
BLOC Publishing
800 SW 37 Ave.
Coral Gables, FL 33134
(305) 445-0903

Galaxy
Omniverse
P.O. Box 1570
Port Townsend, WA 98368
(800) 365-7627

MenuWorks
PC Dynamics
31332 Via Colinas
Suite 102
Westlake Village, CA 91362
(818) 889-1741

Microsoft Works
Microsoft
16011 NE 36th Way
Redmond, WA 98073
(206) 882-8080

My Advanced MailList and My Checkbook
MySoftware
1259 El Camino Real
Suite 167
Menlo Park, CA 94025
(415) 325-9372

PC File 5.0
Buttonware
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Bellevue, WA 98009
(206) 454-0479

PC Tools Deluxe 6.0
Central Point Software
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Beaverton, OR 97006
(503) 690-8090

Procom Plus
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Columbia, MO 65205
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Cupertino, CA 95014
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Quattro Pro
Borland
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Scotts Valley, CA 95066
(408) 438-8400

Quicken
Intuit
P.O. Box 3014
Menlo Park, CA 94026
(800) 624-8742

Simply Ingenious
Stanwood Associates
303 East Ohio
Chicago, IL 60611
(312) 828-9734

XyWrite III Plus
XyQuest
44 Manning Rd.
Billerica, MA 01821
(508) 671-0888

your database. *PC File* 5.0 is a flat-file database that takes in huge amounts of information and returns it to you in several forms.

Although *Microsoft Works* includes a small calendar, use *Top Priority* instead to watch your time and schedule. *Top Priority*'s to-do list should keep you on top of the details.

Rather than pay for generic paper forms, make your own with *Formtool.* It provides complete control over every part of form design.

PC Tools Deluxe 6.0 rounds out this startup kit. Though you may first use it to insulate you from DOS, it has far more to offer than *MenuWorks. PC Tools* includes utilities to secure your programs, back up your data, and repair damaged files—potential lifesavers for your home business.

The $1,000 Startup Kit

The $500 startup kit provides a solid software foundation, but if you have $1,000 in your budget, replace selected pieces of the $500 kit with higher-powered software that can handle your most demanding work. Then spend the rest of your money on programs to expand your business capabilities.

If your work is word-intensive, replace *Galaxy* with *XyWrite III Plus,* a favorite of many professional writers. *XyWrite* has everything—superb formatting control, mail merge, multiple-column printing. Its new menu system makes it easy to use. Best of all, *XyWrite* is extraordinarily fast.

Will your home business require substantial number-crunching power? If so, drop *Microsoft Works'* spreadsheet and opt instead for *Quattro Pro.* It's quick, it produces outstanding charts and graphs to dazzle your clients, and it handles huge worksheets.

If your business depends on lists, replace *PC File* 5.0 with *Q & A,* a top-notch database/word processor combination. *Q & A* is much easier to work with than *PC File.* It lets you retrieve information by asking the program plain-English questions, a plus even for experienced database users.

But don't replace all three of your power hitters unless you have to. Instead, substitute for the one you use most; then go hunting for some extras.

Almost any home business could use a desktop publishing package. *Express Publisher* is perfect for creating newsletters or flyers. If you expect to telecommunicate, you'll want something like *Procom Plus.* It's inexpensive but has the advanced features you'll need. If you spend a lot of time on the phone making contacts, pick up *Simply Ingenious,* a simple-to-use database. It's great for storing contact names, telephone numbers, and the notes you take during phone conversations.

It's Your Business

It's possible that none of these software kits will fit your requirements exactly. Though each kit includes enough software to meet basic business needs, there may be some gaps only you can recognize.

It's your business. That's why you're working for yourself. You call the shots, so make substitutions freely. Just remember to look carefully at your business practices and then buy the software tools that make those practices perfect. ◻

Gregg Keizer, a former editor of *COMPUTE Magazine* and former publisher at *SoftDisk,* is currently freelancing. He is the author of science-fiction stories and computer books.

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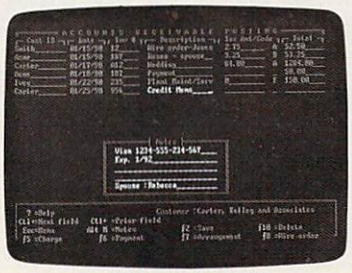
"The Invoicer with Accounts Receivable" sells for $149 (most others cost $500-$800 or more). Complete with disk and tutorial, this package is a quick to learn, complete program for all your needs in billing and accounts receivable. Other inexpensive packages include Accounts Payable, Inventory & Sales Tracking and others. Inquire about quantity discounts.



"The Invoicer" in action!
Notice the easy viewing screen

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With your software package you also receive free telephone support* and consultation from the same people who wrote the program. You may not need the support, but it is there just in case. At your request, we will custom modify the package to precisely fit your particular needs. Rates are low and response is fast--15 days sometimes.

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(go to top of next column)

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"Easy-to-use... A snap" B. Blier – Boston, Mass.

"A nice touch... Very Comfortable..." PCM Magazine – October '89

"Invoicer is a great value" PC Club – Toronto

"Rated 8 out of 10..." "All the basics..." "A new touch..." inCider/A+ – May, '90

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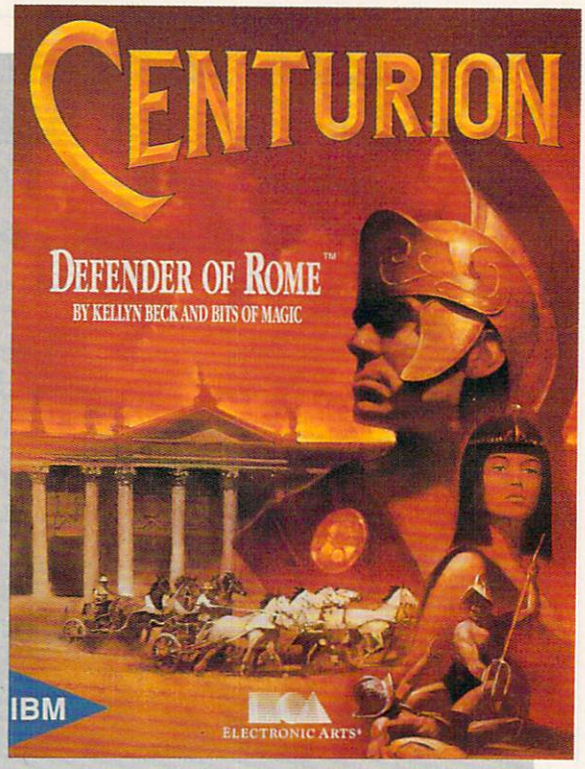


COMPUTE CHOICE

LEAD THE ROMAN LEGIONS TO VICTORY AS YOU CREATE AN EMPIRE AND MAKE HISTORY

HEIDI E. H. AYCOCK

Saddle up your war horse and prepare to invade the province of Gaul. You're on the path of destiny, the road to ruling the known world, the glory-paved route to your place as Ceaser. You're playing *Centurion: Defender of Rome.*

Even if you don't ordinarily enjoy historical simulations of battles and conquests, you should consider *Centurion.* And if you're already a fan of electronic war games, you'll be pleased to see where the next generation of these simulations is headed.

Centurion has many strengths and no obvious weaknesses, just like a real leader. The gameplay is multilayered, the interface is excellent, and the graphics make the most of the PC's abilities. And the game is easy to learn at the beginning, even though it becomes more challenging the longer you play.

When you begin the game, you're a new commander of a single legion. You start in Rome, the capital of Italia. The people are rebellious, their courage fierce, and your legion's coffers low. It's time to take over a province. Another day, another invasion.

Using your mouse, click in a new country on the map. You can only move into a province adjacent to the one your legion is in, so your early choices are slim. You can head east for Dalmatia, north for Alpes, or west for Narbonensis. The manual suggests a quick start to *Centurion:* Begin by occupying Alpes, a land of unremarkable wealth and ordinary strength. Not a daunting foe, but a good oppo-

INMENT

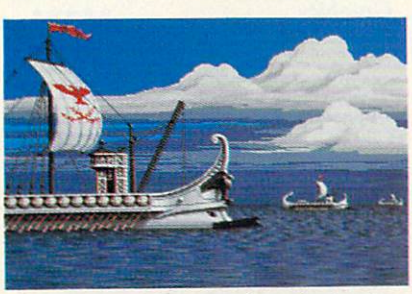
MARK WAGONER © 1990

nent to learn on.

Now that you're in Alpes, you must negotiate with the enemy. Offer them an ultimatum, but don't expect their leader to accept. You're word isn't worth much on foreign soil, not as a fledging commander anyway. They'll insist on battle.

Battle is fine; you're up for it. The field of combat shows up on your screen, and you need to pick a formation: Balanced Army, Wedge, Strong Right, or Strong Left. With your formation selected, you see your army facing the enemy. After you've examined the layout of forces, choose a tactic. Each formation has its own list of tactics. Balanced Army, for example, is complemented by the following options: Frontal Assault, Scipio's Defense, Drive a Wedge, Outflank, and Stand Fast.

As soon as you've picked your tactic, the fray begins. You can sit back and watch, or you can send special commands to individual units that are within the general's sphere of influence. There are two ways to find out the size of the general's sphere of influence. You can click on the general to see a dotted circle surrounding the cohorts he can control, or you can click on a cohort to see if he falls within the circle. If a cohort is accessible, a small dot appears in the lower corner of the unit icon. To issue new orders, grab the dot by pointing at it and holding the mouse button. Then change the unit's course by dragging in the new direction.



Once you've conquered nearby lands, create a fleet and rule the sea.

When the battle has ended, you can plunder the holdings of the province. This adds to your budget but subtracts from your popularity. You can also hold games and festivities. This subtracts from your budget but adds to the contentment of your people. Every action has a negative effect and a positive one. Balancing these influences is sometimes harder than winning contests on the battlefield. To end your turn, click on the year icon in the corner of the screen. Everything starts again.

By the end of the first turn, you've only seen a few aspects of this multidimensional game. *Centurion* isn't just battles and spending money. You can use up a whole year of the game just strengthening your legions, altering tax structures, and building war ships.

These aspects of *Centurion* are passive; you take these actions by selecting them from menus, and they take effect instantly and automatically. The cost is deducted from your budget, and the strength is added to your legions.

To take a more active role, choose the gladiator show at the Colosseum or the race at Circus Maximus. These two phases of the game add to your reputation and your pocket if you win. They also add interest and variety to the game.

The gladiator show is a typical arcade-style fight. You choose two men, armor clad and trained at various levels. Use the keypad to strike at your opponent, block his blows, and execute some fancy footwork. At the end, you choose thumbs up or thumbs down, granting the loser his life or sentencing him to death. If the crowd agrees with you, your people will re-

vere your name. Otherwise, the struggle for popular support goes against you.

The race is another arcade sequence, with some nice twists. After choosing a chariot, you can indulge in some skullduggery. Bribe a few opponents, invoke the favor of the gods, or hire a physician with a magic potion. All of these options cost money, so be careful not to spend so much on cheating that you have nothing left to bet. When the race begins, use the keypad to whip your horses for speed. Don't be seduced by the swiftness, though; your chariot will break up if you take a curve too quickly.

Once you've earned enough money and power, you can increase your strength by raising new legions, upgrading your infantry to horse troops, and building fleets of ships to battle marauding invaders.

Adding to the game's depth are the difficulty levels. Not only can you choose among four levels, but you can also fine-tune them. For example, you might have mastered the fine art of land battle, but your racing skills still leave you fourth in a field of four. Maybe you haven't even set sail yet. You can choose a higher difficulty level for land battles and a lower one for chariot races and sea battles.

For all its multilayered playing possibilities, *Centurion*'s interface is very easy to learn. A mouse is the best way to control the action, but you can also use cursor keys and special commands. You move your legions by clicking where you want to go and choose your actions from well-designed menus.

Although there are many commands available, they're very easy to find. The menus are organized in a pyramid fashion so that there are only three menus to look through at the top level. Each menu leads to others, but you don't end up with too many menus to search through at any level.

Like the menu structure, the controls in the sea battles, gladiator shows, and the races are very well organized. They are laid out intuitively, so you'll have no trouble remembering them. A gladiator's high strike, for example, is the upper left key on the keypad. That's the direction in which you want to move your gladiator anyway, so it makes sense.

The documentation describes all of *Centurion*'s controls clearly and concisely. You don't have to weed through a *Rise and Fall of the Roman Empire*–length manual to learn how the game works. You only need to skim through about 40 pages, most of which describe some of the subtleties of the game. A poster-size map of the Roman Empire helps you keep track of your provinces, and a command summary card explains the controls.

As well-designed as the interface, *Centurion*'s graphics are varied and attractive. You'll find several different styles. One, best exemplified by land battles, shows animated images of quarter-inch-high soldiers marching across the field of war. Along with the infantry soldiers, these land battles feature horses that gallop proudly and

Build prestige and your army's coffers by participating in the chariot race.

Your army won the cities of Egypt, but can you win Cleopatra's heart?

elephants that roll over and die with what seems like a delayed thud. The chariot races are represented in the same way. The best part is when the pre-Christian paramedics come out with a stretcher and scrape you off the racetrack.

Not all scenes are animated. To start the race, the game shows a detailed setting replete with cheering fans and gleaming white horses. Before the sea battle ensues, you see your ships shining, their sails filled with wind. In VGA, these scenes are stunning.

Even the menus are well drawn and sharp. When you click on a rebellious province, for example, you see a still-life mob scene, angry faces and clenched fists. To add to the game's atmosphere, each province has its own panorama that shows the landscape and climate of the area.

Without a sound card, the bleeps and bloops are annoying. But the game supports Ad Lib and Roland sound boards. *Centurion* is so well done that it might be a good enough reason to break down and buy one of these boards. If the sound is as good as the rest of the game, it will be well worth your money.

Centurion is visually beautiful, intellectually interesting, and just plain fun. The challenges change and increase in difficulty. At first, you simply win a few land battles, and that's the measure of your success. After a while, though, the people will cry out for races and gladiator shows. Success becomes more elusive; it will take a mixture of individual strength, dexterity, cunning, and judgment to prosper. When the marauding armies invade your hard-won provinces, global strategy becomes a significant factor. And the high seas call out to your fleets of galleons.

Centurion absorbs you into a fascinating past by giving you the tools to explore the world 300 years before the beginning of this millenium. Many simulations aim for the same goal but miss it for one reason or another. The subject matter may be too obscure, the controls too cryptic, or the graphics too static. This game, on the other hand, takes an inherently interesting period in human history and does it justice by making the subject matter accessible to anyone who wants to approach it.

Because it's so easo to approach, *Centurion* is a game for everyone. If you have children, play this game with them. It will help them see history as something alive with possibilities. If you enjoy reading about history, you'll enjoy wandering through it on your PC just as much. *Centurion* faithfully recreates the atmosphere of Rome's heydey as well as it represents the mechanics of conquest. All hail!

Playability	★★★★★
Documentation	★★★★★
Originality	★★★★
Graphics	★★★★★

Centurion: Defender of Rome
IBM PC and compatibles—$49.95
Package includes 42-page manual, command summary card, map of the Roman empire, and three 5¼-inch disks.

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Four Billion Years Of Evolution Is About To Go Down The Pooper.

Fight or be flushed! Those are your only options as you team with a fellow commando and battle the galaxy's greatest foe—Red Falcon.

Never, not even in the original arcade version, has computer warfare been this devastating. At every level Red's assault will intensify as he punishes earth with tanks, electro zappers and an army of alien annihilators. These ruthless characters are so tough, they often engulf half the battlefield!

To blast through Red's full course menu of mayhem, featuring Fort Fire Storm and the Tropics of Torture, you'll need marksmanship prowess with a Machine Gun, Spread Gun, Rocket Launcher and Laser. You'll also need multiple commando skills to overcome both side and overhead war perspectives. Ultimately though to save every man, woman, child and amoeba, you must clog up Red's attack and snatch victory from the jaws of defeat.

Super C is programmed with realistic bit-map explosions and aliens that replicate the size of those in the original arcade version. It also supports Ad Lib™ and Tandy® Sound Boards.

Super C is a one or two player game available for: Amiga,® IBM®/ 100% compatibles, Tandy® 1000.

KONAMI®

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GAMEPLAY

ORSON SCOTT CARD

Remember the board game called Life? You play by putting your player-figure into a little plastic car and driving along the road, randomly landing on squares that give you money, debts, babies, and disasters. Your career is generated by a throw of the dice; everybody has to get married; and at the end you win by having the most cash value or by staking everything on a throw of the dice. One last gamble.

I played it as a kid, and it was fun. But the more I repeated the game, landing on the same squares, seeing the biases and values built into it, the more frustrated I got. Why should the dice make all the decisions? Why is my "life" in this game wholly imposed upon me? Why can't I take a real part in creating it?

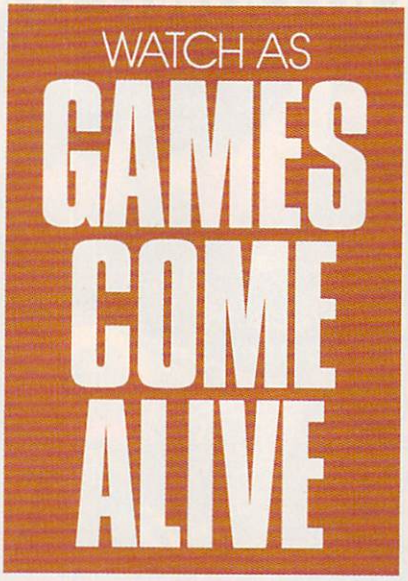
The answer is easy: The board can only be printed once. With a puzzle game (Scrabble, for instance) this doesn't pose a problem; the board takes on new meaning as the player adds pieces. On a story-type board game, however, the meaning is permanently affixed to each location.

With computers, the story game has been able to come into its own. One approach has been filmlike: Sierra On-Line, Lucasfilm Games, and Cinemaware have all developed movielike approaches that attempt to give the illusion of reality. With the game of Life, it would be the equivalent of having a little car that actually runs and little people that move around and talk in squeaky voices.

A lot of fun, but it still runs into that same dilemma: Coming up with scenery for movielike games is expensive in terms of disk space, and companies can't afford to include scenery that isn't used. So, while you have a lot of freedom of movement within each setting—the equivalent of having your little Life people get out of the car and run around—the game still has to force you to move through all the available locations, just like the spaces on the Life game board. The game authors know this and labor mightily to try to increase the illusion of freedom by letting you visit the locations in varying orders. But the boundaries remain firm.

There's another approach, however, that has already come a long way toward giving the player greater control of the story of the game. These are games in which players alter the board during the course of the game. The meaning of the board changes with the players' choices. Think of the developing cityscape in *SimCity* or the constantly changing terrain in *Populous.*

In fact, these are really puzzle games with an intensified story element. If we think of the movielike games as biographical, following an individual character's passage through



the world, then these map-oriented games would be historical, following the flow of larger events. There's little or no individual, personal jeopardy, normally a vital part of fictional storytelling. Instead a whole city or population is at risk.

In a way, these games exactly reverse the relationship between designer and player. Where the biographical games let the player control a person moving through a fixed landscape, the historical games let the player control the landscape, while the computer controls the people who move through it. We gain freedom to control the landscape at the cost of losing individual control over the characters.

The division between these two types of games is not permanent. The biographical games will be greatly benefited by improvements in computer processors, which are finally getting fast enough that it's practical to create new locations on the fly. This way locations can be coded, not as pictures, but as descriptions, and thousands can be stored in the same disk space now used for dozens. Most locations wouldn't even be visited in the course of a game. In fact, it's conceivable that these locations could be infinite: If the program includes algorithms for creating towns or rooms, then if the player moves in an unexpected direction, a new location can be randomly created so that no matter where the player goes, there's already a place to arrive.

At the same time, the historical games are already reaching for ways to include individual characters; to have, in effect, heroes in the overall sweep of history. *SimCity* treats the player as an invisible mayor who has to keep his popularity ratings as high as possible, but this is pretty primitive as an individual game of Life. *Populous* gets somewhat closer by giving your populace a leader who can break loose and become a heroic berserker, ravaging the enemy landscape.

At the moment, we don't yet have computers that allow game authors to do it all; when we do, and we're getting close, the creative minds in both camps will be ready to seize the opportunity.

I personally enjoy each one of the approaches to gaming that I've mentioned here. They're all bearing fruit. Each of the games I've mentioned takes a step toward helping gaming to become a strong storytelling medium, one with the same delights and the same transformative powers as novels, movies, and plays. ⊡

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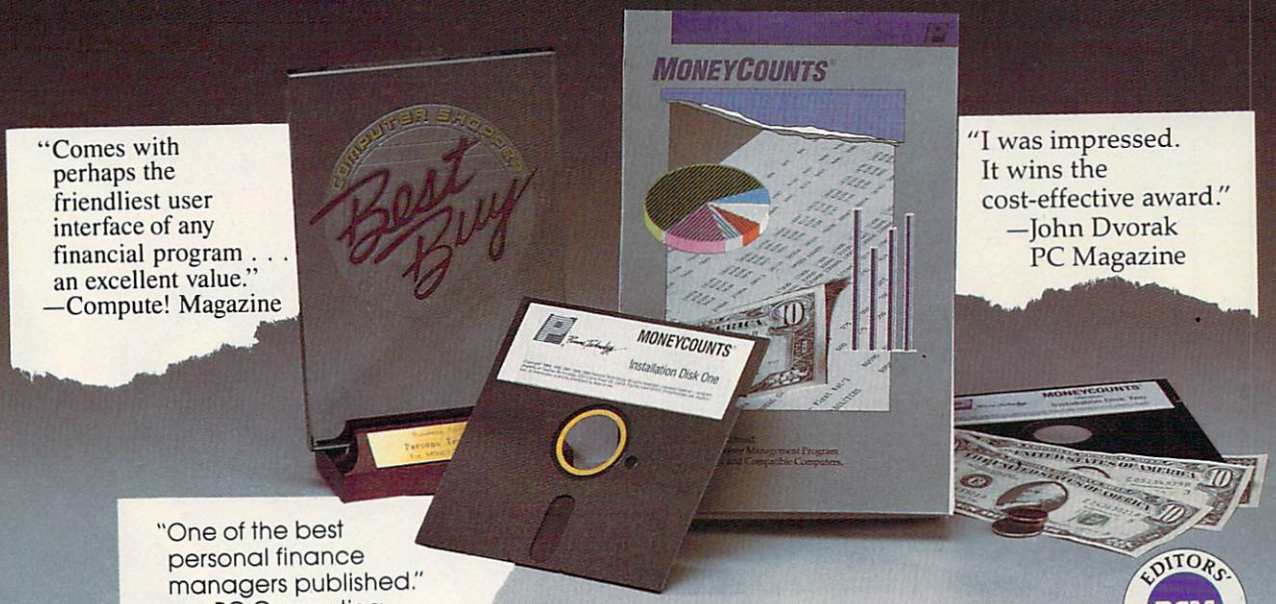

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Role-playing games (RPGs) are one of the fastest growing segments of the computer game market. Dungeons & Dragons–type games, such as the Phantasie, Ultima, Wizardry, and Bard's Tale series, and more recent computer adaptions of paper-and-dice RPGs, such as *Pool of Radiance* and *Dragons of Flame,* have had a tremendous influence in the computer gaming world. But did you know that fantasy role-playing and computer adventures were both around even before the PC? ▷

BOB GUERRA

LARRY ELMORE

Enter the Dragon

In 1974, bored insurance underwriter and freelance game designer, Gary Gygax, decided that full-time game design would be more interesting than the insurance business. Along with his friend, Don Kaye, Gygax opened a game store in a house beside the Pizza Hut in Lake Geneva, Wisconsin. There, they sold all types of games as well as their own rule sets for simulating military battles with lead miniatures. These Tactical Studies Rules (TSR) covered all periods from the Civil War and American Revolution to ancient battles and the Napoleonic wars.

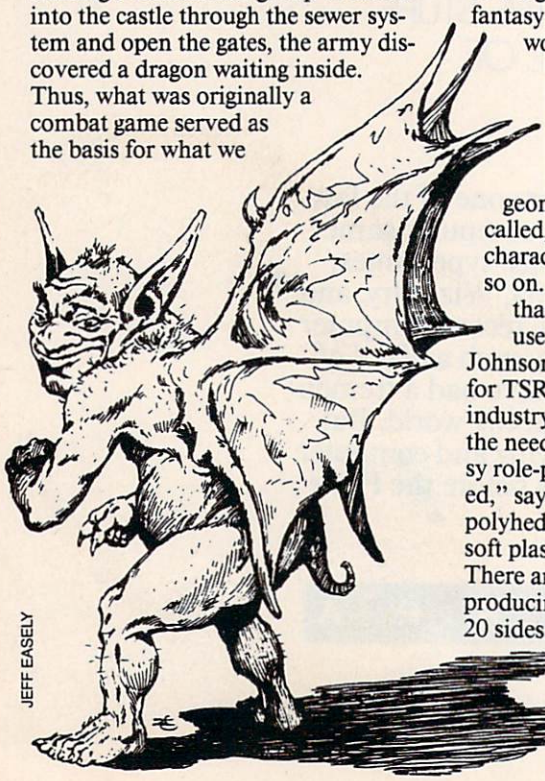
An early rule book for miniature battles, called *Chainmail,* described the rules for medieval battles in which each figure represented one man. By mixing medieval soldiers from miniature sets of various sizes, early gamers introduced giants and dwarves into the battles. Tolkien's *Lord of the Rings* was very popular at the time, and gamers figured a little fantasy would really spice up their battles. Once giants and dwarves began showing up on miniature battlefields, it wasn't long before toy dragons began appearing on the scene. Naturally, if one side had a dragon, the other had to introduce a magic user who was capable of casting fireballs back at the winged beast.

One of the first such fantasy campaigns was created by Dave Arnesson, a player from a Minneapolis/St. Paul miniatures group. It involved a castle under siege by a medieval army. After sending a commando group to sneak into the castle through the sewer system and open the gates, the army discovered a dragon waiting inside. Thus, what was originally a combat game served as the basis for what we know today as Dungeons & Dragons.

TIM TRUMAN

Gygax modified Arnesson's campaign and printed 1000 copies of the Dungeons & Dragons rule book. Although it took a full year to sell the books, the game began spreading like wildfire among college campuses and even some high schools. The second 1000 rule books sold in just six months.

For a lot of players, their first exposure to D & D was from a photocopy of the original rules. Unlike the prepackaged fantasy modules that have become popular in the last several years, these first rule books were simply instructions for playing out your own fantasies. It was largely up to the gamers or referees to create the fantasy worlds and monsters that would be encountered there.



JEFF EASELY

Of Dice and Men

Originally, Dungeons & Dragons was based on two six-sided dice, and the referees, or Dungeon Masters as they're frequently called, rolled the dice to generate character traits, resolve combat, and so on. Eventually, dice with more than the standard six sides were used. According to Harold Johnson, director of special projects for TSR, a lot of the growth in the dice industry can be directly attributed to the need for specialized dice for fantasy role-playing. "When D & D started," says Johnson, "the only polyhedral dice you could get were soft plastic dice from Hong Kong. There are now a dozen companies producing polyhedral dice with up to 20 sides." He adds that someone has even devised a "golf ball–like" 100-sided die for D & D gaming.

Johnson attributes the phenomenal acceptance of fantasy role-playing to two unusual conditions. First, because the Dungeon Master is the only one who has to know the rules, players are free to try anything. It's up to the Dungeon Master to determine the player's chances of success. Second, because the original rules were pretty sketchy, people were encouraged to create their own rules and ignore those they didn't like or understand. The idea was simply to have fun.

Automatic Pilot

By 1976, the D & D fans who also spent a good deal of their time in computer science labs began to realize that most of the Dungeon Master's chores could be automated. Computers could create the dungeons and, instead of your having to roll dice, you could resolve combat with a quick roll of the computer's random-number generators.

It was also at this time that bleary-eyed hackers, working into the wee hours of the morning, were playing and modifying William Crowther's original mainframe *Adventure* game. Crowther, an MIT graduate who spent part of the sixties mapping Mammoth Cave in Kentucky for the National Park Service, wrote his text-based game, *Adventure,* in FORTRAN

continued on page 68

LARRY ELMORE

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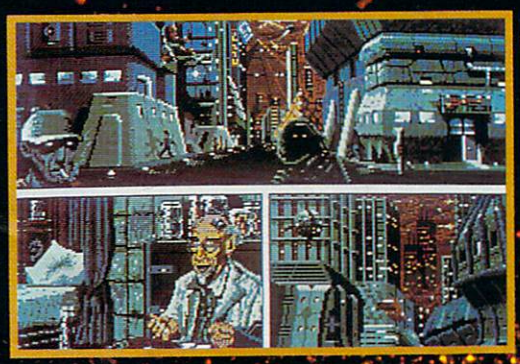

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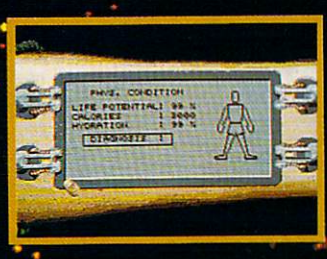

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on a DEC PDP10 mainframe.

Over the next few years, Don Woods was modifying *Adventure* into *Adventure II.* Woods had been studying computer science at Stanford University, where he accessed the game through an early computer network called ARPAnet. Other spinoffs included Scott Adams' all-text *Adventureland,* which was written for the TRS-80 Model I, and Gordon Letwin's *Microsoft Adventure,* which was released on cassette tape for both the TRS-80 and Apple II.

Crowther's original *Adventure* is also said to have greatly influenced the MIT-based designers of *Zork,* one of the first all-text adventures to be available for a number of microcomputers. The only Dungeons & Dragons player in the Zork group, Dave Lebling, also cites D & D as an influence along with the authors H. R. Tolkien and Jack Vance.

Room with a View

By the end of the 1970s, most computerized adventures still relied solely on text to describe the labyrinths and monsters to which fantasy gamers had become so addicted. However, several designers began to work on games that would let players see what they were up against.

Naturally, the first graphic adventures were crude by today's standards. In 1980, Ken and Roberta Williams founded Sierra On-Line and produced *Mystery House,* a fantasy adventure with low-resolution black-and-white graphics. *Wizard and the*

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Dungeons & Dragons Time Line

1974
Gary Grygax and Don Kaye launch TSR (Tactical Studies Rules) in Lake Geneva, Wisconsin.

1975
TSR prints the first 1000 copies of the Dungeons & Dragons rule book.

1976
William Crowther writes *Adventure* in Fortran on a DEC PDP10.

1980
Ken and Roberta Williams form Sierra On-Line and produce *Mystery House,* the first graphic adventure game. It features low-resolution black-and-white graphics.

1981
Sierra On-Line creates *Wizard and the Princess,* the first adventure game with color graphics.

1988
SSI offers the first official Dungeons & Dragons computer game, *Pool of Radiance.*

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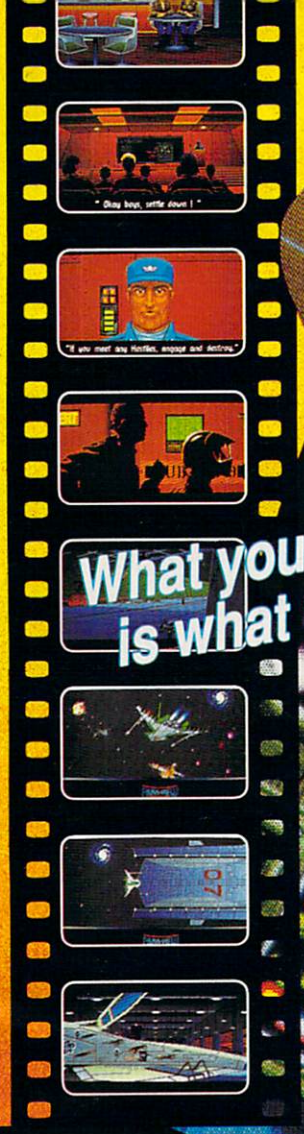

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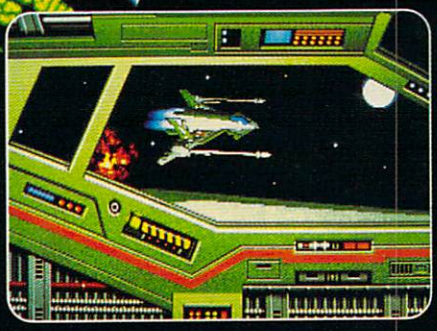

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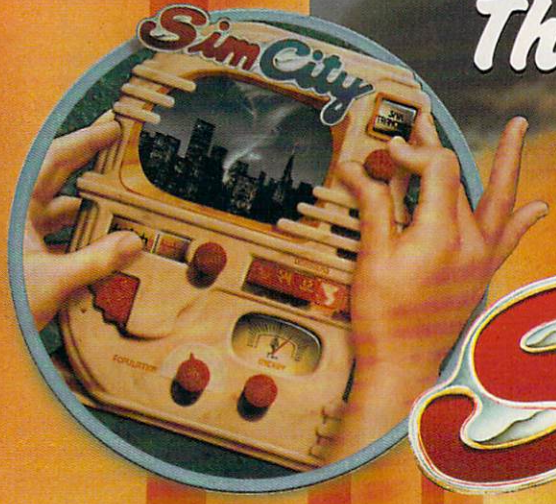

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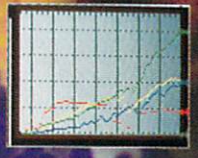

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CMP100

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Princess followed in 1981, and this time they used color graphics to bring their story to life. Just ten years later, Sierra's 3-D graphics adventures, such as *Camelot* and *Sorcerian,* offer superb high-resolution color graphics, dazzling special effects, and high-fidelity stereo music.

Other computer D & D pioneers include Richard Garriott, cofounder of Origin Systems and creator of the tremendously popular Ultima series of role-playing games. Perhaps better known by the name Lord British, Garriott spent a lot of time playing the paper version of Dungeons & Dragons while in high school. His first attempts at creating computerized fantasy role-playing games were actually graded as a school project. Today, Origin still gets high marks for producing quality role-playing games that capture the spirit of early fantasy gaming.

Another fan of paper D & D games who went on to create a successful computer fantasy is Andrew Greenberg—the man behind the early hit, *Wizardry.* Greenberg was the manager of the Plato computer facility at Cornell Universi-

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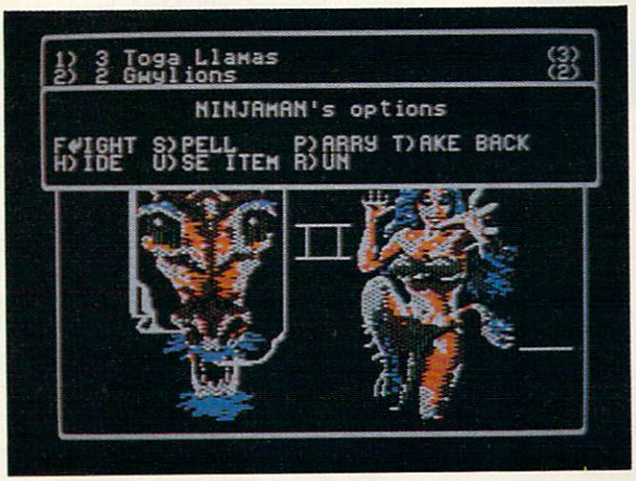
***Advanced Dungeons & Dragons include SSI's* Pool of Radiance.**



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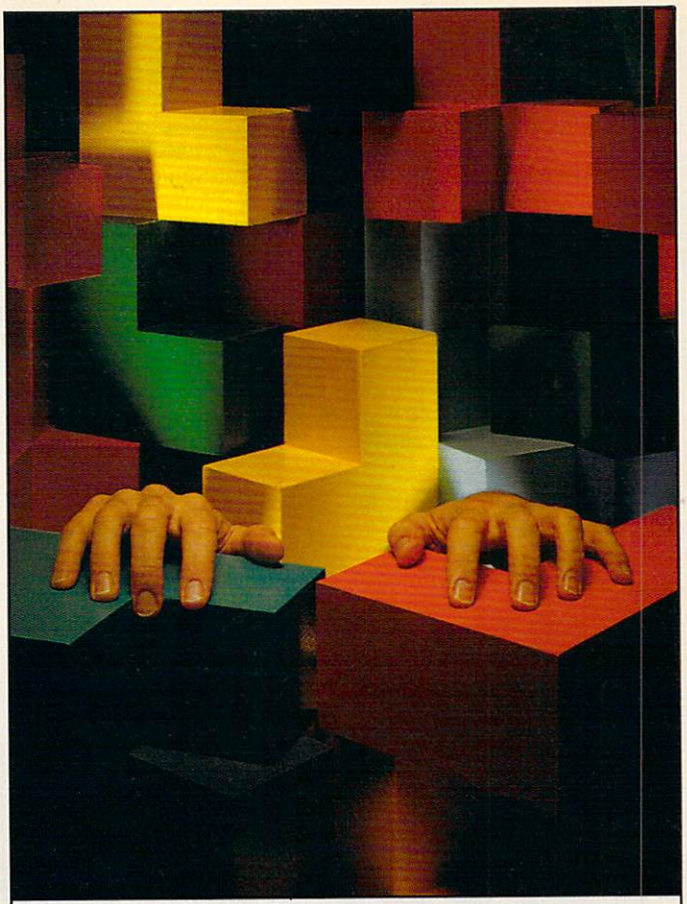

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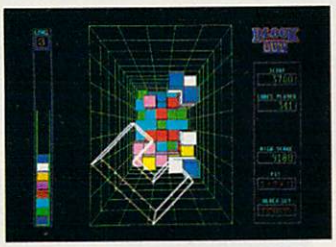

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ty when he met *Wizardry* coauthor, Robert Woodhead. It was Woodhead, in fact, who did most of the actual coding on the *Wizardry* project.

The Adventure Continues

And what of TSR, the company that Gary Gygax started beside the Pizza Hut in Lake Geneva? TSR is still going strong, producing rule books and role-playing modules for Advanced Dungeons & Dragons and other role-playing series. In addition, the company publishes two magazines for RPG fans. Appropriately, one is called *Dungeon* and the other is called *Dragon.*

Some of TSR's Advanced Dungeons & Dragons (AD&D) adventures have, in the past few years, been adapted for a variety of computer formats by Strategic Simulations (SSI) of Sunnyvale, California. Initially known for its hex-based war games, SSI had already created several successful RPGs before linking up with TSR. Some of SSI's earlier fantasy hits included the Phantasie and Questron series, *Wizard's Crown,* and *Rings of Zilfin.* AD&D titles available through SSI include *Pool of Radiance, Curse of the Azure Bonds, Dragons of Flame, War of the Lance, Champions of Krynn, Hillsfar, Heroes of the Lance,* and *Secret of the Silver Blades.*

In addition, SSI's *Dungeon Master's Assistant,* Volumes I and II, let Dungeon Masters use an Apple II, Commodore 64, or IBM PC to create characters, treasures, and encounters—taking much of the work out of creating paper D & D adventures. Finally, the latest TSR/SSI effort has resulted in *Dragon Strike,* a dragon-combat simulator that lets you fly into battle on the back of your very own dragon mount.

Today, there are literally hundreds of computer adventures and RPGs to choose from with new titles arriving every month. Many have spectacular high-resolution graphics and beautiful original music. What's more, fantasy games of the noncomputer variety are more popular than ever. So whether your favorite Dungeon Master has a heart of gold or a brain of silicon, the future holds plenty of dragons to slay and dungeons to explore.

TSR's Harold Johnson agrees: "I think there'll always be a market for computer D & D. Because we're such a mobile society, it's hard to find someone to play with. But it won't supplant the paper game because it's a totally different experience. When you have a living, human Dungeon Master, the game is different every time you play. It's a unique experience that's worth sharing and retelling to other people." ⊡

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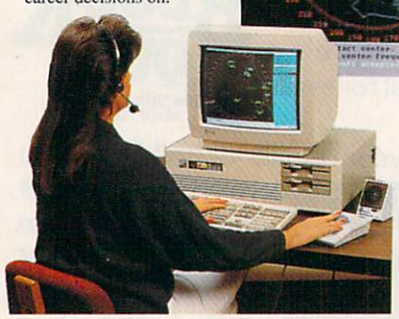

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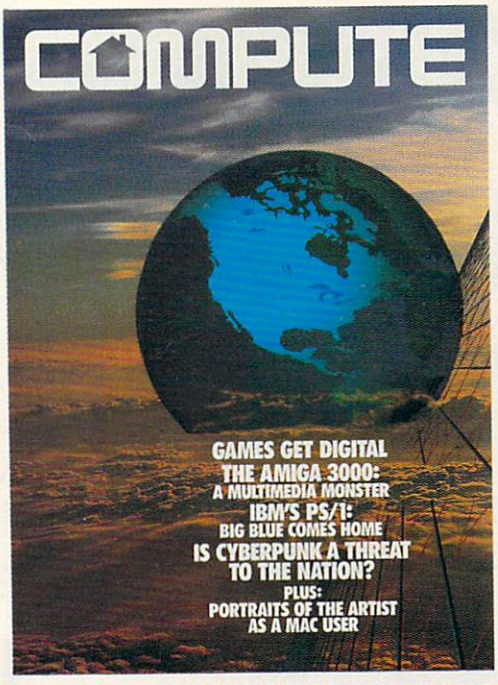

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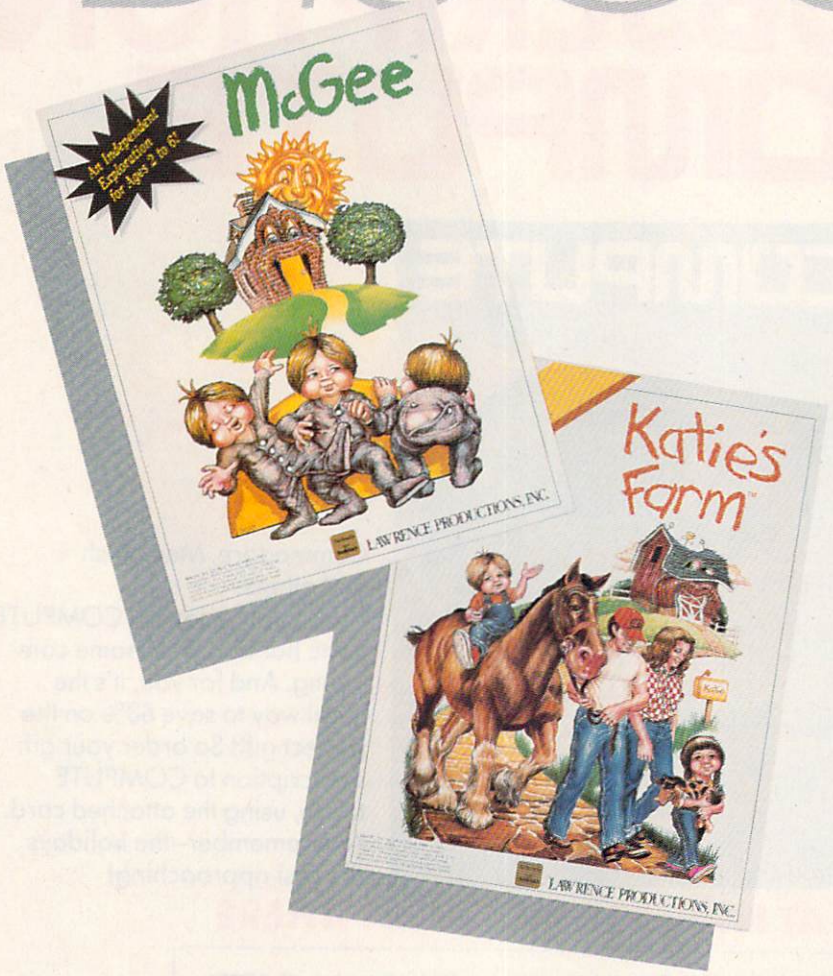


COMPUTE CHOICE

RICHARD MANN

SHARE WITH YOUR TODDLER THE DELIGHTFUL EXPERIENCE OF EXPLORING McGEE'S HOUSE AND KATIE'S FARM

If you have two- to four-year-old family members in your house, I don't need to tell you what inquisitive, imitative, and curious people they are. They love to explore, to "help" mommy and daddy do their work, and to participate in everything just as if they were grownups. The highest compliment you can pay toddlers is to call them "big" and let them do things for themselves.

Two new software packages for toddlers, *McGee* and *Katie's Farm* from Lawrence Productions, cater directly to the needs of youngsters age 2–6. These delightful computer experiences for wee ones contain no written words whatsoever. They put the children in complete charge of the adventure and let them explore on their own as long as they want to. In short, it's computer heaven for small fry.

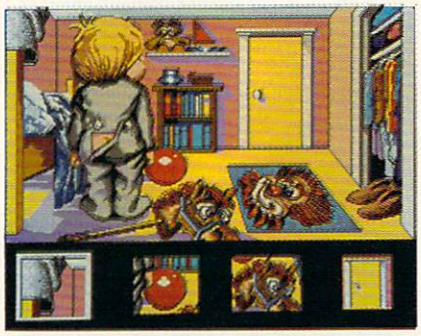
McGee is the two-year-old star of both games. As the game *McGee*

RY

MARK WAGONER © 1990

opens, the star wakes up in his small bed, gets up, and faces into his room, where toys await his attention. The animation stops while the computer waits for your child to make a choice. Look at the screen shot of McGee's room, with its four large icons across the bottom of the screen. One is highlighted by a thick white border around it. Moving the mouse to the left or right moves the highlight to the next icon in that direction. Click the mouse button to choose an action.

Teaching your toddler to use the mouse in this way is a snap; it's a natural way for even a two-year-old to run the computer. Mouseless computers can use the program, too; the arrow keys move the highlight and the Enter key or space bar chooses the action. The mouse, however, seems to be easier for the very young.



Your child clicks on an icon at the bottom of the screen to choose an action.

In that first screen, the four icons are the bunny-rabbit hand puppet, the red rubber ball, the hobbyhorse, and the door. Click on the puppet and a new screen appears in which McGee plays with the puppet, talking to it and moving its arms. Choose the ball and he bounces it against the wall, accompanied by appropriate sound effects. Select the hobbyhorse and he climbs on it, shouts "Giddyap," and canters about the room until the horse finally stops at his shouted "Whoa!"

Choose the door and your next screen is the upstairs hallway, where McGee faces a choice of three doors—one goes back into his bedroom—and the stairs.

McGee has the run of the house. It's early morning, Mommy is still asleep, and McGee can do pretty much as he pleases. Think of how your toddler will love that scenario.

How do we know Mommy's asleep? Go into the door at the end of the hallway and you'll see Mommy sound asleep with the cat curled up at the end of her bed. Click on the icon of Mommy's face and McGee walks over to her and says "Morning, Mommy." A sleepy eye opens and contemplates her son briefly. "Good morning, McGee," she replies, and goes back to sleep. Now McGee knows he's free to do as he pleases. If he's still nervous about Mommy's staying asleep, he can play the music box. After a minute, Mommy's eye opens again and she asks him to turn it off. Then she's asleep again. It looks like clear sailing.

McGee has a lot of places he can go. There's the bathroom, where he'll take a bath (demurely behind the shower curtain) and brush his teeth. Then there's the toilet icon. When you click on that one, McGee turns to you with a wry expression and points out into the hallway. Your point of view shifts to the hallway, the bathroom door closes, and soon you hear the toilet flush. Then you're back in the

bathroom to make a new choice from the icon panel.

Downstairs is the living room, where McGee can crawl under the rug, watch TV, or go into the kitchen. In the kitchen, he can feed the dog, make a phone call, or go into the fenced back yard, which offers a dandelion, a tire swing, and a knothole in the fence to look through.

I have mentioned every screen and action in *McGee.* An adult will take only ten minutes to explore everything McGee can do. An adult will enjoy the quick tour and admire the excellent graphics, the sound, and the cleverness of the ideas involved. An adult will think McGee and Katie are as cute as their own toddlers. An adult will miss the point entirely.

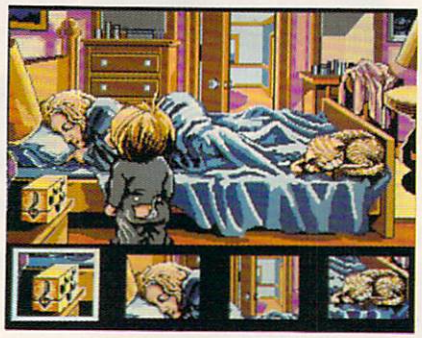
Little tykes will see it with entirely different eyes. Remember how often your two-year-old wants you to read that favorite story? Remember endless repetitions of a favorite song or game? Toddlers don't do ring-around-the-rosey once or twice; they do it over and over again, even if nothing changes.

And so it is with these preschooler's games. They go with McGee all over the house and play with the toys and make phone calls again and again, delighting in the actions each time. The little ones also find things you missed when you went through the house with all your grown-up wisdom. Did you think to look out the knothole in the fence more than once? If you had, you would have seen an apple fall out of the tree across the street the first time. The next time, you'd have seen the neighbor's dog run by.

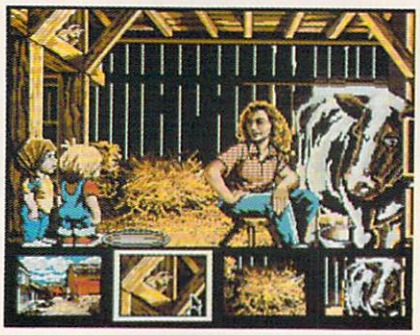
The kids love the feeling of control. They decide what to do and make McGee do their bidding. They don't need adult help; they're in charge. There's great excitement for toddlers who can say, "I can do it myself!" They also like using the computer, doing their "work" with it just the way Mommy and Daddy do.

And they love to share their experience—as long as they remain in charge. Sit with your child on your lap to play the game. You just watch, and soon your toddler will be telling you all about what's going on, making up a story to explain the actions. Educators tell us this kind of activity helps develop verbalization and socialization skills. The kids also enjoy discussing the choices they make, their favorite actions, and the funniest parts. These games provide a welcome opportunity for you to have a happy one-on-one experience with your child.

Katie's Farm is the second game in the series. McGee visits his cousin, Katie, on a farm. Richer than the first game, this one has more choices and more speech; and almost all the actions have more than one outcome if selected repeatedly. Clicking on the old tree even gives you three different animations. Of course, it takes up more room on your hard disk as a result (a total of 1.04MB, as opposed to



While mommy sleeps, McGee has the whole house to himself to explore.



McGee explores rural life as he visits cousin Katie on her family's farm.

McGee's 865K), but it's certainly worth it. The graphics seem even better, with more vibrant colors and more detailed scenes.

On the farm, the two cousins have a glorious time exploring the barn and chicken coop, fishing in the lake, playing with the scarecrow, picking berries (which McGee eats instead of gathering into his bucket), riding the horse, and more. There's so much to explore on a farm!

There's one drawback to these games, at least in the IBM format: the sound. Without a sound board (the games support the Covox Speech Thing, Sound Blaster, and Tandy sound), some of the sound effects are less than effective—and that's being generous. The speech and music come through quite acceptably, but the other effects come out in rough blasts of guttural electronic tones, suggestive of someone funneling large-grain gravel into a tin bucket.

The IBM insert to the manual suggests you may want to turn off the sound during the installation and enjoy the games without sound. Don't do it; kids love noise for its own sake, especially if it's noise they control themselves. They don't care if that chainsaw noise really should be the sound of McGee brushing his teeth.

With the sound board, however, the sound effects are excellent, adding considerably to the enjoyment of the games. If you're into games at all, you need a sound board anyway.

These games come by their understanding of kids and the educational process naturally. Lawrence Productions started 20 years ago with filmstrips. Specializing in educational media products, it now makes interactive computer programs as well as videotaped instructional materials, primarily for the elementary school market.

One day the director, who was working with preschoolers, came up with the idea of a no-words program for toddlers. The artists loved the idea, the educational theorists knew it would work, and they all developed a new excitement about their work. It shows in the product. These games are not production-line "educational" products; they're art, made with love.

If you've got a little McGee or Katie enlivening your life, you can finally share the joy and wonder of your home computer with them, bringing them into the family circle that may occasionally gather 'round the computer. Give them their own adventure game, their own exciting experience with the computer. Give them *McGee* and *Katie's Farm.*

Educational Value	★★★★
Documentation	★★★
Originality	★★★★
Graphics	★★★★

McGee and Katie's Farm

IBM PC and compatibles; 512K for *McGee,* 640K for *Katie's Farm;* 8 MHz or faster recommended; mouse optional—$39.95 each

Packages include manuals, two 3½-inch and three 5¼-inch disks. Not copy-protected.

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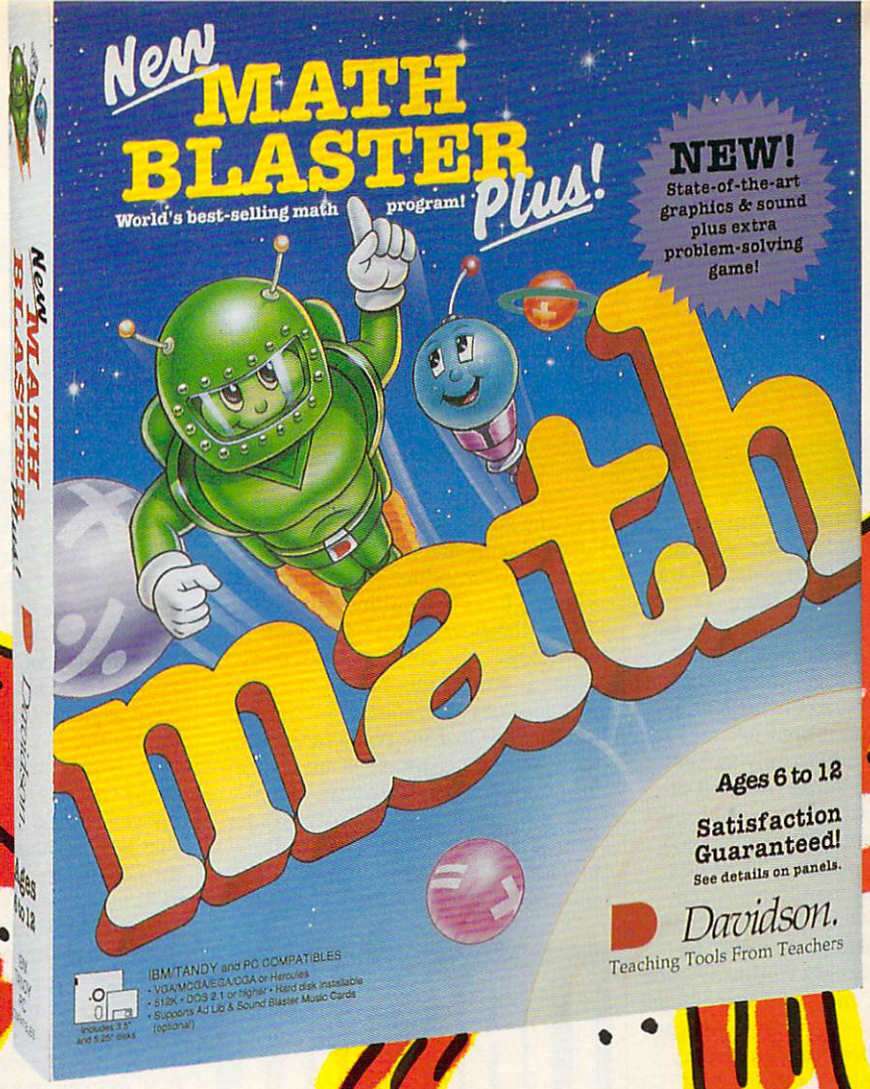

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LIBRARY ON A DISK

STEVEN ANZOVIN

After years of hype and anticipation, CD-ROM (Compact Disc–Read Only Memory) drives are finally here. These relatives of standard laser-read compact discs can annex vast amounts of computer information to your computer, turning it into a library, a concert hall, a movie theater, and more.

CD-ROM is a play-only technology, like a book or audio compact disc, and that appeals to software publishers seeking durable and data-secure ways to deliver their products. CD-ROMs are inexpensive to manufacture and are getting cheaper all the time: It can cost as little as $2 to press a disc, far less than the equivalent floppy disks or paper. Best of all, they hold stupefying amounts of data—600 or more megabytes—equal to perhaps a thousand average-sized books or hundreds of *Lotus 1-2-3*–sized applications.

CD-ROMs offer you easy access to unlimited information—whole encyclopedias, huge bibliographies, massive picture collections, entire orchestral works with notation, even full-motion video—at a very reasonable price. The CD-ROM version of *The New Grolier Electronic Encyclopedia* costs less than the original paper version (it doesn't have high-quality color illustrations, though). A single shelf of CD-ROMs can hold the equivalent of the printed information contained in a good local library, accessible at the speed of your computer. (While CD-ROM drives are still rather slow—search speeds are somewhere between those of floppy drives and hard disks—they're still faster than paging through a book.)

Unfortunately, current CD-ROM drives are expensive (typically $700–$1,000 for a stand-alone unit) and aren't carried in most computer stores. Computer makers are addressing this problem by building CD-ROM drives right into the computer itself. Steve Jobs kicked off the trend two years ago by including read/write optical storage in every NeXT workstation. On the home front, Vendex introduced last November the first PC sporting a built-in CD-ROM drive, bundled with several discs to get you started. Commodore's recently announced CDTV combines an Amiga 500 motherboard with CD-ROM technology. The emphasis will be on games and multimedia programming with a lot of color, sound, and animation. Sierra On-Line plans to seed the market this Christmas season by bundling a CD-ROM drive with some CD-based entertainment software for about $700. The writing is on the wall, and soon you'll see CD-ROM equipped machines from Tandy and other major manufacturers—maybe even IBM and Apple. External CD-ROM drives will become smaller and cheaper as well, since it's not too difficult in principle to adapt a portable CD player to CD-ROM use.

Beyond new hardware, CD-ROMs really call for new kinds of programming as well. It doesn't make sense to publish a CD-ROM with just one game on it (unless it's a *very* complex game with video, animation, and so on). For the near future, most software companies will stick to floppies for distributing single programs; CD-ROMs will be the domain of big reference works, general-purpose databases (such as the *National ZIP Code Directory*), and multimedia.

From the developers' viewpoint, the transition from floppy disk programming to CD-ROM programming is like living in a 1-room apartment all your life and then suddenly moving to a 100-room mansion on a 1000-acre estate. The space is great, but you may have some trouble furnishing the rooms and tending the garden.

As you might expect, the quality of the CD-ROMs currently available is uneven. While some CD-ROMs are easy to use; others have plainly been thrown together without much thought as to how best to organize and provide access to the information. Imagine trying to use a library in which all the books are stacked randomly on the shelves and the librarians have forgotten to provide a card catalog. Some CD-ROM developers, especially for PCs, put you in a similar position by neglecting to include adequate searching capabilities and comprehensive indexes on their discs. Unfortunately, there's usually no way to evaluate how usable a CD-ROM is until you've paid for it; good, comparative reviews of CD-ROMs are hard to find. My observation is that offerings from traditional publishers with years of experience in producing reference books and databases are likely to be useful and well thought out.

Among software publishers, Microsoft is strongly committed to CD-ROM technology; its *Microsoft Office CD-ROM* includes four of the company's best-selling programs plus all the documentation, tutorials, and other goodies you'll ever need, all in a format that's easy to use.

Right now, the number of CD-ROM titles is small, and many are tailored to the specific needs of technical researchers. But the more computers there are with CD-ROM drives, the more general-purpose CD-ROM software will appear to run on them. The market for CD-ROMs could snowball as rapidly as did the market for audio CDs a couple of years ago. And, just as you don't want to be without your CD player, you won't want to be without your CD-ROM. ⊡

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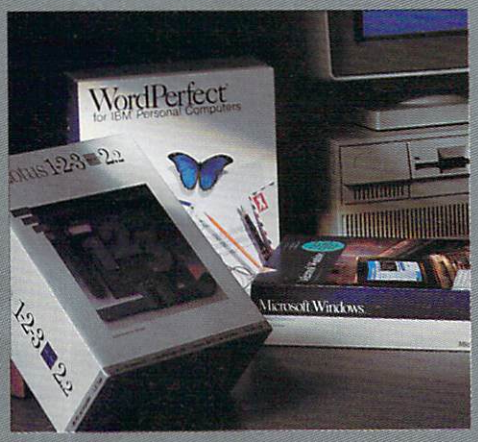
Software Is Important...



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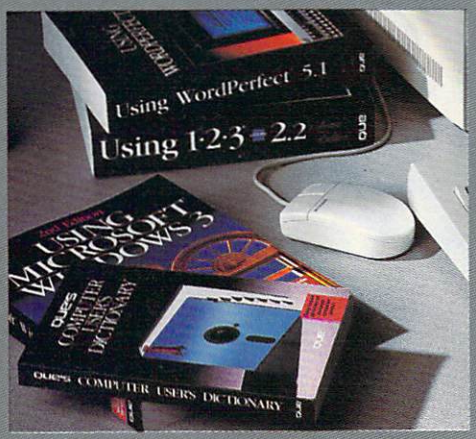

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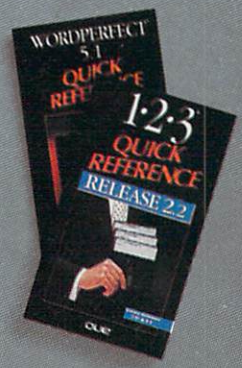

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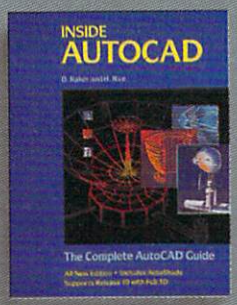

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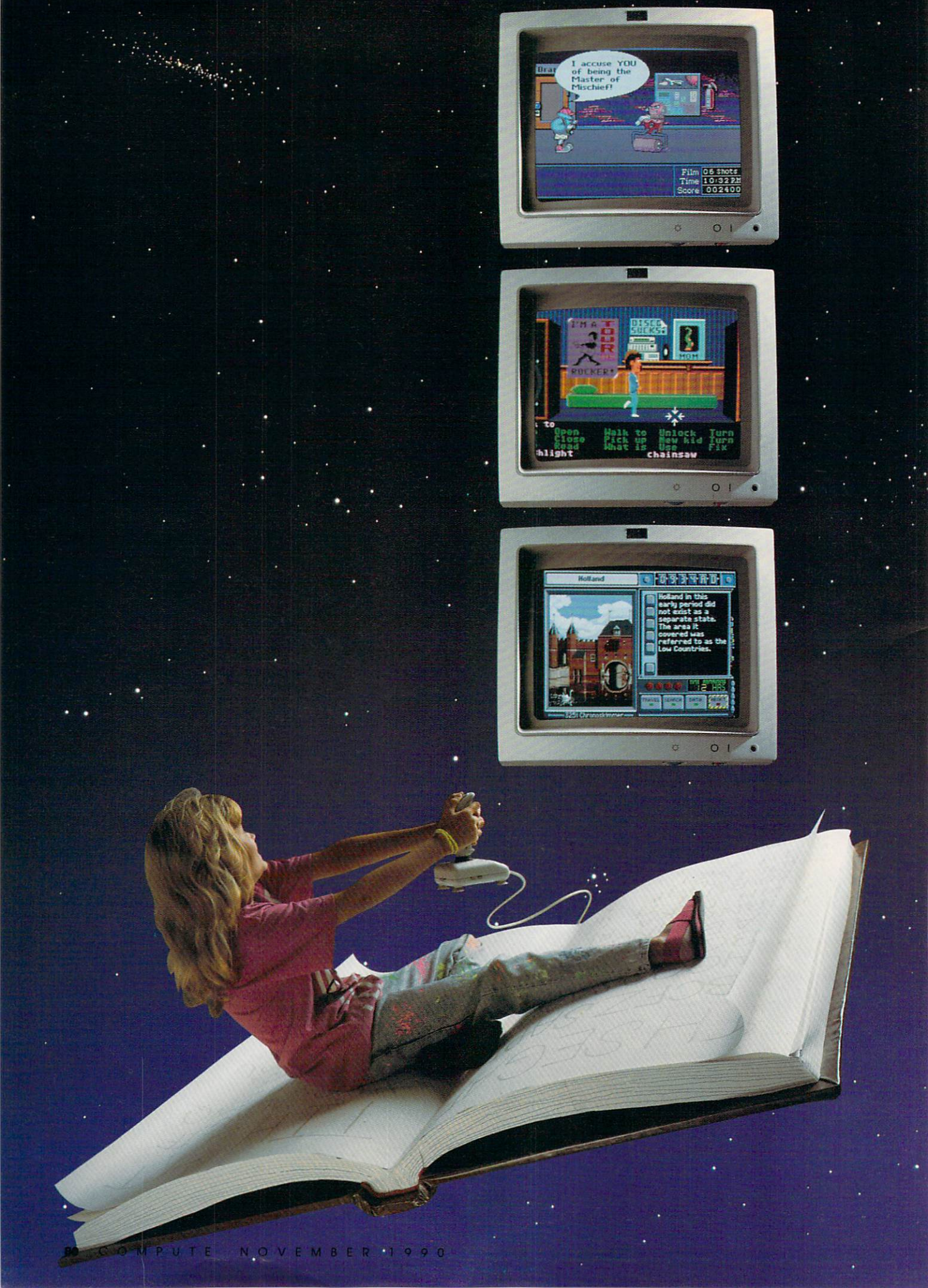
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GAMES

KIDS LOVE TO READ

ARCADE ACTION AND READING FUN. NOW YOU CAN GET IT ALL!

Zing! . . . Boom! . . . Smash! . . . Zap! Typical arcade game sounds, right? But don't bet there isn't some good learning going on. Even if your troops refuse to read the comics, they'll jump at the chance to read when reading is part of a thrilling computer game.

Start your search for the right games by considering game features along with your youngster's particular interests and abilities. There's got to be a careful balance between arcade action and reading level if you want to keep kids coming back for more. A lot of typing may prove frustrating to poor spellers, while poorly motivated readers need challenging puzzles and social acceptability.

To help you pick the perfect program, I've taken several popular computer games and grouped them according to required reading ability. Weak readers will find that the games in group 1 offer a lot of arcade action, involve relatively simple sentence structure, and require no typing skills. Hesitant readers will like group 2 games because they require more reading skills, present more difficult puzzles, and still have enough arcade segments to keep students thinking they're playing a game. Group 3 games should appeal to good but poorly motivated readers. They'll need their sophisticated reading skills, but the reward is increased intellectual challenge with enough adventure sequences to keep things jumping.▷

LESLIE EISER

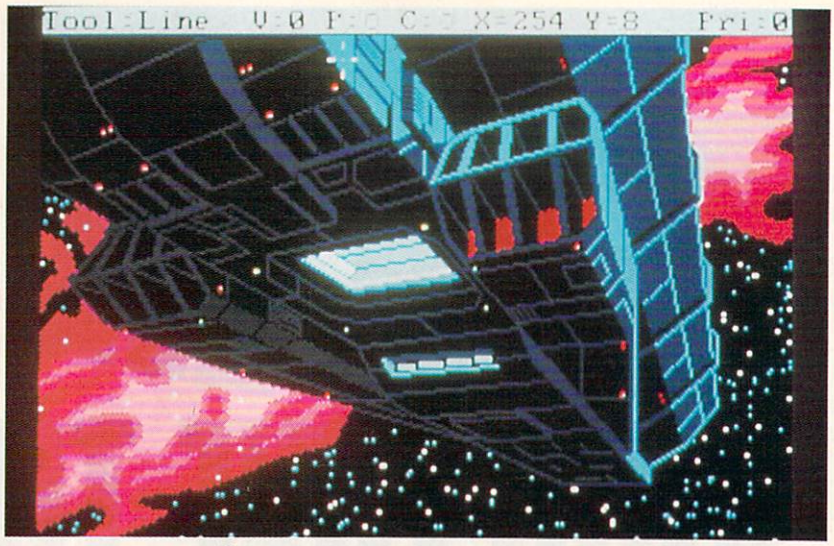
Games for Weak Readers

Readers who stumble over three-syllable words, tend to ignore punctuation, and need control over text speed will like the two programs in this group. Three-syllable words are used infrequently, only about once in every 15 words. When a game's top reading level is grade 6, you can expect sentences to be short and simple.

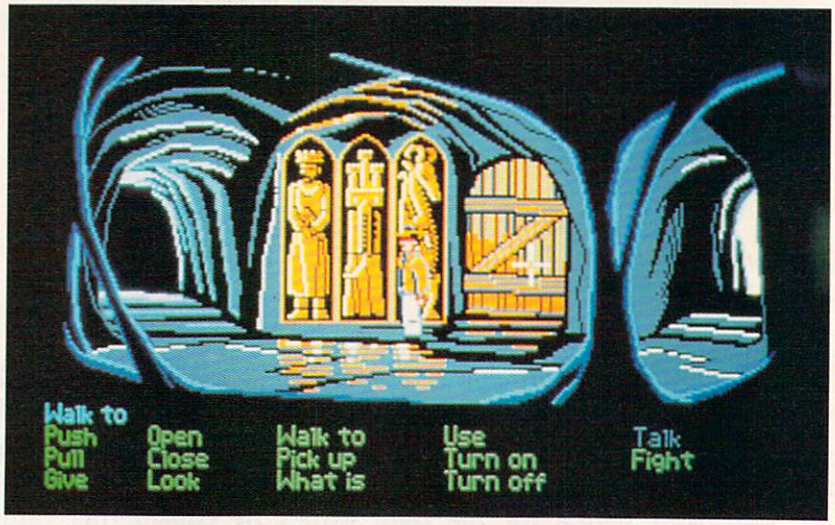
To keep things really simple, both use a "bump" interface. In order to pick up something, ask a question, or even fight, you must first bump the animated character into the object. Once there, the computer will ask the appropriate question for you. There are no choices; you just get to do the reading. Young or inexperienced gamers find this method very reassuring. Even if they don't understand all of the words in the text, they can still play the game and solve the puzzles.

Hillsfar. Magically transformed into a thief, a fighter, a cleric, or a magic user, you follow the advice of the head of your guild, bone up on your archery skills, and practice fighting. You'll need these skills and more to survive in *Hillsfar.* Every 3–5 minutes, you'll have to do some reading; the rest of the time you can roam the countryside, explore mazes, or toss daggers at targets. Each of the roles you pick to play has different puzzles to solve and directions to follow.

Super Solvers Midnight Rescue. Morty Maxwell has threatened to make the school invisible and you're the only hope. Can you read the clues he's left scattered all over the building and take enough pictures of his fiendish robot friends to prevent this disaster? Originally created as an educational tool, this game has enough arcade action to keep kids coming back for more.



Space excitement keeps kids reading.



Join Indy in this computer adventure.

Games for Hesitant Readers

Hesitant readers have basic reading skills, but, fearing failure, they often refuse to pick up a book. The best programs for them have a higher reading level (grade 7–8) and more three-syllable words (about 1 in 10 rather than 1 in 15). Sentences will be more complex, the puzzles a little harder to solve. Arcade sections will be fewer and of much less importance.

Interactive graphics add an important level of complexity to the games in this group. To direct the action, you'll have to pick from a supplied list of only 6–12 vocabulary words. To interact with an object—say to use a beer stein to put out a fire—you'd have to click on the verb *use,* click on the object *beer stein,* and click on noun *fire.* The computer would then write the sentence for you and perform the action. Easier to use than to describe, this interface improves the realism and dramatically increases the potential complexity of the puzzles.

Maniac Mansion. The inhabitants of this creepy house may look nasty, but some of them are actually friendly. Despite their penchant for locking you up in the basement (hint: check out those loose bricks), you can get killed only by doing something really stupid. Older users will find the slightly warped sense of humor particularly appealing.

Shadowgate. If you can survive your encounter with the ghoul of a ruined castle and are smart enough to use the tools provided, you might get out alive.

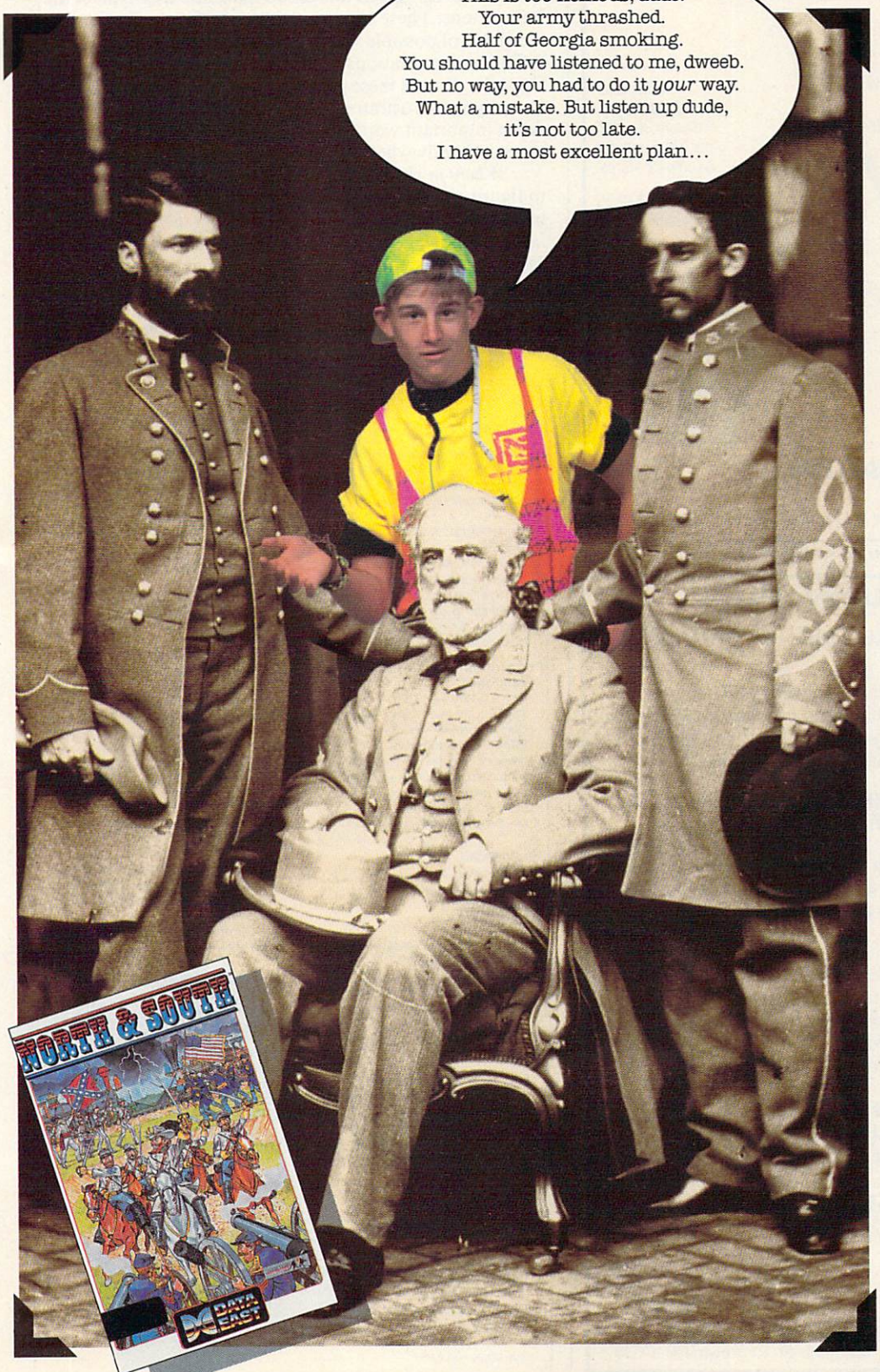
Clever graphics and exciting text rather than arcade sequences make this adventure game come alive. Text appearing at the bottom of the screen is completely under user control, a big advantage for slow readers.

Indiana Jones and the Last Crusade: The Graphic Adventure. Explore the catacombs of Venice and wander through Castle Brunwald. Can you bluff your way past students, guards, and checkpoints as well as Indy does? When you get to the Grail Temple, all you have to do is figure out which is the right cup.

This game combines a few arcade sequences with a lot of reading and traveling. The topic is popular, the graphics are super, and the game is fun to play. The handwriting in some sections of the Grail Diary is tough to decipher, but this didn't dismay my testers. They were keen enough on the concept to spend hours trying to rescue Indy's father and find the Grail.

continued on page 84

REWRITE HISTORY WITH NORTH & SOUTH!



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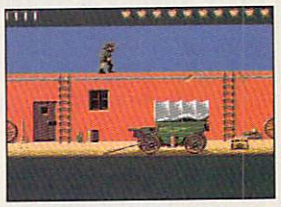

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Free Spirit Software

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Circle Reader Service Number 254

continued from page 82

Good but Unmotivated Readers

Poorly motivated readers have the skills; what they really lack is practice. For them you'll need to pick programs that provide significant challenge to make them want to keep reading. These titles have reading levels up to grade 11, complex sentence structures, and sophisticated puzzles. There aren't many arcade segments, and frequent movielike sequences cover story ground quickly.

Only the Carmen series uses the bump technique; all of the other programs in this group make the user type in the instructions. These type-as-you-go interfaces offer literally hundreds of possible vocabulary words and thousands of different combinations of commands. While this incredible flexibility makes these games a lot of fun, they're also potentially very frustrating. Remind your youngsters to jot down important words for future use. This precaution will come in handy when they eventually run into a dead end.

Where in the World Is Carmen Sandiego? Your task is to figure out the identity of a thief, track the thief back to a hiding place, and make the arrest. The graphics in the newest version are super, the clues are challenging, and the game is fun. Each chase is short, so you won't get too frus-

continued on page 88

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P.O. Box 12947
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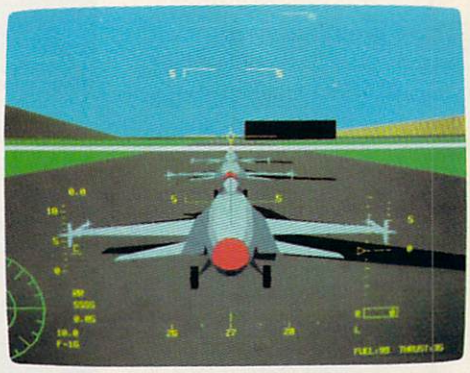

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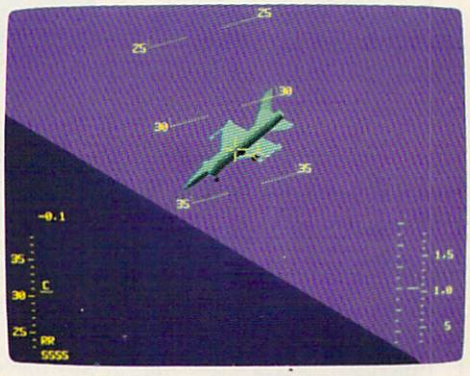

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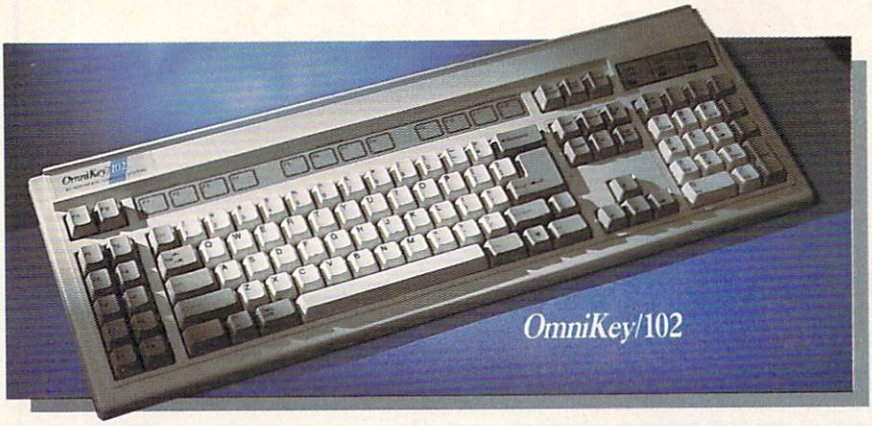

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First keyboard to get back to the basics! Most people learned to type with function keys on left for fast, one-hand combination commands. *OmniKey*/102 delivers this and more. That's why readers of *Computer Shopper* made *OmniKey*/102 their "Best Buy!" You can customize *OmniKey*/102, too! If you prefer the standard IBM enhanced layout, you can swap the CTRL, ALT and CAPS LOCK keys. The best 102 key keyboard available works with virtually every IBM-type personal computer.

OmniKey/102 Features:

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OmniKey/101-I Features:

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IMPORTANT NOTICE FOR COMPUTE DISK SUBSCRIBERS*

Due to production changes instituted with the October issue of COMPUTE, all companion disks are now being mailed separately from the magazine. Although every effort is being made to have both your disk and magazine arrive on the same day, this may not occur. You will receive your disk under separate cover.

* Subscribers to disks for COMPUTE's PC Magazine, Amiga Resource, and Gazette

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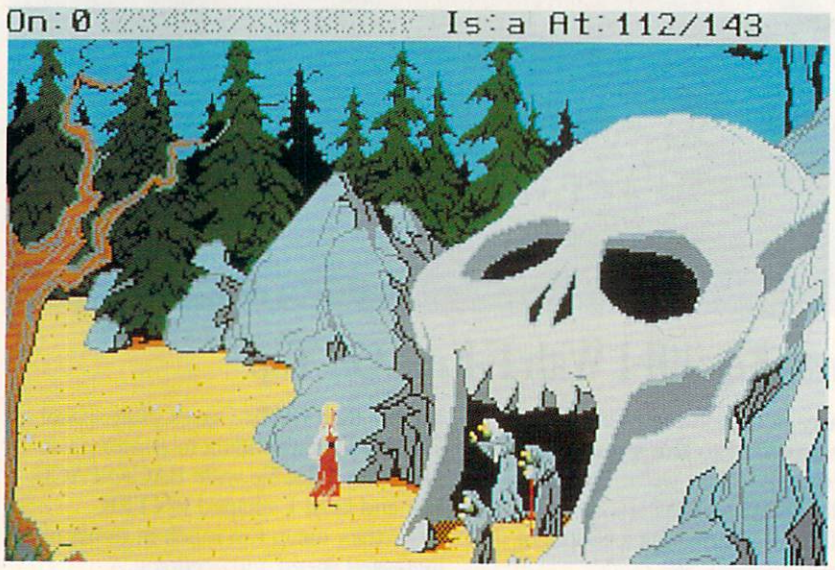
trated if you get confused. Where else can you find a family-oriented reading game that is equally challenging for kids and adults?

Where in Time Is Carmen Sandiego? Now you'll need a Chromoskimmer to travel through time and space if you hope to catch Carmen's gang of thieves. *The New American Desk Encyclopedia* helps you decipher the clues, but be careful: Not everything is what it seems. References to the Netherlands or the Dutch, for example, are used to refer to hiding places located in Holland, a complexity that may confuse a weak reader attracted by the clever graphics and interesting motif.

Kings Quest IV: The Perils of Rosella. In a land of fairy tales and fantasy, you must help Rosella save her father. It's not the reading level that makes this game tough; it's the thousands of possibilities provided by the typing interface that make this series a challenge. Don't forget to buy the clue book; you'll need all the help you can get.

Space Quest III: The Pirates of Pestulon. Rescue two programmers that have been kidnapped by a competing software firm with a reputation for being pretty nasty. While you can't get violent, the people you meet aren't as hesitant. Watch your step or you might get fried, smashed or eaten. Here, as in the King's Quest series, the innumerable possibilities make this game a challenge. Super graphics, an exciting plot, and tough puzzles will keep kids going for hours.



Help Rosella save her father.

Reading Levels

Reading level is important when choosing one of these games, but not that important. If a program really grabs the interest of youngsters, don't discourage them. Often the struggle is as much fun as winning the game. And if the struggle is too much, you can always sit down and play the game with them.

If you want to help your children do their level best in reading, make it fun. Make it a game. ⊡

64/128 VIEW

TOM NETSEL

For some time we've been thinking about providing a showcase for 64 and 128 artists, a place to display their computer masterpieces. Beginning with this month's *Gazette Disk,* we'll be publishing some of your best submissions in what we call "Gazette Gallery."

By selecting COMPUTE's Gazette Gallery Viewer from the disk menu, you'll see some of the best 64/128 artwork available in a slideshow format. Each piece will be presented just as the artist created it and as it was meant to be seen, on a computer monitor.

We pay $50 for each picture that we select for display in "Gazette Gallery." From those selected, we'll name one Picture of the Month and award it an additional $50. So if you have original computer artwork that you're proud of, send it in. We want to see your best work. Pictures may be in *Koala, Doodle,* or any other popular format. Send no more than five entries per disk per month to Gazette Gallery, COMPUTE Publications, 324 West Wendover Avenue, Greensboro, North Carolina 27408. Be sure to put your name, address, and daytime telephone number on your disk. And enclose a self-addressed, stamped disk envelope if you want your artwork returned.

For years we've done our best to provide Gazette readers with outstanding type-in programs for the 64 and 128. Whether they're games, programming utilities, or productivity or educational programs, we try to publish a variety of the best programs submitted to us each month.

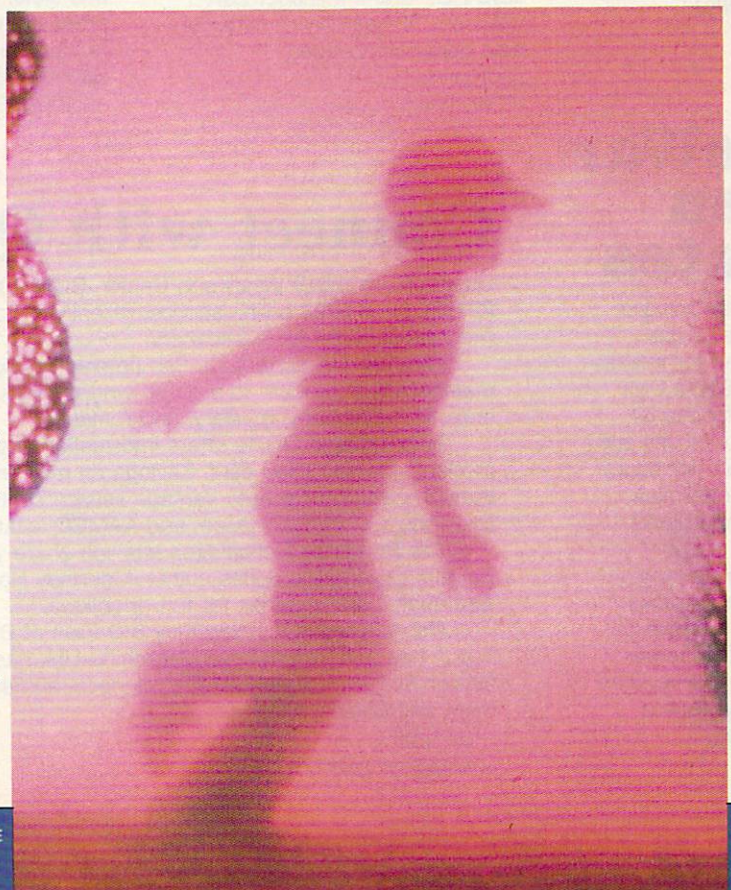
Occasionally we come across programs we like but which are just too large to offer as type-ins. By adding so many outstanding features, the programmer has made the program too big. The listing would run for pages and pages, and it would take weeks for the average reader to type it in. In the past we've been forced to reject these programs, but now we've found a way around this problem.

Each month on the *Gazette Disk,* we're presenting these larger programs and certain others as bonuses. We started with the October disk with a program called *geoGammon.* This computer version of backgammon for GEOS and GEOS 128 was simply too large for us to offer as a type-in, but we felt it was an excellent program that our subscribers would appreciate. The game, with complete documentation, appears only on the October disk. There's nothing to type in; it's ready to run. Two other programs, *Multi-Color Lister* and *64-Shell,* rounded out last month's bonus package on the *Gazette Disk.*

This month's disk features two bonus programs. *Bastion* is a futuristic, one- or two-player arcade-style shoot-'em-up in which your spaceship tries to blast its way through layers of rotating shields. *Eye Catcher* is a scrolling text utility that's handy for announcing special events and the time they're scheduled.

Speaking of utilities, we've noticed a shortage of them recently. Most of our recent submissions have been games. Many of these are excellent, but the 64 and 128 are more than just great game machines. So if you have a programming utility—a piece of software that helps out around the house or office or is educational in nature—we'd like to look at it. We especially need programs for the 128 that take advantage of its unique features. Now's a great time to send your best original programs to our submissions reviewer.

In an effort to allot more magazine pages to type-in programs, we won't be printing *The Automatic Proofreader* and *MLX* in every issue of Gazette as we have done in the past. These programs will still be used, however, to help readers enter the programs correctly. Copies of these handy programs can be found in back issues of the magazine, and we'll print them whenever space allows. If you don't have access to back issues and you need a copy, we'll be glad to send you a free listing. Simply write to Typing Aids at the address listed above. Be sure to enclose a self-addressed, stamped envelope and remember to mention which program listing you need. ⊡



GEOFFREY GOVE

NEWS & NOTES

TLC for Your 64

Remove dust and debris from hard-to-reach areas on your 64/128 with the Mini-Vac ($21.95).

The Mini-Vac comes with interchangeable directional wands and brushes and a one-year, money-back guarantee. It's available from The GiftHorse (4975 Hunters Run, Colorado Springs, Colorado 80911, Department C-P).

—LIZ CASEY

See SPOT Run

SPOT, the cool 7-UP character seen on soft drink cans and advertisements everywhere, is featured in a new release from Virgin Mastertronic (18001 Cowan, Suites A & B, Irvine, California 92714) appropriately called *SPOT the Computer Game* ($29.99).

SPOT is a game as easy to learn as checkers, yet it has levels of complexity that will challenge chess players. Five difficulty levels and the ability to customize the play screen ensure additional play value.

"SPOT has fun everywhere," says 7-UP brand manager Bart Johnson. "It was only a matter of time before he invaded computers."

—TOM NETSEL

Be a Blockhead

California Dreams, maker of *Street Rod* and *Tunnels of Armageddon,* has announced the release of *Blockout* ($29.95) for the 64/128.

This 3-D mind teaser challenges you to maneuver falling blocks within a three-dimensional enclosure and position the blocks to form complete layers. Completing layers adds to your point score and gives you more room to maneuver.

Blockout features a pause mode, animated help screens, a practice mode, and a save feature to store your favorite setup.

Also available from California Dreams is *Vegas Gambler* for the 64/128. Try your luck with blackjack, video poker, roulette, and slots. California Dreams products are distributed by Electronic Arts (1820 Gateway Drive, San Mateo, California 94404).

—LIZ CASEY

Win the War Between the States

Data East (1850 Little Orchard Street, San Jose, California 95125) has scheduled for release *North & South* ($24.95), a Civil War strategy game for the 64.

Three levels of difficulty and four stages of battle offer hours of play as you control armies and territories, launch attacks, and maneuver your troops through conflict, storms, and even Native American attacks.

Choose the perspective of either a Union or Confederate captain, sergeant, or corporal as you test you skill against the computer or a friend.

—LIZ CASEY

Connect with Q-Link

QuantumLink (8619 Westwood Center, Suite 200, Vienna, Virginia 22182), the 64/128 online service, recently announced the addition of five new services for subscribers.

The new Online Writer's Pen (Interactive Novels) encourages members to contribute to a group-written story. Topics include science fiction, fantasy, mystery, and romance.

Auto Vantage Online offers information and savings on late-model autos and used cars. Savings on maintenance is available through participating Auto Vantage service centers, including many Firestone, Goodyear, Maaco, and AAMCO locations.

The Romance Fiction Area lets you share your interests with Bantam LoveSwept Series author, Courtney Henke. Members can also submit short stories for fun or critique.

Also offered is the new Play SID Files of Billboard Magazines' Top Tunes and Forum-Level Search. Q-Link has also updated its Grolier Academic American Encyclopedia and enhanced its Investment and Business News.

—LIZ CASEY

continued on page G-4

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 continued from page G-2

Boys of Summer II

MicroLeague Sports Association (2201 Drummond Plaza, Newark, Delaware 19711-5711) has released *Enhanced MicroLeague Baseball II* ($39.95) for the 64/128. No minor-league joystick game, this simulation forces you to think. You win or lose based on your managerial decisions.

New features include enhanced ballpark graphics of the Polo Grounds, Yankee, and Dodger stadiums, pop-up screens for easy access to midgame statistics and substitutions, expanded offensive and defensive options, pitching and hitting stats against left- or right-handed batters, stealing and base-running ratings, field averages plus throwing range and arm strength, fatigue and power factors, and more.

Enhanced MicroLeague Baseball II comes with a general manager function, an automatic stat compiler, and 26 all-time great teams. Look for MicroLeague Sports to release an Owner's disk, Stadium disks, Season disks, a League Leader disk, and even World Series, Franchise History, and All-Star disks in the future.

—TOM NETSEL

Desktop Publishing Power

Datel Computers (3430 East Tropicana Avenue #65, Las Vegas, Nevada 89121) has been named exclusive distributor for Handyscanner 64 and *Pagefox,* two products that create a powerful desktop publishing system for the 64/128.

Handyscanner 64 is the first hand-held scanner for the 64. Completely printer independent, the unit will read graphics from magazines, books, photographs, or original artwork, which will then appear in a digitized format on the computer screen.

Utilizing an elaborate gray-tone processing method, the Handyscanner 64 promises excellent results for digitized color or black-and-white photographs. There are three processing methods, and the scanner has separate control switches for light intensity and contrast, which help produce superior results with difficult copies such as photographs with little contrast.

Handyscanner 64 operates independently of the computer and requires only the included interface for use with a 64 or 128 and any other paint or graphics program. The software interfaces with the *Pagefox* desktop publishing program module. The unit sells for $299.95.

The second item distributed by Datel is *Pagefox,* a desktop publishing program with a 100K-memory storage-expansion module. The program operates via menus, mouse, or joystick to define text, place pictures, and control the total graphic editor. Text can be placed in any area and expanded or contracted to eliminate the need to format lines.

Ready-to-use layouts for one, two, or three columns are included, and text overflows automatically into the next column in a user-selected sequence. Text also automatically flows around graphics. Frames can be subsequently moved, enlarged, reduced, or eliminated.

Text functions provide direct entry of headlines, legends, and so on through the keyboard with any of 12 character sets. There are eight variations of the sets that can be formatted in any combination for more than 3000 script possibilities such as italics, shadows, outlines, and 3-D outlines. Additional character sets are reloadable.

The *Pagefox* module, with its 96K, plugs into the 64 or 128 expansion port; it costs $139.95.

—TOM NETSEL

Unlock the Secret of Maramon

MicroProse (180 Lakefront Drive, Hunt Valley, Maryland 21030) will distribute *The Keys to Maramon* ($39.95), Mindcraft Software's newest 64 release.

You're hired as the defender of the island town Maramon. Each night monsters attack the city, and you must fight them. By day, you gather equipment, supplies, and information in town to help you battle the creatures at night. You won't rest until all the monsters are dead.

Choose to be either the Huntsman, Courier, Blacksmith, or Scholar, and use each character's unique strengths to win the keys to the city, and your pay.

—LIZ CASEY

For What Bugs You

Arlington Software (P.O. Box 916, North Arlington, New Jersey 07032) has released the *Code Shadow Symbolic Debugger* ($19.95) for the 64. With its many features and transparency, it can provide a sophisticated environment for debugging, testing, and analyzing an ML program.

Complete symbolic capabilities are provided, from assembling or disassembling code to program-stepping to addresses referenced in command arguments. Symbol tables from any assembler can be imported into the debugger, or the debugger can generate its own coded symbols. The program supports conditional breakpoints, automatic code patching, a watch window, one-keystroke program freezing, separate debugger and application screens, and a complete DOS manager.

The program, which is not copy-protected, is RAMDOS compatible and can load into an REU, leaving virtually all of its computer memory free.

—MICKEY McLEAN ⊡

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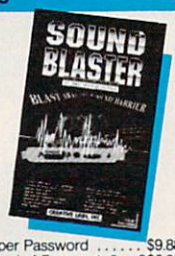

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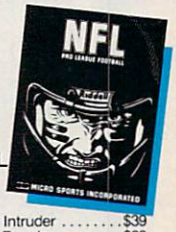

From league play, to head to head, to historical replays. This game features endless strategy unrivaled graphics and an abundance of statistics.

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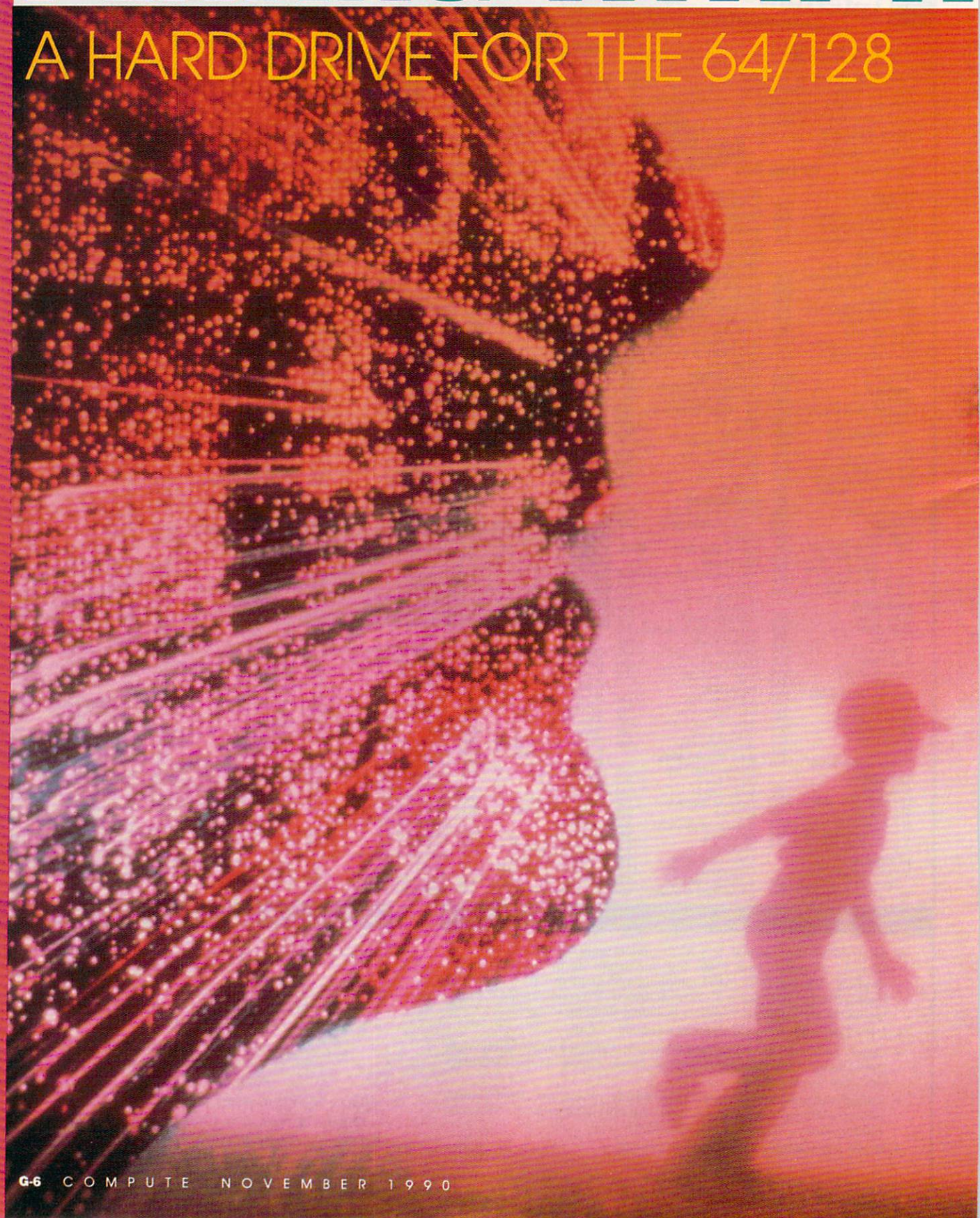
PLAYING WITH TH

A HARD DRIVE FOR THE 64/128

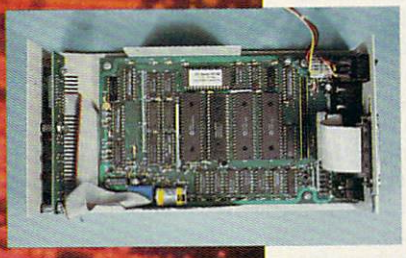


HE BIG BOYS

MORTON A. KEVELSON

TAKE A HANDS-ON LOOK AT CMD'S NEW HARD DRIVES, THE MOST EXCITING BIG PRODUCTS TO HIT THE COMMODORE 8-BIT MARKET IN YEARS

GEOFFREY GOVE

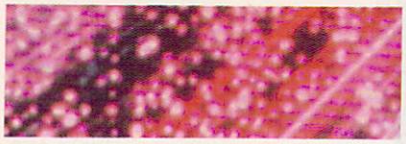


Creative Micro Designs (CMD) has worked for years to improve the user interface to Commodore floppy disk drives and to improve their performance. Now CMD has taken the sum of its Commodore disk drive knowledge and expertise and condensed it into its HD Series of hard drives for the 64 and 128.

By doing so, CMD hopes to extend the useful life of the 64 and the 128 well into this decade. After having worked with a 20-megabyte version of the CMD HD Series hard drive, I think CMD has an excellent chance of doing just that.

Compatibility is the biggest hurdle to overcome when designing a mass storage device for Commodore 8-bit computers. The 1541, the basic Commodore disk drive, has a unique way of formatting and storing data on a floppy disk. Since the 1541 is considered the bottom line for the 64, most software developers have chosen to adopt its format in order to ensure compatibility with the largest number of machines. Unfortunately, the 1541's 170-kilobyte storage capacity, along with its limited data-transfer speed, is considered inadequate by today's standards. ▷

Interestingly enough, it was Commodore's introduction of the double-capacity 1571 disk drive followed by the 800-kilobyte 1581 drive that relaxed the compatibility requirements. This relaxed compatibility approach was taken by CMD when designing the operating system for its HD Series of hard drives.



A Standard Design

CMD has chosen to design its HD Series around the SCSI standard. As a result, although the storage capacity of the basic HD drive can be as small as 20 megabytes, the system can be expanded theoretically to a total of four gigabytes (a gigabyte is 1,000 megabytes, or more than a billion bytes) spread over as many as 13 physical hard drives. At the risk of having to eat my words later, I will state that four gigabytes is more online capacity than any 64 user will ever need.

Physically, the HD is not much larger than a 1581. The external dimensions of its all-metal case are 2.75 inches high, 5 inches wide, and 10 inches deep. The system is FCC certified to meet the limitations on radio interference. Its external power supply, about half the volume of the HD, is U/L certified and provides power at 5 volts, 12 volts, and −12 volts.

The power supply has its own on/off switch and is fitted with six-foot long input and output cables. The HD also has its own on/off switch on its back panel. CMD recommends that the drive be turned on and off via its own power switch. The power supply should be left on to extend the life of the back-up battery for the HD's built in realtime clock.

The HD's front panel is a flat-membrane keyboard that sports eight indicator lights and four push buttons. The lights indicate power (on), activity (two lights), errors, and GEOS. These are followed by push buttons for SWAP8, SWAP9, and WRITE PROTECT, each with an associated indicator light and a RESET button. In addition to their designated functions, the lights flash through a diagnostic pattern whenever the HD is powered up.

Up Front and Out Back

The unique SWAP8 and SWAP9 buttons enhance the HD-20's compatibility with existing software. When one of these buttons has been pressed, the HD's serial bus device number is changed, however, to the corresponding value. If another disk drive set to either device 8 or device 9 is already connected to the serial bus, its device number will be exchanged automatically with the HD-20's. The HD-20's default device number is 12. This can be easily changed to any other device number from 8 to 30 through software control.

The HD's back-panel connectors include a four-pin power plug and a pair of standard six-pin serial bus connectors. The official capacity of the Commodore serial bus is four devices; however, I was able to run the HD-20 (device 12) on a 128 with a pair of 1571 disk drives (devices 8 and 9), a 1581 disk drive (device 10), and a Xetec Super Graphix printer interface (device 4) without any problems.

The remaining back-panel connectors are unique to this drive. A six-pin auxiliary port, which is physically identical to the six-pin serial bus connectors, is for future versions of the operating system that will allow the HD to intercept and store data being sent to device 4 or 5 and then spool it out to the printer.

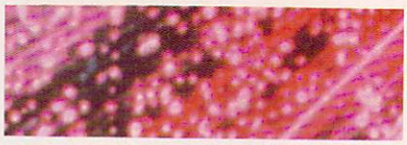
A round, 14-pin, parallel port connector is for the just-released RAMLink parallel interface between the HD and the 64/128. RAMLink has space for up to four megabytes of RAM and can be used to boost data-transfer speeds between the computer and the hard disk drive.

Daisychain

Last, but not least, a 25-pin SCSI connector on the back panel lets you connect up to six additional SCSI devices to the HD-20. Since SCSI ports are inherently bidirectional, you can actually use this connector to access the HD-20 from another computer equipped with a SCSI interface. Thus, it's possible to utilize the hard disk drive in the HD-20 with more than one computer system. In order for this to work, each computer has to be careful not to trash the parts of the hard drive that are used by the other system.

Inside the HD-20, the connection between the system's electronics and the 20-megabyte Conner hard drive is made via a standard 50-pin SCSI connector and a short flat ribbon cable. If you know what you're doing, you can daisychain additional SCSI drives to the system by using the internal 50-pin connector. Since there is no space inside the HD-20 for additional hard drives, you'll have to pass the ribbon cable to the outside of the case. You'll also have to provide power and an enclosure for the external hard drive.

Of course this setup will also violate the HD's six-month warranty and will probably compromise the integrity of the system's radio frequency shielding. Therefore, I do not recommend this approach to the average user, although I suspect that there are plenty of hackers who will take advantage of the available hardware.

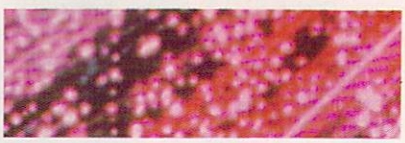


The Operating System

Like all other Commodore 8-bit disk drives, the HD hard drive is an intelligent device with its own DOS in 16 kilobytes of ROM and its own 6502 microprocessor running at 2 MHz with 64 kilobytes of RAM. In effect, the HD is a stand-alone microcomputer. The input/output hardware consists of a pair of 6522A VIA chips and an 8255 chip. Most of the HD's DOS is actually stored on a small part of the hard drive. The operating system's program code is downloaded into part of the HD's RAM when it's powered up.

By placing a part of the operating system on the hard disk, CMD is able to upgrade the system by simply sending a floppy disk to the end user. Installing the updated operating system is a very simple process that takes only a few minutes and does not affect any of the data already stored on your drive.

CMD has given a lot of thought toward maintaining the compatibility of the HD-20's operating system with existing 64/128 software. In general, any software that does not rely on disk-based copy protection and uses any of the standard Commodore DOS functions can be transferred to and run from the CMD hard drive. It's safe to say that any software originally distributed on a 1541 floppy disk that you've been able to copy successfully onto a 1571- or 1581-format floppy disk should run from the HD-20.



Native Partitions

The 20-megabyte capacity of the hard disk drive cannot be accessed as a single chunk. Instead, the HD-20's operating system divides up the available space into partitions. You can choose

continued on page G-10

CMD

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continued from page G-8

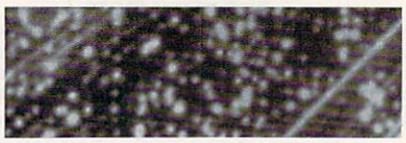
from a variety of partition types, depending on your needs. Native partitions can be as small as 256 blocks (64 kilobytes) or as large as 65,280 blocks (about 16 megabytes). They can store more than 59,000 files, any one of which can be as large as the entire partition. Relative files in a native partition can have as many as 65,535 records. Native partitions also support true subdirectories similar to those used with MS/DOS or AmigaDOS systems.

The HD also supports partitions that mimic the 1541, 1571, and 1581 disk drives. These partitions have all of the characteristics of the original disk drives, such as storage capacity and file-size limitations. The 1581 partitions even support 1581-style subdirectories.

Compatibility with the various drives has been maintained by supporting all Commodore DOS functions, including the various direct disk access commands and the direct memory access commands. For 128 users, the 1571 and 1581 burst-command instruction set is supported with the exception of the MFM formatting commands. It would make no sense to support the MFM formatting commands because the drive medium in the HD is fixed. CMD has even gone so far as to emulate 1541, 1571, and 1581 job queue instructions.

To the 64 or 128, the HD looks like a multiple floppy disk drive with up to 254 drive units. Think of the HD as a floppy drive with units numbered between 0 and 254. You do not have to have 254 partitions, though; just create as many as you want using the provided software. The current partition is the one that responds as drive 0 to the 64/128. You can make any partition the current partition by issuing an instruction over the HD's command channel. You can also set any of the partitions to be the current partition when the drive is powered up. Thus, any software that lets you issue standard Commodore DOS commands can access any of the HD partitions.

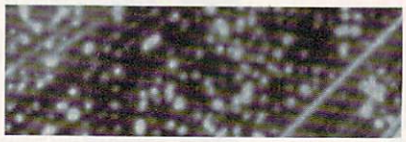
It's also possible to change the current partition via the push buttons on the HD's control panel. But the procedure is cumbersome, as it requires the entry of the partition number as three binary digits using the front panel's indicator lights.



GEOS and CP/M

To use GEOS with the HD, replace the GEOS Configure program with the one provided by CMD. You also install the CMD HDTime program on your GEOS boot disk, which lets GEOS automatically set its clock from the HD's built-in realtime clock. GEOS can only access 1581 partitions on the HD. Thus, to GEOS the HD looks like a 1581 disk drive whose floppies are changed with the CMD QuickMove utility. QuickMove also lets you copy GEOS files between 1581 partitions on the HD. It's also possible to boot GEOS directly from the HD. According to CMD, the Maverick utility, available from Software Support International, can be used to install GEOS onto a 1581 partition.

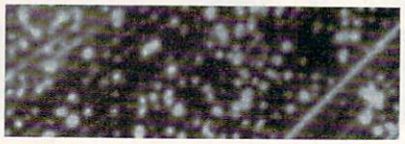
If you have the May 28, 1987, version of CP/M Plus 3.0, you'll be able to access 1541, 1571, and 1581 CP/M partitions on the CMD. Note that the 1581 CP/M partition can only be accessed from CP/M, as it isn't the same as a standard 1581 partition. Earlier versions of CP/M can only access 1541 and 1571 partitions. As with GEOS, CP/M treats the HD as another floppy disk drive whose disks can be changed under software control. The SPORT.COM utility is a CP/M program provided with the HD that issues Commodore DOS commands via the serial port. SPORT.COM is used to swap partitions on the HD under CP/M.



More Utilities

A set of generic utilities comes with the HD in addition to specific utilities for GEOS, CP/M, and QuantumLink. These utilities include a versatile file copier; a whole disk copier that can duplicate a 1541, 1571, or 1581 floppy disk into the corresponding HD partitions; and a variety of partition and HD system-maintenance utilities. Most of these utilities come in both 128 and 64 versions. In general, the utility programs are easy to use with onscreen menus and built-in prompts.

Since the HD supports the serial port's burst modes, it works very well with the 128. However, the 64 lacks the burst-mode hardware, which limits its data-transfer speed over the serial port. CMD's JiffyDOS greatly improves the performance of the HD with a 64. JiffyDOS consists of a replacement ROM chip for the computer's operating system. To install it, you'll have to open your computer and replace the existing ROM. You'll also have to replace the ROM in your floppy disk drive. On the 128, separate ROMs are provided for the 64 and the 128 modes. Replacing the ROMs can be a problem if the original chips in your particular model are soldered in or if you aren't familiar with handling semiconductor components.



Speed

Serial-port transfer speeds between the HD and the computer are the same as for a 1541 disk drive when run with a stock 64. On a 128, transfer speeds were comparable to a 1581. Internal drive operations, such as formatting a partition, generally take only a few seconds. Loading a 150-block file from the HD, with JiffyDOS, takes only 5 seconds. Saving the same file to the HD, with JiffyDOS, takes 19 seconds. Booting CP/M from an HD partition requires only 24 seconds. Copying a double-sided 1571 disk to an HD partition, using the included MCOPY whole disk copy program, requires only 74 seconds. Copying a 1581 disk to an HD partition using MCOPY takes 81 seconds.

CMD has done an excellent job of designing a SCSI hard drive interface for the 64/128 computers. It has addressed compatibility issues by providing both hardware emulation and custom software. In general, the limitations of the system are due to the built-in limitations of the Commodore operating system.

The HD series of hard drives is intended for serious users of productivity software who can justify its cost. In particular, Creative Micro Designs has indicated that a number of bulletin board programs will work with the HD hard drives. GEOS users should find the HD an effective tool. Keep in mind, however, that the HD operates as a collection of 1581 disk drives as far as GEOS is concerned. A similar limitation applies to CP/M users. Also, be prepared to add JiffyDOS to your system in order to obtain the maximum possible performance from the HD. ⊡

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FEEDBACK

QUESTIONS FROM OUR READERS

Wait and See

I was dismayed yesterday when I called the circulation department of your magazine to find out why I had not received my July issue. I was informed that *Gazette* magazine was being combined with the parent magazine. The primary reason I subscribed to *Gazette* was that I wanted a magazine dedicated to the Commodore 8-bit computers and this was the best one on the market. Now I fear that if Commodore machines will have to compete for magazine space with other computers, there will be fewer articles and programs for mine. I have a 128. I will wait and see, but if it is not the quality I have enjoyed and grown accustomed to, I will sadly not renew my subscription.

TIMOTHY GROSSER
COPPERAS COVE, TX

As a Gazette reader and subscriber since December 1984 (still have 'em all), it should make little difference as to your choices in format, paper, binding, and so on. Gazette is Gazette is Gazette. Whatever it takes to move ahead into the nineties is OK. Content, not format is what is important to me.

M. R. PLECHATY
SARATOGA, CA

Autobooting

I was at a friend's house (who has an IBM), and when he turned on his computer all the programs booted automatically with something called a CONFIG.SYS file. Is there something for the 64 that can do this?

NICK D'ALONZO
COATESVILLE, PA

Your friend's IBM probably has a file called AUTOEXEC.BAT in the directory of its default startup disk. DOS automatically executes whatever commands are in this file whenever the computer is switched on. This command is often used to load and run a commonly used program. The 128 has a similar autoboot feature for 128 programs, but it's unavailable for the 64 or for use with 64 programs. We did run a program for the 128 called Fast Boot *(May 1987) that lets you insert a disk in the drive, turn on the computer, and have a 64 program appear on the screen.*

A Jiffy *Proofreader* Tip

I am a contented user of a 128D and JiffyDOS, and I like to type in some of the interesting programs you publish in your excellent magazine. In order to use *The Automatic Proofreader* with JiffyDOS, however, I find it necessary to make two small changes to the program since JiffyDOS alters the vector found at 772 and the *Proofreader* checks this vector twice to identify which machine is being used. In lines 30 and 90, change IF VE = 17165 to IF VE = 61137. Earlier versions of the *Proofreader* have a different line number but the same PEEK. I hope this may save one or two readers who have the same setup a few minutes of head scratching.

JOHN SPIRA
AUSTINMER, N.S.W.
AUSTRALIA

Thanks for the tip and the kind words, John. The JiffyDOS speed enhancement system from Creative Micro Designs does indeed alter the vector you mentioned and could interfere with the Proofreader. *Those of you using JiffyDOS installed on a 64 might want to make a similar change in your version of the* Proofreader. *Change the value of VE in line 20 from 42364 to 60004. Also, check out the review of JiffyDOS 6.0 elsewhere in this issue.*

Tree Tracing Revisted

In the June "Letters" column of Gazette, *we asked readers to help Roy N. Kelley of Hamilton, Ohio, locate genealogy programs for his 64/128. Dozens of people wrote, and here are some of their suggstions.*

Byteware, 906 West 6th Avenue, Monmouth, Illinois 61462, has shareware, *FGS and PED C*, $21.95, that produces family group sheets and pedigree sheets. I have been using the original for two years, and I like it very much. An improved version is also available.

J. M. KINABREW JR.
NEW ORLEANS, LA

The following companies provide 64 and 128 genealogy software of various degrees of sophistication and pricing: Traces, P.O. Box 168, Center, Missouri 63436; PFA, 8600 Old Spanish Trail #79, Tucson, Arizona 85710; and Quinsept, P.O. Box 216, Lexington, Massachusetts 02173.

I have used Traces' program for recording census data, and it generally works well. I use *Jenny II, the Genealogist,* from Basic Fundamentals, 3366 South 2300 East, Salt Lake City, Utah 84109, $19.95, regularly to update my family files.

JAMES H. HOOD
SALT LAKE CITY, UT

COMPUTE!'s Third Book of Commodore 64 provided a program titled *Family Tree* on pages 82–92. It provided for disk and printer output.

HARRY L. ADAIR
LAS VEGAS, NV

Try Remsoft, P.O. Box 2249, Camarillo, California 93011-2249. You get a lifetime membership, a disk full of software, and a catalog for $7.98. It's all worth it. Disk number 5066 has a program called *Family Tree* for $4.00 and $2.00 for postage.

PAUL DUBEY
ATHOL, MA

Here are several outlets for genealogy programs: *Family Roots* (64 and 128 versions), Quinsept, P.O. Box 216, Lexington, Massachusetts 02173, $185.00; *Your Ancestors,* Ken Barber, 5785 Brickyard Road, Tillamock, Oregon 97141, $10.00; *Family/64,* Petrocci Freelance, 651 Houghton Road, Tucson, Arizona 85748, $29.95; *Gleaner,* Kudzu Software, P.O. Box 993, Morrow, Georgia 30260, $19.95; *Your Family Tree,* Hurdware, P.O.

FEEDBACK

Box 241746, Memphis, Tennessee 38124, $44.95.

ROBERT D. YATES
VIRGINIA BEACH, VA

QuantumLink's Your Family Tree has several genealogy programs available for downloading. Also try the Roots board on CompuServe and the Genealogy board on GEnie.

M. R. PLECHATY
SARATOGA, CA

I have been using a program for several years now on my 128 in 128 mode. It is *Family Tree* and can be obtained from Briwall, P.O. Box 129/58 Noble Street, Kutztown, Pennsylvania 19530.

R. A. CARTER
NORTH BAY, ONT., CANADA

Sandy and Don Ritzinger of Software Solutions, 7378 Zurawski Court, Custer, Wisconsin 54423, have created *Arbor-Aid,* which is easy to use and can be adapted to virtually any family recordkeeping system.

BILL HARROP
TAMPA, FL

Software Support International has *Family Tree 128/64 Version II.* It sells for $36.97, and its catalog number is C00523. The address is 2700 NE Andersen Road, Suite A-10, Vancouver, Washington 98661.

MARK VAVRA
MILLIGAN, NE

The only ones I have found are from QS! Alliance, 5846 Highway 111 South, New Albany, Indiana 47150. Its disk number X007 contains programs for both the 128 and 64. Disk number B018 contains one for the 64.

WILLIAM EVANS
GOWER, MO

Powerful Utilities

Most of the time machine language programs conflict with each other in memory, but I use three great ones simultaneously. First I load *Quick!* (December 1988), relocated to block 202. Next, *Function Key Magician* (February 1988) goes in, giving me 16 tailor-made function keys. One of these loads my all-time favorite utility, *Triple 64* (April 1985). I can now load and edit three separate 25-block BASIC programs quickly and efficiently. That's a lot of muscle for a 64! Thanks and keep encouraging authors.

LUIS MORENO
WINDSOR, NY

You're right, Luis. Those utilities do pack a lot of power. Gazette is always looking for handy utilities and productivity tools to make the 64 even more useful. So, if you're a programmer, we want to see your best efforts. Send them on disk to our Submissions Reviewer at the address listed below.

If you have a question, comment, or problem, we want to hear from you, too. Send your letters to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Greensboro, North Carolina 27408. ⊡

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D'IVERSIONS

FRED D'IGNAZIO

It's 5:00 a.m. It's dark. My daughter, Catie, and I have just finished doing "her" paper route. It's a Tuesday morning, and the routine never varies. Deliver the papers. Feed Mowie the cat. Take the trash out to the curb. Brew a fresh pot of coffee. Now, steaming cup of coffee in hand, I trudge up the stairs to my study, where I spend many long minutes staring with bleary eyes into an empty computer screen.

Suddenly my fingers start to itch. I feel a subliminal, submuscular trembling begin to wriggle up my nerve fibers. In anticipation, I place my fingers on the keyboard. Miraculously the fingers begin tapping, and words appear magically on the computer screen. The cursor flies across the screen like a kite, sweeping across the blue sky, uncovering clouds shaped like letters, words, entire sentences.

I push away from the keyboard and gaze fondly at the screen. Now that's real writing, I think admiringly. I grab my empty coffee cup. Coffee break time!

As I sit watching the steam rise from my fresh cup of coffee, it occurs to me how strange it is that we interact with our computers by using a keyboard. Think about it. Dancing fingers. Ballerina fingertips that tap and skip across the keys. Is this normal? Have we as a species spent millions of years evolving just for this moment—so we could poke a few keys and communicate with a computer?

Isn't there a better way?

We all know that computers require input through a keyboard because that's the way they evolved. Once upon a time (approximately 40 years ago), they were highly specialized beasts that required communication through special symbols—originally numerical, later alphanumerical. First cables were used, later switches on the computer's front panel. For a while computer punch cards were in vogue. Finally it occurred to someone that perhaps the simplest solution was to just attach a QWERTY, typewriterlike keyboard to the machines and have at it.

But it's no longer the 1940s and 1950s. It's 1990, and maybe it's time to look beyond keyboards. After all, how many *regular* human beings actually feel cozy around a keyboard anyway?

One of the most advanced computers to grace the movie screen in recent years was Johnny Five, the hero of the two *Short Circuit* movies. Johnny loved input. But did you ever see him getting it through a keyboard? Never. Instead he used his powerful optical sensors (his eyes), auditory sensors (his ears), and tactile sensors (his fingers and hands) to gain his prodigious knowledge of the real world.

OPEN YOUR MIND TO COMPUTER IMPLANTS

In addition, Johnny looked distinctly uncomputerlike. Instead of sitting on someone's desk meekly and quietly waiting for the gentle tap of little keys, he was rolling around cities and forests, combing the countryside for more input. "Input! Input!" he cried. "More input!"

Johnny Five is a good example of a computer that doesn't look like a computer. There are many more examples in everyday life. Take your car or your wristwatch. Take your telephone, your microwave, your video camera, your CD, or your Walkman. Or how about fax machines and phone mail at offices? All these are computers. Some still have keys, control panels, or buttons, but they accept other forms of input as well—images, voices, light waves, and so on.

As computer chips keep getting smaller and more powerful, the pressure will grow to transform desktop computers into something totally new. Already, incredibly powerful computers can fit in a briefcase, on your lap, or even in your pocket. A new computer from Sony lets you write on the computer screen with a plastic stylus. A new touchscreen from IBM lets you point at the screen and abandon the keyboard entirely!

If computers keep shrinking, it will soon get impractical to try to attach a full QWERTY keyboard. For many years experts have been predicting that computers of the future will be built right into our clothing—our eyeglasses, our credit cards, our shirts, even our underwear and socks.

In his award-winning book *Neuromancer,* William Gibson speculates that in the future computers will become so small that they'll be able to dangle from necklaces, hang from our ears like earrings, or nestle inside of fillings in our teeth. Gibson imagines that human-computer interfaces will evolve into small "terminals" implanted in our skulls directly behind our ears. We'll carry small cartons of *microsofts*—intelligent cosmetic jewelry that contains huge databases, new skills libraries (like juggling or speaking French), and antennae (cellular phones the size of a sugar crystal).

Whenever we need to communicate with our computer, we'll just pop open the case, pull out a microsoft, and plug it into our head. Rich people will have real diamonds, emeralds, and pearls aboard their microsofts. The rest of us will settle for inexpensive, synthesized replicas.

So, what do you think? Write me and tell me your gut reaction to this question: How do you feel about your computer keyboard? Could you give it up if something better came along? What kinds of new computer interfaces can you imagine? Send your ideas to Fred D'Ignazio, COMPUTE's Gazette, 324 West Wendover Avenue, Greensboro, NC 27408. ⊡

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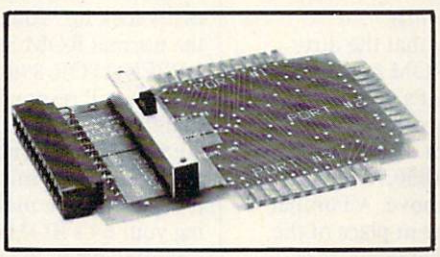

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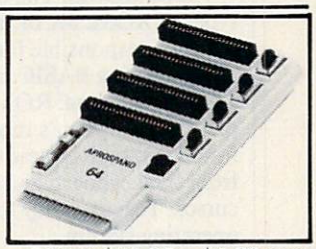

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PROGRAMMER'S PAGE

RANDY THOMPSON

COMPUTER BRAIN SURGERY

Feel like giving your 64 a frontal lobotomy? Try this: POKE 1,PEEK(1) AND 253. You've just removed your computer's intelligence. Hit RUN/STOP–RESTORE to return your 64 to a more productive state.

Experienced programmers will recognize the above command as the one that switches out the computer's ROM (Read Only Memory). Every time your computer prints READY, flashes the cursor, or complains about your syntax, it's because the instructions located in ROM told it to do so. Without its ROM, your computer is functionally brain dead.

Two ROMs. The 64 has two types of ROM: 8K of BASIC ROM, which is responsible for interpreting and executing BASIC instructions, and 8K of Kernal ROM, which handles the computer's more specialized functions, such as reading characters from the keyboard and moving the cursor. Together they form the 64's operating system.

BASIC ROM is located at 40960–49151 ($A000–$BFFF), and Kernal ROM is located at the top of the 64's memory map at 57344–65535 ($E000–$FFFF). As you might expect, reading one of these locations returns the value that's stored in ROM. After all, that's what the computer sees here. However, when you switch out ROM as we did above, RAM takes its place. At this point, reading one of these locations returns the value that's stored in RAM. Interestingly, values written to these locations are *always* stored in the RAM that resides here, no matter what the in-out status of the ROM is.

The reason your computer hangs when you switch out ROM from BASIC is because the underlying RAM doesn't contain any coherent machine language routines for the computer to execute. That is, not unless you put them there.

Customizing ROM. Because the underlying RAM can be written to at any time, it's easy to move the contents of ROM to the corresponding RAM addresses. Once that's accomplished, switching out ROM has no ill effects. Best of all, you can now modify the ROM code to your liking, thus changing the way the computer behaves.

To copy ROM to RAM and then switch out ROM, type in and run the following program. Be patient; this takes more than a minute to run.

```
10 FOR I=40960 TO 49151:POKE
   I,PEEK(I):NEXT
20 FOR I=7344 TO 65535:POKE I,
   PEEK(I):NEXT
30 POKE 1,PEEK(1) AND 253
```

Line 10 copies BASIC ROM, and line 20 copies Kernal ROM. Line 30 switches out ROM by clearing bit 1 of memory location 1 (the computer's R6510 register). Bit 0 of this register controls BASIC ROM, while bit 1 controls Kernal ROM. You should note that we simply clear bit 1 in line 30 because BASIC ROM is automatically switched out whenever Kernal ROM is. Only BASIC ROM can be switched independently.

READY? Now that the dirty work is done and ROM has been moved into RAM, it's time to have some fun. To begin with, let's change the READY prompt. Enter **POKE 41849,65:POKE 41850,78** after running the program above. A familiar name should appear in place of the computer's normal greeting. If you like, you can add these POKEs to the end of the program above.

On the more practical side, disk drive owners can force their computers to default to loading from and saving to device 8, the disk drive, instead of device 1, the datasette. Enter **POKE 57818,8** and you won't have to type a ,8 after every load and save command.

In an old issue of *COMPUTE!* magazine, Jim Butterfield lists a POKE that stops BASIC from shouting ILLEGAL QUANTITY ERROR every time you try to get the ASCII value of a null string. Enter **POKE 46991,5** and the computer will return a value of 0 when you PRINT ASC(" ").

Sheldon Leemon mentions changing INPUT's prompt character from a question mark to a colon in his book *Mapping the Commodore 64*. Enter **POKE 53846,58** to make this change. Actually, you could POKE the ASCII value of any character here, such as a 32 for a space.

Enter **POKE 61765,252** and BASIC's GET statement will wait until it receives a valid keypress before continuing on (no more GET K$:IF K$=" " THEN. . . commands).

Adventuresome machine language programmers might go even further and replace the 64's ROM code entirely. BASIC could be replaced with a Pascal interpreter, or the whole computer could be converted into a dedicated word processor or database system.

Of course, switching out ROM does make your computer more vulnerable to stray POKE commands. If you accidentally destroy a sensitive ROM location, your computer could easily lock up. You can switch back to the normal ROM by entering POKE 1,PEEK(1) OR 3 (assuming the computer is still responding to your commands), hitting RUN/STOP–RESTORE, or turning your computer off and on. Any mistakes (or improvements) that you make while modifying your 64's ROM code are quickly forgotten when the power goes out. ⊡

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BEGINNER BASIC

PROGRAMMING WITH A MUSICAL SPRITE

LARRY COTTON

Last month, we began a program that moves a musical sprite with a joystick. Let's continue from the point where we placed a green quarter note on a musical treble clef staff.

We'll be able to play 41 notes, from two octaves below middle C to the fourth A above middle C. *The 64's Programmer's Reference Guide* provides the frequency values; from them we calculate POKEable values. First we must dimension the arrays.

```
200 DIMFU(41),FL(41),C(41)
```

FU( ) and FL( ) are the upper- and lower-frequency arrays that will hold the values to be POKEd into voice 1's frequency control registers. C( ) is the array for the colors that correspond to the musical notes.

Let's read the 41 decimal values and colors and calculate two POKEable values for each.

```
210 K=256:FORJ=41TO1STEP-1:
    READD,C(J):FU(J)=INT(D/K):
    FL(J)=D-FU(J)*K:NEXT
220 DATA1072,5,1204,2,1351,3,1432,
    4,1607,12,1804,6,2025,7,2145,5,
    2408,2,2703,3
225 DATA2864,4,3215,12,3608,6,4050,
    7,4291,5,4817,2,5407,3,5728,4,
    6430,12,7216,6
235 DATA8101,7,8583,5,9634,2,10814,
    3,11457,4,12860,12,14435,6,16203,
    7,17167,5
240 DATA19269,2,21629,3,22915,4,
    25721,12,28871,6,32407,7,34334,
    5,38539,2
250 DATA43258,3,45830,4,51443,12,
    57743,6
```

Now we define JS, the memory register for joystick port 2.

```
300 JS=56320
```

Lines 310–390 form an infinite loop; the only way to break out is to press the Run/Stop key or to turn off the computer. First, PEEK at the joystick port to see what value is there (JD means Joystick Direction).

```
310 JD=PEEK(JS)
```

We need to check only for certain values that correspond to particular directions. To detect if the stick is pushed up, enter

```
320 IFJD=126THENN=N-4:IFN
    <49THENN=49
```

The note should move up when the stick is pressed up. N is the vertical position of the sprite on the screen (see lines 110 and 180). N must be decremented by four pixels for the sprite to move up a note.

We limit the value of N to keep the note on the screen. In this case, the top line's position has the value N=49. Now look to detect a downward press.

```
330 IFJD=125THENN=N+4:IFN
    >209THENN=209
```

In this case N is incremented by 4 and the bottom line of the staff corresponds to a value of 209 for N.

We haven't moved the sprite yet; we've only assigned it a new vertical position. Let's look at the port again to detect a press of the fire button, which will sound a note.

```
340 IFJD=111THENGOSUB400
```

Press the fire button and port 2 contains the value 111. We also want to detect if the joystick is pushed up or down with the button pressed. This sounds notes as it moves, with gliding arpeggios. GOSUB400 to play the note, assign a new vertical position to the sprite, and check vertical limits.

```
350 IFJD=110THENGOSUB400:
    N=N-4:IFN<49THENN=49
360 IFJD=109THENGOSUB400:
    N=N+4:IFN>209THENN=209
```

Here's where we actually move the sprite to the new position N:

```
370 POKEV+1,N:Q=INT(N/4-11)
```

V+1 is sprite 1's vertical postion. Q is a calculated index to the color array. (Remember reading the color numbers in line 210?). The colors cycle through seven changes, then repeat.

Thus all Cs are green, all Ds are red, and so on. Now POKE the color number into sprite 1's color memory register.

```
380 POKEV+39,C(Q)
```

End the main loop by returning to its beginning:

```
390 GOTO 310
```

To sound the note, POKE voice 1's frequency registers with the figures calculated in 210:

```
400 POKES,FL(Q):POKES+1,FU(Q)
```

S and S+1 are the first two registers of the sound chip; they control voice 1's frequency. We now turn on the note in a rather strange way: by turning it off first. This, combined with our envelope (defined in line 20), ensures that our notes can sound either one at a time or as an arpeggio.

```
410 POKES+4,64:POKES+4,65
420 RETURN
```

When you run the program, try playing a tune with the joystick. ⊡

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MACHINE LANGUAGE

JIM BUTTERFIELD

MORE BIT ANALYSIS

This month, we'll show how the BIT command may be used to perform certain tests. Here's our project: Given a 6502-based opcode, we want to find out how long the instruction might be.

A pattern in the opcodes allows us to guess the length: If an instruction (in hexadecimal) ends with D, it's a length-3 opcode. But some patterns are not that simple. Opcode $20 (JSR) has length 3, code $30 (BMI) has length 2, and code $40 (RTI) has length 1. The test will need to be constructed carefully.

Standard disassemblers use a lookup table to determine an instruction's length.

The code that follows is more compact, and it shows a new way to use the BIT instruction.

Normally, a programmer would examine specific bits by masking them with AND and then performing a comparison. To continue testing, the original value would need to be loaded again so that a new mask could be applied. The BIT instruction has a built-in AND test that doesn't disturb the values being tested. It's more efficient.

The following program runs on all Commodore 8-bit computers. Assume that the opcode to be analyzed is in the A register. It won't be disturbed during our analysis program; it will still be there when we've finished, and the length value will be in the X register.

First, test specifically for the one instruction that defies the pattern—JSR, opcode $20, with a length of 3.

```
2045  LDX  #$03   ;may be length 3
2047  CMP  #$20   ;test for $20
2049  BEQ  $2069  ;yes, so we're
                   done
```

Address $2069 represents the end of our analysis. As you can see above, we've preloaded X with 3—the right value—so we can branch directly to our completion address. Preloading X makes for smooth coding.

Next, we test the opcode in A against a fixed mask of $9F stored at address $2081. (Wouldn't it be nice to have immediate-mode addressing available for the BIT instruction?)

If none of the bits match, the Z flag will be set. Mask $9F has six bits set. The only instructions that will set the Z flag are opcodes $00 (BRK), $40 (RTI), and $60 (RTS). Value $20 would also match, but we've already handled it. When any of the length-1 codes are detected, the program goes to $2069.

```
204B  LDX  #$01   ;may be length 1
204D  BIT  $2081  ;test against $9F
2050  BEQ  $2069  ;exit if it is
```

Now we test against a mask of $08 stored at $2082. Only a single bit is set in this number. Which opcodes will it extract? If you wrote the opcode in hexadecimal, you'd see that this coding will identify all instructions whose last digit (in hex) is less than 8. Opcodes like $A2 (LDX), $30 (BMI), $85 (STA), and dozens of others will take this exit with length 2.

```
2052  LDX  #$02   ;may be length 2
2054  BIT  $2082  ;test against $08
2057  BEQ  $2069  ;exit if it is
```

About half of the possible opcodes now have been identified. Next, we extract the codes whose hex representation ends in 8 or A. We accomplish this by using a mask of $05, which is stored at $2083.

```
2059  LDX  #$01   ;may be length 1
205B  BIT  $2083  ;test against $05
205E  BEQ  $2069  ;exit if it is
```

All that's left are opcodes ending in (hex) 9, B, C, D, E, and F. Those ending in B and F are not legitimate instructions. The remaining opcodes are length 3, with one important exception. An even first digit (in hex) followed by 9 will be a length-2 instruction. For example, LDA immediate is coded as $A9. We can test for this combination with a mask of $16.

```
2060  LDX  #$02   ;may be length 2
2062  BIT  $2084  ;test against $16
2065  BEQ  $2069  ;exit if it is
2067  LDX  #$03   ;else set length 3
2069  (analysis is complete)
```

The BIT intruction came through with stunning elegance and efficiency. It takes time and care to get the masks correct and in their most efficient order.

In the accompanying BASIC program, I've added a hex input routine to precede the above code and a brief output routine to follow it.

```
QR 100 DATA 160,0,185,133,32,3
       2,210,255,200,201
MJ 110 DATA 32,208,245,32,228,
       255,201,71,176,249,201
RF 120 DATA 48,144,245,32,210,
       255,56,233,48,201,10
GJ 130 DATA 144,2,233,7,10,10,
       10,10,141,0,37
EK 140 DATA 32,228,255,201,71,
       176,249,201,48,144,245
JR 150 DATA 32,210,255,56,233,
       48,201,10,144,2,233,7
PB 160 DATA 13,0,37,162,3,201,
       32,240,30,162,1
GP 170 DATA 44,129,32,240,23,1
       62,2,44,130,32,240,16
BX 180 DATA 162,1,44,131,32,24
       0,9,162,2,44,132,32
JF 190 DATA 240,2,162,3,160,0,
       185,138,32,32,210,255
KP 200 DATA 200,201,58,208,245
       ,138,9,48
PS 210 DATA 32,210,255,169,13,
       76,210,255
XG 220 DATA 159,8,5,22,72,69,8
       8,63,32
HD 230 DATA 61,76,69,78,58
PP 300 FOR J=8192 TO 8334
DS 310 READ X:T=T+X
SA 320 POKE J,X:NEXT J
KX 330 IF T<>16245 THEN STOP
BH 340 SYS 8192                ⊡
```

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BUG-SWATTER

• Some of our readers have had trouble with *Think Tank,* from the April 1990 issue of *Gazette.* A crucial character in line 1080 was inadvertently dropped from our program listing.

Here's the corrected line:

```
1080 RETURN:DATA0,0,16,0,0,0,0,
     0,0,0,16,0,66,0,136,0,0,40,8,0,3,
     32,32,32
```

• The *Disk Editor* program (February 1990) does not function as written for plotting the current file sector chain in BAM mode (Ctrl-P). To make the corrections, load and run *MLX.* Enter 8000 as the starting address and 8F97 as the ending address; then load your copy of *Disk Editor.*

A LOAD ERROR message will appear because this new ending address exceeds the ending address of the original program. This is not a problem. Choose the ENTER DATA option to modify the following lines.

```
8AA0 84 8F AE 40  80 E8 E8 AC DB

8298  54 53 20 43  55 52 53 4F BE
82A0  52 20 43 48  41 49 4E 20 AF

8F80  8F 4C 5A 8F  AE 95 80 E8 74
8F88  8E 3F 80 AE  96 80 8E 40 CD
8F90  80 4C 2B 8B  00 00 00 00 21
```

Note: Watch your line numbers and make sure you enter them correctly; they aren't all consecutive. For example, hit Return after entering the first line to return to the *MLX* menu. Select Enter Data again and start at 8298 for the next two lines. Then, save the program with a new name. ⊡

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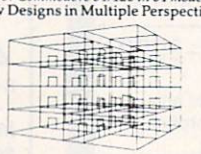

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ONLY ON DISK

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 are descriptions of this month's bonus programs.

Bastion

Steve Harter

This challenging one- or two-player game is based on the popular arcade hit *Star Castle*. *Bastion* is written entirely in machine language and features beautiful vectored graphics. The object is to destroy an enemy spacecraft protected by a multilayered force field.

Eyecatcher

Michael Lalonde

Eyecatcher is perfect for posting notices at user group meetings, school functions, or parties. Messages scroll across the top and bottom of the screen in huge letters while a large clock displays the time in the center.

PROGRAMS

GABRIEL RIVERA

Knowing the multiplication tables is intrinsic to all multiplication and division operations. Multiplication is one of the major components in the study of mathematics. Therefore, memorizing the multiplication tables is a necessary ingredient in understanding mathematics.

Memorizing the multiplication tables takes time, effort, and plenty of practice. This educational program is designed to help students learn those tables in a colorful and friendly environment.

Getting Started

Times Table Tutor is written in BASIC. Enter the program by using *The Automatic Proofreader;* see "Typing Aids" elsewhere in this section. When you've finished typing in *Times Table Tutor,* be sure to save a copy to disk.

Using the Program

Times Table Tutor begins with a menu. Students have the choice of practicing an entire set of multiplication tables, a single set, or quitting the program.

Practicing an entire set drills students with random multiplication problems, with numbers ranging from 0 to 9. The program provides correct answers whenever a user gives an incorrect answer. Students can correct mistakes before they press Return by using the Delete key. The drilling continues until the user presses the back-arrow key.

Practicing a single set drills students with a specific set of problems. *Times Table Tutor* asks which set to drill. Students may choose any set from 0 to 9. If the user enters 5, for example, the program presents 5 × 2 =, 5 × 3 =, 5 × 9 =, and so on. This continues until the user has correctly answered all of the problems in the set. At this point, the program asks whether or not the student wants to repeat the set. Entering *No* returns the student to the main menu.

Times Table Tutor uses large and colorful digits that help make learning pleasant. Sound effects after correct or incorrect answers also add to the learning environment. While nothing can make memorizing the multiplication tables easy, *Times Table Tutor* makes it more exciting than doing repetitive drills with pencil and paper. Some might even think it's fun.

TIMES TABLE TUTOR

LEARNING THE MULTIPLICATION TABLES IS NEVER EASY, BUT THIS HANDY TUTOR FOR THE 64 AT LEAST MAKES IT PLEASANT

TIMES TABLE TUTOR

```
FD 10 REM COPYRIGHT 1990 COMPU
      TE PUBLICATIONS, INTL -
      {SPACE}ALL RIGHTS RESERV
      ED
MX 100 CO$="{4}{8}{2}{1}{BLU}
       {7}{RED}{3}{RED}"
QM 110 POKE53280,0:POKE53281,0
       :PRINT"{H}"
GS 120 GOSUB10000
BJ 1000 PRINT"{CLR}{N}"SPC(14)
        "{PUR}{A}**********{S}
        "
QB 1010 FORX=0TO6:PRINTSPC(14)
        "-{10 SPACES}-":NEXT
PA 1020 PRINTSPC(14)"{Z}******
        ****{X}"
QQ 1030 PRINT"{HOME}"SPC(15)"
        {DOWN}{8}";
EH 1040 FORX=0TO2:PRINT"{A}{R}
        {S}{DOWN}{2 LEFT}-
        {DOWN}{LEFT}{E}";:NEXT
CG 1050 PRINT"{5 UP}{4 LEFT}IM
        ES{2 DOWN}{2 LEFT}ABLE
        {2 DOWN}{2 LEFT}UTOR"
DH 1060 PRINTTAB(13)"{YEL}
        {3 DOWN}COPYRIGHT 1990
        "
PD 1061 PRINTTAB(7)"COMPUTE PU
        BLICATIONS, INTL"
RD 1062 PRINTTAB(11)"ALL RIGHT
        S RESERVED"
KM 1100 PRINTTAB(14)"{2 DOWN}C
        HOOSE ONE:"
FC 1110 P$="F1-ENTIRE SET":GOS
        UB40000:P$="F3-SINGLE
        {SPACE}SET":GOSUB40000
FE 1120 P$="F5-QUIT":GOSUB4000
        0
GD 1150 GETX$:IFX$<"{F1}"ORX$>
        "{F5}"THEN1150
KK 1160 GOSUB16000
BF 1170 IFX$="{F5}"THEN6000
SC 1180 IFX$="{F1}"THEN2000
GP 1190 GOTO3000
RB 2000 GOSUB5000
CE 2010 FORX=0TO1:N(X)=INT(RND
        (1)*10):NEXT:GOSUB4000
QP 2020 IFETHENE=0:GOTO1000
SQ 2030 GOTO2010
HH 3000 PRINT"{CLR}":P$="SINGL
        E SET":GOSUB40000ADY.
FG 3010 GOSUB30000:PRINT"
        {DOWN}WHICH SET? (0-9)
        ";
GS 3020 GETX$:T=VAL(X$):IFX$<>
        "0"ANDT=0THEN3020
BD 3030 PRINT"{CLR}"CHR$(142):
        GOSUB30000:PRINT"
        {2 DOWN}THE {HOME}
        {4 RIGHT}"N$(T)"{HOME}
        {7 RIGHT}{3 DOWN}
        {3 RIGHT}{OFF}SET!"
EJ 3040 FORX=0TO800:NEXT:GOSUB
        5000
FC 3050 N(0)=T:FORX=0TO9:D(X)=
        0:NEXT:R=0
DR 3060 X=INT(RND(1)*10):IFD(X
        )THEN3060
QH 3070 N(1)=X:GOSUB4000:IFETH
        ENE=0:GOTO1000
HF 3080 IFW=0THENR=R+1:D(N(1))
        =1:IFR=10THEN3100
AF 3090 GOTO3060
GB 3100 PRINT"{CLR}":P$="YOU'V
        E COMPLETED THE"+STR$(
        T)+" SET!":GOSUB40000
RR 3110 GOSUB30000:PRINT"
```

PROGRAMS

```
        {DOWN}PRACTICE"T"SET A
        GAIN? (Y/N)"
AR 3120 GETX$:IFX$<>"Y"ANDX$<>
        "N"THEN3120
AA 3130 IFX$="N"THEN1000
EM 3140 GOSUB5000:GOTO3050
PR 4000 PRINT"{HOME}{9 DOWN}";
AH 4010 FORX=0TO6:PRINT"
        {RIGHT}{38 SPACES}
        {RIGHT}";:NEXT
CK 4020 PRINT"{HOME}{9 DOWN}
        {2 RIGHT}";
GX 4030 GOSUB30000:PRINTN$(N(0
        ));
RP 4040 GOSUB30000:PRINT"
        {4 UP}{RIGHT}{OFF}"M$;
PH 4050 GOSUB30000:PRINT"
        {5 UP}{RIGHT}{OFF}"N$(
        N(1));
KJ 4060 GOSUB30000:PRINT"
        {4 UP}{RIGHT}{OFF}"E$"
        {4 UP}{RIGHT}{OFF}";:A
        $=""
FP 4070 GETX$:IFX$=""THEN4070
BJ 4080 IFX$="<"THENE=1:RETURN
PR 4090 IFX$="0"ORVAL(X$)>0THE
        NIFLEN(A$)<2THEN4130
EF 4100 IFX$=CHR$(20)ANDLEN(A$
        )THEN4140
PQ 4110 IFX$=CHR$(13)ANDLEN(A$
        )THEN4160
EH 4120 GOTO4070
JP 4130 GOSUB30000:PRINTN$(VAL
        (X$))"{6 UP}{RIGHT}
        {OFF}";:A$=A$+X$:GOTO4
        070
PF 4140 A$=LEFT$(A$,LEN(A$)-1)
        :PRINT"{6 LEFT}{UP}";
SD 4150 FORX=0TO6:PRINT"{DOWN}
        {5 SPACES}{5 LEFT}";:N
        EXT:PRINT"{6 UP}{OFF}"
        ;:C=C-1:GOTO4070
EX 4160 A=N(0)*N(1):PRINT"
        {8 DOWN}":IFVAL(A$)=AT
        HEN4190
GE 4170 W=1:P$="SORRY!":GOSUB4
        0000:PRINT"{DOWN}{8}
        {8 SPACES}THE CORRECT
        {SPACE}ANSWER IS{WHT}"
        A"{8}{LEFT}. "
SP 4180 GOSUB15000:FORX=0TO250
        0:NEXT:GOTO4200
DF 4190 W=0:P$="CORRECT!":GOSU
        B40000:GOSUB16000
RS 4200 FORX=0TO500:NEXT:PRINT
        "{HOME}{17 DOWN}"
XM 4210 FORX=0TO4:PRINT"
        {33 SPACES}":NEXT:RETU
        RN
FA 4999 PRINT:RETURN
AR 5000 PRINT"{CLR}"CHR$(142)"
        {8}{12 P}":PRINT"{5}
        {RVS} [<] EXITS. "
SA 5010 PRINT"{4}{12 Y}
        {5 DOWN}"
JA 5020 PRINT"{WHT}U";:FORX=0T
        O37:PRINT"*";:NEXT
HS 5030 PRINT"I";:FORX=0TO6:PR
        INT"{DOWN}{LEFT}-";:NE
        XT
EJ 5040 PRINT"{DOWN}{LEFT}K";:
        FORX=0TO38:PRINT"
        {2 LEFT}*";:NEXT
JF 5050 PRINT"{LEFT}J";:FORX=0
        TO6:PRINT"{LEFT}{UP}-"
        ;:NEXT:RETURN
GJ 6000 PRINT"{CLR}":P$="QUIT"
        :GOSUB40000
SK 6010 PRINT"{DOWN}{YEL}ARE YO
        U SURE? (Y/N)"
HE 6020 GETX$:IFX$<>"Y"ANDX$<>
        "N"THEN6020
GR 6030 IFX$="N"THEN1000
QG 6040 PRINT"{CLR}{YEL}{I}"CH
        R$(142);:END
PA 10000 N$(0)="{RVS}£{3 P}
        {*}{DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT} {3 RIGHT}
        {DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT} {3 RIGHT}
        {DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}"
DQ 10005 N$(0)=N$(0)+"{5 LEFT}
        {OFF}{*}{RVS}{3 Y}
        {OFF}£"
EQ 10010 N$(1)="{RIGHT}{RVS}£
        {DOWN}{3 LEFT}£
        {OFF}£{RVS} {DOWN}
        {3 LEFT}{OFF}£
        {RIGHT}{RVS} {DOWN}
        {LEFT} {DOWN}{LEFT}
        {DOWN}{LEFT} {DOWN}
        {3 LEFT}{2 Y} {2 Y}"
RB 10020 N$(2)="{RVS}£{3 P}
        {*}{DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {2 LEFT}£{OFF}£
        {DOWN}{3 LEFT}{RVS}£
        {OFF}£{DOWN}{3 LEFT}
        {RVS}£{OFF}£{DOWN}
        {3 LEFT}{RVS}£{OFF}
        £{DOWN}{2 LEFT}{RVS}
        {4 Y}"
BG 10030 N$(3)="{RVS}£{3 P}
        {*}{DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {2 LEFT}£{OFF}£
        {DOWN}{3 LEFT}{RVS}
        {2 SPACES}{DOWN}
        {LEFT}{OFF}{*}{RVS}
        {*}{DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT}{OFF}{*}{RVS}
        {3 Y}{OFF}£"
CX 10040 N$(4)="{3 RIGHT}{RVS}
        £ {DOWN}{3 LEFT}£
        {OFF}£{RVS} {DOWN}
        {4 LEFT}£{OFF}£
        {RIGHT}{RVS} {DOWN}
        {5 LEFT}£ {2 Y}
        {DOWN}{LEFT} {DOWN}
        {LEFT} {DOWN}{LEFT} "
AF 10050 N$(5)="{RVS} {4 P}
        {DOWN}{5 LEFT} {DOWN}
        {LEFT} {DOWN}{LEFT}
        {4 P}{*}{DOWN}{LEFT}
        {SPACE}{DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT}{OFF}{*}{RVS}
        {3 Y}{OFF}£"
PD 10060 N$(6)="{RVS}£{3 P}
        {*}{DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT} {DOWN}{LEFT}
        {3 P}{*}{DOWN}
        {5 LEFT} {3 RIGHT}
        {DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT}"
BJ 10065 N$(6)=N$(6)+"{OFF}{*}
        {RVS}{3 Y}{OFF}£"
RK 10070 N$(7)="{RVS}{4 P}
        {DOWN}{LEFT} {DOWN}
        {LEFT} {DOWN}{2 LEFT}
        £{OFF}£{DOWN}
        {3 LEFT}{RVS}£{OFF}
        £{DOWN}{3 LEFT}{RVS}
        £{OFF}£{DOWN}
        {3 LEFT}{RVS}£{OFF}
        £{3 RIGHT}"
JR 10080 N$(8)="{RVS}£{3 P}
        {*}{DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT}{OFF}{*}{3 O}
        £{DOWN}{5 LEFT}{RVS}
        £{OFF}{3 U}{RVS}{*}
        {DOWN}{5 LEFT}
        {3 RIGHT} {5 LEFT}
        {3 RIGHT} {DOWN}"
BC 10085 N$(8)=N$(8)+"{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT}{OFF}{*}{RVS}
        {3 Y}{OFF}£"
EH 10090 N$(9)="{RVS}£{3 P}
        {*}{DOWN}{5 LEFT}
        {3 RIGHT} {DOWN}
        {5 LEFT} {3 RIGHT}
        {DOWN}{5 LEFT}{OFF}
        {*}{RVS}{3 Y} {DOWN}
        {LEFT} {DOWN}{LEFT}
        {DOWN}{LEFT} "
AG 10100 M$="{*}{RVS} {*}£
        {OFF}£{DOWN}{5 LEFT}
        {*}{RVS}{2 SPACES}
        {OFF}£{DOWN}{4 LEFT}
        {RVS}£{2 SPACES}{*}
        {DOWN}{5 LEFT}£
        {OFF}£{*}{RVS} {*}"
AD 10110 E$="{RVS}{5 SPACES}
        {2 DOWN}{5 LEFT}
        {5 SPACES}"
DQ 10120 S=54272:FORX=0TO24:PO
        KES+X,0:NEXT
PR 10130 POKES+24,15:POKES+5,1
        7:POKES+12,17:POKES+6
        ,234:POKES+13,234
MR 10140 POKES+1,16:POKES+8,24
        :RETURN
DA 15000 POKES+4,17:FORX=16TO4
        STEP-1:POKES+1,X:FORY
        =0TO30:NEXT:NEXT
MF 15010 POKES+4,16:RETURN
MQ 16000 POKES+11,17:POKES+11,
        16:RETURN
HC 30000 C=C+1:IFC=10THENC=1
HK 30010 C$=RIGHT$(LEFT$(CO$,C
        ),1):PRINTC$;:RETURN
GF 40000 P$=" "+P$+" ":Z=LEN(P
        $)
AS 40010 X=20-(Z/2)
PF 40020 PRINTSPC(X);:GOSUB300
        00:PRINT"{D}";:FORY=1
        TOZ-1:PRINT"{I}";:NEX
        T:PRINT"{F}{DOWN}
        {LEFT}{V}{UP}"
BH 40030 PRINTSPC(X);:GOSUB300
        00:PRINT"{RVS}"P$:RET
        URN
```

FRED KARG

PHARAOH'S REVENGE

IT TAKES BRAIN POWER TO SOLVE THIS PUZZLER FOR THE 64 AND GAIN ACCESS TO THE PHARAOH'S TREASURE

After months of backbreaking labor, digging at the base of Pharaoh's Pyramid, you've finally uncovered the doors to eight crypts that may lead to a fabulous treasure. You check each crypt, but there's no treasure to be found. Has the Pharaoh outwitted you?

You're not about to give up before you've solved the Pharaoh's riddle. You're sure the entrance to the pyramid is here, if only you can unravel its key. You deduce that if opening no single door provides access to the pyramid and its hidden treasure, then perhaps all of the doors must be open before the secret entrance reveals itself.

As you set out to test your theory, you're surprised to find that the doors are linked mechanically. Opening and closing one door triggers a mechanism in one or more of the others. There seems to be a consistent pattern as to how the doors are linked, but you realize that you'll need luck, persistence, and intelligence to open all doors.

Getting Started

Pharaoh's Revenge is written entirely in BASIC. Type it in using *The Automatic Proofreader;* see "Typing Aids" elsewhere in this section. Be sure to save a copy after you've finished typing it in. When you're ready to take on the Pharaoh, simply load and run the program.

Playing the Game

Three challenging levels of play have been included in the game. At the easy level, all doors are connected in pairs. Open one door and a second one opens. If that second door is already open, then it closes. At the difficult level, each door may be linked to one, two, or three others. Finally, the level for superbrains requires you to pass successfully through three tiers before you can gain entrance. To open a specific door, just type the number that appears above it. Depending on their previous states, other doors associated with it will either open or close.

The game keeps track of how many moves it takes in your attempt to gain access to the treasure. If you get frustrated, you can close all the doors at any time by pressing the A key. If the Pharaoh's curse proves to be too much, press S to see the solution. The numbers of the key doors will be highlighted in green. Enter these numbers to solve the puzzle. If you choose to look at the solution, the treasure will, of course, elude you, and the Pharaoh will have his revenge on yet another treasure seeker.

PHARAOH'S REVENGE

```
GM 1 REM COPYRIGHT, 1990, COMP
     UTE PUBLICATIONS, INTL, L
     TD{2 SPACES}ALL RIGHTS RE
     SERVED
QK 10 V=53248:Y=222:DIMB%(3,8,
     3),DE%(3,8),S%(3,5):S1=1
     0:POKEV+21,0:C=255
RF 20 BL$="{40 SPACES}":POKE53
     281,5:POKE53280,13
CX 30 PRINT"{CLR}{7 DOWN}":PRI
     NTSPC(11);"{WHT}{RVS}
     {19 SPACES}"
HP 35 PRINTSPC(11);"{WHT}{RVS}
      PHARAOH'S REVENGE {BLK}
     "
GA 40 PRINTSPC(11);"{WHT}{RVS}
     {19 SPACES}{BLK} "
QE 45 PRINTSPC(11);"{WHT}{RVS}
     {9 SPACES}BY{8 SPACES}
     {BLK} "
RA 50 PRINTSPC(11);"{WHT}{RVS}
     {19 SPACES}{BLK} "
XS 55 PRINTSPC(11);"{WHT}{RVS}
     {5 SPACES}FRED KARG
     {5 SPACES}{BLK} "
SG 60 PRINTSPC(11);"{WHT}{RVS}
     {19 SPACES}{BLK} ":PRINT
     SPC(13);"{BLK}{RVS}
     {18 SPACES}
AR 70 PRINT"{6 DOWN}{12 RIGHT}
     {8}COPYRIGHT 1990"
RR 71 PRINT"{4 RIGHT}{8}COMPUT
     E PUBLICATIONS, INTL, LT
     D"
GH 75 FORN=16128TO16383:READD:
     POKEN,D:NEXT
MS 80 PRINT"{CLR}{5 DOWN}":POK
     E53281,2:POKE53280,10:SC
     =0:SS=0
XX 90 PRINT"{CLR}{5 DOWN}":POK
     E53281,2:POKE53280,10:SC
     =0:SS=0
QK 95 PRINTSPC(S1);"{WHT}{RVS}
     {22 SPACES}"
GG 100 PRINTSPC(S1);"{WHT}
     {RVS}{5 SPACES}DIFFICUL
     TY{7 SPACES}{BLK}
     {2 SPACES}"
BF 105 PRINTSPC(S1);"{WHT}
     {RVS}{5 SPACES}{10 Y}
     {7 SPACES}{BLK}
     {2 SPACES}"
FQ 110 PRINTSPC(S1);"{WHT}
     {RVS} 1. EASY
     {14 SPACES}{BLK}
     {2 SPACES}"
JM 115 PRINTSPC(S1);"{WHT}
     {RVS}{22 SPACES}{BLK}
     {2 SPACES}"
CM 120 PRINTSPC(S1);"{WHT}
     {RVS} 2. DIFFICULT
     {9 SPACES}{BLK}
     {2 SPACES}"
EP 125 PRINTSPC(S1);"{WHT}
     {RVS}{22 SPACES}{BLK}
     {2 SPACES}"
CX 130 PRINTSPC(S1);"{WHT}
     {RVS} 3. SUPERBRAINS ON
     LY{2 SPACES}{BLK}
     {2 SPACES}"
AJ 135 PRINTSPC(S1);"{WHT}
     {RVS}{22 SPACES}{BLK}
     {2 SPACES}"
GD 140 PRINTSPC(S1);"
     {2 SPACES}{BLK}{RVS}
     {22 SPACES}"
CC 145 PRINTSPC(S1);"
     {2 SPACES}{BLK}{RVS}
     {22 SPACES}"
KM 150 PRINT"{3 DOWN}{8 RIGHT}
     PLEASE CHOOSE FROM 1 TO
      3 {P}{LEFT}";
```

PROGRAMS

```
RM 160 GETK$:IFK$=""THEN160
CG 170 K=ASC(K$):IFK>32ANDK<90
       THENPRINTK$"{LEFT}";
MK 180 IFK>51ORK<49THEN160
QB 190 K=K-48:PRINT:PRINT"
       {2 DOWN}{15 SPACES}
       {RVS}PLEASE WAIT...":IF
       K=1THENP=0:CL=1
RX 200 IFK=2THENP=0:CL=1
AP 210 IFK=3THENP=2:CL=8
ES 220 GOSUB450
AQ 225 ONKGOSUB480,520,530:GOS
       UB680:X=32:FORN=0TO7:PO
       KE2040+N,255:POKEV+39+N
       ,2
FF 230 POKEV+2*N,X:POKEV+1+2*N
       ,Y:X=X+40:IFX>255THENX=
       X-255
RA 240 NEXT:POKEV+27,255:POKEV
       +23,0:POKEV+28,255:POKE
       V+29,0
RD 250 POKEV+16,192:POKEV+27,0
       :POKEV+21,255:POKEV+37,
       7:POKEV+38,CL
HE 260 PRINT"{UP}{YEL}{RVS}
       {2 SPACES}1{4 SPACES}2
       {4 SPACES}3{4 SPACES}4
       {4 SPACES}5{4 SPACES}6
       {4 SPACES}7{4 SPACES}8
       {2 SPACES}";
GS 270 PRINTSPC(10)"{WHT}
       {7 UP} OPEN CRYPT NUMBE
       R ";
DQ 280 PRINT"{HOME}{WHT}{RVS}
       {SPACE}{RED} MOVES
       {WHT} ":PRINT"
       {3 SPACES}"SC;:K$="?":G
       OSUB580:POKE204,0
EE 290 GETK$:POKE207,0:IFK$=""
       THEN290
JM 300 K1=ASC(K$)-49:IFK1>34OR
       K1<0THEN290
AA 310 POKE204,1:IFK$="A"THENG
       OSUB590
SE 320 IFK$="Q"THENGOTO420
AS 330 IFK$="S"THENGOSUB590:GO
       SUB720
QP 340 IFK1>7THEN290
MS 350 SC=SC+1:PRINTK$"{LEFT}"
       ;:I=0:IFPEEK(2040+K1)=C
       THENPOKE2040+K1,C-1-P:G
       OTO370
PP 360 POKE2040+K1,C
CS 370 IFB%(P,K1,I)<>-1THENGOS
       UB430:I=I+1:GOTO370
MR 380 WI=1:FORN=0TO7:IFPEEK(2
       040+N)<>254-PTHENWI=0
RS 390 NEXT:IFWI=1THENP=P-1:CL
       =CL-1:IFP=-1THEN600
MC 400 IFWI=1THENGOSUB590:POKE
       V+38,CL:IFSO=1THENGOSUB
       700
SX 410 GOTO280
JX 420 END
QF 430 IFPEEK(2040+B%(P,K1,I))
       =CTHENPOKE2040+B%(P,K1,
       I),C-1-P:RETURN
RS 440 POKE2040+B%(P,K1,I),C:R
       ETURN
HM 450 SO=0:FORM=0TO2:FORN=0TO
       7:DE%(M,N)=N:NEXT:NEXT
AA 455 FORM=0TO2:FORN=0TO7:DE%
       (M,N)=N:NEXT:NEXT
XB 460 FORM=0TO3:FORN=1TO20:R1
       =INT(RND(0)*8):R2=INT(R
       ND(0)*8)
SG 470 T=DE%(M,R1):DE%(M,R1)=D
       E%(M,R2):DE%(M,R2)=T:NE
       XT:NEXT:RETURN
DD 480 J=0:FORN=0TO6STEP2:J=J+
       1:S%(P,J)=DE%(0,N)+1:NE
       XT:S%(P,5)=-1
JG 490 FORI=0TO6STEP2:B%(0,DE%
       (0,I),0)=DE%(0,I+1)
AQ 500 R1=INT(RND(0)*8):IFR1=D
       E%(0,I+1)ORR1=DE%(0,I)T
       HEN500
DC 510 B%(0,DE%(0,I+1),0)=R1:N
       EXT:FORI=0TO7:B%(0,DE%(
       0,I),1)=-1:NEXT:RETURN
HQ 520 GOSUB540:S%(P,1)=DE%(0,
       0)+1:S%(P,2)=DE%(0,4)+1
       :S%(P,3)=-1:RETURN
FS 530 FORM=0TO2:S%(M,1)=DE%(M
       ,0)+1:S%(M,2)=DE%(M,4)+
       1:S%(M,3)=-1:NEXT
GC 535 GOSUB540:RETURN
RH 540 FORM=0TO2:FORI=0TO7:FOR
       J=0TO2
XA 550 R1=INT(RND(0)*8):IFR1=D
       E%(M,I)GOTO550
CM 560 B%(M,DE%(M,I),J)=R1:NEX
       T:B%(M,DE%(M,I),3)=-1:N
       EXT:NEXT:FORM=0TO2:FORJ
       =0TO2
HX 570 B%(M,DE%(M,0),J)=DE%(M,
       J+1):B%(M,DE%(M,4),J)=D
       E%(M,J+5):NEXT:NEXT:RET
       URN
FH 580 POKE781,14:POKE782,30:P
       OKE783,0:SYS65520:PRINT
       K$"{LEFT}";:RETURN
FD 590 FORN=0TO7:POKE2040+N,C:
       NEXT:RETURN
KF 600 IFSS=1THENPRINT:POKEV+2
       1,0:PRINT"{5 DOWN}{GRN}
       {RVS}";
HJ 605 IFSS=1THENPRINT"
       {4 SPACES}PHARAOH'S TRE
       ASURE ELUDES YOU
       {5 SPACES}";
KX 610 IFSS=1THENPRINT"{RVS}
       {9 SPACES}BETTER LUCK N
       EXT TIME!{10 SPACES}";:
       GOTO650
QE 620 PRINT:PRINT"{3 DOWN}
       {5}{RVS}£{5 SPACES}
       {YEL}{5 SPACES}{5}
       {8 SPACES}{4}{8 SPACES}
       {YEL}{5 SPACES}{4}
       {5 SPACES}{*}{OFF}
MC 630 PRINT"{5}{RVS}£
       {6 SPACES}{YEL}
       {5 SPACES}{5}{8 SPACES}
       {4}{8 SPACES}{YEL}
       {5 SPACES}{4}{6 SPACES}
       {*}{OFF}"
XS 635 POKEV+21,0:PRINT"{RVS}
       {UP}{BLK}"BL$"{UP}";
DR 640 PRINTSPC(10)"{GRN}
       {2 SPACES}CONGRATULATIO
       NS{2 SPACES}"
MX 645 PRINT" YOU GAINED THE T
       REASURE IN "SC-1"MOVES
       {SPACE}"
JG 650 PRINT"{WHT}{RVS}
       {7 SPACES}PRESS ANY KEY
        TO CONTINUE{8 SPACES}
QA 660 GETK$:IFK$=""THEN660
EA 670 GOTO80
AE 680 POKE53280,0:POKE53281,0
       :KI=0:PRINT"{CLR}";:PRI
       NTSPC(19)"{RVS}{6}{5}£
       {4}{*}"
DC 685 FORN=18TO0STEP-1
RG 690 PRINTSPC(N)"{RVS}{5}£"
       ;:FORJ=0TOKI/2:PRINT"
       {RVS}{T}";:NEXT:FORM=0T
       OKI/2:PRINT"{RVS}{4}{T}
       ";:NEXT:PRINT"{RVS}{*}"
       :KI=KI+2:NEXT:RETURN
MP 695 FORM=0TOKI/2:PRINT"
       {RVS}{4}{T}";:NEXT:PRIN
       T"{RVS}{*}":KI=KI+2:NEX
       T:RETURN
SC 700 FORN=1TO4:POKE(56093+S%
       (P+1,N)*5),7:IFS%(P+1,N
       +1)=-1THENN=4
BE 710 NEXT:SO=0:RETURN
CR 720 FORN=1TO4:POKE(56093+S%
       (P,N)*5),5:IFS%(P,N+1)=
       -1THENN=4
CA 730 NEXT:SO=1:SS=1:RETURN:D
       ATA000,084,000,000,168,
       000,001,169
KS 740 DATA000,000,168,000,005
       ,069,064,008,000,000,02
       1,069,080,010,170,128
AE 750 DATA021,085,080,010,170
       ,128,005,085,064,002,17
       0,000,005,085,064,002
EB 760 DATA170,000,001,085,000
       ,000,168,000,001,085,00
       0,000,168,000,001,085
PR 770 DATA000,000,168,000,000
       ,084,000,012,000,042,00
       0,002,170,160,010,170
JG 780 DATA168,010,170,168,042
       ,130,170,042,128,170,17
       0,160,170,154,096,170
DG 790 DATA170,160,170,170,160
       ,170,176,226,168,048,20
       2,168,010,042,160,000
CQ 800 DATA170,168,010,170,170
       ,042,162,170,170,138,04
       2,162,168,168,168,162
FP 810 DATA168,170,042,160,042
       ,170,128,000,002,170,00
       0,010,170,128,043,171
BP 820 DATA160,058,238,176,186
       ,186,184,187,087,184,18
       7,087,184,185,085,184
SJ 830 DATA184,016,184,185,153
       ,184,185,085,184,185,08
       5,184,185,069,184,184
BG 840 DATA084,184,184,220,184
       ,176,152,056,176,236,05
       6,176,184,056,128,236
FG 850 DATA008,128,184,008,000
       ,236,000,231,000,255,00
       0,015,255,240,255,255
CS 860 DATA255,000,000,000,048
       ,000,012,048,000,012,04
       8,000,012,048,000,012
SA 870 DATA048,000,012,048,000
       ,012,048,000,012,048,00
       0,012,048,000,012,048
PK 880 DATA000,012,048,000,012
       ,048,000,012,048,000,01
       2,048,000,012,048,000
PG 890 DATA012,000,000,000,252
       ,000,063,231
```

DAVID BRAY

DITTO

THIS UTILITY FOR THE 64 LETS PROGRAMMERS COPY PORTIONS OF CODE QUICKLY AND EASILY FROM ONE PART OF A PROGRAM TO ANOTHER

Programmers often use commands and routines repeatedly in their source code. Since Commodore's BASIC editor and the majority of assembly language editors don't have a cut-and-paste option, you have to retype a lot of code. Well, not anymore. With *Ditto,* you can grab sections of code, partial lines, or blocks of text and then copy them elsewhere in your program.

Experiment with *Ditto.* You'll find dozens of useful applications for this versatile little program.

Getting Started

Ditto is written entirely in BASIC. Type it in using *The Automatic Proofreader.* See "Typing Aids" elsewhere in this section. Be sure to save a copy to disk when you've finished typing. When you're ready to use *Ditto,* simply load and run the program.

First, you're asked if you want to create a disk file. This option is used for customizing *Ditto.* For the time being, answer *No,* as we'll discuss customizing later. You'll then see a message that says *Editor Activated.* Now you can load and edit a program or begin to write one. *Ditto* is especially useful when writing assembly language programs. When using *Ditto,* you have the following commands at your fingertips.

f1 Begin block define.
f3 End block define.
f5 Clear defined block.
f7 Copy defined block.

When you want to copy something, move your cursor to the beginning of the block and press f1. Move your cursor to the end of the block and press f3. This defined block is then highlighted. Move the cursor to the place you want to copy the block and press f7.

Customizing the Program

To customize *Ditto,* first load the BASIC program and list the first few lines. The default highlight color is determined by the COLR variable in line 3. The default color is black, but you can change it to any of the 64's 16 colors by supplying a new value, ranging from 0 to 15. Once you've entered a new highlight color, run the program.

You are then asked if you want to create a disk file. Answer *Yes,* and the program saves a machine language (ML) version of itself to disk with the filename you specify. The new ML version of *Ditto* can be loaded by typing LOAD"*filename*",8,1 and activated by typing SYS49152.

How It Works

As *Ditto* runs, it constantly checks for keyboard input at vector 788 and 789. When the f1 and f3 keys are detected, *Ditto* memorizes the entire screen to keep the data intact.

When f7 is pressed, the block is stored in the keyboard buffer one character at a time to simulate the user actually retyping the information. This allows the Commodore editor to do the work of inserting lines when necessary. For example, if you add something to a line that contains approximately 35 characters, an extra line is inserted to hold the additional data so it doesn't overwrite the following line.

Ditto is designed to let a programmer copy segments from one line to another. Although it will let you copy large sections of text, the outcome may not be as you had desired because when the copy takes place, the Commodore editor is unable to determine where the line boundaries are, causing some lines to wrap together. This can be avoided by copying only segments from one line to another. Since the 64's screen editor lets you move to certain lines and change the line number, there is no real purpose in copying whole lines of text to another section of a program.

When you want to deactivate *Ditto,* press Run/Stop–Restore. It stays in memory, so if you want to reactivate it, simply type SYS49152.

DITTO

```
BS 1 REM COPYRIGHT 1990 COMPUT
     E PUBLICATIONS, INTL., LT
     D. - ALL RIGHTS RESERVED
HM 2 PRINT"{CLR}{2 DOWN}READIN
     G DATA...{DOWN}"
HH 3 COLR=0:T=0
BB 10 FOR A=0TO491:READB:T=T+B
     :POKE49152+A,B:NEXT:POKE
     49544,COLR
MP 20 IF T<>70387 THEN PRINT"E
     RROR IN DATA":END
ES 30 PRINT"CREATE A DISK FILE
      [Y/N] ?"
KD 40 POKE198,0:WAIT198,1:GETA
     $
HA 50 IF A$<>"Y" THEN 101
MM 60 INPUT "{DOWN}FILENAME";A
     $
DE 70 OPEN2,8,2,"0:"+A$+",P,W"
AQ 80 PRINT#2,CHR$(0)CHR$(192)
     ;
DJ 90 FORT=49152TO49643:PRINT#
     2,CHR$(PEEK(T));:NEXT
MB 100 CLOSE2
GM 101 SYS49152
QB 49152 DATA 120,169,51,141,2
         0,3,169,192
ME 49160 DATA 141,21,3,169,0,1
         41,230,193
MM 49168 DATA 141,233,193,141,
         234,193,88,169
XJ 49176 DATA 31,160,192,32,30
         ,171,96,17
ER 49184 DATA 69,68,73,84,79,8
         2,32,65
KB 49192 DATA 67,84,73,86,65,8
```

PROGRAMS

```
          4,69,68
EX 49200  DATA 46,17,0,173,230,
          193,240,3
BS 49208  DATA 76,237,192,165,1
          97,205,235,193
KC 49216  DATA 240,19,141,235,1
          93,201,3,240
FE 49224  DATA 45,201,4,240,76,
          201,5,240
AR 49232  DATA 104,201,6,240,3,
          76,49,234
XC 49240  DATA 173,134,2,141,22
          9,193,173,233
PR 49248  DATA 193,240,8,173,23
          4,193,240,3
JP 49256  DATA 32,140,193,169,0
          ,141,233,193
AR 49264  DATA 141,234,193,76,4
          9,234,173,233
GF 49272  DATA 193,240,27,173,2
          34,193,240,22
CB 49280  DATA 173,134,2,141,22
          9,193,32,140
DE 49288  DATA 193,169,1,141,23
          0,193,169,0
EB 49296  DATA 141,233,193,141,
          234,193,76,49
RG 49304  DATA 234,32,217,192,3
          2,21,193,173
QX 49312  DATA 231,193,133,251,
          173,232,193,133
QS 49320  DATA 252,169,1,141,23
          3,193,173,234
RR 49328  DATA 193,240,3,32,92,
          193,76,49
HB 49336  DATA 234,32,217,192,3
          2,21,193,173
BG 49344  DATA 231,193,133,253,
          173,232,193,133
DF 49352  DATA 254,169,1,141,23
          4,193,173,233
FQ 49360  DATA 193,240,3,32,92,
          193,76,49
RB 49368  DATA 234,173,233,193,
          240,14,173,234
JH 49376  DATA 193,240,9,173,13
          4,2,141,229
PK 49384  DATA 193,32,140,193,9
          6,160,0,177
XG 49392  DATA 251,32,49,193,14
          1,119,2,169
XB 49400  DATA 1,133,198,165,25
          1,197,253,208
FA 49408  DATA 11,165,252,197,2
          54,208,5,169
QP 49416  DATA 0,141,230,193,23
          0,251,208,2
EX 49424  DATA 230,252,76,49,23
          4,165,209,141
CE 49432  DATA 231,193,165,210,
          141,232,193,173
DF 49440  DATA 231,193,24,101,2
          11,141,231,193
AD 49448  DATA 173,232,193,105,
          190,141,232,193
KE 49456  DATA 96,162,0,134,199
          ,72,41,128
GE 49464  DATA 240,4,169,1,133,
          199,104,41
CH 49472  DATA 127,201,32,176,6
          ,24,105,64
XD 49480  DATA 76,91,193,201,64
          ,144,12,201
QQ 49488  DATA 127,176,6,24,105
          ,128,76,91
FK 49496  DATA 193,169,191,96,1
          65,254,197,252
FE 49504  DATA 144,110,208,6,16
          5,253,197,251
KF 49512  DATA 144,102,160,0,18
          5,0,4,153
PX 49520  DATA 0,194,185,0,5,15
          3,0,195
KC 49528  DATA 185,0,6,153,0,19
          6,185,0
FF 49536  DATA 7,153,0,197,200,
          208,229,169
XS 49544  DATA 0,141,229,193,16
          5,253,56,229
QK 49552  DATA 251,141,227,193,
          165,254,229,252
XC 49560  DATA 141,228,193,165,
          251,133,2,165
MS 49568  DATA 252,24,105,22,13
          3,3,238,227
RE 49576  DATA 193,208,3,238,22
          8,193,160,0
KP 49584  DATA 173,229,193,145,
          2,173,227,193
RK 49592  DATA 208,3,206,228,19
          3,206,227,193
BJ 49600  DATA 200,208,2,230,3,
          173,227,193
EF 49608  DATA 208,230,173,228,
          193,208,225,96
CE 49616  DATA 166,251,164,252,
          165,253,133,251
DJ 49624  DATA 165,254,133,252,
          134,253,132,254
EX 49632  DATA 76,106,193,0,0,0
          ,0,0
BH 49640  DATA 0,0,0,0
```

ROBERT B. COOK

RIGHT/SIDE

GOT A FILE THAT'S TOO WIDE FOR YOUR 80-COLUMN PRINTER? PRINT IT SIDEWAYS WITH THIS HANDY PROGRAM FOR THE 64.

Sometimes 80 columns just aren't enough. You may want to print a spreadsheet or other document, but it won't fit on an 80-column printer. It's too wide. You could print it smaller if your printer supports condensed type, but that's not always the best answer. For times like this, you need *Right/Side.*

Right/Side is a sideways file printer for sequential files. It's designed primarily to be used with *SpeedScript* for printing word processor files and charts that are up to 255 columns wide. It's also handy for printing addresses on large manila envelopes that have to be fed vertically into narrow-carriage printers. *Right/Side* should work with all odd-numbered Commodore and compatible dot-matrix printers such as the Okidata 120 and the Star Gemini II.

Typing It In

Right/Side consists of two programs. The first program is written in BASIC. To ensure accurate entry, use *The Automatic Proofreader.* See "Typing Aids" elsewhere in this section. When you've finished, be sure to save a copy to disk.

The second program is written in machine language. To enter it, you'll need to use *MLX,* our machine language entry program (see "Typing Aids"). The *MLX* prompts, and the values you should enter, are as follows:

Starting address: C000
Ending address: C157

When you've finished typing, be sure to save a copy of the program with the filename RIGHT/SIDE.ML before you leave *MLX.* When you're ready to use *Right/Side,* simply load and run it as you would any BASIC program.

Using the Program

When creating a sequential file for *Right/Side,* the margin for the right side of the text will be printed at what's normally the top of the paper. In *SpeedScript,* set the right margin to

your choice of widths up to 255. If you choose a number that is more than the length of the longest line, the printer will space down that number of lines. The maximum number of lines *Right/Side* will print is 80, the normal printer width. The left margin should be set to 0.

Before you can use *Right/Side,* you must first convert your original file or document to a sequential file. To do that from *SpeedScript,* press Shift-Ctrl-P, then press D to print your document to disk as a sequential file. Next, load and run *Right/Side.*

When the *Right/Side* menu appears, you must first select f1, Create Right/Side File, to convert the sequential file into a *Right/Side* file. Enter the name of your sequential file and then the name of the file you'll be creating. The letters *R/S* are added automatically as a prefix to indicate to the program that this is a *Right/Side* document. Press Return on a blank line to return to the main menu.

To print your file sideways, simply choose f2, Print Right/Side Files, and enter the name of the newly created *Right/Side* file. You don't have to include the R/S prefix—it's added automatically. Next, choose between normal density (draft mode) and high density (NLQ mode); then press any key to start printing. To stop printing, press and hold the space bar.

RIGHT/SIDE

```
DS 0 REM COPYRIGHT 1990 COMPUT
     E PUBLICATIONS, INTL., LT
     D. - ALL RIGHTS RESERVED
RP 100 GOSUB302:REM INITIALIZE
AH 102 GOSUB264:REM MAIN SCREE
       N
DH 104 POKE198,0:WAIT198,1:GET
       G$:G=ASC(G$)-132:IFG<10
       RG>4THEN104
FK 106 ONGGOSUB114,158,206,108
       :GOTO102
MR 108 POKE53280,14:POKE53281,
       6:POKE53272,(PEEK(53272
       )AND240)OR4
FM 110 PRINT"{7}{CLR}":END
MM 112 REM{2 SPACES}CREATE FIL
       E
FB 114 PS=1:GOSUB266:PS=0
AK 116 PRINTTAB(7)"{2 DOWN}
       {RVS}{RED}'############
       ############%"
FF 118 PRINTTAB(7)"{RVS}'{OFF}
        {GRN}CREATE {RVS}{BLK}
       R{OFF}IGHT/{RVS}S{OFF}I
       DE {GRN}FILE {RVS}{RED}
       {BLK} "
CR 120 PRINTTAB(7)"{RVS}{RED}'
       $$$$$$$$$$$$$$$$$$$$$$
       ${BLK} "
FK 122 PRINTTAB(9)"{RVS}{BLK}
       {24 SPACES}"
RJ 124 POKE214,10:PRINT"{DOWN}
       {2 SPACES}{RVS}{BLU}F
       {OFF}ILE TO BE READ?
       {GRN}"BF$;
FS 126 LN=16:GOSUB218:F1$=IN$:
       IFF1$=""THENRETURN
AC 128 DE=63:GOSUB232:IFEN<>63
       THEN124
EF 130 DE=0:GOSUB234:IFEN>19TH
       EN124
BE 132 POKE214,13:PRINT"{DOWN}
       {2 SPACES}{RVS}{BLU}F
       {OFF}ILE TO BE CREATED?
        {GRN}R/S."MID$(BF$,5,2
       4);
GF 134 LN=12:GOSUB218:IN$="R/S
       ."+IN$:F2$=IN$:IFF2$="R
       /S."THENRETURN
RG 136 DE=62:GOSUB232:IFF2$=F1
       $THEN132
MP 138 IFDE=ENTHEN146
AH 140 PRINT"{UP}{2 SPACES}
       {RVS}{RED}O{OFF}VERWRIT
       E FILE? [{GRN}Y/N{RED}]
       {GRN} ";:IN=1:GOSUB218
GB 142 IFIN$<>"Y"THENPRINT"
       {UP}"BL$:GOTO132
DB 144 OPEN15,8,15,"S0:"+F2$:C
       LOSE15
MS 146 POKE214,19:PRINTTAB(7)"
       {DOWN}{PUR}{5 Q} CREATI
       NG{2 SPACES}FILE {5 Q}
       {HOME}"
PB 148 SA=49152:FORL=1TO2
RJ 150 OPEN8,8,8,F1$+",S,R":SY
       S SA:SA=49194:CLOSE8:NE
       XT:REM READ & CONVERT
JR 152 OPEN8,8,8,F2$+",S,W":SY
       S49285:CLOSE8:REM WRITE
        TO DISK
FA 154 RETURN
CF 156 REM PRINT FILE
JK 158 PS=1:GOSUB266:PS=0:NP=0
AH 160 PRINTTAB(7)"{2 DOWN}
       {RVS}{RED}'############
       ###########%"
MQ 162 PRINTTAB(7)"{RVS}'{OFF}
        {GRN}PRINT {RVS}{BLK}R
       {OFF}IGHT/{RVS}S{OFF}ID
       E {GRN}FILE {RVS}{RED}
       {BLK} "
CM 164 PRINTTAB(7)"{RVS}{RED}'
       $$$$$$$$$$$$$$$$$$$$$$
       {BLK} "
SJ 166 PRINTTAB(9)"{RVS}{BLK}
       {23 SPACES}"
EB 168 POKE214,10:PRINT"{DOWN}
       {2 SPACES}{RVS}{BLU}F
       {OFF}ILE TO BE PRINTED?
        {GRN}R/S."MID$(BF$,5,2
       4);
GJ 170 LN=12:GOSUB218:IN$="R/S
       ."+IN$:F1$=IN$:IFF1$="R
       /S."THENRETURN
JF 172 DE=63:GOSUB232:IFEN<>63
       THEN168
BC 174 DE=0:GOSUB234:IFEN>19TH
       EN168
KF 176 POKE214,13:PRINT"{DOWN}
       {2 SPACES}{RVS}{BLU}N
       {OFF}ORMAL OR HIGH DENS
       ITY? [{GRN}N/H{BLU}]
       {GRN} ";
EH 178 IN=1:LN=1:GOSUB218:GM=8
       0:IFIN$="H"THENGM=81
JP 180 IFIN$=""THENRETURN
FG 182 OPEN15,4,15:CLOSE15:ON-
       (ST=0)GOTO188:IFNP=1THE
       NRETURN
GE 184 POKE214,16:PRINT"{DOWN}
       {2 SPACES}{RVS}{RED}C
       {OFF}ONNECT PRINTER THE
       N PRESS A KEY":GOSUB258
       :NP=1
BG 186 POKE198,0:WAIT198,1:GET
       Q$:GOTO182
QX 188 POKE214,16:PRINT"{DOWN}
       {2 SPACES}{RVS}{PUR}P
       {OFF}RESS ANY KEY TO BE
       GIN PRINTING ":GOSUB252
XX 190 POKE198,0:WAIT198,1
QH 192 POKE214,19:PRINT"{DOWN}
       {PUR}{2 SPACES}{5 Q} PR
       ESS {RVS}{RED}SPACE
       {RIGHT}BAR{OFF} {PUR}TO
        ABORT {5 Q}{HOME}"
XE 194 OPEN 4,4,7:PRINT#4,CHR$
       (27)CHR$(GM)
RC 196 PRINT#4,CHR$(8):REM GRA
       PHICS MODE
EA 198 OPEN 8,8,8,F1$+",S,R":S
       YS49356:CLOSE8:CLOSE4
FA 200 OPEN 4,4,7:PRINT#4,CHR$
       (15):CLOSE 4
CC 202 RETURN
QJ 204 REM DIRECTORY
QJ 206 PRINT"{CLR}{RVS}{GRN}D
       {OFF}IRECTORY{BLU}"
JC 208 SYS57812"$",8:POKE43,1:
       POKE44,48:POKE768,174:P
       OKE769,167:SYS47003,1
MJ 210 POKE782,48:SYS65493:SYS
       42291:LIST:POKE44,8:POK
       E768,139:POKE769,227
DF 212 PRINT:PRINT" {RVS}{GRN}
        PRESS ANY KEY TO RETUR
       N {HOME}"
PP 214 POKE198,0:WAIT198,1:RET
       URN
SP 216 REM INPUT
BC 218 CP=0:IN$="":GOSUB252
GF 220 POKE204,0:POKE198,0:WAI
       T198,1:GETQ$
JQ 222 IFQ$=CHR$(20)ANDCP>0THE
       NCP=CP-1:IN$=LEFT$(IN$,
       CP):PRINTQ$;
KF 224 IFQ$=>" "ANDQ$<="Z"ANDC
       P<LNTHENCP=CP+1:IN$=IN$
       +Q$:PRINTQ$;
KC 226 POKE212,0:IFQ$<>CHR$(13
       )THEN220
CE 228 POKE204,1:PRINT"{OFF} "
       :RETURN
KG 230 REM DISK CHECK
PF 232 OPEN15,8,15,"R0:"+IN$+"
       ="+IN$:CLOSE15:GOTO236
HJ 234 OPEN8,8,8,IN$+",S,R":CL
       OSE8
KA 236 OPEN15,8,15:INPUT#15,EN
       ,EM$:CLOSE15
PA 238 IFDE=ENOREN<20THENRETUR
       N
XF 240 PRINT"{2 DOWN}
       {2 SPACES}{RVS}{1}D
       {OFF}ISK ERROR: {BLK}"E
       N;EM$:GOSUB258:POKE198,
       0
BR 242 FORL=0TO1500:GETQ$:IFQ$
       =""THENNEXT
GM 244 PRINT"{UP}"BL$
CG 246 RETURN
HC 248 REM SOUNDS
XD 250 REM BING
JH 252 POKEAT,10:POKESR,73:POK
```

PROGRAMS

```
      EWV,17:POKEHF,50:POKELL
      ,0
SJ 254 FORI=1TO333:NEXT:POKEWV
      ,16:RETURN
AQ 256 REM BUZZ
AE 258 POKEHF,5:POKEAT,0:POKES
      R,240:POKEWV,33
CA 260 FORI=1TO500:NEXT:POKEWV
      ,32:RETURN
SC 262 REM SCREEN
PF 264 POKE53280,3:POKE53281,1
      :POKE53272,(PEEK(53272)
      AND240)OR10
AA 266 PRINT"{CYN}{CLR}{I}{T}
      {I}{T}{I}{T}{I}{T}{I}
      {T}{I}{T}{I}{T}{I}{T}
      {I}{T}{I}{T}{I}{T}{I}
      {T}{I}{T}{I}{T}{I}{T}
      {I}{T}{I}{T}{I}{T}{I}
      {T}{I}{T}";
SS 268 PRINT"{8}----------
      ----------
      ---"
EE 270 POKE214,22:PRINT"{DOWN}
      {8}{40 @}";
GS 272 PRINT"{CYN}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{K}
      {SHIFT-SPACE}{HOME}":PO
      KE2023,97
QE 274 IFPSTHENRETURN
JH 276 PRINTTAB(12)"{DOWN}{3}
      {M}{14 £}£"
AF 278 PRINTTAB(12)"{G}
      {14 SPACES}{RED}{+}
      {RVS}{BLK} "
KC 280 PRINTTAB(12)"{3}{G}
      {2 SPACES}{RVS}{BLK}R
      {OFF}IGHT/{RVS}S{OFF}ID
      E{2 SPACES}{RED}{+}
      {RVS}{BLK} "
KE 282 PRINTTAB(12)"{3}{G}
      {14 SPACES}{RED}{+}
      {RVS}{BLK} "
AQ 284 PRINTTAB(12)"{RED}{N}
      {14 Q}{D}{RVS}{BLK} "
ED 286 PRINTTAB(13)"{RVS}
      {16 SPACES}"
XQ 288 PRINTTAB(7)"{2 DOWN}
      {BLU}F 1{2 SPACES}{RVS}
      {GRN}C{OFF}REATE {RVS}
      {BLK}R{OFF}IGHT/{RVS}S
      {OFF}IDE {GRN}FILE"
JF 290 PRINTTAB(7)"{2 DOWN}
      {BLU}F 3{2 SPACES}{RVS}
      {GRN}P{OFF}RINT {RVS}
      {BLK}R{OFF}IGHT/{RVS}S
      {OFF}IDE {GRN}FILE"
QM 292 PRINTTAB(7)"{2 DOWN}
      {BLU}F 5{2 SPACES}{RVS}
      {GRN}D{OFF}ISK DIRECTOR
      Y"
XM 294 PRINTTAB(7)"{2 DOWN}
      {BLU}F 7{2 SPACES}{RVS}
      {GRN}Q{OFF}UIT PROGRAM"
KX 296 FORL=1TO4:POKE214,6+L*3
      :PRINTTAB(6)"{DOWN}{5}
      {Z}{3 S}{P}{5 LEFT}
      {DOWN}{A}{3 RIGHT}{E}
      {5 LEFT}{DOWN}{R}{3 W}
      {H}{HOME}":NEXT
SP 298 RETURN
RJ 300 REM INITIALIZE
BF 302 IFPEEK(10240)+PEEK(4915
      2)=222THEN322
PH 304 IFA=0THENA=1:LOAD"RIGHT
      /SIDE.ML",8,1
JK 306 PRINT"{CLR}{2 DOWN}READ
      ING DATA...."
HB 308 POKE56334,0:POKE1,51
HX 310 POKE781,9:POKE782,1:POK
      E88,0:POKE89,48:POKE90,
      0:POKE91,224
MB 312 SYS41964:POKE1,55:POKE5
      6334,1
FA 314 FORL=0TO255:POKE11776+L
      ,PEEK(10752+L):NEXT
QP 316 FORL=0TO255:POKE10752+L
      ,PEEK(10240+L):NEXT
FC 318 FORL=0TO247:POKE11528+L
      ,PEEK(11016+L):NEXT
AX 320 FORL=11008TO11175:READK
      :POKEL,K:NEXT
DP 322 LF=54272:HF=54273:WV=54
      276:AT=54277:SR=54278:V
      L=54296:POKEVL,15
RX 324 BL$="{38 SPACES}"
XP 326 BF$="{16 SPACES}
      {16 LEFT}"
XQ 328 RETURN
HB 330 REM CUSTOM CHARACTERS
SX 332 DATA 3,7,7,7,3,0,0,0,19
      2,224,224,224,192,0,0,0
CJ 334 DATA 0,0,0,3,7,7,7,3,0,
      0,0,192,224,224,224,192
PS 336 DATA 0,0,0,0,126,0,0,0,
      170,170,170,170,170,170
      ,170,170
FQ 338 DATA 85,85,85,85,85,85,
      85,85,255,128,191,160,1
      75,168,171,170
SB 340 DATA 255,0,255,0,255,0,
      255,0,255,1,253,5,245,2
      1,213,85
CR 342 DATA 170,171,168,175,16
      0,191,128,255,0,255,0,2
      55,0,255,0,255
FH 344 DATA 85,213,21,245,5,25
      3,1,255,0,0,0,15,24,20,
      19,19
EE 346 DATA 0,0,0,255,0,0,255,
      0,0,0,0,240,24,56,248,2
      48
AP 348 DATA 18,18,18,18,18,18,
      18,18,120,120,120,120,1
      20,120,120,120
AX 350 DATA 19,19,23,31,15,0,0
      ,0,0,255,255,255,255,0,
      0,0
XS 352 DATA 248,184,216,248,24
      0,0,0,0
```

RIGHT/SIDE.ML

```
C000:A2 00 A0 00 84 FC A2 08 4C
C008:20 C6 FF 20 B7 FF D0 67 14
C010:C8 20 CF FF C9 0D D0 0A 26
C018:C4 FC 90 02 84 FC A0 00 C6
C020:A2 00 20 E1 FF D0 E4 4C 6E
C028:77 C0 A2 08 20 C6 FF A9 30
C030:00 85 F7 A9 30 85 F8 A2 D8
C038:00 A0 00 84 FD 20 B7 FF 0A
C040:D0 35 E8 20 CF FF C9 0D B5
C048:D0 1A E4 FC F0 09 A9 20 44
C050:20 6F C0 E8 4C 4A C0 A2 14
C058:00 E6 FD A5 FD C9 50 90 F5
C060:DC 4C 77 C0 20 6F C0 20 BE
C068:E1 FF D0 D1 4C 77 C0 91 65
C070:F7 C8 D0 02 E6 F8 60 20 56
C078:CC FF A9 08 20 C3 FF A9 CF
C080:04 20 C3 FF 60 A2 08 20 42
C088:C9 FF 20 B7 FF D0 E8 C6 4A
C090:FC A5 FC 85 FE 18 A9 FF 9D
C098:65 FC 85 F7 A9 2F 69 00 19
C0A0:85 F8 A6 FD A0 00 B1 F7 38
C0A8:20 D2 FF 18 A5 F7 65 FE 47
C0B0:85 F7 A5 F8 69 00 85 F8 86
C0B8:CA D0 EB A9 0D 20 D2 FF 7A
C0C0:C6 FC F0 B3 20 E1 FF D0 97
C0C8:CC 4C 77 C0 A9 00 85 FB 13
C0D0:85 02 A2 08 20 C6 FF 20 A6
C0D8:E4 FF AA 20 B7 FF D0 0E 91
C0E0:8A C9 0D F0 0D A4 FB 99 57
C0E8:00 30 E6 FB D0 E9 A9 02 96
C0F0:85 02 A0 00 88 D0 FD 20 6D
C0F8:CC FF 88 D0 FD A2 04 20 A1
C100:C9 FF A9 00 85 FC A2 08 0B
C108:A4 FC B9 00 30 85 FD A9 91
C110:00 85 F7 A9 28 85 F8 18 EF
C118:A5 F7 65 FD 85 F7 A5 F8 49
C120:69 00 85 F8 CA D0 F0 A0 B4
C128:00 B1 F7 30 03 18 69 80 E5
C130:20 D2 FF C8 C0 08 D0 F1 BE
C138:E6 FC A5 FC C5 FB D0 C6 79
C140:A9 0D 20 D2 FF 20 CC FF 27
C148:A5 02 D0 09 A5 C5 C9 3C DD
C150:F0 03 4C CC C0 4C 77 C0 4A
```

TYPING AIDS

MLX, the machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in Gazette programs without making mistakes. These labor-saving utilities are on each *Gazette Disk* and printed in issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write and we'll send you free copies of both of these handy utilities. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope.

Write to Typing Aids, COMPUTE!'s Gazette, 324 West Wendover Avenue, Greensboro, North Carolina 27408.

MIKE SEDORE

CAVEMAN

SAVE YOUR PREHISTORIC BUDDIES FROM MAN-EATING DINOSAURS IN THIS DELIGHTFUL ARCADE GAME FOR THE 64. JOYSTICK REQUIRED.

You live in the savage world of 2 million B.C. The earth is dominated by dinosaurs, all roaming the planet each day in search of food. Surprisingly, these huge reptiles crave one of the smallest and weakest creatures on the planet: the Neanderthal. Neanderthals are neither man nor ape, but a tasty breed of evolution caught in the middle.

You belong to a caveman tribe that dwells on a mountainside. Your people live in constant fear of being devoured by the huge carnivores. So, you've been appointed as cave sentry. You must patrol the mountain ledges and use your trusty club to knock off any dinosaurs posing a threat to your people. Green tyrannosaurs and red pterodactyls are your chief concerns.

Typing It In

Caveman is written entirely in machine language, so you must use *MLX* to type it in. After you've loaded and run *MLX*, respond to the prompts with the values below.

Starting address: $0801
Ending address: $1951

When you've finished typing, be sure to save the program to disk. To play, plug a joystick in port 2 and then load and run the program. At the right side of the screen, the high score, current score, lives remaining, and level number are displayed.

Playing the Game

Caveman is set on a mountainside that's divided into 28 levels, each one subdivided into eight ledges. Once you've conquered a level, you move on to a higher, more difficult one with faster dinosaurs. If you survive through the 28th level, you return to the 1st level.

Move the joystick up or down to change the level. When you're ready to begin, press the fire button. The caveman will appear in the center of a ledge. Initially, he appears in a protected state and will remain safe until you press the fire button.

The caveman is quite agile and moves around by jumping or walking off the ledges. Push the joystick forward to jump straight up. While airborne, push the stick left or right to move onto a higher ledge. Pull back on the stick to leap across small gaps. Be careful though—falling off the bottom ledge spells doom for one of the caveman's five lives.

To clear a level, you must knock the green tyrannosaurs from the ledge while avoiding the red pterodactyls. When you're lined up with a dinosaur, press the fire button to throw the club. If you hit him, he falls from the ledge and you score 100 points.

You must avoid the pterodactyls because they cannot be knocked down. You can use your club to momentarily stun them, or you can leap over them when they're close. You receive ten points each time you hit a pterodactyl even though you can't knock one down. When all dinosaurs have been eliminated, the caveman moves on to the next level.

Caveman

```
0801:1A 08 00 00 9E 32 30 37 75
0809:36 20 20 42 59 20 4D 49 93
0811:4B 45 20 53 45 44 B0 45 33
0819:00 00 00 20 26 19 4C 87 E0
0821:18 00 00 00 00 00 00 00 3D
0829:20 EC 15 4C 35 09 A9 13 20
0831:20 D2 FF A9 0D 20 05 09 9C
0839:A9 01 4C EA 08 A2 00 BD 1F
0841:71 08 2D 34 03 CD 34 03 AF
0849:D0 06 20 7B 08 4C 54 08 21
0851:20 CF 08 E8 E0 09 D0 E7 A9
0859:A9 0D 20 D2 FF 20 F5 08 27
0861:20 F5 08 0E 34 03 AD 34 1E
0869:03 C9 00 D0 7F 60 00 00 F7
0871:B2 6F DF 55 98 55 DF 6F 51
0879:B2 00 A9 11 20 D2 FF A9 1F
0881:12 20 D2 FF A9 98 20 D2 BF
0889:FF AD 35 03 C9 01 D0 08 D7
0891:A9 2F 20 D2 FF 4C 9E 08 E9
0899:A9 A9 20 D2 FF A9 91 20 04
08A1:D2 FF A0 00 B9 B3 08 20 FB
08A9:D2 FF C8 C0 1B D0 F5 4C 9C
08B1:E2 08 92 9B A4 A4 A4 11 53
08B9:9D 9D 9D 12 98 2F 2F 92 47
08C1:A9 11 9D 9D 9D 9D 9B B8 CB
08C9:B8 B8 91 91 00 00 A9 1D 20
08D1:20 D2 FF 20 D2 FF 20 D2 52
08D9:FF A9 00 8D 35 03 60 00 A3
08E1:00 A9 01 8D 35 03 60 00 CB
08E9:00 8D 34 03 A9 00 8D 35 B1
08F1:03 4C 3E 08 AD 34 03 C9 EC
08F9:80 F0 05 A9 0D 20 05 09 BD
0901:60 00 00 00 20 D2 FF A9 39
0909:1D 4C D2 FF AE AF 2F AE 58
0911:2E 31 AA 2D 05 05 05 05 F9
0919:05 02 09 09 00 00 00 00 DF
0921:00 00 00 00 00 00 00 00 33
0929:82 00 00 00 34 4C 64 7C 94
0931:94 AC C4 DC A9 06 A2 20 E9
0939:A0 5C 20 85 09 A9 0A A2 B4
0941:20 A0 66 20 85 09 A9 0E 0C
0949:A2 20 A0 70 20 85 09 A9 A2
0951:14 A2 20 A0 7A 20 85 09 8C
0959:4C 08 0A 53 43 4F 52 45 4B
0961:30 30 30 30 30 48 49 53 29
0969:43 52 30 30 30 30 30 4C A9
0971:45 56 45 4C 20 30 30 31 7C
0979:20 4C 49 56 45 53 20 20 15
0981:35 20 20 00 86 D3 85 D6 9F
0989:8C 9F 09 20 10 E5 A2 00 4A
0991:BD C8 09 20 D2 FF E8 E0 21
0999:13 D0 F5 A0 00 B9 7A 09 17
09A1:20 D2 FF C8 C0 05 D0 F5 B6
09A9:AD 9F 09 8D BB 09 BD C8 BA
09B1:09 20 D2 FF E8 E0 1F D0 84
09B9:F5 B9 7A 09 20 D2 FF C8 2A
09C1:C0 0A D0 F5 4C FA 09 9A 2B
09C9:92 B0 60 60 60 60 60 AE 57
09D1:11 9D 9D 9D 9D 9D 9D 9D 9D
09D9:62 9F 9A 62 11 9D 9D 9D 56
09E1:9D 9D 9D 9D 62 05 9A 62 76
09E9:11 9D 9D 9D 9D 9D 9D 9D B5
09F1:ED 60 60 60 60 60 BD 00 25
09F9:00 BD C8 09 20 D2 FF E8 5A
0A01:E0 30 D0 F5 60 00 00 EA F8
0A09:20 39 15 85 D6 A9 20 85 99
0A11:D3 20 4D 0A A2 00 B9 2C 16
0A19:0A 20 D2 FF E8 C8 E0 08 C8
0A21:D0 F4 E6 D6 C0 20 90 E5 B2
0A29:4C 58 0A B0 B2 B2 B2 B2 3E
0A31:B2 AE 05 43 41 56 45 1F 2C
0A39:7B 7B B3 AB 7B 7B 7B 05 E0
0A41:4D 41 4E 1F AD B1 B1 B1 51
0A49:B1 B1 FD A3 84 02 20 10 19
0A51:E5 A4 02 60 00 00 00 A2 6A
```

PROGRAMS

```
0A59:00 BD 80 0A 9D 80 2A BD 8E
0A61:80 0B 9D 80 2B E8 E0 00 F2
0A69:D0 EF 4C 42 0D 00 00 00 F7
0A71:00 00 00 00 00 00 00 00 85
0A79:00 00 00 00 00 00 00 00 8D
0A81:00 00 00 00 00 00 A0 00 D6
0A89:02 A8 00 02 90 00 28 94 52
0A91:00 AA A8 00 AA AA 00 2A 8F
0A99:AA 00 0A A4 00 02 69 00 69
0AA1:02 5A 00 02 5A 80 02 5A A0
0AA9:A0 02 9A 20 02 AA 00 02 A0
0AB1:9A 00 02 52 00 00 50 00 19
0AB9:00 50 00 00 54 00 7B 00 7B
0AC1:00 00 00 00 00 00 A0 00 17
0AC9:02 A8 00 02 90 00 28 94 92
0AD1:00 AA A8 00 AA AA 00 2A CF
0AD9:AA 00 0A A4 00 02 69 00 A9
0AE1:01 5A 00 01 6A 80 01 AA 1F
0AE9:A0 02 AA 20 02 AA 00 02 E2
0AF1:AA 00 02 69 00 01 45 00 C0
0AF9:01 41 40 01 51 50 2E 00 1F
0B01:00 00 00 00 00 00 A0 00 58
0B09:02 A8 00 02 90 00 02 94 87
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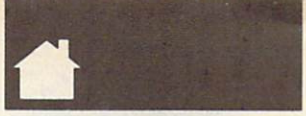

PROGRAMS

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18C9:FF 18 4A EA 8D 01 D4 A9 BB
18D1:00 4C 38 17 A0 00 8C 01 AC
18D9:D4 8C 01 D4 4C 84 11 A9 45
18E1:00 8D 01 D4 8D 08 D4 4C 65
18E9:1B 15 AD 0E D0 8D 08 D4 25
18F1:4C 4E 12 A0 00 8D 08 D4 43
18F9:4C 10 0F AC 0E D0 C0 00 36
1901:D0 03 8C 08 D4 4C 83 14 61
1909:A9 81 8D 04 D4 AD 4E 03 5F
1911:49 02 8D 4E 03 8D 01 D4 24
1919:AD FE 07 60 A9 11 8D 04 79
1921:D4 AD 0D D0 60 A9 00 8D 0F
1929:20 D0 8D 21 D0 A9 93 20 D7
1931:D2 FF A9 08 20 D2 FF A9 78
1939:8E 20 D2 FF A9 48 8D 18 B6
1941:03 A9 19 8D 19 03 60 A2 93
1949:00 8E 18 D4 9A 4C 1C 08 B5
```

PROGRAMS

HUBERT CROSS AND LIGIA LATINO

TANK SHOOTOUT

ORDER SOLDIERS, TANKS, AND MISSILES INTO BATTLE IN THIS TWO-PLAYER GAME FOR THE 64. JOYSTICKS REQUIRED.

Tank Shootout begins with two hostile armies lined up like pieces on a chess board. Instead of an open space between these opposing forces, the field is filled with numerous obstacles that block the armies' field of fire. Across the bottom of the screen, a row of missiles waits.

You command one army, and your opponent controls the other. The object of the game is to maneuver your forces around the obstacles and capture the enemy command post.

Each player starts with a force of ten tanks, 11 soldiers, five rockets, and a command post that resembles a castle. Once you start a soldier or tank moving, it will continue until it strikes an obstacle. If an enemy piece is within range, your soldier or tank will automatically fire at it.

Getting Started

Tank Shootout is written entirely in machine language. 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: 1A80

When you've finished typing in the data, be sure to save a copy to disk before exiting *MLX*.

Although it's written in machine language, *Tank Shootout* loads and runs like a BASIC program. When you and a friend are ready to play, plug a joystick into each port; then load the program and type RUN.

Into Battle

Before starting the game, the two players should agree on whether to play until one of the command posts is destroyed or until one of the players loses all of his or her pieces.

To play, use the joystick to move your flickering rectangle until it covers the piece you want to move. Press the fire button and hold it down while you move the stick in the direction you want the piece to move. Hold it in that direction and then release the fire button. The piece will move on its own until it strikes an obstacle or reaches an edge of the screen. To halt a piece, put the rectangle on it and press and release the fire button.

Please note that pieces will shoot automatically when they meet an enemy. (If a piece does not shoot when you think it should, look closer; you will find that the enemy piece is outside your piece's field of fire.)

The tanks can move and shoot in all four directions. The soldiers can move in all four directions but can shoot only left and right. (Soldiers are still dangerous because they fire much faster than the tanks.)

The rockets work in a different manner. Once you've ordered them to move with the joystick, they will only move up. Once launched, they will destroy any piece in their path, friend or foe. They continue until they hit a wall and explode or until they hit the top of the screen. Be extra careful with the two missiles that are located beneath your army. Generally, you should use those two as a defensive measure and only as a last resort.

Soldiers will take 5 hits before dying. Tanks will take 15, and rockets, 25. The command post is the weakest piece. It will explode with the first hit. If you are playing to destroy command posts, plan carefully how to defend yours. You can start a fresh game at any time by tapping the Restore key. ⊡

Tank Shootout

```
0801:0A 08 00 00 9E 32 30 36 6C
0809:31 00 00 00 A9 17 8D 18 8E
0811:03 A9 08 8D 19 03 78 A2 4F
0819:F0 9A A9 31 8D 14 03 A9 FC
0821:EA 8D 15 03 AD 0D DC 58 90
0829:20 4E 13 A9 0A 85 F9 A9 DD
0831:0F 8D 18 D4 A9 01 8D 25 0E
0839:D0 A2 08 A9 07 9D 26 D0 C1
0841:CA 10 FA A2 35 8A 9D 7A CD
0849:1A CA 10 F9 A2 1F A9 00 9F
0851:9D 00 78 CA 10 FA A2 00 9D
0859:BD 00 19 9D B0 1A BD 00 AE
0861:1A 9D B0 1B E8 D0 F1 20 3C
0869:44 E5 20 80 11 A2 35 20 BE
0871:25 0C CA 10 FA A9 DF 8D 3D
0879:F8 07 8D F9 07 A9 03 8D 8B
0881:15 D0 A2 01 BD D8 0D 9D BD
0889:C3 02 A9 17 9D C5 02 20 CA
0891:FA 0B CA 10 EF A9 03 8D F5
0899:15 D0 A0 0F B9 C7 08 99 04
08A1:F0 3B 88 10 F7 A9 7E 8D FB
08A9:00 3D 8D 07 3D A9 AA 8D 9E
08B1:CB 02 A9 28 8D CC 02 78 FB
08B9:A9 D7 8D 14 03 A9 08 8D E3
08C1:15 03 58 4C C4 08 00 00 33
08C9:00 00 FF FF 00 00 3C 3C 8E
08D1:3C 3C 3C 3C 3C 3C CE BE 89
08D9:02 D0 17 A9 04 8D BE 02 72
08E1:A0 01 B9 CB 02 BE 3E 3F 3D
08E9:99 3E 3F 8A 99 CB 02 88 6F
08F1:10 F0 A2 02 DE E2 02 D0 12
08F9:17 BD DA 02 9D E2 02 DE DB
0901:EA 02 D0 09 AD 15 D0 3D 54
0909:E2 0D 8D 15 D0 FE F8 07 4E
0911:E8 E0 08 D0 DF EE BD 02 16
0919:AD BD 02 4A B0 5A A2 1F A9
0921:BD 00 78 F0 50 BD 20 78 62
0929:8D 59 09 8D 52 09 18 7D B6
0931:60 78 9D 20 78 8D 74 09 33
0939:8D 61 09 BD 40 78 8D 5A C0
0941:09 8D 53 09 7D 80 78 9D B2
0949:40 78 8D 75 09 8D 62 09 EE
0951:2C FF FF 30 05 A9 20 8D 19
0959:FF FF DE 00 78 F0 16 2C 27
0961:FF FF 10 0B A9 00 9D 00 AE
0969:78 20 5A 10 4C 76 09 BD 18
0971:A0 78 8D FF FF CA 10 A8 97
0979:A2 00 A0 00 2C A0 1B B9 C4
0981:F4 1B F0 1B B9 7A 1A 38 C8
0989:E9 01 99 7A 1A 10 10 B9 96
0991:CA 18 F0 03 A9 0A 2C A9 D4
0999:18 99 7A 1A 20 30 0E C8 B5
09A1:C0 30 F0 07 C0 15 D0 D7 82
09A9:E8 D0 D2 C6 F9 F0 03 4C 11
```

PROGRAMS

```
09B1:3D 0A A9 0A 85 F9 A2 35 49
09B9:BD F4 1B F0 79 BD 88 1B 49
09C1:30 74 85 05 BD CA 18 0A 5D
09C9:0A 65 05 A8 BD E6 1A 85 A8
09D1:F8 BD 1C 1B 18 79 EA 0D 8E
09D9:9D 1C 1B BD B0 1A 79 F6 D8
09E1:0D 85 F7 DD B0 1A D0 17 5F
09E9:BD 52 1B 18 79 02 0E 9D E1
09F1:52 1B BD E6 1A 79 0E 0E FA
09F9:85 F8 DD E6 1A F0 37 A5 DF
0A01:F7 C9 26 B0 31 A5 F8 C9 2F
0A09:18 90 16 BD CA 18 C9 02 38
0A11:D0 24 A9 00 9D F4 1B 8E 51
0A19:1F 0A 20 42 12 A2 00 F0 73
0A21:15 20 C9 0C D0 10 20 22 EA
0A29:0C A5 F7 9D B0 1A A5 F8 B7
0A31:9D E6 1A 20 25 0C CA 30 32
0A39:03 4C B9 09 A2 01 BD 27 65
0A41:D0 29 0E D0 04 BD 2D 0E 56
0A49:2C A9 01 9D 27 D0 BD 00 CF
0A51:DC 29 10 F0 03 4C E9 0A 56
0A59:BC E5 0B B9 F4 1B F0 10 48
0A61:B9 B0 1A DD C3 02 D0 08 6F
0A69:B9 E6 1A DD C5 02 F0 09 56
0A71:C8 98 DD E6 0B D0 E4 F0 90
0A79:7E 8E C2 0A 8C 8C 0A 20 34
0A81:E9 0B B9 CB 0A 9D F8 07 01
0A89:84 05 A2 00 BD CA 18 0A C8
0A91:0A 7D CA 18 65 05 A8 B9 2F
0A99:D5 0A 0A 08 A4 05 B9 D0 5A
0AA1:0A 28 B0 1C 85 05 BD CA 23
0AA9:18 C9 02 08 A5 05 28 D0 5F
0AB1:0C DD 88 1B F0 07 48 A9 E3
0AB9:04 20 1A 0E 68 9D 88 1B E1
0AC1:A2 00 A9 80 9D BF 02 4C A0
0AC9:DB 0B DE DD DC DB DA 80 D4
0AD1:01 03 02 00 40 00 00 00 69
0AD9:00 40 40 40 00 00 80 40 4B
0AE1:80 80 80 80 80 80 80 80 F5
0AE9:1E BF 02 90 0A A9 DF 9D 9A
0AF1:F8 07 A9 14 9D C1 02 BD 70
0AF9:C1 02 F0 05 DE C1 02 D0 B0
0B01:C6 20 E9 0B F0 C1 A9 05 57
0B09:9D C1 02 88 F0 6A 88 F0 5A
0B11:2B 88 F0 2B A9 80 8D C7 E1
0B19:02 BC E5 0B B9 F4 1B F0 95
0B21:12 B9 B0 1A DD C3 02 90 F8
0B29:0A F0 08 CD C7 02 B0 03 09
0B31:8D C7 02 C8 98 DD E6 0B E1
0B39:D0 E2 F0 32 4C AA 0B A9 7E
0B41:00 8D C7 02 8D C8 02 BC 24
0B49:E5 0B B9 F4 1B F0 13 B9 18
0B51:B0 1A DD C3 02 B0 0B CD F4
0B59:C7 02 90 06 8D C7 02 6E 44
0B61:C8 02 C8 98 DD E6 0B D0 70
0B69:E1 2C C8 02 10 6C AD C7 0A
0B71:02 30 67 9D C3 02 10 5F 01
0B79:A9 00 8D C7 02 8D C8 02 6C
0B81:BC E5 0B B9 F4 1B F0 13 75
0B89:B9 E6 1A DD C5 02 B0 0B F9
0B91:CD C7 02 90 06 8D C7 02 C1
0B99:6E C8 02 C8 98 DD E6 0B FA
0BA1:D0 E1 2C C8 02 10 33 30 91
0BA9:26 A9 80 8D C7 02 BC E5 CB
0BB1:0B B9 F4 1B F0 12 B9 E6 36
0BB9:1A DD C5 02 90 0A F0 08 C3
0BC1:CD C7 02 B0 03 8D C7 02 DB
0BC9:C8 98 DD E6 0B D0 E2 AD A3
0BD1:C7 02 30 06 9D C5 02 20 DA
0BD9:FA 0B CA 10 03 4C A3 12 2D
0BE1:4C 3F 0A 1B 00 1B 36 1B D4
0BE9:BD 00 DC 0A 0A 0A 0A A0 48
0BF1:04 0A 90 03 88 D0 FA 98 E4
0BF9:60 8A 0A A8 BD C5 02 0A C1
0C01:0A 0A 69 32 99 01 D0 BD 21
0C09:C3 02 0A 0A 69 0C 0A 99 8E
0C11:00 D0 AD 10 D0 3D E2 0D 62
0C19:90 03 1D DA 0D 8D 10 D0 1B
0C21:60 A9 80 2C A9 00 8D BC CB
0C29:02 86 06 BD B0 1A 85 02 7B
0C31:BD E6 1A 85 03 BD CA 18 3A
0C39:F0 15 C9 01 F0 08 C9 02 95
0C41:F0 1C A9 00 F0 21 BD BE 54
0C49:1B D0 1C A9 01 D0 18 BD 7A
0C51:88 1B 4A A9 03 90 02 69 20
0C59:03 7D BE 1B D0 09 A0 0B D2
0C61:BD 88 1B 30 01 C8 98 85 C2
0C69:04 A6 03 BD F0 EC 18 65 3A
0C71:02 85 FB 85 FD BD 41 10 3D
0C79:69 00 85 FC 69 D4 85 FE 6F
0C81:A6 06 A9 02 E0 1B 90 02 5A
0C89:A9 05 A6 04 1D CB 0D 8D 8C
0C91:B2 0C 8A 0A 85 05 0A 65 B1
0C99:05 AA A0 00 2C A0 28 BD E4
0CA1:7D 0D 2C BC 02 30 05 C9 B1
0CA9:20 F0 10 2C A9 20 91 FB BF
0CB1:A9 00 2C BC 02 10 02 A9 ED
0CB9:01 91 FD E8 C8 C0 03 F0 45
0CC1:DC C0 2B D0 DA A6 06 60 C8
0CC9:BD CA 18 C9 02 F0 3E BC 20
0CD1:E6 1A B9 F0 EC 38 E9 29 6F
0CD9:85 FB B9 41 10 E9 00 85 AC
0CE1:FC A5 FB 18 7D B0 1A 85 4B
0CE9:FB 90 02 E6 FC BD 88 1B DD
0CF1:0A 0A A8 B9 6D 0D 85 05 F1
0CF9:C8 B9 6D 0D 8C 08 0D A8 AA
0D01:B1 FB C9 20 D0 06 A0 00 0E
0D09:C6 05 D0 EC 60 8E 5B 0D B1
0D11:BD B0 1A 8D CD 02 BD E6 2B
0D19:1A 8D CE 02 CE CE 02 A9 FC
0D21:03 8D CF 02 AE CE 02 AC 9B
0D29:CD 02 20 2F 10 B1 FB C9 AA
0D31:20 F0 1D 10 23 B1 FD 29 41
0D39:07 C9 01 F0 20 8E D5 02 61
0D41:8C D4 02 20 09 12 30 08 12
0D49:A9 00 9D F4 1B 20 42 12 2B
0D51:EE CD 02 CE CF 02 D0 CC 78
0D59:08 A2 00 28 60 AE 5B 0D 24
0D61:A9 00 9D F4 1B 20 42 12 43
0D69:AE 5B 0D 60 02 2C 54 00 C2
0D71:03 01 02 03 02 28 50 00 0F
0D79:03 79 7A 7B FA FE FB FF 46
0D81:FD FC E3 E1 F8 E2 E0 DF 69
0D89:F8 DD DB DE DC DA 20 E4 78
0D91:F8 F7 F6 F5 20 F9 20 F7 85
0D99:F6 F5 F8 E4 20 F7 F6 F5 DE
0DA1:20 EF 20 F7 F4 F5 20 E4 EF
0DA9:F8 F3 F1 F2 20 F9 20 F3 C7
0DB1:F1 F2 F8 E4 20 F3 F1 F2 96
0DB9:20 EF 20 F3 F0 F2 20 EE A5
0DC1:20 EB ED EC EA E8 E6 E9 26
0DC9:E7 E5 08 00 00 00 00 00 52
0DD1:00 00 00 00 00 08 08 01 1D
0DD9:24 01 02 04 08 10 20 40 C7
0DE1:80 FE FD FB F7 EF DF BF 7A
0DE9:7F 30 00 D0 00 20 00 E0 3E
0DF1:00 00 00 00 00 00 00 FF 0C
0DF9:00 00 00 FF 00 00 00 00 14
0E01:00 00 D0 00 30 00 E0 00 7A
0E09:20 00 00 00 00 00 FF 00 35
0E11:00 00 FF 00 00 00 FF 00 2D
0E19:00 8D 34 03 AD 1B 0E 18 5D
0E21:69 07 C9 49 D0 02 A9 34 97
0E29:8D 1B 0E 60 02 05 02 86 49
0E31:A4 84 A5 B9 B0 1A 8D C9 E3
0E39:02 B9 E6 1A 8D CA 02 BD 9C
0E41:2E 0E 8D D7 02 B9 CA 18 CB
0E49:C9 01 F0 07 B0 26 20 B7 2F
0E51:0F 10 05 20 EC 0F 30 1C BB
0E59:A4 A5 D9 BE 1B 99 BE 1B 30
0E61:F0 08 A6 A5 20 22 0C 20 E8
0E69:25 0C A2 20 BD 00 78 F0 41
0E71:08 CA 10 F8 A6 A4 A4 A5 8C
0E79:60 AC CA 02 B9 F0 EC 18 ED
0E81:6D C9 02 9D 20 78 B9 41 78
0E89:10 69 00 9D 40 78 AC D6 F5
0E91:02 BD 20 78 18 79 91 0F 82
0E99:9D 20 78 8D C9 0E 8D C4 DA
0EA1:0E BD 40 78 79 95 0F 9D A1
0EA9:40 78 8D CA 0E 8D C5 0E A2
0EB1:B9 99 0F 9D 60 78 B9 9D C2
0EB9:0F 9D 80 78 B9 A1 0F 9D 6C
0EC1:A0 78 2C FF FF 30 03 8D 26
0EC9:FF FF 98 F0 0F 88 F0 15 99
0ED1:88 F0 18 A9 17 38 ED CA 4C
0ED9:02 4C EF 0E A9 25 38 ED 29
0EE1:C9 02 4C EF 0E AD CA 02 AA
0EE9:4C EF 0E AD C9 02 9D 00 56
0EF1:78 A4 A5 BE CA 18 BD 8F D5
0EF9:0F 20 1A 0E 8A 0A 0A 6D C7
0F01:D6 02 A8 20 61 0F B0 53 1E
0F09:B9 6F 0F 9D F8 07 A4 A5 6E
0F11:B9 CA 18 F0 03 A9 03 2C C1
0F19:A9 0A 9D DA 02 9D E2 02 3E
0F21:A9 01 9D EA 02 A9 00 20 8D
0F29:77 0F A9 01 20 7A 0F A9 BE
0F31:00 20 7D 0F 8A 0A A8 AD 73
0F39:CA 02 0A 0A 0A 69 2E 99 0B
0F41:01 D0 AD C9 02 0A 0A 69 1C
0F49:06 0A 99 00 D0 A0 10 20 69
0F51:80 0F AD 15 D0 1D DA 0D 38
0F59:8D 15 D0 A6 A4 A4 A5 60 6B
0F61:A2 07 AD 15 D0 0A 90 05 6E
0F69:CA E0 01 D0 F8 60 D3 D4 18
0F71:D5 D6 D1 00 D2 00 A0 1C 5E
0F79:2C A0 1D 2C A0 17 4A B9 EB
0F81:00 D0 3D E2 0D 90 03 1D 77
0F89:DA 0D 99 00 D0 60 05 02 9F
0F91:03 D9 FF 51 00 FF FF 00 BC
0F99:01 D8 FF 28 00 FF FF 00 F0
0FA1:7E 7F 7E 7F 98 DD E5 0B B9
0FA9:90 08 DD E6 0B B0 03 A9 07
0FB1:80 60 B9 CA 18 60 AC C9 71
0FB9:02 C8 AE CA 02 CA 30 10 39
0FC1:20 2F 10 B1 FB 10 F6 B1 98
0FC9:FD 29 07 CD D7 02 F0 4E E5
0FD1:AE CA 02 E8 E8 E0 19 B0 76
0FD9:4E 20 2F 10 B1 FB 10 F4 A0
0FE1:B1 FD 29 07 CD D7 02 F0 B0
0FE9:3B D0 3C AE CA 02 20 2F 1A
0FF1:10 AC C9 02 88 30 0D B1 6D
0FF9:FB 10 F9 B1 FD 29 07 CD E4
1001:D7 02 F0 1D AC C9 02 C8 D6
1009:C8 C8 C0 26 B0 19 B1 FB 83
1011:10 F7 B1 FD 29 07 CD D7 26
1019:02 D0 0C A9 00 2C A9 01 8F
1021:2C A9 02 2C A9 03 2C A9 20
1029:80 A8 8D D6 02 60 BD F0 D0
1031:EC 85 FB 85 FD BD 41 10 7A
1039:85 FC 18 69 D4 85 FE 60 10
1041:04 04 04 04 04 04 04 05 62
1049:05 05 05 05 05 06 06 06 70
1051:06 06 06 06 07 07 07 07 80
1059:07 86 A4 A2 18 AD 61 09 A0
1061:DD F0 EC AD 62 09 FD 41 99
1069:10 B0 06 CA 10 EF A6 A4 5D
1071:60 8E D5 02 AD 61 09 38 7D
1079:FD F0 EC 8D D4 02 20 09 43
1081:12 30 57 DE F4 1B F0 55 DA
1089:20 61 0F B0 48 A9 D7 9D 35
1091:F8 07 A9 06 9D DA 02 9D 7F
1099:E2 02 A9 01 9D EA 02 A9 37
10A1:01 20 77 0F A9 00 20 7A 32
10A9:0F A9 00 20 7D 0F 8A 0A 05
10B1:A8 AD D5 02 0A 0A 0A 69 62
10B9:2E 99 01 D0 AD D4 02 0A 53
10C1:0A 69 07 0A 99 00 D0 A0 D1
10C9:10 20 80 0F AD 15 D0 1D 7B
10D1:DA 0D 8D 15 D0 A9 01 20 F4
10D9:1A 0E 4C E1 10 20 42 12 C9
10E1:A6 A4 60 00 0C 18 24 30 C3
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PROGRAMS

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10E9:3C 48 54 60 6C 78 84 00 19
10F1:00 00 00 01 00 00 00 00 22
10F9:00 00 00 00 00 00 00 01 1B
1101:00 00 00 00 00 00 00 01 24
1109:00 00 00 00 00 00 00 01 2C
1111:00 00 00 01 00 00 00 00 43
1119:00 00 00 01 00 00 00 00 4B
1121:00 00 00 01 00 00 00 00 53
1129:00 00 00 00 00 00 00 00 4B
1131:00 00 00 01 00 00 00 01 64
1139:00 00 00 00 00 00 00 01 5C
1141:00 00 00 01 01 01 01 01 82
1149:00 00 00 00 00 00 00 00 6B
1151:00 00 00 01 00 00 00 00 83
1159:00 00 00 00 00 00 00 01 7C
1161:00 00 00 00 00 00 00 01 84
1169:00 00 00 00 00 00 00 01 8C
1171:01 01 01 01 00 00 00 00 84
1179:00 00 00 00 00 00 00 A9 45
1181:08 8D FE 11 A9 04 8D FF 74
1189:11 A2 00 A9 0C 85 05 BC B4
1191:E4 10 B9 F0 10 20 F6 11 70
1199:C8 C6 05 D0 F5 88 A9 0C B0
11A1:85 05 B9 F0 10 20 F6 11 0E
11A9:88 C6 05 D0 F5 AD FE 11 E4
11B1:18 69 10 8D FE 11 90 03 75
11B9:EE FF 11 E8 E0 0C D0 CB A8
11C1:CA A9 0C 85 05 BC E4 10 82
11C9:B9 F0 10 20 F6 11 C8 C6 5D
11D1:05 D0 F5 88 A9 0C 85 05 7F
11D9:B9 F0 10 20 F6 11 88 C6 EC
11E1:05 D0 F5 AD FE 11 18 69 2A
11E9:10 8D FE 11 90 03 EE FF D6
11F1:11 CA 10 CD 60 B9 F0 10 0A
11F9:4A 6A 09 20 8D FF FF EE 5A
1201:FE 11 D0 03 EE FF 11 60 2D
1209:AE D5 02 CA 8E 3B 12 AE 1B
1211:D4 02 CA 8E 2B 12 CA 8E 28
1219:2F 12 A2 35 BD F4 1B F0 E9
1221:1C BD B0 1A CD D4 02 F0 31
1229:08 C9 00 F0 04 C9 00 D0 EA
1231:0C BD E6 1A CD D5 02 F0 04
1239:07 C9 00 F0 03 CA 10 DC A2
1241:60 BD B0 1A 8D D4 02 BD 3E
1249:E6 1A 8D D5 02 20 22 0C 57
1251:20 61 0F B0 48 A9 D7 9D 01
1259:F8 07 A9 0A 9D DA 02 9D 8B
1261:E2 02 A9 03 9D EA 02 A9 23
1269:01 20 77 0F A9 01 20 7A 02
1271:0F A9 01 20 7D 0F 8A 0A F0
1279:A8 AD D5 02 0A 0A 0A 69 2E
1281:25 99 01 D0 AD D4 02 0A 9A
1289:0A 69 05 0A 99 00 D0 A0 5D
1291:10 20 80 0F AD 15 D0 1D 47
1299:DA 0D 8D 15 D0 A9 03 4C F0
12A1:1A 0E A2 14 BD 46 03 9D 96
12A9:00 D4 CA 10 F7 A2 0E BC 80
12B1:34 03 F0 3F 88 98 0A 0A 87
12B9:0A A8 A9 00 9D 34 03 9D A3
12C1:05 D4 9D 06 D4 BD 4A 03 E6
12C9:29 FE 9D 04 D4 A9 06 8D 1D
12D1:37 03 8E E4 12 B9 26 13 49
12D9:9D 47 03 C8 E8 CE 37 03 7F
12E1:D0 F3 A2 00 B9 26 13 9D E9
12E9:36 03 B9 27 13 9D 35 03 10
12F1:18 90 25 DE 35 03 D0 08 38
12F9:BD 4A 03 29 FE 9D 4A 03 88
1301:BD 47 03 18 7D 36 03 9D 22
1309:47 03 6A 5D 36 03 10 08 9C
1311:A9 00 9D 06 D4 9D 4C 03 D8
1319:8A F0 07 38 E9 07 AA 18 FD
1321:90 8D 4C 31 EA 02 00 08 F6
1329:81 00 FA 00 05 32 00 08 68
1331:81 00 F9 00 02 0A 00 08 97
1339:81 00 FA 00 05 2F 00 08 6C
1341:81 CB 2C 01 36 03 00 08 76
1349:81 00 FA 00 05 A9 15 8D 16
1351:5E 13 A9 34 8D 61 13 A0 9C
1359:04 A2 00 BD 0A 15 9D 40 26
1361:34 E8 D0 F7 EE 5E 13 EE 7B
1369:61 13 88 D0 EE 78 A9 33 03
1371:85 01 A9 D0 8D 83 13 A9 27
1379:38 8D 86 13 A0 08 A2 00 8B
1381:BD 00 D0 9D 00 38 E8 D0 FD
1389:F7 EE 83 13 EE 86 13 88 49
1391:D0 EE A9 37 85 01 58 BD 23
1399:D2 13 9D C8 3E BD D2 14 D0
13A1:9D C8 3F E8 D0 F1 A9 D8 B9
13A9:8D 16 D0 A9 01 8D 86 02 1E
13B1:8D 20 D0 A9 00 8D 21 D0 A4
13B9:A9 01 8D 22 D0 A9 07 8D 91
13C1:23 D0 A9 1D 8D 18 D0 A9 CC
13C9:0E 20 16 E7 A9 08 4C 16 5C
13D1:E7 FF FF FF FF AA AA AA 96
13D9:28 40 C0 C0 80 C0 DC FE 08
13E1:E7 00 80 80 80 FC BC C0 46
13E9:80 77 1F 7F FB 73 71 F1 8C
13F1:F0 0F 1F 1F 0E EF FF ED 48
13F9:7F 00 00 00 00 00 00 00 DF
1401:03 00 00 00 00 00 00 00 AA
1409:C0 EE F8 FE DF CE 8E 8F 43
1411:0F F0 F8 F8 70 F7 FF B7 C6
1419:FE 02 03 03 01 03 3B 7F DB
1421:E7 00 01 01 01 3F 3D 03 EF
1429:01 00 00 7E FF 7E 7E FF B0
1431:7E 50 50 50 50 00 00 00 3E
1439:00 00 00 00 00 00 00 40 A1
1441:50 FF FF FF FF AA AA 28 B9
1449:00 3C FF FF FF FF FF FF 80
1451:FF 05 05 05 05 00 00 00 D3
1459:00 00 00 00 00 00 00 01 82
1461:05 00 00 01 05 05 05 05 67
1469:05 00 00 40 50 50 50 50 CC
1471:50 FF FF FF FF FF FF FF C1
1479:FF 00 00 00 00 3C FF FF 92
1481:FF 00 00 00 7E DB BD FF 88
1489:3C BD BD BD DB E7 FF 81 D2
1491:81 FF FF FF FF FF FF 81 FB
1499:81 F0 90 F0 90 F0 90 F0 3A
14A1:90 0F 09 0F 09 0F 09 0F 8D
14A9:09 BD BD BD 18 C3 C3 00 B0
14B1:FF FF C7 BB 3B 86 8C 18 B3
14B9:F0 FF FF FF 3C C3 C3 00 D2
14C1:FF FF E3 DD DC 61 31 18 2B
14C9:0F 00 00 00 00 FF FF 00 79
14D1:00 18 3C 3C 7E FF DB E7 DE
14D9:3E 00 00 0F 0F 0F 0F 00 E4
14E1:00 00 00 00 00 00 00 00 0A
14E9:00 22 22 AA A8 A8 A8 A8 6B
14F1:A8 BE BE AA AA 82 82 82 87
14F9:82 00 00 FC FC FC FC 3C 45
1501:3C 88 88 AA 2A 2A 2A 2A 9F
1509:2A 00 00 00 00 00 00 00 48
1511:00 00 00 00 00 00 00 00 3B
1519:00 00 02 00 00 05 18 00 C7
1521:1A 16 00 3E 0E 00 3D 18 C4
1529:00 1E 00 00 05 00 00 02 05
1531:00 00 00 00 00 00 00 00 5B
1539:00 00 00 00 00 00 00 00 63
1541:00 00 00 00 00 00 00 00 6B
1549:00 00 00 00 00 00 00 00 73
1551:00 00 00 00 00 00 00 00 7B
1559:40 00 00 A0 00 00 58 00 5E
1561:18 7C 00 68 BC 00 70 78 7C
1569:00 18 A0 00 00 40 00 00 AE
1571:00 00 00 00 00 00 00 00 9B
1579:00 00 00 00 00 00 00 00 A3
1581:00 00 00 00 00 00 00 00 AB
1589:00 00 00 00 00 00 00 00 B3
1591:00 00 00 00 00 00 00 00 BB
1599:00 00 00 00 00 00 00 00 C3
15A1:1C 00 00 3F 00 00 3F 00 4C
15A9:00 1C 00 00 00 00 00 00 DA
15B1:00 00 00 00 00 00 00 00 DB
15B9:00 00 00 00 00 00 00 00 E3
15C1:00 00 00 00 00 00 00 00 EB
15C9:00 00 18 00 00 3C 00 00 E7
15D1:7E 00 00 7E 00 00 66 00 EF
15D9:00 24 00 00 00 00 00 00 0D
15E1:00 00 00 00 00 00 00 00 0C
15E9:00 00 00 00 00 00 00 00 14
15F1:00 00 00 00 00 00 00 00 1C
15F9:00 00 00 00 00 00 00 00 24
1601:00 00 00 00 00 00 00 00 2D
1609:00 00 00 00 00 00 00 00 35
1611:00 00 00 00 00 00 00 00 3D
1619:00 00 00 00 00 00 38 00 B5
1621:00 FC 00 00 FC 00 00 38 AC
1629:00 00 00 00 00 00 00 00 55
1631:00 00 00 00 00 00 00 00 5D
1639:00 00 00 00 00 00 00 00 65
1641:00 00 00 00 00 00 00 00 6D
1649:00 00 00 00 00 00 00 00 75
1651:00 00 00 00 00 00 00 00 7D
1659:00 00 00 00 00 00 00 00 85
1661:00 00 00 00 00 00 00 00 8D
1669:00 00 00 00 00 00 00 00 95
1671:00 00 00 00 00 00 00 3C D9
1679:00 00 7E 00 00 7E 00 00 6F
1681:3C 00 00 3C 00 00 18 00 BF
1689:00 00 00 00 00 00 00 00 B5
1691:00 00 00 00 00 00 00 00 BD
1699:00 00 00 00 CC C0 00 3F 6E
16A1:C0 00 F7 00 00 15 C0 00 03
16A9:D5 00 00 37 C0 00 FF 00 3A
16B1:00 CF C0 00 0C 00 00 00 4A
16B9:00 00 00 00 00 00 00 00 E5
16C1:00 00 00 00 00 00 00 00 ED
16C9:00 00 00 00 00 00 00 00 F5
16D1:00 00 00 CC 00 03 30 30 67
16D9:0C FF C0 00 F7 7C 33 1F 5B
16E1:F0 00 F5 CC 03 D7 70 33 9D
16E9:7D CC 03 F7 70 0C DF 30 8B
16F1:00 FF C0 0C 04 30 00 3F 17
16F9:10 03 00 C0 00 CC 00 00 2E
1701:00 00 00 00 00 00 00 00 2F
1709:00 00 00 00 0C 33 00 00 64
1711:0C C0 30 40 0C 03 0C 40 44
1719:0C 33 30 C0 C4 0C 30 30 13
1721:C1 04 CC 33 03 01 CC 30 E3
1729:D3 03 03 30 C4 0C 00 30 EB
1731:30 C3 00 04 1C 03 00 33 C8
1739:10 03 0C CC 00 00 00 33 B1
1741:0C C0 00 40 30 00 30 00 8B
1749:00 00 00 00 00 00 00 00 77
1751:00 00 00 00 00 00 00 00 7F
1759:00 06 00 00 07 80 07 FF 51
1761:E0 07 FF E0 00 07 80 00 EC
1769:06 00 00 00 00 00 00 00 9A
1771:00 00 00 00 00 00 00 00 9F
1779:00 00 00 00 00 00 00 00 A7
1781:00 00 00 00 00 00 00 00 AF
1789:FF 00 00 00 00 00 00 00 B7
1791:00 00 00 00 00 00 00 00 BF
1799:00 60 00 01 E0 00 07 FF 05
17A1:E0 07 FF E0 01 E0 00 00 9B
17A9:60 00 00 00 00 00 00 00 08
17B1:00 00 00 00 00 00 00 00 DF
17B9:00 00 00 00 00 00 00 00 E7
17C1:00 00 00 00 00 00 00 00 EF
17C9:FF 00 00 00 00 00 00 00 F7
17D1:18 00 00 18 00 00 18 00 BD
17D9:00 18 00 00 18 00 00 18 E6
17E1:00 00 7E 00 00 7E 00 00 D9
17E9:3C 00 00 3C 00 00 18 00 2A
17F1:00 18 00 00 00 00 00 00 26
17F9:00 00 00 00 00 00 00 00 28
1801:00 00 00 00 00 00 00 00 31
1809:00 00 00 00 00 00 00 00 39
1811:18 00 00 18 00 00 3C 00 47
1819:00 3C 00 00 7E 00 00 7E CA
```

AUTO PROOFREADER

```
1821:00 00 18 00 00 18 00 00 B4
1829:18 00 00 18 00 00 18 00 17
1831:00 18 00 00 00 00 00 00 67
1839:00 00 00 00 00 00 00 00 69
1841:00 00 00 00 00 00 00 00 71
1849:00 00 00 00 00 00 00 00 79
1851:00 00 00 00 00 00 00 00 81
1859:00 FF 00 00 FF 00 00 FF 89
1861:00 00 FF 00 00 FF 00 00 91
1869:FF 00 00 00 00 00 00 00 99
1871:00 00 00 00 00 00 00 00 A1
1879:00 00 00 00 00 00 00 00 A9
1881:00 00 00 00 00 00 00 00 B1
1889:FF FF FF FF C0 00 03 C0 86
1891:00 03 C0 00 03 C0 00 03 B8
1899:C0 00 03 C0 00 03 C0 00 24
18A1:03 C0 00 03 C0 00 03 C0 80
18A9:00 03 C0 00 03 C0 00 03 D0
18B1:C0 00 03 C0 00 03 FF FF BA
18B9:FF 00 00 00 00 00 00 00 E9
18C1:00 00 00 00 00 00 00 00 F1
18C9:FF 00 00 00 00 00 00 00 F9
18D1:00 00 00 01 01 01 01 01 21
18D9:01 01 01 01 01 01 02 02 0D
18E1:02 02 02 03 00 00 00 00 04
18E9:00 00 00 00 00 00 01 01 1D
18F1:01 01 01 01 01 01 01 01 22
18F9:01 02 02 02 02 02 03 00 A9
1901:00 00 00 00 00 00 00 00 33
1909:00 04 04 04 04 04 04 04 39
1911:04 04 04 04 01 05 09 0D 42
1919:11 00 25 25 25 25 25 25 F7
1921:25 25 25 25 21 21 21 21 17
1929:21 21 21 21 21 21 21 14 4E
1931:18 1C 20 24 25 00 02 04 ED
1939:06 08 0C 0E 10 12 14 00 C3
1941:02 04 06 08 0A 0C 0E 10 63
1949:12 14 17 17 17 17 17 0A 2B
1951:00 02 04 06 08 0C 0E 10 81
1959:12 14 00 02 04 06 08 0A 0C
1961:0C 0E 10 12 14 17 17 17 82
1969:17 17 0A 80 80 80 80 80 BD
1971:80 80 80 80 80 80 80 80 A3
1979:80 80 80 80 80 80 80 80 AB
1981:80 80 80 80 80 80 80 80 B3
1989:80 80 80 80 80 80 80 80 BB
1991:80 80 80 80 80 80 80 80 C3
1999:80 80 80 80 80 80 80 80 CB
19A1:80 80 80 80 80 80 80 80 D3
19A9:80 80 80 80 80 80 80 80 DB
19B1:80 80 80 80 80 80 80 80 E3
19B9:80 80 80 80 80 80 80 80 EB
19C1:80 80 80 80 80 80 80 80 F3
19C9:80 80 80 80 80 80 80 80 FB
19D1:80 80 80 80 80 80 80 80 04
19D9:80 80 80 80 80 80 80 80 0C
19E1:80 80 80 80 80 80 80 80 14
19E9:80 80 80 80 81 81 81 81 2B
19F1:81 80 82 82 82 82 82 82 23
19F9:82 82 82 82 82 82 82 82 2C
1A01:82 82 82 82 82 82 82 81 34
1A09:81 81 81 81 80 00 00 00 AA
1A11:00 00 00 00 00 00 00 00 45
1A19:00 00 00 00 00 00 00 00 4D
1A21:00 00 01 01 01 01 01 00 93
1A29:02 02 02 02 02 02 02 02 5D
1A31:02 02 02 02 02 02 02 02 65
1A39:02 02 02 02 02 01 01 01 66
1A41:01 01 00 0F 0F 0F 0F 0F 09
1A49:0F 0F 0F 0F 0F 05 05 05 37
1A51:05 05 05 05 05 05 05 05 85
1A59:19 19 19 19 19 01 0F 0F 0F
1A61:0F 0F 0F 0F 0F 0F 0F 0F 95
1A69:05 05 05 05 05 05 05 05 9D
1A71:05 05 05 19 19 19 19 19 14
1A79:01 00 00 00 00 00 00 00 2E
```

PHILIP I. NELSON

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.

The *Proofreader* ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. However, spaces inside quotes are significant, so the program pays attention to them.

The *Proofreader* does *not* accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can check the line later by LISTing it, moving the cursor back to the line, and pressing Return.

If you're using the *Proofreader* on the 128, *do not perform any GRAPHIC commands while the* Proofreader *is active.* When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the *Proofreader*—to another memory area, causing it to crash. The same thing happens if you run any program with a GRAPHIC command while the *Proofreader* is in memory.

Though the *Proofreader* doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. The simplest way to disable it is to turn the computer off then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the SYS command.

When using the *Proofreader* with another utility, disable *both* programs before running a BASIC program.

The Automatic Proofreader

```
10 VE=PEEK(772)+256*PEEK(773):
   LO=43:HI=44:PRINT"{CLR}
   {WHT}AUTOMATIC PROOFREADER
   {SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
   6:GRAPHIC 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<>20570 THEN PRINT "*E
   RROR* CHECK TYPING IN DATA
   {SPACE}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,L
   B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
   RROR* RELOAD PROGRAM AND CH
   ECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
   ,22:POKE SA+18,23:POKESA+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 DATA120,169,73,141,4,3,169
   ,3,141,5,3,88,96,165,20,133
   ,167
130 DATA165,21,133,168,169,0,1
   41,0,255,162,31,181,199,157
   ,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 DATA7,165,176,208,3,104,20
   8,226,104,166,180,24,165,16
   7
180 DATA121,0,2,133,167,165,16
   8,105,0,133,168,202,208,239
   ,240
190 DATA202,165,167,69,168,72,
   41,15,168,185,211,3,32,210,
   255
200 DATA104,74,74,74,74,168,18
   5,211,3,32,210,255,162,31,1
   89
210 DATA227,3,149,199,202,16,2
   48,169,146,32,210,255,76,86
   ,137
220 DATA65,66,67,68,69,70,71,7
   2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137
```

HOW TO TYPE IN

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

Although you can move the cursor around the screen with the Crsr keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT} and {HOME} in the program 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. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a graphics symbol for cursor left. In this case, you can use the Del key to back up and edit the line. Type another quotation mark and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing Return. Then cursor up to the mistyped line and fix it. If the mistake involves cursor movement, however, 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	

GET TOTAL CONTROL • RENDER IN 3-D • CAST MAGIC SPELLS • KEEP YOUR APPOINTMENTS

TOTAL WORD

Sharp, professional-looking documents are every professional's goal. Clients expect it. You should deliver it. To meet these high expectations and achieve just the right shine, word processing manufacturers are including more desktop publishing features, such as multiple typefaces, the ability to integrate graphics with text, and support for laser printers. *Total Word,* from the makers of *Volkswriter,* blends word processing and desktop publishing into one impressive package.

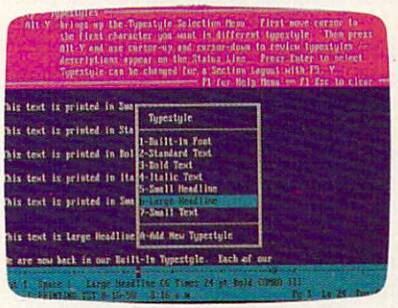
Total Word has many of the features of the best word processors, including mail merge, a spelling checker, a thesaurus, word counting, math functions, automatic hyphenation, macros, and so on. Unlike other word processors, however, *Total Word* has graphics and formatting capabilities that may well win you over if you're really interested in a polished, professional look for your documents.

Powerful formatting features are available through *Total Word*'s easy-to-use style sheets, which simplify document layout. You select a paragraph or a blank line and type F9. The section layouts menu lets you change line spacing, margins, tabs, columns, and other options. If you need a previously saved section layout, you select it from this menu also.

All of the different section layouts can be scrolled through and then used, edited, or copied. The program ties style sheets to the documents by filename extension so the same style sheet can be used with other documents. If, for example, you create a style sheet for a proposal in the file BILL.PRO, you can use the same style sheet when you write another proposal simply by using the same extension. Call your new proposal TOM.PRO, and you're in business. Now you can concentrate on the content of this winning proposal rather than on its format.

Like macros in other word processors, *Total Word*'s macros speed you right along. However, this program offers a distinct advantage: simplicity. Anyone can use its macros. Anyone can appreciate their power.

The only graphics *Total Word* can use in its documents are those captured from the screen with the *Snapshot* program provided in the package. Using the graphics menu, you can insert, reduce, enlarge, lighten, darken, or reverse images.



Choose from a variety of typefaces.

Before you print, you have the option to view the page with *Total Word*'s preview function. The page is displayed on the screen as it would appear when printed. Although it's too rough a display to proof more than the general layout, it is useful for checking margins, headers, and columns. There's also a zoom feature to give you a closer look at the text and layout. You can move around the page in the zoom view, but no editing is possible. Since graphics are not displayed in the editing mode, the preview function is useful for the placement of graphics.

When you're ready to print your document, all of your printer's capabilities can be used. *Total Word* supports a large number of printers including the HP LaserJet family and PostScript laser printers. If you have the standard Hewlett-Packard soft fonts or cartridge fonts, *Total Word* has the drivers to support them. Soft fonts from programs such as Bitstream Fontware and Digi-Fonts or the standard PostScript fonts can also be used. The program uses only a limited range of point sizes even in PostScript, but it is an adequate number for most word processing needs.

Although *Total Word* is marketed as a word processor with desktop publishing power, its real strength is scientific and technical word processing. With an extremely large extended character set, you have the capability to use complex mathematical formulas and organic chemistry symbols. However, you do need a laser printer to print these characters.

Total Word offers nine alternate keyboard layouts that let you take advantage of the extended characters. Using simple keystroke combinations, you select an alternate keyboard from the menu that corresponds to the character set you wish to use. A display appears at the top of the screen with the alternate characters mapped to each key on the keyboard. You then type the necessary characters or switch to another alternate keyboard to insert an entirely different set of characters. Choose from keyboards with special symbols for business, the Greek alphabet, math symbols, and many others.

An impressive feature of *Total Word* is its manual. Written with the beginner in mind, the first section of the manual includes the basics of computer word processing. The second section uses specific sample files such as a business letter or a newsletter to explain advanced commands. The final section is for reference. Advanced users can locate information quickly since the manual is well indexed. After you've gleaned the basics from the manual, an onscreen tutorial

allows you to practice many of the major features of *Total Word.*

A major weakness of *Total Word* is the absence of mouse support. When it comes to editing text, moving blocks of text, or just moving the cursor to other parts of the document, a mouse is much faster than the keyboard. Even with its powerful capabilities, *Total Word* just doesn't feel quite right without mouse support in the rapidly growing world of graphical user interfaces and pull-down menus.

All in all, *Total Word* is a worthy competitor in the arena of high-powered word processing. If you have to write math equations or use scientific notation, *Total Word* may, in fact, be your best choice.

THOMAS J. MORRIS

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

IBM PC and compatibles; DOS 2.0 or higher (DOS 3.0 or higher recommended); 410K of RAM (after loading DOS) minimum; EGA, MCGA, VGA, or Hercules Graphics Plus with RamFont adapter; PostScript, LaserJet, or compatible printer (to print extended character set); one floppy drive and a hard disk with 2MB of available disk space—$495
Upgrade for registered *Volkswriter* users—$149

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HEAT WAVE

The flag drops. Your engine comes to life. All 1300 horsepower of racing machine screams across the starting line, kicking up a monster rooster tail of water. This is the world of superboat racing.

In *Heat Wave,* you try to capture the crown of superboat racing, the title US-1. Race a season and see how your points stack up against the other racers of the circuit.

Six preset courses provide plenty of high-speed challenge, and you can create up to ten different custom courses.

Try to handle the power of a superboat.

Select your boat from one of four different types. I chose a catamaran because it performs best in calm water and reaches speeds of 100 mph.

As a rookie to the racing world, I had to register myself and my boat before I could race. And I made good use of the practice sessions, which are set up just like the real race but don't affect your season standing. After choosing a course, you race the other four computer-controlled competitors.

The graphics are superb, and you control the degree of detail. The greater the detail, the slower the game speed. Although I didn't find the game speed to be a problem, occasionally the game didn't respond to my keystrokes. This was quite irritating at the starting flag.

Qualifying isn't easy, either. Running full speed to the first buoy of the race and then turning 180 degrees to race full speed back to the starting line turns out to be quite a challenge.

At first it's hard enough just keeping track of where you are on the course and where you're going. But once you've developed a little proficiency in basic boat handling, you'll start to notice the impressive array of engine instruments and equipment on board. Pay attention to this equipment to avoid running aground, overheating, overrevving, or running out of fuel.

Winning in superboat racing is more than just being the first to cross the finish line. During the course of a race, you can accumulate time penalties, which are added to your finishing time. Missing a buoy or having to repair your boat during the race adds minutes to your time.

Heat Wave is a game of excitement and challenge that may give even Don Johnson a run for his money. With some skill and a little luck, you might make it to the winner's circle.

THOMAS J. MORRIS

Playability	★★★
Documentation	★★★
Originality	★★★
Graphics	★★★★

IBM PC and compatibles with 384K; CGA, EGA, Hercules MGA, VGA, or Tandy 16-color; 3½-inch disks available—$39.95

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PACKARD BELL 9500 DESKTOP LASER PRINTER

The PB9500 passed, with flying colors, a pretty stringent test: It performed beautifully for two editors whose printing needs are intense and ongoing. We threw everything at this printer: daily memos, article drafts, long proposals and reports (complete with charts), and even a book manuscript or two. The printer threw back, with the unflappable precision of a machine doing what it's designed to do, crisply reproduced pages with nary a smudge and only the rarest of paper jams.

The printer is well equipped for its price (which should be substantially below retail list in the stores through which Packard Bell markets its products). Resident fonts include four Courier styles as well as Portrait and Landscape line printer modes. Additional fonts can be added, although the add-on slots are optional. The printer's standard emulation is Hewlett-Packard Laserjet II; you can add other emulations by way of optional cartridges. The machine comes with 1.5 megabytes of memory, and you can upgrade to either 2.5 or 4.5 megabytes. Packard Bell has done a good job of assembling an attractive array of features at a competitive price.

continued on page 92

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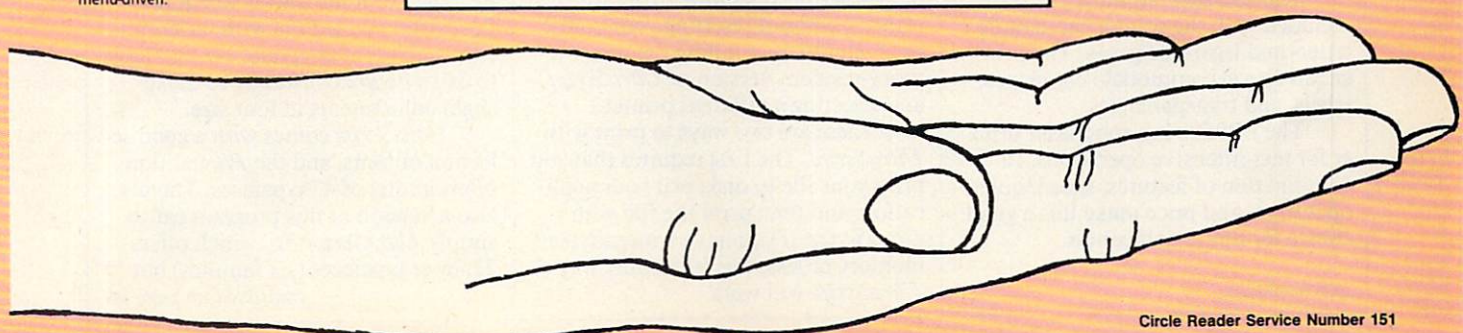

continued from page 90

This is also one of the quietest laser printers I've used. I especially appreciated the way the printer powers down its fan between uses. There's no constant low hum in the background as is customary with most lasers. The idle mode is a feature that other printer manufacturers would do well to incorporate.

The PB9500 laser printer offers crisply reproduced pages with nary a smudge and only the rarest of paper jams.

Although the printer's output is rated at six printed text pages per minute, I found the unit capable of exceeding that rate on all but the heaviest of jobs. Typical text output, with reasonable margins, can easily hit seven pages per minute.

While this is not a printer for ambitious desktop publishing applications, it did perform at an acceptable speed when printing documents involving simple graphs, charts, and logos.

Well-built, with a solid housing and equally solid catches and latches, the PB9500 should hold up well over time. Its small footprint lets you place it comfortably in the corner of a desk, although the paper tray adds to the space required. LCD controls are arranged along the front of the machine. Setup is simple and relatively foolproof. The few paper jams we encountered were easily cleared.

The 150-sheet input paper tray included with the printer can handle letter- and legal-size pages. The printer can also accommodate envelopes, labels, and transparencies.

The PB9500 is a solid laser printer for text-intensive operations. Its combination of features, speed, quiet operation, and price make this a good choice for home or business.

KEITH FERRELL

Ease of Use/Installation	★★★★
Documentation	★★★
Features	★★★★
Compatibility	★★★

Packard Bell PB9500—$2,195.00
Options: Output paper tray—$29.95
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ULTRASCRIPT PC PLUS

Recent technological developments have greatly enhanced the quality and capabilities of PC desktop publishing. One of them is *UltraScript PC Plus,* a PostScript language–compatible interpreter that offers PostScript compatibility on non-PostScript printers. With this software marvel, I now have the power of PostScript at a fraction of the cost.

Although it requires at least AT (80286) technology, *UltraScript* will run in as little as 640K of RAM. If you have at least 800K of extended memory, you can print without exiting your application. You'll need four megabytes of free disk space and DOS 3.1 or higher, but most AT-compatible computers can easily accommodate these requirements. Your laser printer will need at least a megabyte of memory to print a full page at 300 dpi.

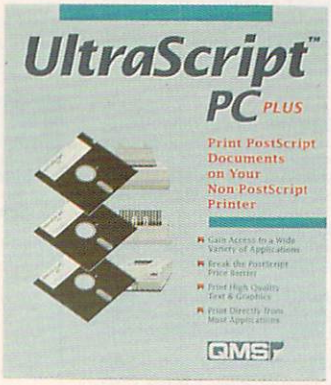
UltraScript supports an impressive list of printers, and even your dot-matrix printer can take advantage of PostScript capabilities. Change printers without resetting your computer simply by running the non–memory-resident version of *UltraScript* and selecting a different printer.

There are two ways to print with *UltraScript.* The first requires that you print your file to disk, exit your application, and then print the file with *UltraScript.* If you have a megabyte of memory or less, this is the only way *UltraScript* will work.

The second method is to load the memory-resident version of *UltraScript* and print from within your application. You select the PostScript driver for your application and print the file as usual except *UltraScript* redirects the output (with a program called PCAPTURE) to the PostScript interpreter; then it converts the file to a bitmap and sends it to the printer.

The memory-resident version of *UltraScript* uses 44K of regular memory; the rest of the program resides in extended memory. If necessary, the print file is written to the hard disk.

When I first tried to run *UltraScript,* I tried to print directly from within *Ventura Publisher* using the memory-resident mode. The file eventually printed, but *Ventura* would not leave its print menu, and I had to reset the computer. I managed to solve this apparent memory problem only after spending the good part of a day trying to get through to technical support and then working through a solution. If I'd had customers waiting, it could have cost me money.



***UltraScript* offers you PostScript compatibility on non-PostScript printers.**

After I finally got *UltraScript* up and running, it was a breeze to use. Printing with the program takes a little longer, but the wait is worth it. PostScript spoiled me with its simplification of font selection. I didn't have to exit *Ventura* constantly to make slight adjustments in font size.

UltraScript comes with a good selection of fonts, and the *Plus* edition offers a total of 47 typefaces. There's also a version of this program called simply *UltraScript PC,* which offers 22 fewer typefaces (six families) but

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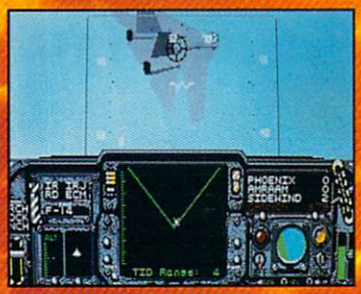
DOGFIGHT WITH DAREDEVILS



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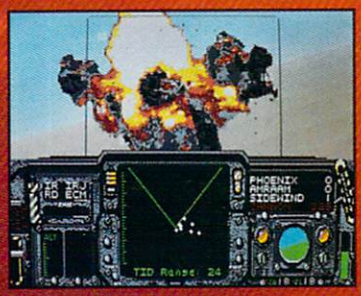

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C1190

continued from page 92

costs less and has the same system requirements.

UltraScript will work with other PostScript fonts, such as those produced with Bitstream Fontware, but the manual warns you that using other vendors' fonts could result in longer print times.

UltraScript PC Plus gives you the best of both worlds—the speed of an HP LaserJet or the power of PostScript—without doubling your costs.

THOMAS J. MORRIS

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

IMB PC AT, PS/2 Model 30-286 and higher, and compatibles; 640K of RAM minimum, 1.5MB needed to print from within an application (recommended); MS-DOS or PC-DOS, version 3.1 or higher; 1.2MB 5¼-inch or 1.44MB 3½-inch floppy disk drive; hard disk with 4MB of available memory

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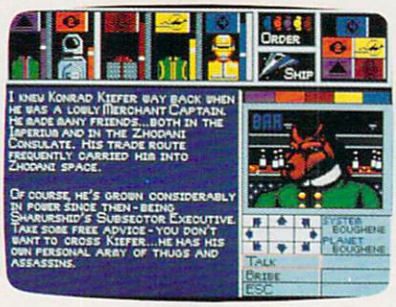
MEGATRAVELLER 1: THE ZHODANI CONSPIRACY

Are you ready to explore 28 star systems, trying to prevent a cataclysmic galactic war? Are you the stuff of heroes? You'll find out when you play *MegaTraveller 1: The Zhondani Conspiracy,* part 1 of an epic space adventure.

Those familiar with role-playing board games will recognize this as the computerized version of the popular award-winning Traveller game. Designer Marc Miller has broken new ground with this board-to-computer translation, adding many arcadelike features to *MegaTraveller.* Still, the game moves slower than a tax refund when it comes to character development and routine tasks.



Explore richly diverse planets.

Amazingly detailed EGA graphics enhance your party's exploration of the richly diverse planets, each defined by numerous distinguishing characteristics. For instance, you might discover a huge water world with a poisonous atmosphere and a small population with a prestellar technology—but no starport where you might land. This degree of detail is evident throughout the game, from weapons variety to vehicle types to the colorful characters you're likely to meet during your travels.

You get a 144-page manual crammed with background story, charts, diagrams, and explanations of every aspect of gameplay. *MegaTraveller* allows you to create extremely complex playing characters to include in your party of five.

Characters can develop up to 54 vital skills, which determine how successfully they will perform tasks required during the game. It's advisable to make each party member a specialist in several unique areas rather than to develop a group of, say, fighters. During the game, characters can pay for training and education to add new skills or enhance existing abilities.

Your ship, the Interloper, must be greatly upgraded during the game to give it the capabilities needed for success.

The money for all this training and upgrading comes from trading. Saving the galaxy costs money, and an elaborate bartering system will let you earn credits through interplanetary trading.

MegaTraveller supports RealSound as well as digitized sounds by Covox, but you'll need 600K of free RAM to hear all the sounds. With less memory, you'll hear only partial sound effects. But even without a sound card, you'll have great sound effects.

With all the obvious work that went into this game, I'd love to say I recommend it for everyone, but this game isn't for everyone. It requires a lot of methodical work, such as training characters, earning money for required supplies, and exploring vast regions. You'll need to set aside a fair chunk of time to really explore what *MegaTraveller* has to offer. Maybe if I were stranded on Gilligan's Island and the Professor built a 386-based PC using coconut shells, bamboo sticks, and the never-say-die batteries from the radio for power. . . .

SCOTT MILLER

Playability	★★★
Documentation	★★★★★
Originality	★★★★
Graphics	★★★★
Sound	★★★★

IBM PC and compatibles; 512K (600K for full sound effects); CGA, EGA, VGA (requires 640K), Tandy 16-color (requires 640K); mouse or joystick optional—$59.95

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FALCON 3.0
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The bogey came out of nowhere. You see him just off your tail. The adrenalin hits you like a fist. You call your wingman: "Viper One, I've got a bandit on my six. This is not good..."

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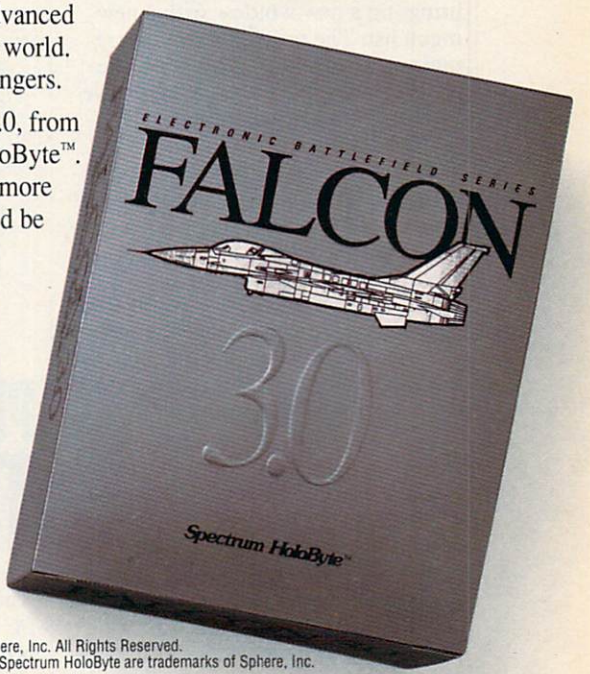

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Circle Reader Service Number 223

MS-DOS

With *CIM*, navigation is easy and fun.

the error-correcting protocols for down- and uploading files. Because automated scripts and interface programs depend on accurate responses, it's common for them to lock up when the original interface's ASCII commands and prompts are garbled by line noise. This shouldn't be a problem with HMI, because if a command or prompt isn't received perfectly, HMI automatically sends it again.

With the command line interface, you might start at an opening menu and make a series of selections until you reach your destination. When you do this with *CIM*, each selection brings up a new window with a new menu list. The previous windows remain onscreen so you can select the appropriate window and easily move back and forth through the levels.

With both the original interface and *CIM*, you can type GO and a keyword to move directly to a specific location. *CIM* automates this process by letting you save these locations to a Favorite Places menu. You can also find areas of interest by selecting Find from the pull-down Service menu. Type in a keyword and you'll see a list of CompuServe services that are related to your chosen topic.

To search the forum libraries, you select your search parameters and click on the library section you want to search. A window with a menu of files will open with the entries that qualify. You can scroll forward and backward through the selections and click on a file. Another window will open, this time with the file's title (which usually functions as a short description) and five buttons: Next, Abstract or View, Retrieve, Mark, and Cancel.

While you can download GIF files or view them online (viewing is no faster than downloading), you can't do both. If you decide you like a GIF file after you've viewed part of it, you'll have to start all over again to download it.

CIM automates a number of other CompuServe areas, including messages, mail, stock quotes, CB Simulator, and Weather. In addition, *CIM* comes with an excellent 300-page manual that also provides an introduction to CompuServe's many services.

CompuServe has said that the original interface will still be available for members who use automated scripting programs, but the days of the command line interface are numbered. HMI is a great leap forward for making CompuServe easy to use, and *CompuServe Information Manager* is an excellent—and attractively priced—way to use this powerful telecommunications service.

DAVID ENGLISH

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

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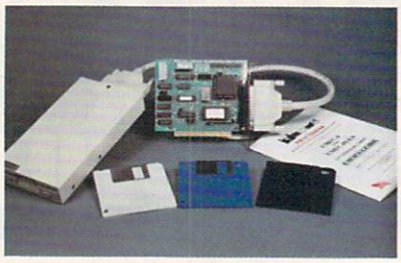
PRACTIDISK

There's no such thing as enough money or enough disk space. No matter how much capacity you have, you'll always scream for more. Practidisk, a 2.88MB disk drive completely compatible with standard PC hardware and lower capacity disks, is one among a handful of products manufactured in response to that plea.

Developed and patented by Toshiba and manufactured by TEAC, the Practidisk drive is the size and shape of a standard 3½-inch disk drive, but it uses carefully arranged barium ferrite particles and perpendicular recording technology to squeeze twice as many bits onto the tracks.

Practidisk's extremely flexible 8-bit controller card works with almost any version of BIOS and any version of DOS 2.0 or higher to control any capacity 5¼- or 3½-inch floppy disk drive installed in almost any PC-, XT-, or AT-compatible computer.



Use 2.88MB, 1.44MB, and 720K disks.

The drive and controller worked flawlessly on the AT clone I tested, but not on a Commodore Colt XT-compatible, even with a replacement card the company sent. A company official assured me that this was a very rare situation, encountered so far only with Commodore PCs.

Thanks to Practidisk's own BIOS and driver program, you can treat your 2.88MB drive as if it were just another DOS device. The only difference is that, when you format a disk, you must use a special PFORMAT command specifying the density of the disk. Once everything is set up and running, you can use, for example, *PC Tools Deluxe* to perform a surface analysis and optimization of your extra-high-density disk.

You can insert the drive in one of your drive bays or—for about $110 more—install an external unit, which comes with a cable with a 37-pin D connector on each end.

While doctoring regular disks for use in high-density drives is a popular way to save money, I don't recommend trying it with the Practidisk drive. The size of the tracks and the amount of power used to write data to the disk vary with capacity, and disks not designed for a given format may retain that format only temporarily, though initially they appear to perform flawlessly. ▷

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ELECTRONIC ARTS®

Circle Reader Service Number 242

MS-DOS

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The principal anxiety involved in buying a technology that IBM has not annointed, like 2.88MB floppy disk drives, is that the standard may end up being incompatible with the hardware you have purchased. Therefore, people are interested in whether a new piece of technology has industry support. The manufacturers of *Back-It* support the 2.88MB format. Extra-high-density disks (virtually identical in appearance to high-capacity disks but marked with the letters *ED*) are available from 3M (I found them for $32.50 apiece), Maxell (slated to list at $162.85 for a 10-pack), and Toshiba. Practical Computer Technologies sells the extra-high-density disks for a bargain—$7.00 each. If, at some point, these disks lose favor to some other extremely high-density disk standard, the Practidisk drive won't be obsolete because it will still be used with 720K and 1.44MB disks and any 2.88MB disks you have on hand.

ROBERT BIXBY

Ease of Setup/Installation	★★★★★
Documentation	★★★★
Features	★★★★
Compatibility	★★★★

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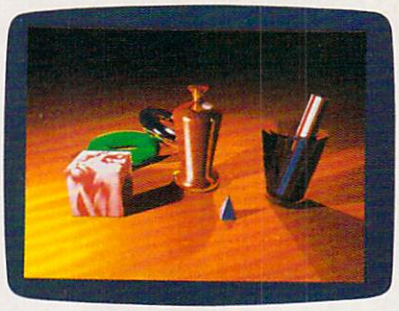
AMIGA

3-D PROFESSIONAL

Creating 3-D graphics on the Amiga has fascinated me ever since I saw the Juggler demo at my Amiga dealer's in 1986. Creating objects on graph paper and typing in coordinates, or trying to draw the starship Enterprise using only triangles, however, did not intrigue me.

Now Cryogenic Software has developed *3-D Professional,* the modeling and animation program for "the rest of us." *3-D Pro* is extremely easy to use and has an intuitive user interface, but it's still very powerful.



Scenes like this are easy to render using *3-D Pro*'s ray-trace module.

Objects in *3-D Pro* are built from simple shapes, called *primitives.* There are 13 predefined primitives, including a sphere, a cone, a cube, a cylinder, a line segment, and even a torus. It's amazing how many objects can be created from these primitives, but if your needs are more complex, *3-D Pro* also has lathe, conic, and profile tools that let you create more complex primitives. You can even create fractal trees and landscapes or convert Amiga fonts or IFF brushes into 3-D objects. You can also import *VideoScape 3-D, Sculpt 3-D, AutoCad, Forms in Flight, Turbo Silver, 3-Demon,* and Atari ST *Cad 3-D* objects. Your *3-D Pro* objects can be saved in *VideoScape 3-D* format for editing with a third-party object editor.

The objects you create can have a wide variety of characteristics. You can choose an object's color, transparency, roughness, reflectiveness, glossiness, index of refraction, and amount of specular reflection. There are also a number of predefined surface properties, such as plastic, stone, aluminum, and glass. The most impressive effects can be created using the editable textures. With a single click, you wrap your objects with wood, marble, checkered patterns, bricks, or a host of other textures.

Once you've created your objects, *3-D Pro* makes it easy to arrange them into a scene. You can edit an object from one of six different views (left, right, top, bottom, front, and back). Only one view can be displayed at a time while editing, but there's a Model view that lets you preview your scene from four different angles.

The camera view shows your scene as from the observer's viewpoint. This is very handy—most 3-D packages require you to render a test scene to see exactly how your objects will be displayed.

Instead of just displaying a wireframe view of your objects while you're editing them, *3-D Pro* shows you a solid, dithered, color representation of the scene. This makes it easy to remember which colors you've chosen for individual objects and gives you a basic idea of how objects will be shaded.

Once you've created your scene, it's time to shed some light on your subjects. You can have up to 99 different light sources in a scene. Lights can be points (like a light bulb or the sun), cylindrical (like a laser beam), or conical (like a spotlight). Light beams can have different colors, handy for creating effects like red laser beams or purple spotlights. You can also control the amount of ambient light and create haze effects.

Your lights are in place, the camera is ready, and now it's showtime. Options abound at rendering time, too. There are four different rendering options built in: pattern, solid, gourad, and phong. Pattern is similar to the shading used in the work modes; the shading of each polygon is achieved by dithering gray patterns with the polygons in each object to make varying shades of the polygon's color. Solid rendering uses more colors, but each face of the polygon is rendered in a single color. Gourad employs a smoothing algorithm to remove the faceted look of each object.

Pattern-, solid-, and gourad-rendering algorithms are good for first-draft pictures, but you'll want to use phong shading for final output. Phong rendering determines shading on a pixel-by-pixel basis, so it shows all textures and specular highlights, and it's much faster than ray-tracing. While phong-rendered objects often look as good as their ray-traced counterparts, they don't cast shadows, so phong-rendered pictures generally aren't as realistic as ray tracings. To get the most out of *3-D Pro,* you'll want to purchase the optional ray-tracing module. ▷

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Circle Reader Service Number 106

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I examined an early beta version of the *3-D Professional Ray-Trace Custom Rendering Module.* This program can be run in conjunction with *3-D Pro* (select Custom Rendering and *3-D Pro* will send the file to the ray tracer), or as a stand-alone (the program loads a *3-D Pro* data file). The module gives you an incredible amount of control over the tracing process. You can select the number of rays to trace through each pixel and toggle features such as soft shadows, fuzzy reflections, and smoothing. *3-D Pro's* ray-tracing module is the first to support atmospheric distortion, so your pictures can even have a foggy or hazy appearance. The module should be available sometime late this fall.

You can display *3-D Pro* rendering on a wide variety of devices. Of course, *3-D Pro* will render directly to the Amiga monitor in lo res, hi res, or HAM. You can output 24-bit RAW RGB files, so you can modify your renderings with programs such as ASDG's *The Art Department.* The program also supports the 2024 and Moniterm 1008 × 800 monochrome monitors, the Mimetics Frame Buffer, and the MicroIllusions Transport Controller. You can even output to a PostScript or EPS file if you're planning on using your creation in a laser-printed document.

3-D Pro isn't limited to just creating pretty pictures, either. You can create animations using scripts or the menu interface. *ARexx* scripts can be used to set up each frame in the animation, or you can use the key-frame feature to set up starting and ending frames and let *3-D Pro* handle the movements necessary to get objects from Point A to Point B. You can tune up your animations using the included *Animation Station* software, a powerful frame-by-frame animation editor that's also available separately from PP & S.

The program comes in a huge box that's packed with documentation. There's a 310-page tutorial manual, a 450-page reference manual, and another 100-page manual covering the *Animation Station* software. There's even a two-hour tutorial videotape included in the package. The manuals are well written and logically organized.

I have only a few complaints about *3-D Pro.* When you first start the program, you're faced with a requester asking how many objects, primitives, vertices, and other elements you'll need for your scene. While you can usually just accept the default values, the requester is an intimidating element in a program that's otherwise very friendly to novices. Also, the program is slow on 68000 machines. Using the sample scene file, it took the program 13 seconds to redraw the screen after I moved a single object. On a 25-MHz 3000 using the supplied 68020/68881 version, the same scene was redrawn in only 3.5 seconds. Finally, because of the $499.95 retail price of *3-D Professional,* PP & S should charge only a nominal fee for the ray-tracing module, considering that it should have been included with the package in the first place.

DENNY ATKIN

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

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BARNEY BEAR GOES TO THE FARM

Barney Bear is back. In *Barney Bear Goes to the Farm,* the second entry in this series for young children, Barney visits his grandparents' farm. This interactive tale includes short stories, games, and even a computerized coloring book.

Barney starts by performing his chores, such as milking cows and feeding chickens. Each chore is depicted in a still picture. Click on an object and you'll hear a sound or a voice telling you something about the object.

He then heads to the farmhouse, where he sits by the fire, reading stories and playing games. There are ten different activities in the program. Healthy Bears teaches children about how to be health conscious. The Seed tells how a seed is planted and grows. In the I Can Read activity, the program displays pictures of ten farm animals. When the child clicks on each animal, the animal makes a sound, and the program uses the Amiga's voice synthesizer to tell a story about the animal.

In the What Belongs to Me? game, a child must match one of five objects to an appropriate animal. The most entertaining game is the Silly Scarecrow Game, where you initially see a scarecrow in a field. By clicking on various arrows, you can change the head, body, and legs to form different, and often silly-looking, scarecrows. Finally, the program contains a coloring book with 12 black-and-white pictures for children to paint.

While the program appears relatively simple and basic to an adult, children enjoy it immensely. The Amiga's internal voice synthesizer, ignored in most programs, is used extensively, and my play testers accepted the somewhat stilted voice surprisingly well.

While *Barney Bear Goes to the Farm* is geared for the three- to eight-year-old age group, children over six may find the program uninteresting. The graphics and sounds are good, and children can get through most of the activities without having to read. The only negative aspect is the lack of animated sequences, which would make the program more interesting and exciting to kids. The program is a success, though, according to my six-year-old, who thoroughly enjoys the program.

STEVE KING

Educational Value	★★★
Documentation	★★★
Originality	★★★★
Graphics	★★★

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AMIGA

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PROWRITE 3.1

Highly intuitive and designed specifically for the Amiga, *ProWrite* 3.1 is an extremely powerful yet deceptively simple-to-use graphic word processor. Using *ProWrite*'s pull-down menus and keyboard shortcuts, it took my ten-year-old son only 15 minutes to learn to use the program.

Text editing is beautifully implemented and very fast. The four main commands are under the left hand: Amiga-V to paste, C to Copy, X to cut, and Z for the new Undo function, which has become one of my favorites. You can undo all editing and formatting commands, alignment changes, picture moves, ruler changes, and other actions. You can even change your mind and undo the Undo command. You can also edit headers and footers, include automatic dates and page numbering, and use subscripts and superscripts.

If you like a clean writing screen, you can toggle the ruler away. The screen isn't cluttered with gadgets, so you can see more of your text. You can have up to ten windows open at once, containing pictures and text, with multiple colors and fonts. The WYSIWYG display takes all the guesswork out of formatting and printing.

The 100,000-word spelling checker lets you check a range of text, look up a single word, check continuously, and add words to the user dictionary. The 300,000-word cross-reference thesaurus allows you to move back and forth through several hierarchies of words.

ProWrite 3.1 has many powerful new features including both newspaper-style and snaking columns, *ARexx* macros, and a special storyboarding feature. *ProWrite* will automatically open its screen in the same resolution as your Workbench screen, or you can force it to use almost any other screen mode, including the new ECS Productivity and SuperHires modes.

Version 3.1 includes an improved file requester that's still easy for novices to use but that now lets you type filenames and paths directly

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into a text box, move forward or backward between disk directories, and select a path from a list of disks and system assignments. It also adds an adjustable Speak command that will read a marked block of text back to you. The improved font requester shows you a sample of the font you've chosen and lets you install your favorite fonts in a quick-access submenu.

ProWrite has many user-definable parameters that can be changed by the user and saved as defaults. In fact, everything in your document setup that can be changed is now saved in your Prefs file. This welcome new feature makes starting writing sessions a breeze.

Print options abound, including smoothing and print reduction for high-quality output on a dot-matrix printer. You can also print back-to-front, odd-even, or collated. *ProWrite* will print using Amiga bitmap fonts or native printer fonts. You can even mix graphics with your printer's built-in letter-quality fonts. If you have a color printer, you'll be especially pleased with *ProWrite*'s excellent dithered color graphic output.

The *ProWrite* manual is easy to use, with sections for quick reference and a good index. You probably won't need the manual much at all, but I recommend browsing through it to find all the nice little extra touches this program has, such as several editing shortcuts.

New Horizons deserves top marks for its Bug-Free Guarantee. If you find a bug in the program, the company will fix it free within 30 days or you can return the program. *ProWrite*'s flexibility and speed, along with its great range of options, make it an excellent value.

PAMELA ROTHMAN

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

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64/128

SECRET OF THE SILVER BLADES

SSI perfected its AD & D (Advanced Dungeons & Dragons) game system with the release of *Champions of Krynn.* The first two games in the series, *Pool of Radiance* and *Curse of the Azure Bonds,* were too difficult to play because of the combat system and vast numbers of monsters the games threw at you.

Champions of Krynn revamped the game system to make the adventure easier to play. The result was exactly what gamers were looking for. This game system has been transferred to *Secret of the Silver Blades,* the newest role-playing epic in SSI's AD & D line.

A long time ago, two brothers named Eldamar and Oswulf lived in the town of Verdigris. Eldamar succumbed to the dark side of human nature and practiced evil studies. Oswulf condemned his brother's practices and managed to overpower him and his minions. Oswulf refused to kill his brother; instead he encased Verdigris and the evil ones in a glacier. In recent days, however, the glacier receded and miners began reworking the mines. They've renamed the town New Verdigris and turned it into a thriving business.

Recently, evil members of the community, known as the Black Circle, suggested that the miners dig deeper for even greater riches. Unfortunately, the miners opened a passage that released the monsters from the glacier. The town was ravaged. The citizens took all of their wealth and threw it into the Well of Knowledge, hoping for a savior. Your party in *Secret* is charged with ridding New Verdigris of its evil threat.

The Silver Blades of the title was the name of Oswulf's group that defeated his brother. Your party must become like the Silver Blades of old. It isn't hard to ease into this role because of *Secret*'s game system. Most commands are entered using menus and lists. Movement in exploration and combat is controlled using the joystick. Together, the joystick and keyboard effectively control the game. You will be up and running with *Secret* in 15–20 minutes. Most commands are intuitive, and those that aren't are explained very well in the manual. The system adheres closely to the rules for the AD & D board game and is approved by TSR, creator of AD & D.

As with other AD & D games, the graphics are highly detailed and colorful. The fluidity of movement is reflected in the views from which you see the *Secret* game world. You see mazes, dungeons and such in 3-D, while general areas, outdoor travels, and combat are seen from an overhead perspective. The characters and monsters are depicted in great detail in all views. It's almost as much fun to watch *Secret* as it is to play it. The AD & D games from SSI are the type that you might record with a VCR and show as background video for parties and gatherings. Graphics are captivating and pull you into the story. Full-screen pictures and in-between scenes accentuate normal play. *Secret* boasts of having the largest 3-D terrain of any of the AD & D games. You'd better believe it!

Once again, SSI has proved why its game manuals are considered the finest in the industry. In addition to the data card that explains how to use *Secret* on your particular computer, SSI packages a rule book and an adventurer's journal. Both booklets are easy to read and include illustrations or screen shots where necessary. These manuals are organized very well and also act as copy protection. The game refers directly to entries made in the *Adventurer's Journal,* and these add to the atmosphere and mystery of *Secret.* I have always found this technique effective in keeping the game fresh and not requiring the gamer to stare at a screen for hours without an occasional diversion.

Although it isn't needed to finish the game, I strongly recommend buying the clue book for *Secret.* It offers all of the hints you need to finish the game: maps, monster weaknesses, and important game events. It was indispensable for my getting a good distance into the game to do this review; it was much quicker than relying on

continued on page 110

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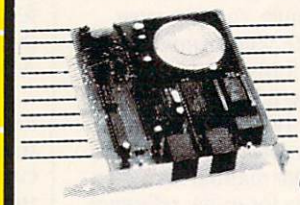

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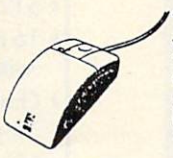

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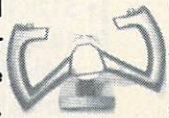

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my wits alone. It adds the final touch to a complete game experience that will wrap you up for weeks on end.

Once again, SSI has proved why it is a consistent leader in the role-playing game genre. Instead of just offering the same rehashed AD & D gold-box game in a different environment, SSI has added new things to keep gamers happy. New monsters and spells and higher character classes are part of the refinement. The best new feature is the combat LEVEL command that allows you to make combat easier or harder. The down side of this feature is that experience points are scaled to reflect the difficulty. This feature should make *Secret* accessible to newer players as well as offering a stronger challenge to veterans.

Secret is the finest gold-box AD & D game from SSI to date. I think SSI should wait awhile before releasing another game in this series. *Champions of Krynn* was set in the Dragonlance world. Without changing the interface, SSI should come up with a game that has a lot of new features to make it more attractive to gamers who have already played one of the gold-box games.

Until then, pick up *Secret of the Silver Blades* if you're between games. I was considerably impressed and look forward to future products. Happy adventuring!

RUSS CECCOLA

Playability	★★★★
Documentation	★★★★★
Originality	★★★★
Graphics	★★★★

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Just as every aspiring pilot knows, complete study of the supplied manual and all related documentation is required to completely understand your airship and its capabilities. Even experienced pilots may find this a wise first step before sending the F-16 skyward. The creators of this simulation have spent nine man-years in research and development to make *F-16 Combat Pilot* as real as possible.

Outfitting the F-16's nine hardpoints with weapons is a decision you can oversee yourself, or you can depend on your ground crew to make the right choices for you. Care must be taken not to overload the aircraft.

Mastery of the F-16's seven weapons systems and two radar modes will ensure the pilot better odds in each of the five missions. Tactical Air Command (TAC) monitors your success and ranks you accordingly. A Pilot's Log (save disk) may be maintained since completion of all five missions is quite a lengthy process. Once TAC is satisfied with your accomplishments, you are promoted to Squadron Leader and allowed to plan and lead multiple aircraft against the enemy in OPERATION CONQUEST.

A word of caution to all hotdoggers. *F-16 Combat Pilot* is not an arcade style shoot-'em-up. It is a complex and very realistic simulation that requires study and dedication. It's tough. However, the satisfaction of directing such a highly technical piece of battle hardware, almost as an extension of one's self, is nothing short of magical.

STEVE HEDRICK

Playability	★★★★
Documentation	★★★★
Originality	★★★
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continued from page 110

Macintosh

ALARMING EVENTS

If your calendar could just nudge you a few minutes before an important meeting, you might get to more of your appointments on time. Coming to the rescue, CE Software has grafted a couple of elbows onto a new electronic calendar called *Alarming Events.*

Alarming Events stores the critical data from your appointments and uses that information to remind you of your appointments before you have a chance to be late.

To help keep you on time, the program's designers organized *Alarming Events* around three calendar views—monthly, weekly, and daily. The monthly and weekly calendars simply display information. The monthly calendar shows as many months at a time as you want. The program highlights dates on which you have appointments. Of course, this highlighting becomes almost meaningless when you have appointments every day. The weekly calendar shows five days at a time and lists your appointments for each day. Clicking on a date in the monthly calendar or an event in the weekly calendar brings up the daily calendar.

The daily calendar is the central feature of *Alarming Events.* On this screen, you enter your appointments, set up the kind of alarm you want, and choose a time to be reminded of your meetings. You can also set up recurring events so a regular appointment will transfer from week to week, month to month, or even every other week on your calendar.

Although the daily calendar holds a lot of information, the screen is laid out clearly. When you first open a daily calendar, you start by typing a new event into the Event Subject field. Tab to the Event Notes field and add as many lines of detailed information as you'd like for each event.

At the top of the screen, you can click on the clock to set the time for your appointment. It refers to your system clock to tell when it should notify you of an appointment. To the right of the text fields, you'll find boxes in which you can enter the event's duration, when you want to be reminded of the event, and how often the event recurs. Each of these fields is easy to set: You type a number and then choose the unit of time from drop-down menus beside the field.

Alarming Events works well for simple scheduling, but you shouldn't limit this program to storing information about appointments and meetings. You can use *Alarming Events* to plan projects, too. For example, it will notify you on the day that you need to call your writers to remind them of their deadlines. It will remind you that tomorrow is the last day you can submit a bid to your newest client. If you list phone calls you need to make, you can include the phone number in the description of the event. Then, when the notification screen pops up, the phone number pops up, too.

In addition to its fine calendars, *Alarming Events* offers little touches that make the final package shine. Menu items let you customize the program, save event information in text files, and switch to other *Alarming Events* files. You can even import and export calendar files.

In spite of all its good features, *Alarming Events* still leaves room for improvement. For example, viewing the notes for an event is too troublesome. Once you've clicked on an event—even if it's just to review your notes—you can't click on OK or Cancel until you've made some change on the screen. This means you must do something trivial, like insert a space and then delete it, in order to move on to the next event you want to review.

None of the program's weaknesses should lead you away from *Alarming Events,* though. It's very useful for all kinds of scheduling tasks. CE Software's latest entry works just like a trusted assistant, nudging you in plenty of time to make that important appointment.

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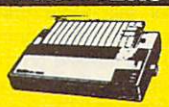

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FAST LOOKS

Amarillo Slim's Real Poker PC	As an enjoyable, well-apportioned introduction to the world of high-stakes poker, this game has everything you need to become a better bettor. You control the game with function keys, which are labeled on the screen. Features include an Odds display, a Stats screen that rates your strategy, and an online tutor. Playing three computer adversaries, you'll bet, call, raise, and bluff your way to the top of the stack without going broke. *Peter Scisco*	IBM and compatibles with CGA, EGA, or VGA graphics	Villa Crespo Software 1725 McGovern St. Highland Park, IL 60035 (800) 521-3963 $49.95
Their Finest Hour: The Battle of Britain AMIGA	In this superb aerial combat simulation, you pilot a British Spitfire or Hurricane, a Luftwaffe Bf-109 or Me-110 fighter, or a Stuka, Ju-88, Do-17, or He-111 bomber. You must also man gunner positions and target bombs. The planes perform realistically but aren't hard to fly, and the excellent 3-D bitmap graphics and digitized sounds make you feel as if you're sitting in the cockpit. Fly single missions or a campaign in this must-have game. *Denny Atkin*	Amiga with 512K, 1MB recommended	Lucasfilm Games Distributed by Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 (415) 571-7171 $59.95
Turbo Mouse ADB 3.0 MAC	Ten percent of Mac owners use a trackball. If you're one of the 90 percent who don't, take a look at Kensington's top-selling Turbo Mouse ADB. It offers 200 CPI precision, can be switched for left- and right-handed users, and automatically moves the cursor farther when you move the trackball faster. Because it has a second ADB port, you can still use your mouse for those programs that work better with a mouse. Highly recommended. *David English*	Mac SE series, Mac II series, or Apple IIgs (also available in a non-ADB model for Mac 512, Mac Plus, and Apple IIe)	Kensington Microware 251 Park Ave. S New York, NY 10010 (212) 475-5200 (800) 535-4242 $169.95
House of Cards PC	This collection of popular card games will fill an idle afternoon. It features spades, cribbage, hearts, pinochle, bridge, and gin rummy, all in two-player format (you against the computer). Because of the twitchy mouse interface, the keyboard option is recommended. The graphics and sound are not spectacular, but in card games strategy is the important thing. Watch out for the computer—it sandbags. *Robert Bixby*	IBM, Tandy, or compatible PC; 256K; CGA, EGA, VGA, or Tandy 16-color graphics adapter	Virgin Mastertronic 18001 Cowan Irvine, CA 92714 (714) 833-8710 $9.99 (5¼-inch disk); $12.99 (3½-inch disk)
Redline PC	*Redline*'s sole purpose is to turn the cursor into a solid highlight that stretches across the entire screen. Originally designed for spreadsheet users, it's less successful in the general marketplace because many packages bypass the hardware cursor and create their own, thus defeating *Redline*. It worked well with spreadsheets, but not with *PC Tools* or *Microsoft Word*. Make sure it will work with your favorite package. *Tom Campbell*	IBM, Tandy, or compatible PC; 256K; one floppy drive	DynaCorp 4828 Loop Central Dr. Suite 520 Houston, TX 77081 $39.95
CompuServe Information Manager 1.02 MAC	*CompuServe Information Manager* makes it easy and even fun to use this popular online service. The Mac version uses more icons but otherwise has the same features as the PC version. These features include a favorite places menu, multiple-file uploading and downloading, and the ability to compose and read your mail offline. It's easily the best way to connect to CompuServe—and at this price, they're practically giving it away. *David English*	Mac Plus, SE series, II series, or Portable; System 4.1 or higher; hard drive; and modem (Hayes-compatible recommended)	CompuServe 5000 Arlington Centre Blvd. Columbus, OH 43220 (800) 848-8199 $24.95 (includes free online time); $39.95 for new subscribers
Imperium AMIGA	Defense, diplomacy, and economics play a major role in this game of intergalactic conquest. Using a 3-D windowed interface, you must build your planet's technology level, production capacity, and military might. Expand your empire through trade or conquest. Deal with four competing empires as you try to conquer over 100 different worlds. Superior artificial intelligence routines make for a challenging and lasting game. *Denny Atkin*	Amiga	Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 (415) 571-7171 $39.95
John C. Dvorak's PC Crash Course and Survival Guide PC	First-time computer users can learn how to buy and use their PCs and compatibles with this book/software package. Numerous examples, pictures of screen displays, and hands-on exercises are used throughout the book, which offers a step-by-step approach. A disk full of programs is designed to give you confidence and practical experience in using DOS commands and other types of applications. *Jane Cross*	IBM PC and compatibles, 256K	Scandinavian PC Systems 51 Monroe St. Suite 1101 Rockville, MD 20850 $34.95

FAST LOOKS

MenuPro² Hard Disk Menu Program Version 1.01-B PC	This slick and easy-to-use package thankfully keeps most DOS commands at arm's length. With very little effort, you can create an autoloading menu that contains all of your commonly used programs. These programs load at the touch of a button. The program also offers mouse support, DOS utilities, a calendar, an address book with reminders, a text editor, security, and network support. *Richard Sheffield*	IBM PC or compatible, 256K, MS-DOS or PC-DOS 2.11 or higher, any size or type hard drive, CGA, EGA, MCGA, VGA, or Hercules, color or monochrome	BobCoPro SR # 161-C Edgartown, MA 02539-9606 (800) 447-6955 $49.95
Damocles AMIGA	Imagine an entire universe stuffed onto a single floppy. Pilot starships, aircraft, and ground vehicles on a number of planets and moons as you try to find a way to prevent the comet Damocles from colliding with the planet Eris. Explore bases and cities as you try to find useful objects and clues. Fast 3-D graphics, excellent sound, hundreds of locations, and a first-person viewpoint make this one of the most realistic space games out there. *Denny Atkin*	Amiga	Bethesda Softworks 15235 Shady Grove Rd. Suite 100 Rockville, MD 20850 (301) 926-8300 $44.95
MicroPhone II 3.0 MAC	Version 3.0 of this powerhouse communications program adds the ability to create a complete front end for any online service. You can invoke scripts using color icons, buttons, command keys, function keys, or menu commands. Compared with *White Knight, MicroPhone II* has an equally powerful script language and is easier to use—but it costs twice as much. You also get a 30-day unconditional money-back guarantee. *David English*	Mac 512KE, Plus, SE series, II series, or Portable; System 4.2 or higher; and modem	Software Ventures 2907 Claremont Ave. Suite 220 Berkeley, CA 94705 (415) 644-3232 $295
Flood AMIGA	*Populous*-creator Bullfrog is back with this cute arcade game. You're Quiffy, a green Blobbie who climbs walls and dives under water to feed on the trash found in underground caverns. Evil characters such as the Bulbous Headed Vong, Psycho Teddy, and the ghost of your chastising aunt are out to make your life miserable and short. While not as deep as *Populous,* witty arcade action and 36 levels will keep you coming back. *Denny Atkin*	Amiga	Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 (415) 571-7171 $39.95
Altered Beast PC	Lon Chaney's werewolf couldn't hold a candle to the scary were-creatures in Sega's graphically superior arcade adventure. The animated sequences depicting the metamorphosis from one creature to another entrance my 15-year-old son, and he keeps coming back for more. Once you get through the unfriendly installation process, you'll be ready to rescue Athena, the daughter of Zeus, from the clutches of Neff, the demon god. *Joyce Sides*	IBM, Tandy, or compatible PC; 512K; CGA, EGA, MCGA, VGA, or Tandy 16-color graphics adapter	Sega Distributed by Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 (800) 245-4525 $39.95
AmTRAC AMIGA	Mouse hidden under a pile of paper? Try the AmTRAC trackball. The large center ball is surrounded by two wrap-around buttons, making it a snap to hit the button from any hand position. A third button acts as a drag lock, letting you move icons or make menu choices without holding a button down. Not as comfortable as a mouse for Workbench use, the AmTRAC is great for games like *Falcon* and *Marble Madness.* *Denny Atkin*	Amiga	MicroSpeed 44000 Old Warm Springs Blvd. Fremont, CA 94538 (415) 490-1403 $99
SitBack 3.0 PC	*Sitback* is an automated backup program. After making a full backup, use SitBack to back up new and updated files to any DOS drive. Sitback works automatically while you use other programs or at preset times daily. You can exclude files (like *.exe) and create different backup specs for each directory. No program totally automates backups, but *Sitback* makes it relatively easy, safe, and thorough. J. Blake Lambert	IBM PC and compatibles, 14K free memory, DOS 3.0 or higher	SitBack Technologies 9290 Bond, Suite 210 Overland Park, KS 66214 (913) 894-0808 (800) 783-7482 $99
Mutant Ninja Turtles AMIGA	You see them everywhere. Now the heroes in a half-shell have hit your Amiga. They're kicking, punching, and somersaulting through the New York sewers, battling turtle tormenters like Mouser, Fire Freak, and Shredder, as they attempt to rescue their friend April. Graphics are average, and there's too much disk access, but six levels of fast-paced arcade action will keep both turtle fans and game lovers glued to their Amigas for hours. *Kim Horn*	Amiga	Ultra Games 900 Deerfield Pkwy. Buffalo Grove, IL 60089-4510 (708) 215-5100 $24.95

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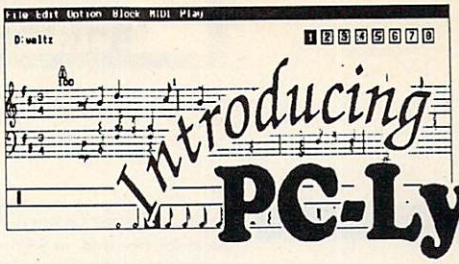

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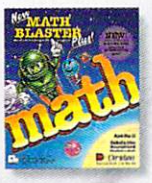
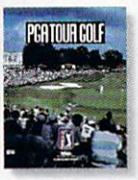
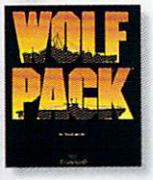


Davidson's NEW Math Blaster Plus

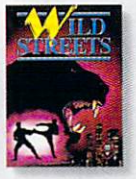


Electronic Arts' PGA TOUR® Golf

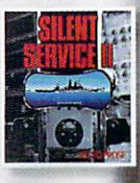


Bröderbund's WolfPack

The Learning Company's Super Solvers Treasure Mountain!



Titus' Wild Streets



MicroProse's Silent Service II

System requirements: IBM PC, XT, AT, or compatible with 256K RAM, DOS 2.0 or higher, CGA, EGA, or monochrome graphics adaptor, and headset or external speaker.

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Circle Reader Service Number 139

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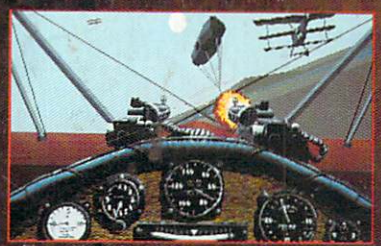

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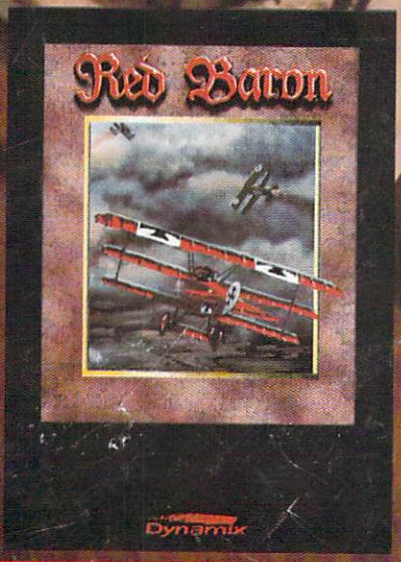

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