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NOVEMBER 1990

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NX-2420
RAINBOW

NX-1020
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NX-1001
MULTI-FONT

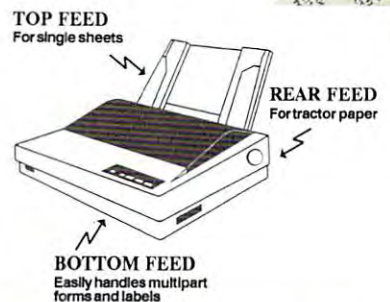
NX-2420
MULTI-FONT

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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which, when combined, put thousands of printstyles at your fingertips. And all offer high resolution graphics for more professional-looking presentations.

Advanced paper handling features (which are optional on most printers)



Multiple fonts

Advanced
paper handling

COMPUTE

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PETER SCISCO

The impact and influence of Japanese engineering on our home computing devices continue to grow.

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Japan exerts a significant impact on home computing through videogame machines and on the personal computer industry in general through technologies like LCD color displays and miniaturization. Read of the paradoxes and promises of Japan and what they mean for the future of home technology.

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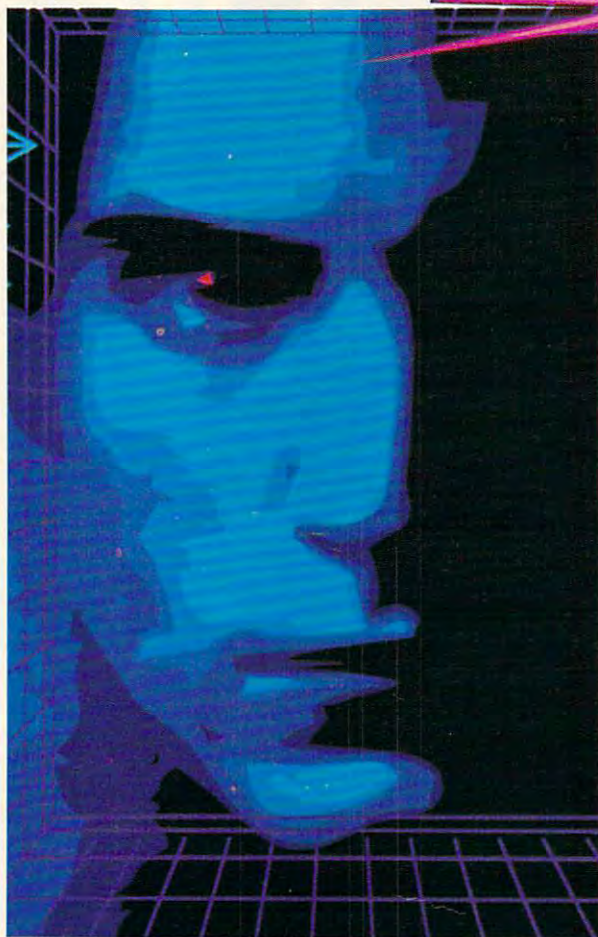
KEITH FERRELL

An American computer company doing big business in Japan? Jim Ashbrook of AST tells the tale.

COMPUTE's November Sharepak Disk 32

RICHARD C. LEINECKER

Explore the Far East with a Japanese language and culture tutor, a Japanese puzzle game, and a Japanese compression program.



ON THE COVER

Computer-generated illustration
by Schuster/SUPERSTOCK

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LESLIE EISER

Arcade action and reading fun—here are some games that bring it all together.

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 Méléé 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!

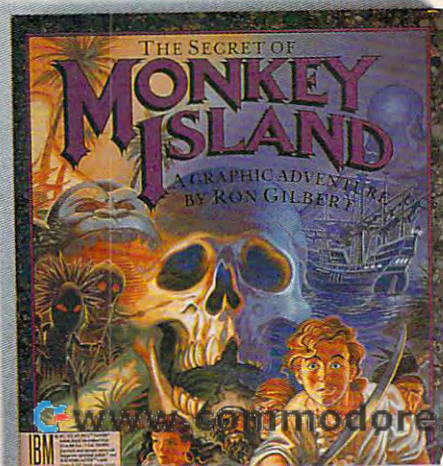
If you can solve a few sneaky puzzles in a special demo of *The Secrets of Monkey Island*, you might just win one of the sweetest prizes since Captain Kidd's treasure chest. A Carnival Cruise for two, one of a hundred AdLib™ sound cards, or one of hundreds more prizes! You'll find the demo and complete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

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NOVEMBER 1990

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Playing with the Big Boys: A Hard Drive for the 64/128 **G-6**

MORTON KEVELSON

Take a hands-on tour of CMD's new hard drive for the 64 or 128. It's the most exciting new product to hit the 8-bit Commodore market in years.

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TOM NETSEL

We want to publish your 64/128 artwork in "Gazette Gallery," a new feature added to the *Gazette Disk*.

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FRED KARG

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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.

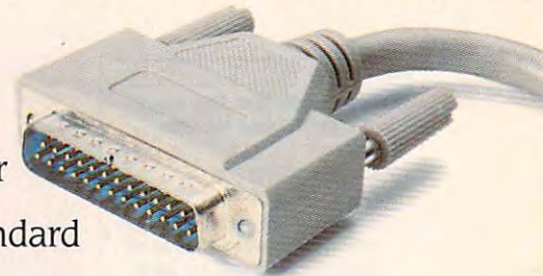
are standard with Star. The switchable push/pull tractor makes changing paper paths a snap — a feature that's especially handy when you're printing a lot of hard-to-manage forms. Plus, convenient paper parking lets you feed single sheets through at the touch of a button — without removing or wasting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



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Compatibility

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Color printing



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

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PC Magazine

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Robert Cullen, Home Office Computing

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P E T E R S C I S C O

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 prerogatives. 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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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.

"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.



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

—DENNY ATKIN

continued on page 16

2

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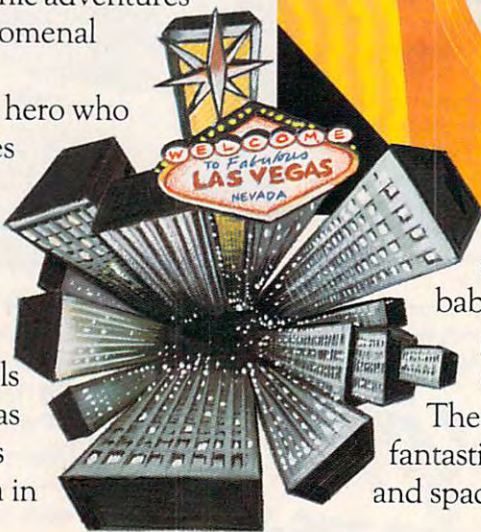
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Hold on to your parser. Accolade

is about to redefine the world of animated graphic adventures with two phenomenal new games.

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



"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. All trademarks and registered trademarks.

One minute you're a guy eating nacho-flavored popcorn. The next, you're sucked through your TV into a fantastic alien world.



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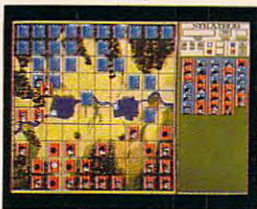
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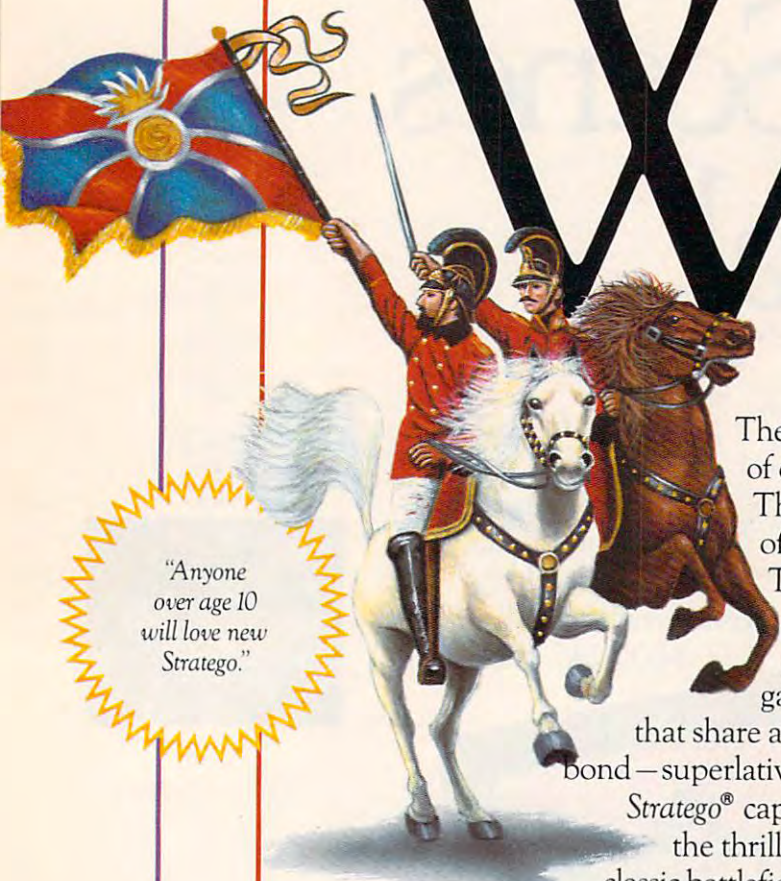
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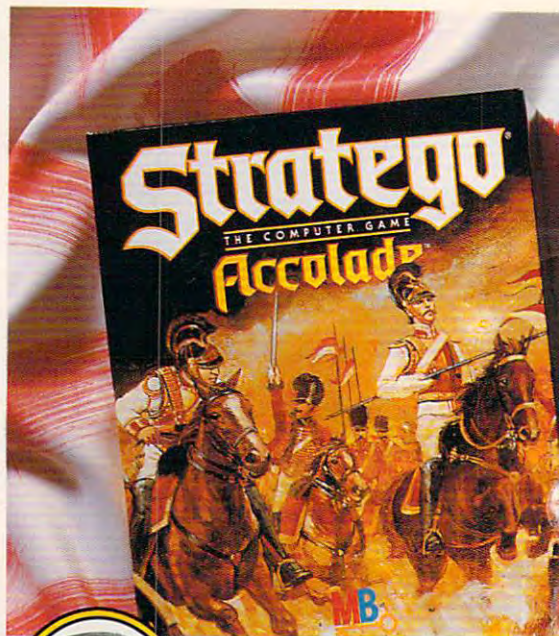
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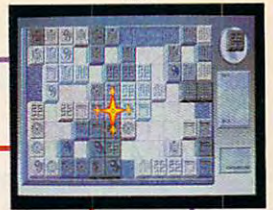
Actual game screens from IBM PC and M
Stratego © 1990 Milton Bradley
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IBM PC



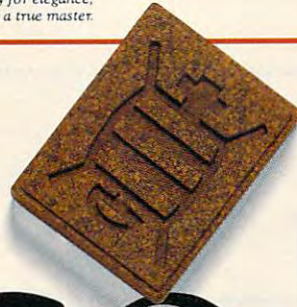
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MAC II



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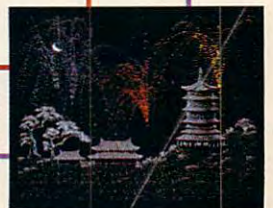
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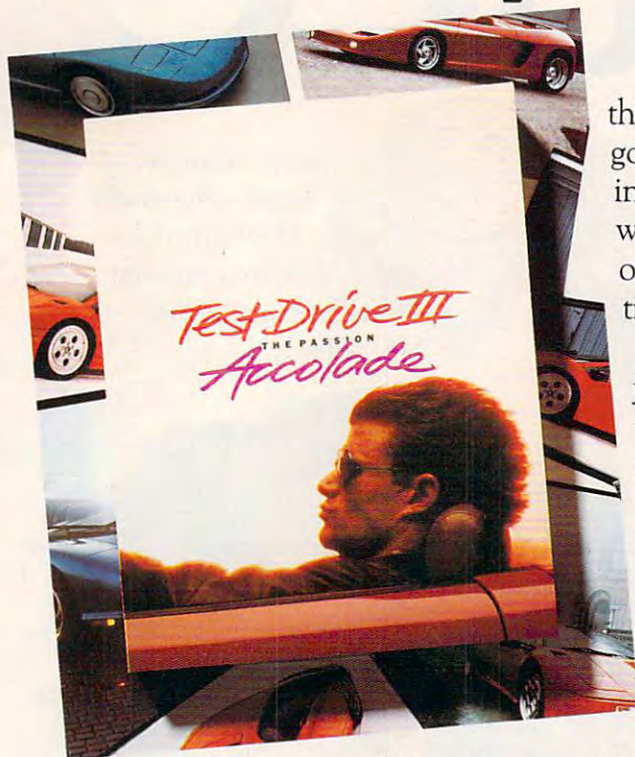


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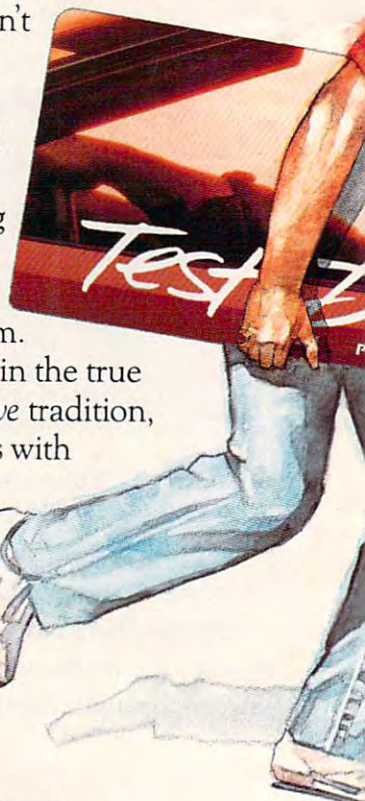
Test Drive III's advanced syn-

thesis of bit-mapped and polygon-fill graphics, plus digitized interiors, provides the racer with an unprecedented sense of speed, realistic road perspective and performance.

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

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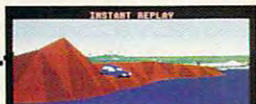
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The Collegiate Schools of Richmond, Virginia, recently won the 1990 Texaco Star National Academic Championship at Rice University in Houston. Each team member took home an AT & T personal computer and a gold championship ring. In addition, the team as a whole re-

ceived a \$50,000 scholarship from the Texaco Foundation. Watching as teammate Billy Braoddu (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 micro-processor, and Tandy's Power View battery gauge.

—MIKE HUDNALL

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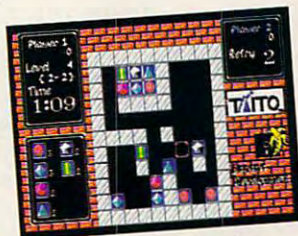


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Don't let nasty elevator cubes squeeze you into a corner!



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, Rich-

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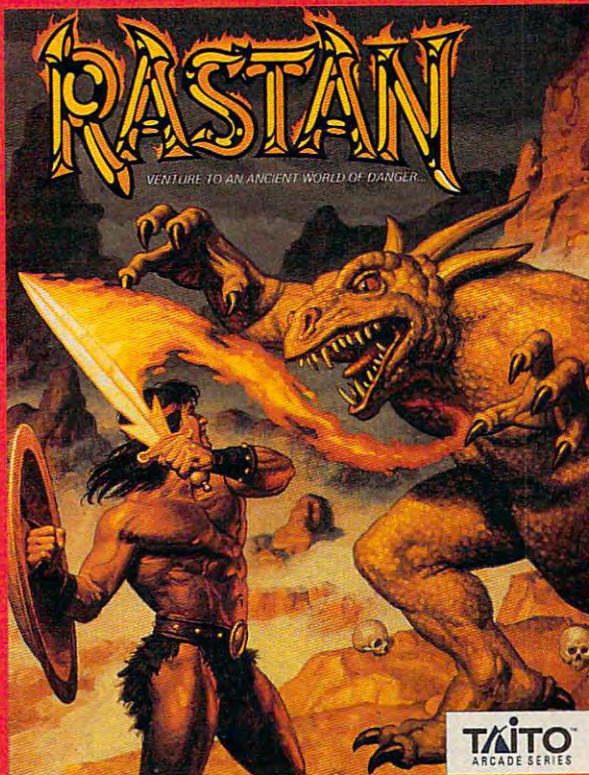
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doesn't work, turn off the power switch and wait until the hard drive stops turning completely before re-starting the system. If you turn on the system while the drive is spinning, it may damage the heads on your hard drive.

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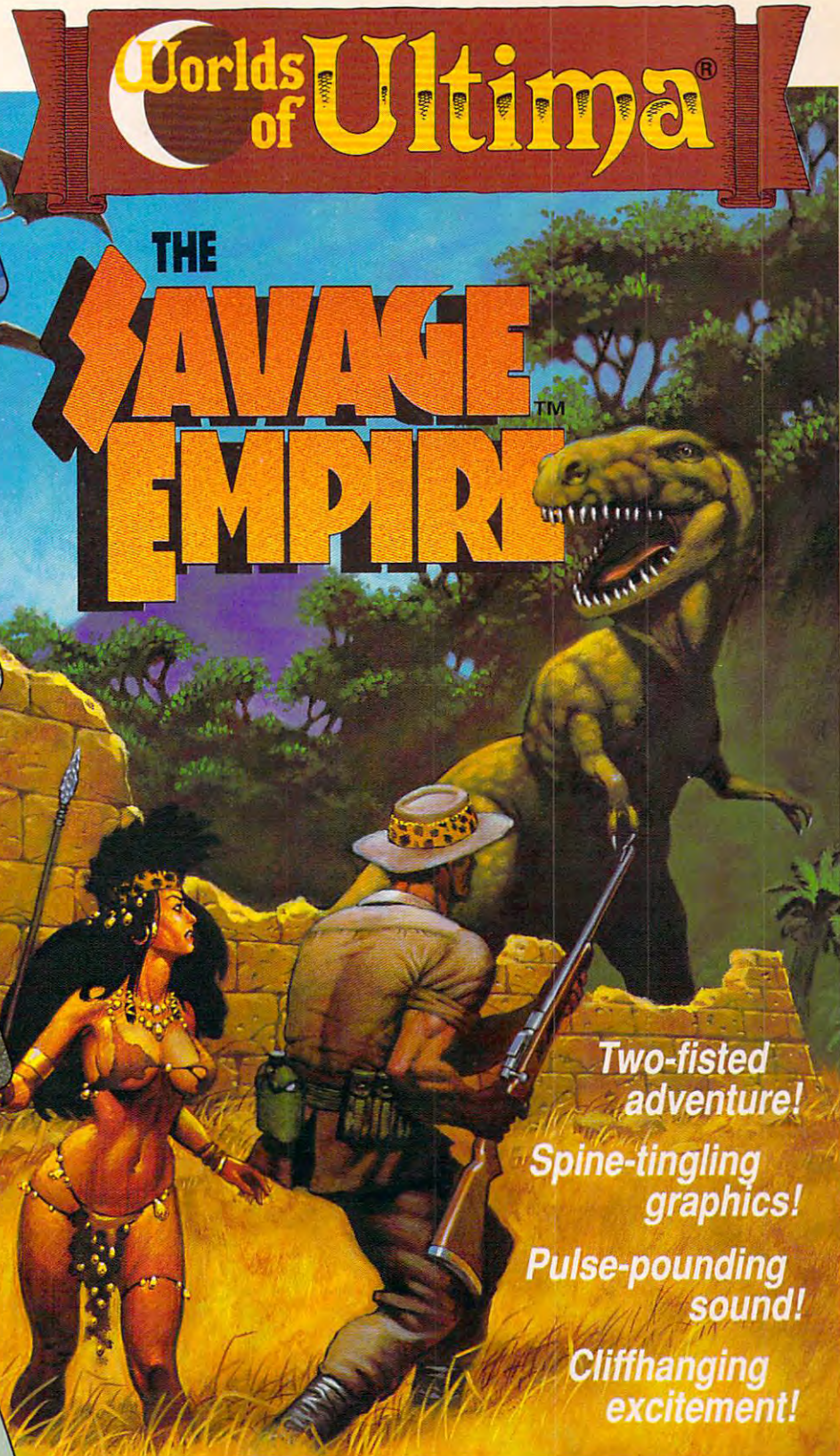
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Thinner, shorter, smaller, lighter. The four words that guided the Japanese consumer electronics revolution are now being applied to computers, with startling results. Other adjectives applicable to Japanese computers include *faster, cheaper, and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

**T
H
E**

Japan

F A C T O R

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 manu-

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

NEC



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.

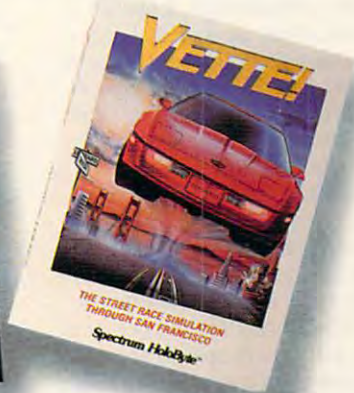
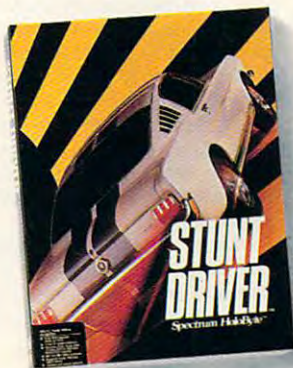
The Japanese have, over the last decade, come to dominate most of the subsystems that make up desktop computers—from silicon chips to drives, from floppy disks to monitor technology. Increasingly, the world of computers moves to a Japanese beat.

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-

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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.

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 bogymen 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 de-

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.

bating 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.

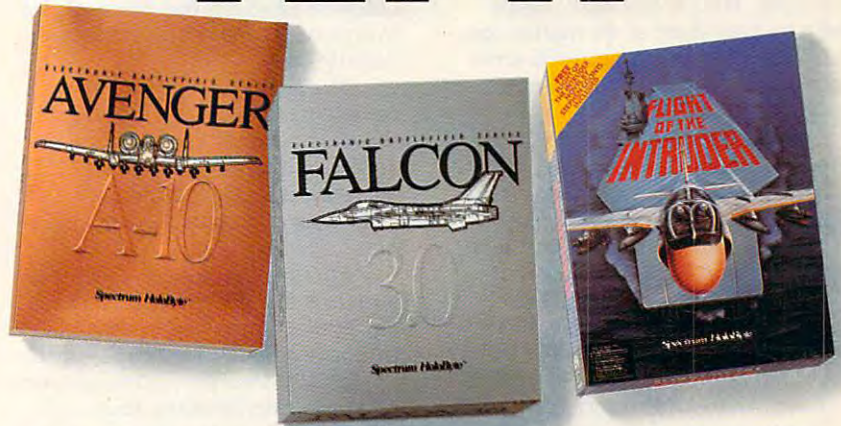
Most Japanese keyboards include both Roman and kana alphabets. Kana is a phonetic lettering system that's simpler than kanji but requires conversion into the larger character system.

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.

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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

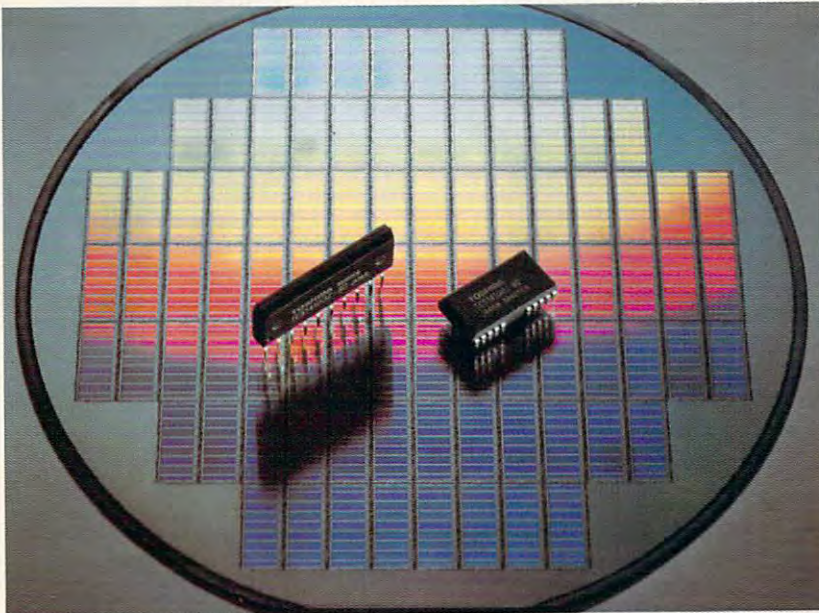
should be only slightly less surprising that the Macintosh, with its graphical, mouse-driven interface, has captured several percentage points of the Japanese microcomputer market.

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). ▸



TOSHIBA CORPORATION

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

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

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 to be severely outnumbered.

while spending more time with the family, Japanese computer makers may sell more computers.

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

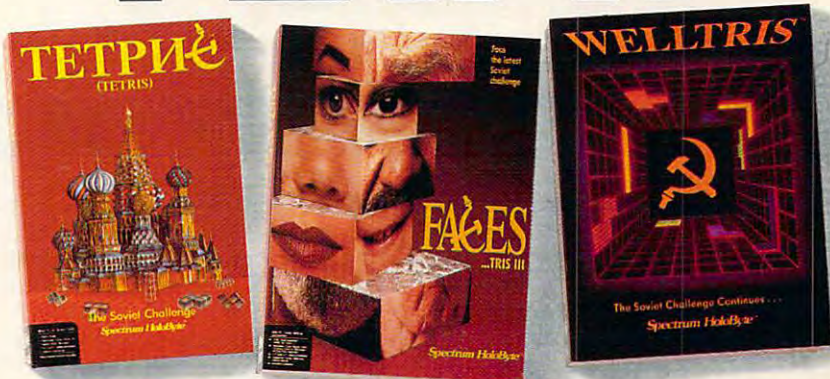
Poised on the cusp of the next millennium, the Japanese seem to have it all. They own the chip market, are dominant in display technology, and are exploring new ground in artificial intelligence and parallel processing.

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. □

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CONVERSATIONS

K E I T H F E R R E L L

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.

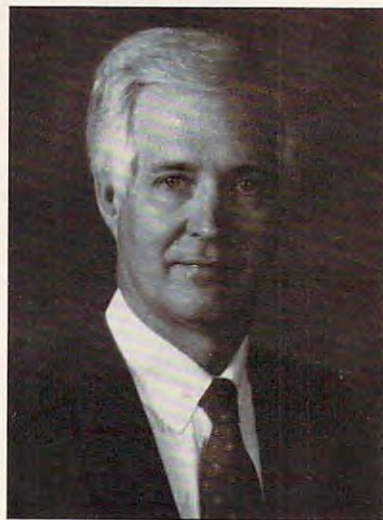
"We started in Hong Kong, but we also put a factory there," Ashbrook says. The company opened a Hong Kong sales office at the same time. The investment has paid off. "That particular segment of our business has grown very rapidly," he says. AST has since expanded into Taiwan, Australia, and Japan.

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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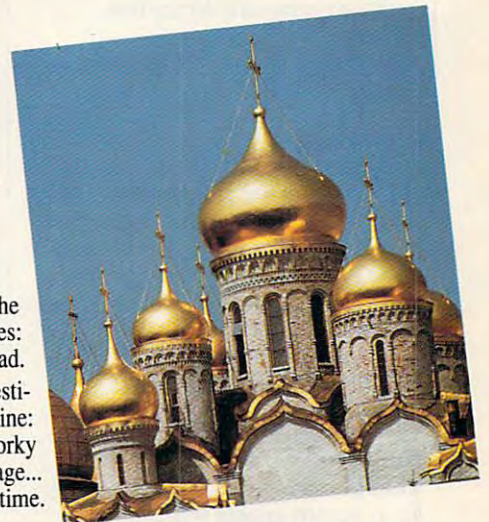
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SHAREPAK

R I C K L E I N E C K E R

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.

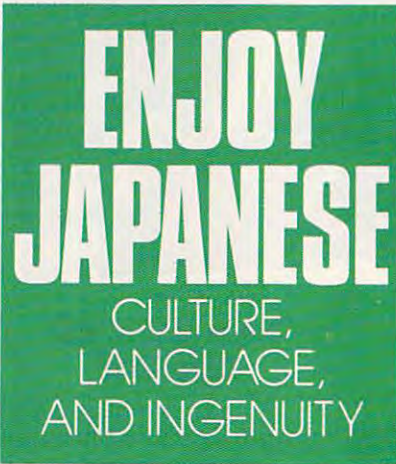
Vocabulary drills give you the

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 x 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 squeeze 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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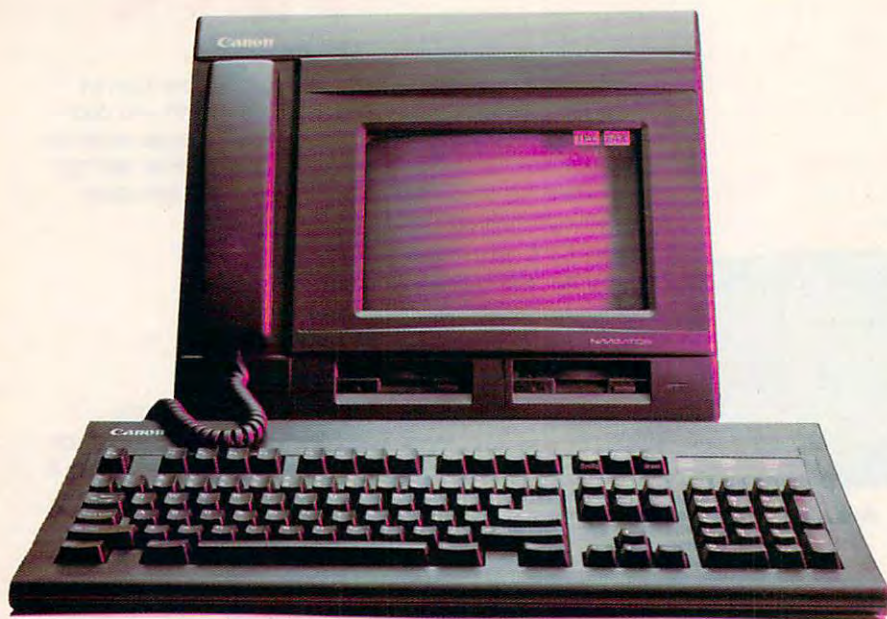
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HOME OFFICE



COMPUTE CHOICE

DEE SCHNEIDERMAN

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

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.

OFFICE

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

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.



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.

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 avail-

able 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

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

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 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

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Power Computing For The 90's?

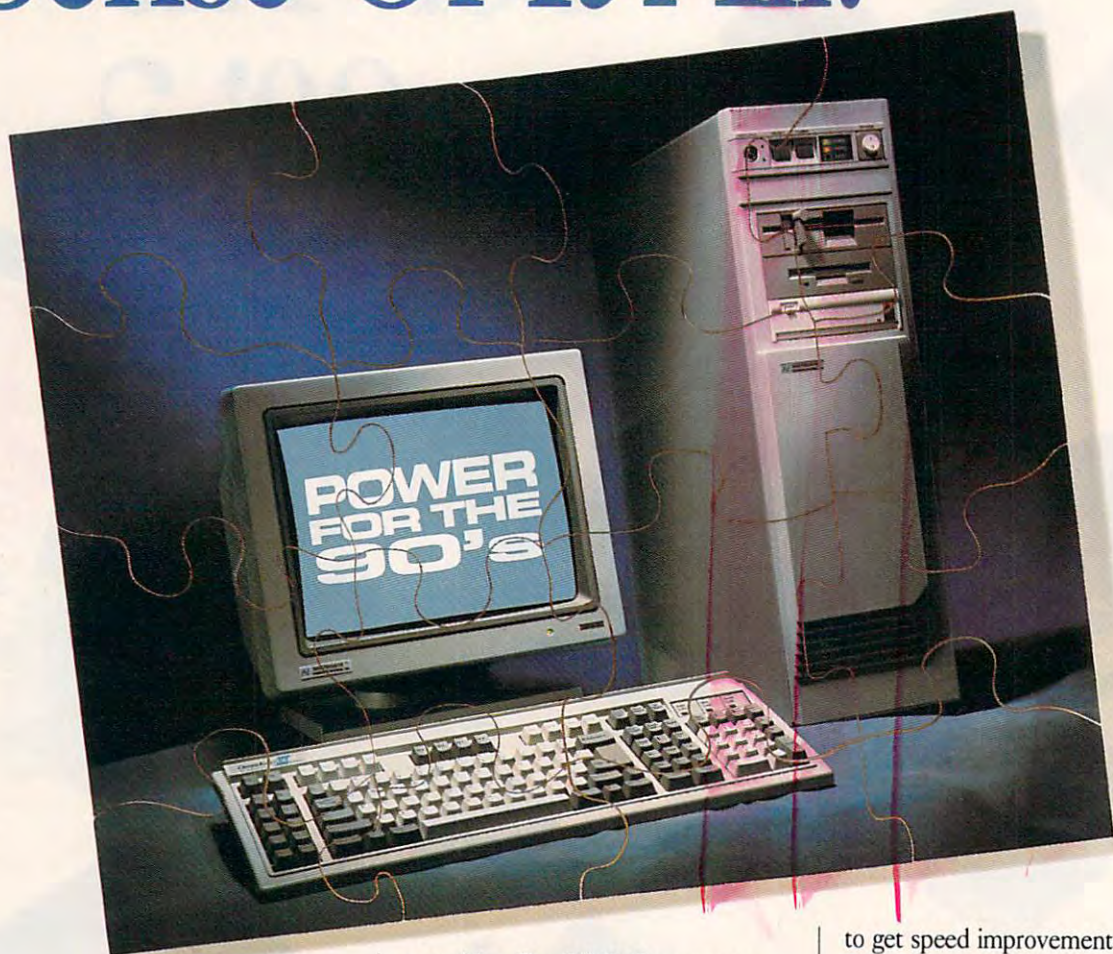


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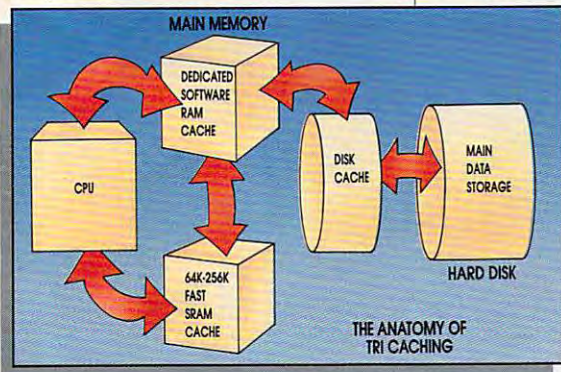
However, this RAM is best used for extended memory needs like disk caching, RAM disk, and spoolers. When Shadow RAM eats up this space, you can experience software compatibility and operating problems. You'll never experience shortcut-related problems with a Northgate system. Call toll-free 800-548-1993.

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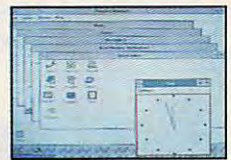
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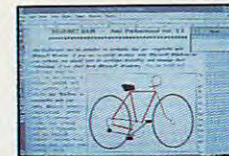
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PC Magazine
October 31, 1989

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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!

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Notice to the Hearing Impaired: Northgate has TDD capability. Dial 800-535-0602.

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SYSTEMS

"We hear you!"

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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
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- 1 year warranty on system parts and labor; 5 years on keyboard
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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.

BUYER'S SIGNATURE _____ DATE _____

*You must request deferred billing when ordering. Payments will be deferred for three billing cycles after shipment.

Interest will accrue during the deferred period at a rate of 1.5% per month (18% APR).

This is not an application. A completed application and agreement must be on file prior to approval for credit.



WORKPLACE

DANIEL JANAL

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

**RAISE
YOUR
REVENUE**

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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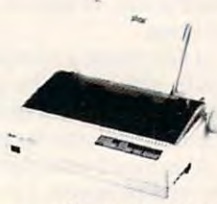
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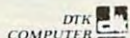


PS/2 Model 30	20 Meg Drive	\$1925
PS/2 Model 30286	30 Meg Drive	\$2495
PS/2 Model 50 Z	30 Meg Drive	\$2745
PS/2 Model 55 SX 386SX/16	30 Meg Drive	\$3495
PS/2 Model 65 SX 386SX/16	60 Meg Drive	\$5295
PS/2 Model 60 286	44 Meg Drive	\$2750
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LASER	TURBO II \$389 ⁹⁵	286/2 \$589 ⁹⁵	386SX \$799 ⁹⁵	386 \$1499 ⁹⁵
PANASONIC	-----	FX-1800 \$979 ⁹⁵	FX-1925S \$1239 ⁹⁵	FX-1950* \$1399 ⁹⁵
MAGNAVOX	-----	MaxStation 286 \$1179 ⁹⁵	MaxStation 386 SX \$1559 ⁹⁵	-----
DTK (Base Model)	DATA 1000 \$149 ⁹⁵	Tech 1230C \$319 ⁹⁵	Peer 1630C \$459 ⁹⁵	Keen 2503 \$1299 ⁹⁵

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T1000SE 1149⁹⁵



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- Real time clock/calendar
- 1 Parallel, 2 serial ports
- 4 expansion card slots
- Internal speaker

- EXTRA FEATURES FREE
- MS-DOS/GW Basic INCLUDED
 - MP 286L diagnostics routines INCLUDED
 - 25 MB hard drive INCLUDED
 - Key pad, external drive ports INCLUDED

MP 286L \$1749⁹⁵
220



Laser Turbo II 8088/10 MHz

"Everything you expect from a 8088 CPU plus powerful features."

Standard Features Include

- 8088-1 Microprocessor (4.77/10)
- 180 watt power supply
- 4 drive bays/exposed
- 102 Key enhanced keyboard
- 1 360K 5.25" floppy drive
- 8 expansion slots
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- #1 rated desk-top organizer \$129 VALUE
- MS-DOS GW Basic 4.01 \$99 VALUE
- One-Year warranty (parts and labor) INCLUDED

\$389⁹⁵ Starter System

Turbo II Drive Options	VIDEO OPTIONS (Includes monitor & display card)			
	MONO	CGA	EGA	VGA
1 Floppy 3.5	\$459	\$599	\$779	\$839
Dual Floppy	\$539	\$679	\$849	\$899
4MB Seagate	\$729	\$869	\$1039	\$1099

*Second drive Toshiba 3.5" or 5.25" floppy drive

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"The Magnavox MaxStation 286 personal computer is the solution for those who need the computing power to run today's high powered business software."

Standard Features Include

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\$1179⁹⁵ Starter System

DTK Keen 250 80386/25MHz

Tower with 64K Cache

Standard Features Include

- Microprocessor: 80386-25
- Coprocessor: 80387/Weitec 3167
- Clock speed: 25/10MHz
- 64KB/256KB/SMB on board expandable to 16MB if use of PEI 305 RAM card
- BIOS: Phoenix
- 64K Cache
- 6 layer PCB
- Expansion: 32-bit x 1, 16-bit x 6, 8-bit x 2
- Performance Landmark: 43.5 Norton SI: 32 MIPS: 6.2
- 200 Watt Power Supply
- 115/230V-50/60 Hz
- Tower Cabinet
- Driver Bays: Outer: 5.25" X 3 Inner: 5.25" X 2

\$1299⁹⁵ Starter System

Laser 386SX 386SX/16MHz

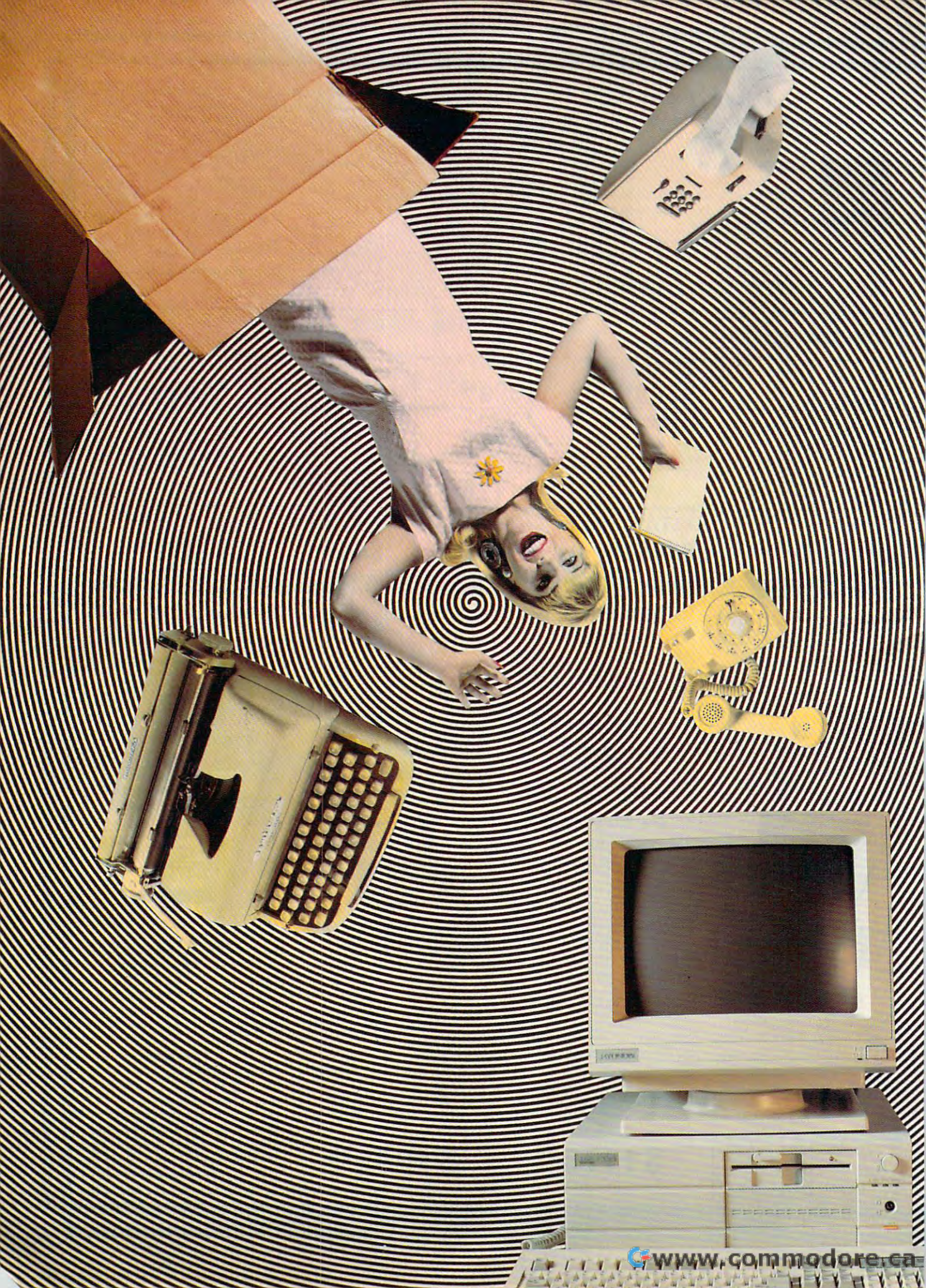
"One of the most affordable ways to enter the powerful world of 386 computing at a 286 price."

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- Optional Game Port
- 102 Key Enhanced Keyboard
- 200 Watt Power Supply
- Microsoft OS/2™ Ready

\$799⁹⁵ Starter System
Includes MS DOS/GW Basic 4.01

386SX Drive Option	VIDEO OPTIONS (Includes monitor & display card)			
	MONO	VGA mono	EGA	VGA color
40MB Seagate	\$1379	\$1529	\$1649	\$1759
60MB Seagate	\$1439	\$1579	\$1699	\$1809
84MB Seagate	\$1479	\$1619	\$1739	\$1849



BUSINESS

In a Box

Three Ready-to-Go Software Kits for Home Business Startups

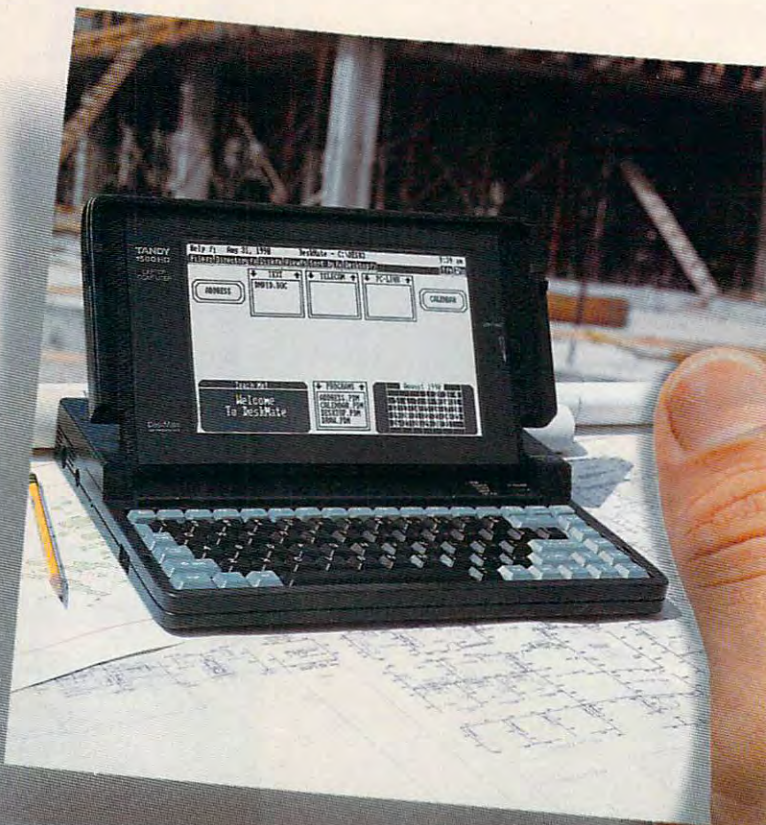
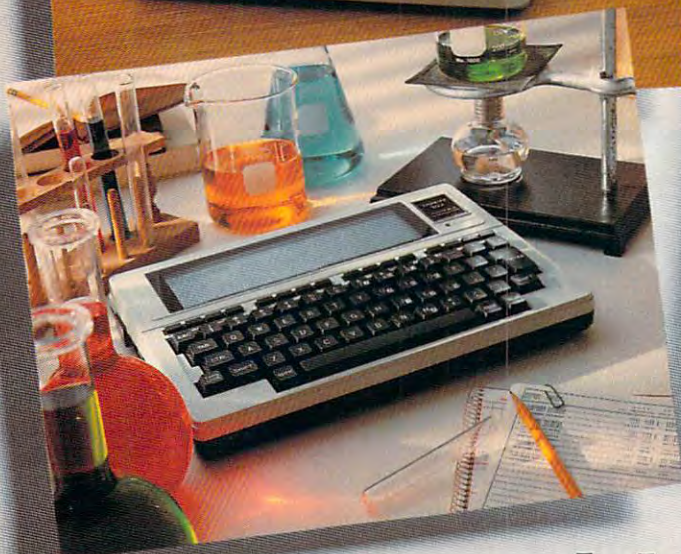
You've made up your mind. You're going to take the plunge and start your own business. Good for you. You've set up a home office. You've shopped long and hard for a computer, printer, and telephone. You've even stocked up on pencils, pens, and paper. You're ready for business.

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. ▶

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Or grab the slim, 6-pound Tandy 1500 HD with a 20MB hard drive and DeskMate software. If you demand 286 power, our Tandy 2800 HD is ready to run, with 640 x 400 EGA graphics. Plus, there's the Tandy 102—the 3-pound portable that started the laptop revolution.

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

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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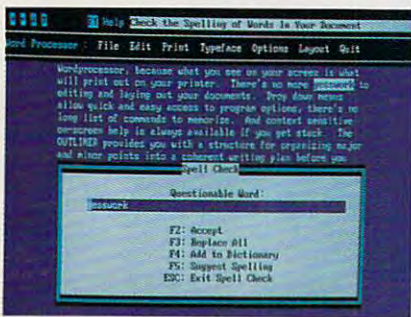
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Circle Reader Service Number 251

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

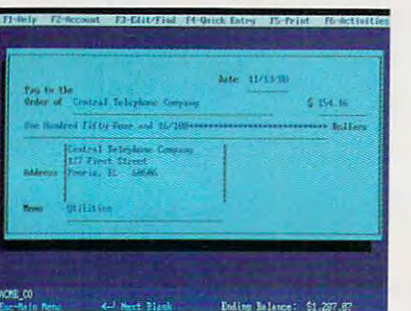
Eight-in-One also contains spreadsheet and time-management software. The spreadsheet offers mathematical and financial functions



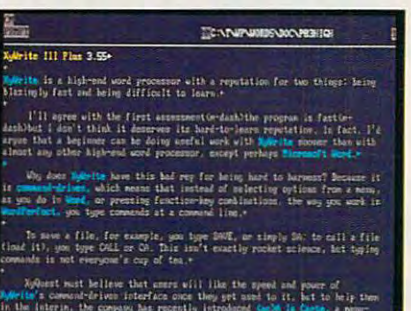
Eight-in-One is an economical integrated package. Its word processor features a dictionary and a thesaurus.



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.

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.

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
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San Mateo, CA 94403
(415) 345-5900

Formtool

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

Galaxy

Omniverse
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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
P.O. Box 96058
Bellevue, WA 98009
(206) 454-0479

PC Tools Deluxe 6.0

Central Point Software
15220 NW Greenbriar Pkwy. #200
Beaverton, OR 97006
(503) 690-8090

Procom Plus

DataStorm
P.O. Box 1471
Columbia, MO 65205
(314) 443-3282

Q & A

Symantec
10201 Torre Ave.
Cupertino, CA 95014
(408) 253-9600

Quattro Pro

Borland
1800 Green Hills Rd.
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* does 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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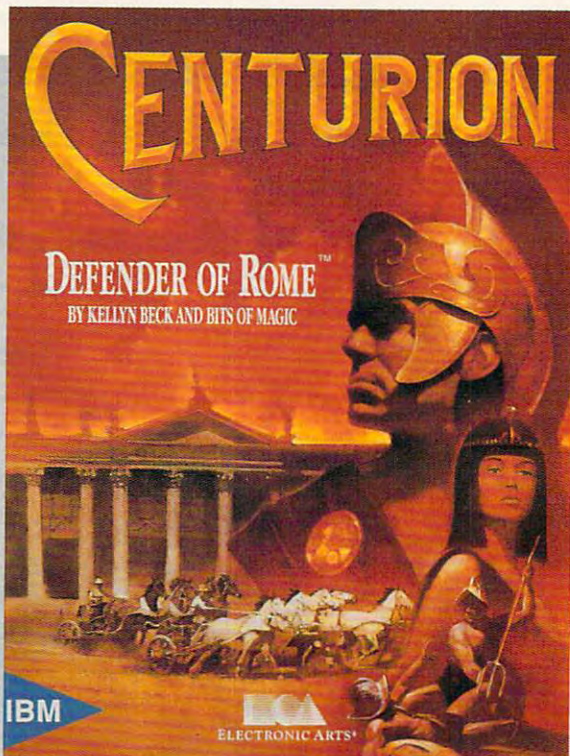
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LEAD THE ROMAN
LEGIONS TO
VICTORY AS YOU
CREATE AN EMPIRE
AND MAKE
HISTORY

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 multi-layered, 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-

MINIMENTS



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.

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.

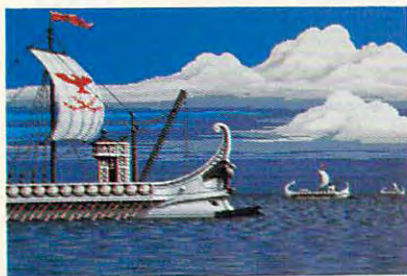
By the end of the first turn, you've only seen a few aspects of this multidimensional game. *Centurion*

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-



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

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 bleeps 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 millennium. 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 easy 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 heyday as well as it represents the mechanics of conquest. All hail!

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

Centurion: Defender of Rome

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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.

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GAMEPLAY

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

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

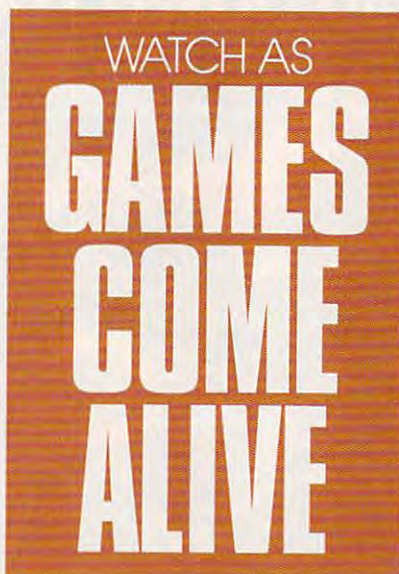
player control the landscape, while the computer controls the people who move through it. We gain freedom to control the landscape at the cost of losing individual control over the characters.

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. □



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

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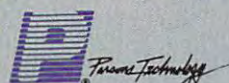
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Dungeons & Dragons

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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 adaptations 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? ▸

B O B G U E R R A

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.

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.

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

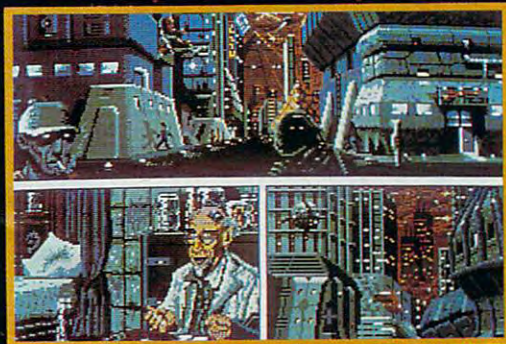


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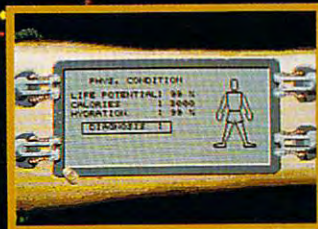


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on a DEC PDP10 mainframe.

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*
continued on page 71

**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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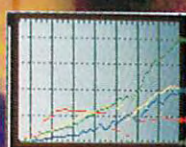
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continued from page 68

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.

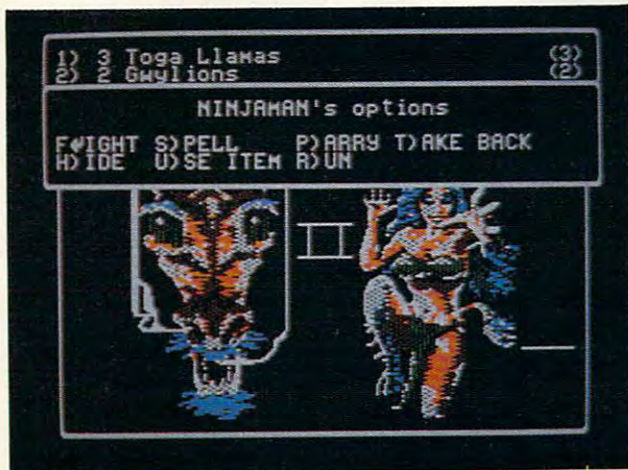
Other computer D & D pioneers include Richard Garriott, cofounder of Origin Systems and creator of the tremendously popular *Ultima* series of role-playing games. Perhaps better known by the name Lord British, Garriott spent a lot of time playing the paper version of *Dungeons & Dragons* while in high 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 University.

continued on page 72



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



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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*



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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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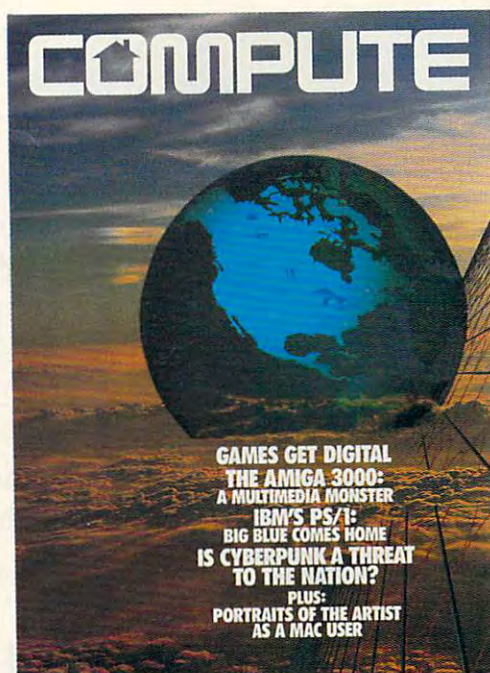
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If you have two- to four-year-old family members in your house, I don't need to tell you what inquisitive, imitative, and curious people they are. They love to explore, to "help" mommy and daddy do their work, and to participate in everything just 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.

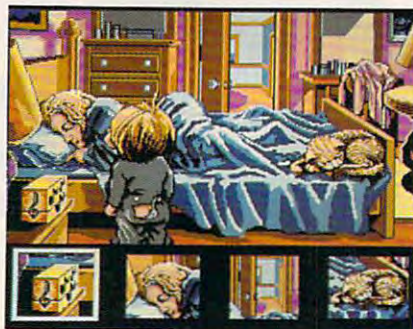
Little tykes will see it with entirely different eyes. Remember how often your two-year-old wants you to read that favorite story? Remember endless repetitions of a favorite song or game? Toddlers don't do ring-around-the-rosey once or twice; they do it over and over again, even if nothing changes.

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.

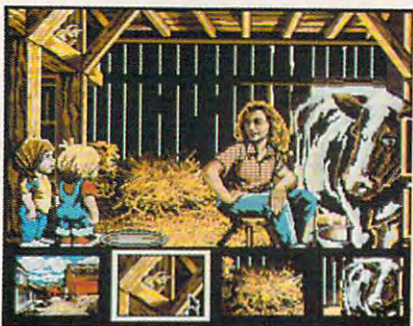
The kids love the feeling of control. They decide what to do and make McGee do their bidding. They don't need adult help; they're in charge. There's great excitement for toddlers who can say, "I can do it myself!" They also like using the computer, doing their "work" with it just the way Mommy and Daddy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

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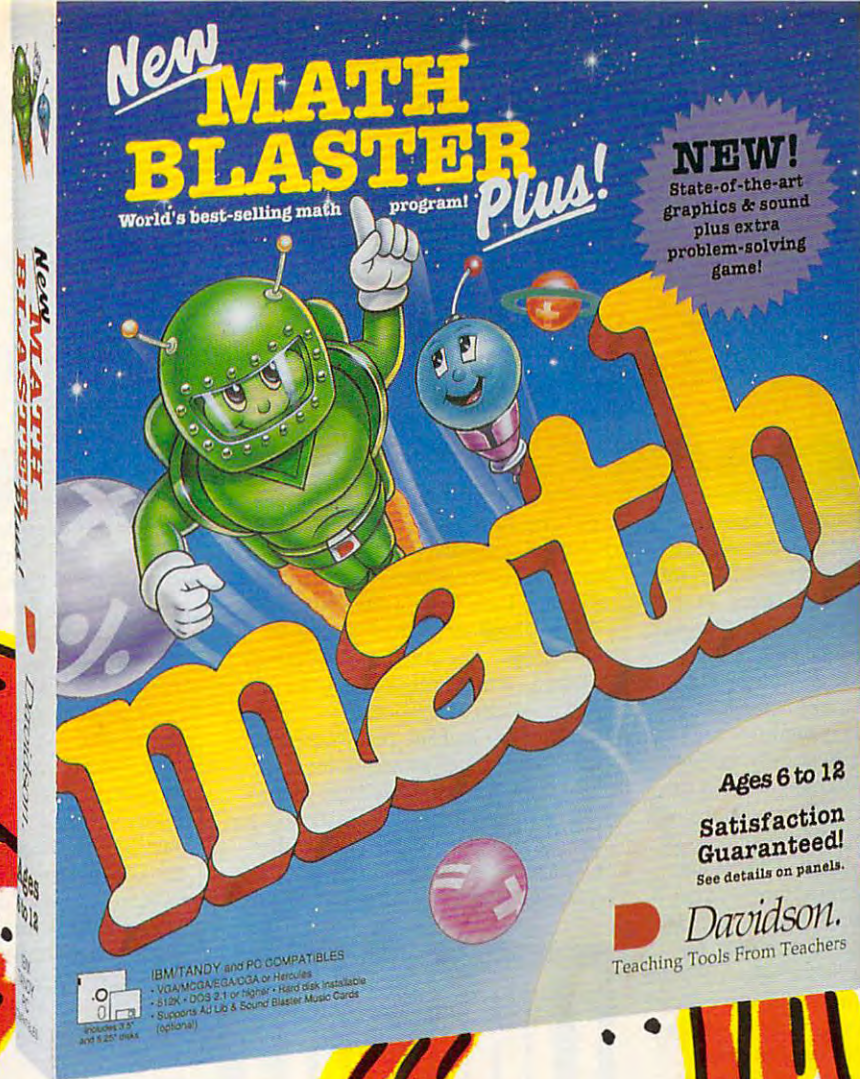
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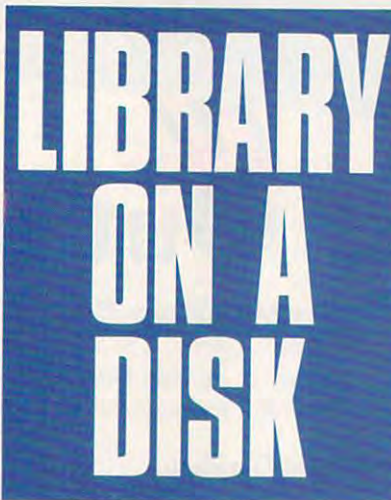
After years of hype and anticipation, CD-ROM (Compact Disc-Read Only Memory) drives are finally here. These relatives of standard laser-read compact discs can annex vast amounts of computer information to your computer, turning it into a library, a concert hall, a movie theater, and more.

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.

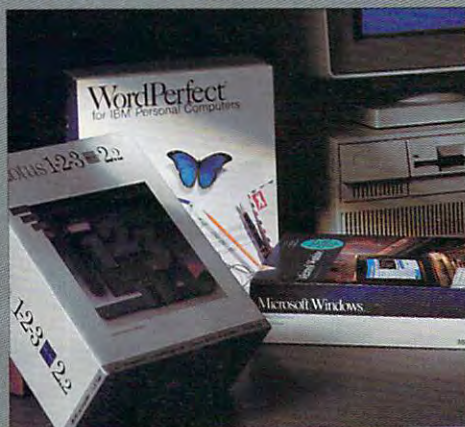
Right now, the number of CD-ROM titles is small, and many are tailored to the specific needs of technical researchers. But the more computers there are with CD-ROM drives, the more general-purpose CD-ROM software will appear to run on them. The market for CD-ROMs could snowball as rapidly as did the 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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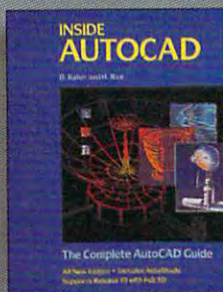
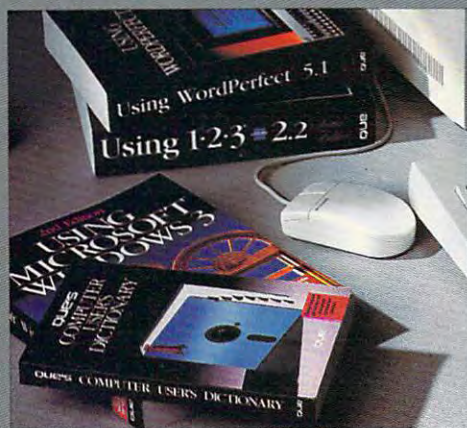
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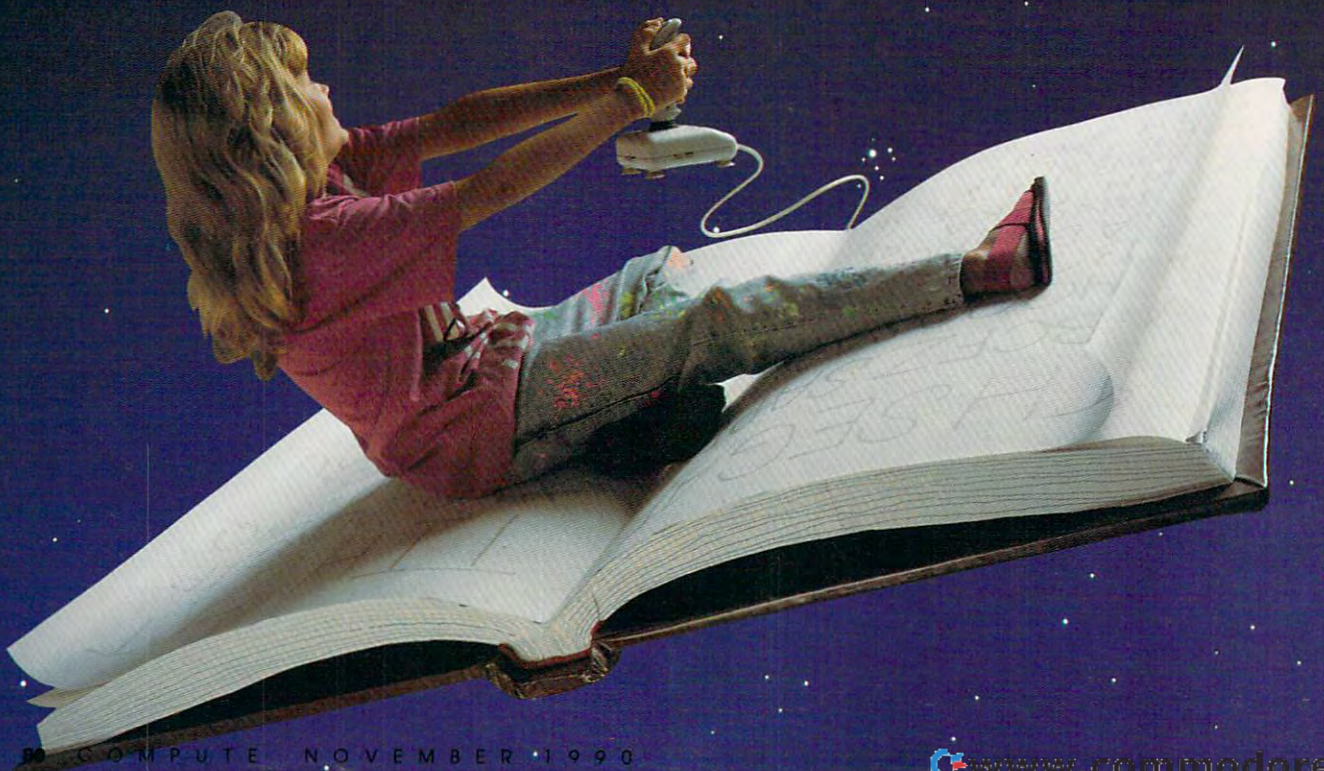


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Zing! ... Boom! ... Smash! ... Zap! Typical arcade game sounds, right? But don't bet there isn't some good learning going on. Even if your troops refuse to read the comics, they'll jump at the chance to read when reading is part of a thrilling computer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

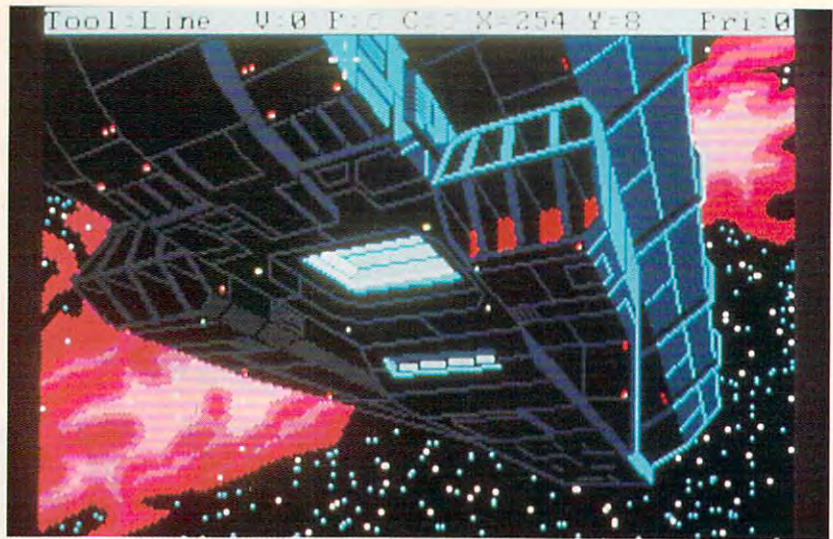
Hillsfar. Magically transformed into a thief, a fighter, a cleric, or a magic user, you follow the advice of the head of your guild, bone up on your archery skills, and practice fighting. You'll need these skills and more to survive in *Hillsfar*. Every 3-5 minutes, you'll have to do some reading; the 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.

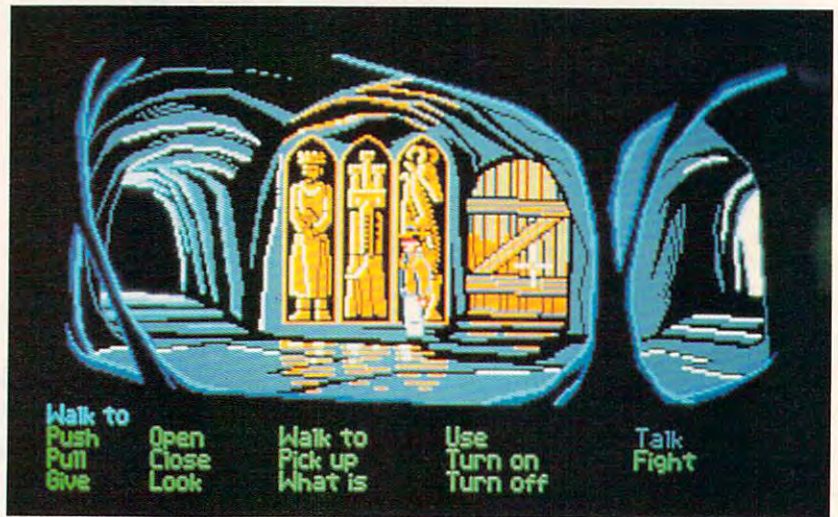
Games for Hesitant Readers

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



Space excitement keeps kids reading.



Join Indy in this computer adventure.

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.

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Circle Reader Service Number 254

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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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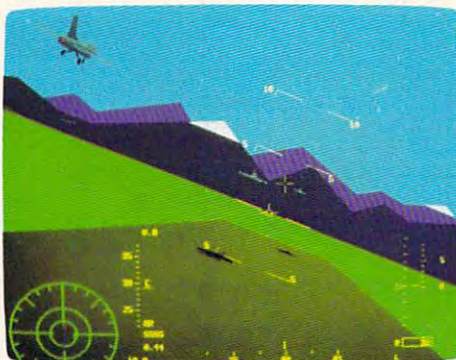
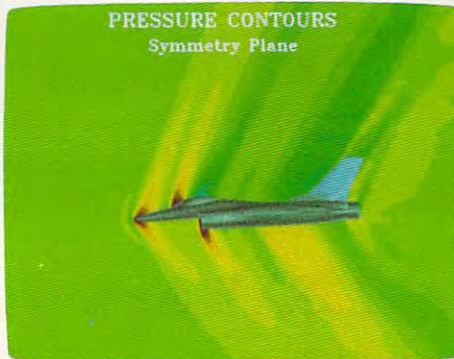
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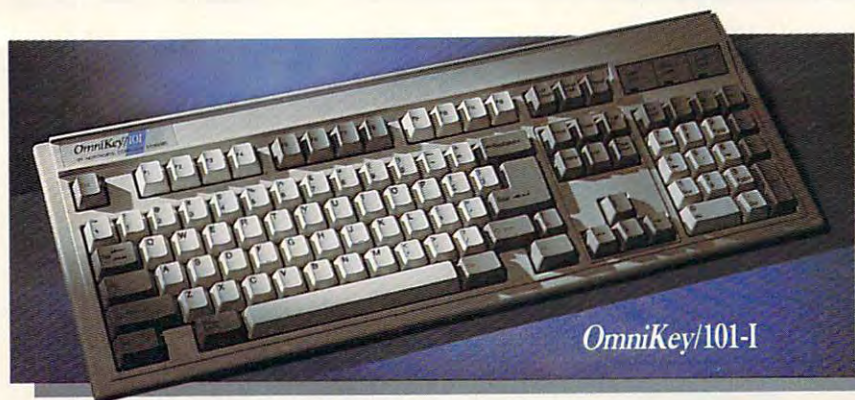
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IMPORTANT NOTICE FOR COMPUTE DISK SUBSCRIBERS*

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

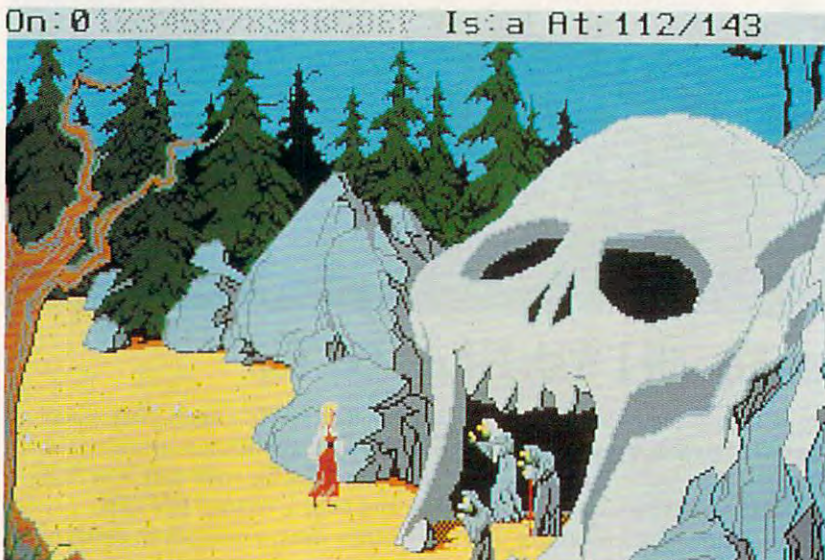
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trated if you get confused. Where else can you find a family-oriented reading game that is equally challenging for kids and adults?

Where in Time Is Carmen Sandiego? Now you'll need a Chromo-skimmer 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



Help Rosella save her father.

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.

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

T O M N E T S E L

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. □





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

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 your skill against the computer or a friend.

—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

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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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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A HARD DRIVE FOR THE 64/128

G A Z E T T E C O M M O D O R E 6 4 / 1 2 8



THE 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

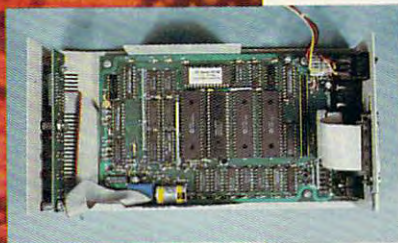
GEOFFREY GOVE

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.

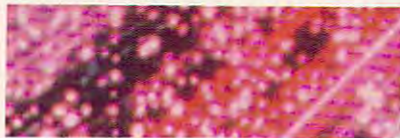
By doing so, CMD hopes to extend the useful life of the 64 and the 128 well into this decade. After having worked with a 20-megabyte version of the CMD HD Series hard

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.



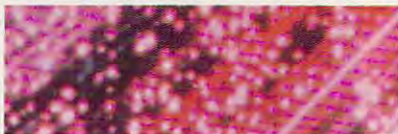
A Standard Design

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 compatibil-

ity 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



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- Compatible with GEOS™, CP/M™, BBS programs and most commercial software.
- FAST - with JiffyDOS, the HD can access PRG, SEQ, REL & USR files FASTER over the serial bus than the parallel interfaced Lt. Kernal.
- 3 1/2" SCSI technology allows for quiet reliable operation in a compact case about the same size as a 1581 drive.
- High-performance intelligent peripheral equipped with 2 MHz processor, 64K RAM, 16K ROM, two serial ports, parallel port, auxiliary port and SCSI port.
- Built-in Commodore compatible DOS responds to all 1541, 1571 and 1581 commands, including Block, Memory and Burst commands.
- Up to 254 partitions in sizes ranging from 256 blocks to 65,280 blocks each.
- Partitions can emulate 1541, 1571, 1581 drives for compatibility.
- Built-in real time clock automatically time and date stamps all files.
- Can be interfaced with Amiga, IBM - compatible and Macintosh computers, allowing you to take it with you when you upgrade.
- Serial bus interface supports Standard Serial as well as high-performance Fast Serial and JiffyDOS protocols. Parallel interface for connection to RAMLink.
- Connects easily to the serial bus without risky hardware hacks. Leaves expansion port open for use with cartridges, REU's and RAMLink.
- Easy-to-use utilities included which allow backing up and copying files or whole partitions to and from 1541, 1571, or 1581 floppy disks.
- Supports an unlimited number of true MS-DOS style subdirectories which may share all available blocks within a partition.
- 30 user buffers allow having up to 10 Relative files open at once. Any file type (including Relative files) may be over 65,000 blocks long.
- Pre-installed Q-Link software provides easy access and faster downloading to America's most popular 64/128 online service.
- External power supply avoids overheating and wear on computer power supply.
- Includes standard 25 pin SCSI port and all utilities needed to easily expand the system (up to 4 Gigabytes).
- Front panel controls for device number swapping, write protect, drive reset and partition selection.



HD-20 \$599.95 • HD-100 \$1149.95
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The CMD HD offers compatibility with many popular programs including:

BBS

Image CNET 64/128
Color 64 Omni 128
Vision DragonFire 128
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GEOS

Recognized by Berkeley Software for GEOS compatibility. Capable of booting GEOS and all applications. Operates nearly as fast as a RAM Expander.

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And many more...

The CMD Hard Drive is compatible with many other types of software such as: Languages, Desk Top Publishing, Assemblers, Compilers, Games, Graphics, Bible search programs, etc.

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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 Amiga-DOS 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 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.

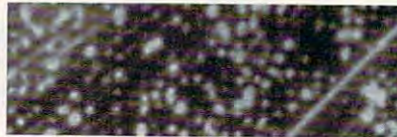


More Utilities

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 MCOPI whole disk copy program, requires only 74 seconds. Copying a 1581 disk to an HD partition using MCOPI 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. □

CMD Hard Drives

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