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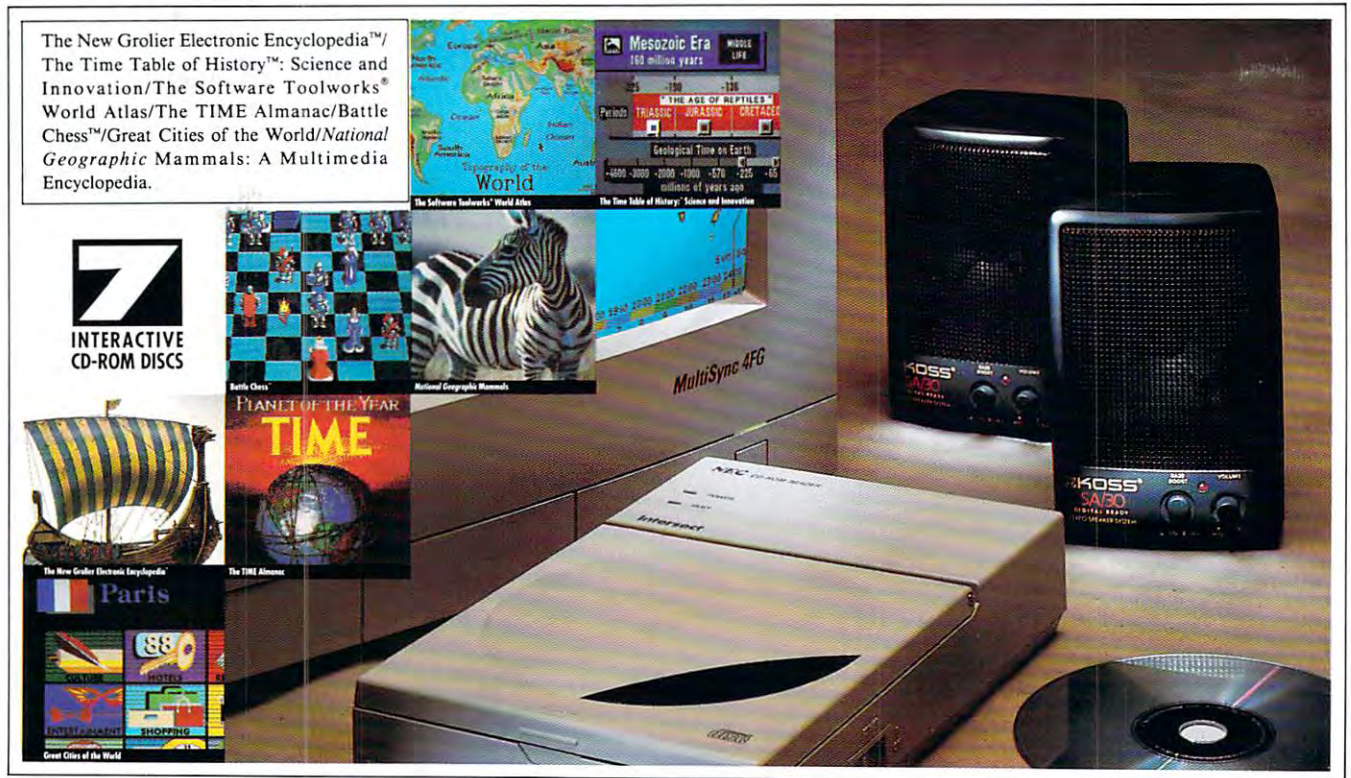
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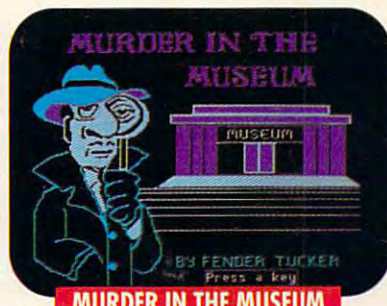
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"With its associated software, it has quietly (no pun intended, but what the heck) become the standard sound system for advanced PCs."

Jerry Pournelle, **BYTE** June 1991

COMPUTE August 1991

"...Creative Labs is now turning up the volume with the Sound Blaster Pro. It's basically two Sound Blasters on a single card with additional multimedia features thrown in. It has twin FM chips capable of creating 22 individual voices, two DACs for stereo voice and sound-effects playback, a stereo microphone jack, and a built-in stereo mixer that can adjust the volume of all your Sound Blaster audio sources (stereo DAC, stereo FM, microphone, stereo line-in, CD-Audio and PC internal speaker).

The built-in mixer makes the Sound Blaster Pro fully compliant with Microsoft's Multimedia Level 1 Extensions to Windows. Multimedia software will be able to fade-in, fade-out and pan the various audio sources to create elaborate sound montages.

The Sound Blaster Pro includes a CD-ROM interface for either an internal or external CD-ROM player. There's also an internal connector for CD-Audio. The MIDI interface is compatible with the original Sound Blaster's MIDI interface but adds the MIDI time-stamp that's part of Microsoft's new multimedia standard.

All in all, the Sound Blaster Pro is chock-full of new features, yet it's fully compatible with its younger brother."

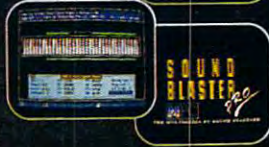
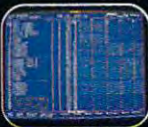
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- * Pro-Intelligent Organ
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- * SBTALKER - text-to-speech synthesizer with DR SBAITSO2
- * Talking Parrot - voice in/out application.
- * MMPLAY Multimedia Presentation
- * CD music player
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"The big question is, at a list price of \$249.95, is the Sound Blaster worth the investment? Yes, yes, a thousand times yes!!!" **PC HOME JOURNAL**

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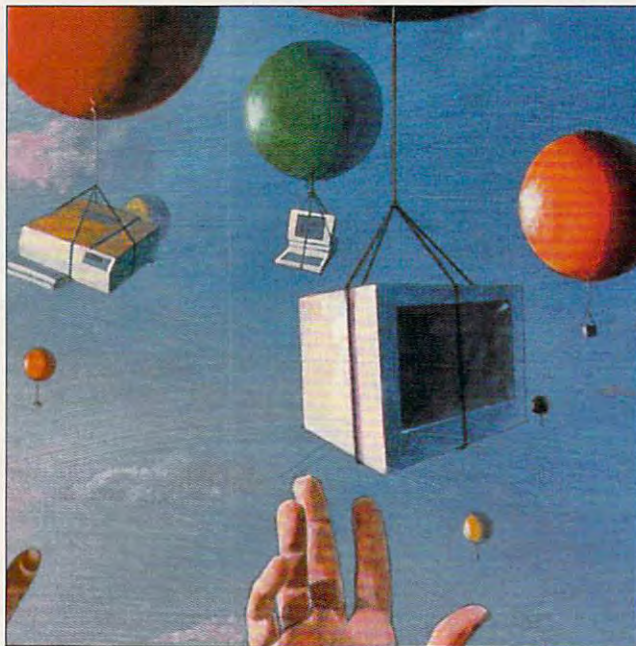
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the hard-hitting game from Bethesda Softworks, as well as an inexpensive notebook computer, Leading Technology's 9800NB. We also look at today's leading computer software and hardware, including *FastLynx LapPack*, *Teenage Mutant Ninja Turtles World Tour—Electric Crayon Deluxe*, NEC Graphics CDs, *Mace Express Recovery*, *ThunderStrike*, *Flow Charting 3*, and *Dvorak on Typing*.

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EDITORIAL LICENSE

Clifton Karnes

At COMDEX/Fall, held this past October in Las Vegas, Nevada, printer manufacturer Star Micronics hosted a breakfast press conference to present the results of a Gallup survey it had commissioned on the home computer market.

Some of the results were startling, some were what we expected to hear, but all pointed to a growing, healthy home computer market. Here are some highlights.

they're going to use their new computer to earn money. This was a surprise, as was the fact that nearly a third of all home machines are currently being used to earn income.

A large number—76 percent—say they want to use their PCs to bring work home. More than half of this group think that the computer will increase their chance of a promotion (or increase their chance of keeping their present job if their company downsizes).

About 80 percent of those planning to buy a PC say they're interested in the machines as educational tools—both for their children and themselves.

Of those planning to buy for the first time, 59 percent state that they want a computer to play games. For those upgrading, this number is slightly higher—about 62 percent.

Obviously, there's a lot of overlap in these figures. It's clear that most people planning to buy a PC are interested in all three areas—home office, education, and entertainment.

What does all this boil down to? In short, a phenomenal growth in home computing that's being fueled by a combination of interests in home office, education, and entertainment.

At COMPUTE, we have more than a passing interest in the home computer market. For 13 years, it's been our mandate as a magazine to serve this exciting and constantly evolving group. We're dedicated to the home computer as a tool for the entire family.

And as Star's Gallup survey shows, the home market is anything but one-dimensional. In fact, home users place demands on their machines that far exceed the responsibilities given to the home PC's corporate cousins.

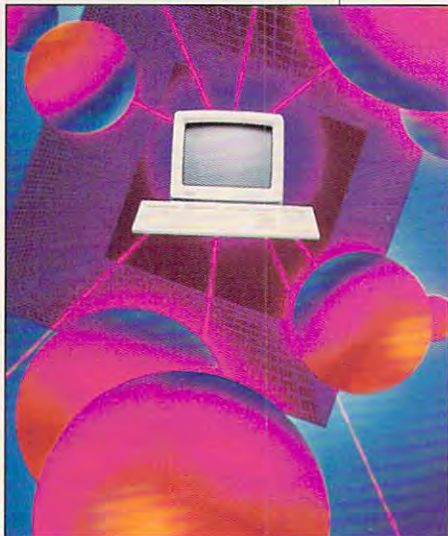
Nothing demonstrates this multifaceted nature of home computing or shows the range of *COMPUTE's* coverage better than our annual COMPUTE Choice Awards, where we choose the best software and hardware products for the year.

In this issue, you'll find our choices of the best products for 1991 in the categories of home office, entertainment, discovery (education), and technology.

A look at this year's Choices will convince you that home computer users are a varied and exciting group. The awards show that home users are interested in everything from the best operating systems to the tops in education for their children, from the most demanding fantasy/role-playing game to the best utility, from the hottest arcade action to the most feature-rich programming language.

Star's Gallup survey and our own COMPUTE Choice awards give a clear idea of home computer users in broad strokes, but we're interested in our readers as individuals, too. That's why, every few months, we include a readership survey in our pages. In this issue, you'll find such a survey, and we hope you'll take the time to fill it out. This survey will provide us with specific information about you, your equipment, what you like about *COMPUTE*, and what you'd like to see changed. We use the results from these surveys to fine-tune *COMPUTE* so it's the magazine you want. Talk to us. We're listening. □

A look at this year's COMPUTE Choices will convince you that home computer users are a varied and exciting group.



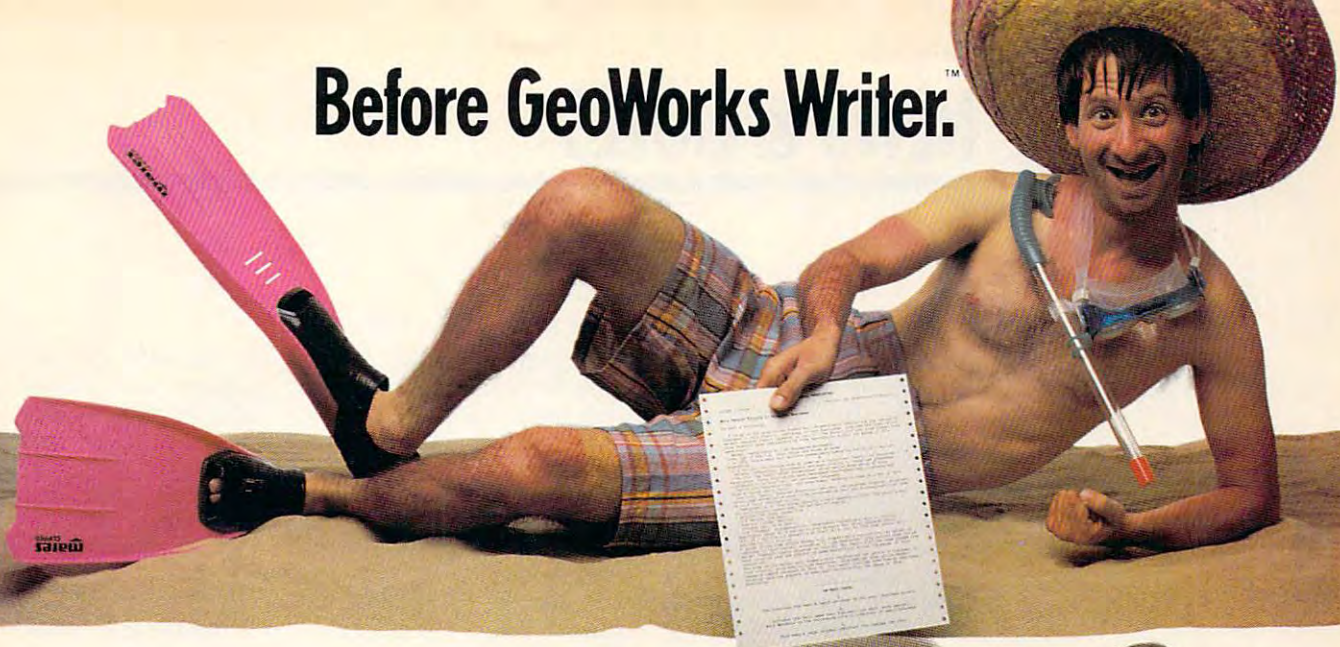
According to the survey, about 25 percent of all American households have home computers. That's no surprise. The news is that 23 percent of all households plan to buy a computer in the next two years. That's 21 million households.

Of this 21 million, roughly one-quarter are upgrading; the majority, however, are first-time buyers. This means that the installed base of home computers is going to nearly double in the next two years.

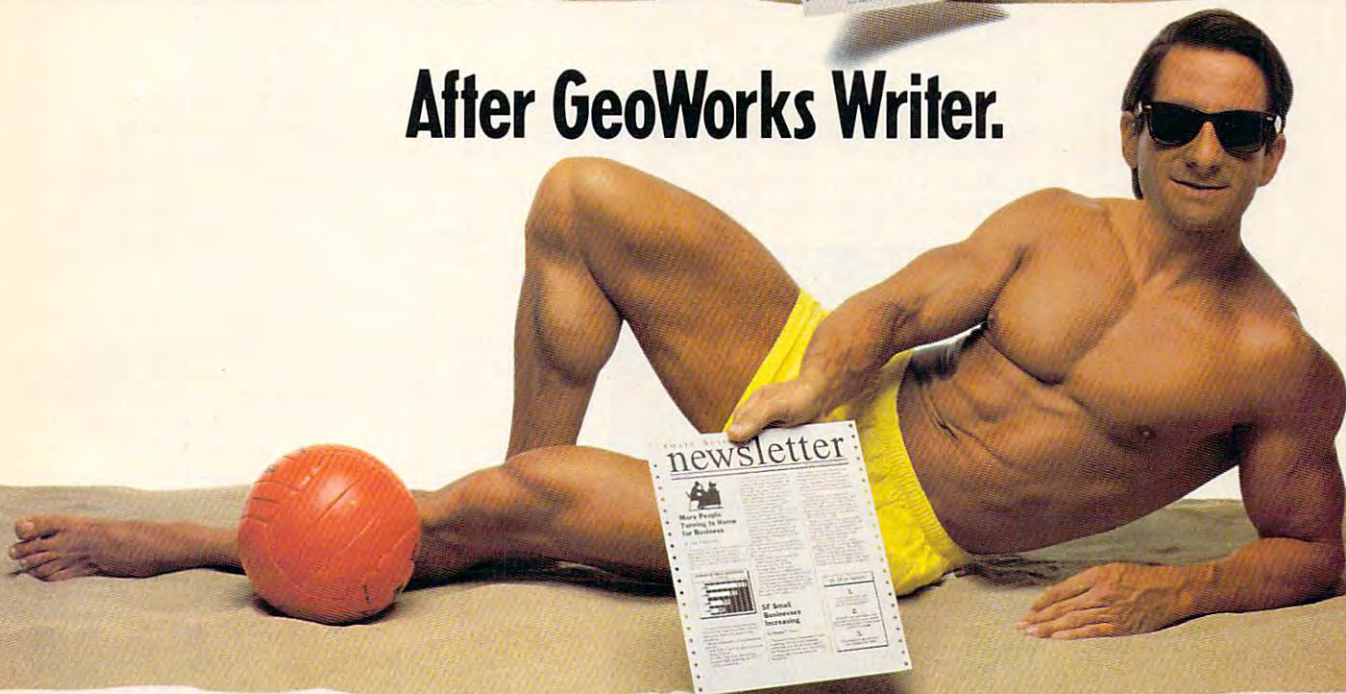
Why are all these Americans buying PCs? The three E's: earnings, entertainment, and education.

Of those planning to buy a machine, nearly half say

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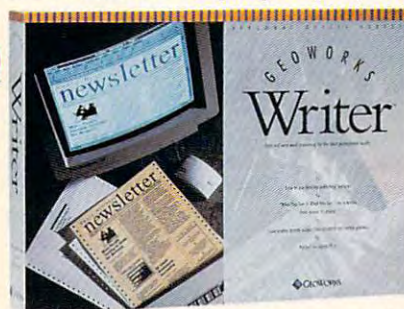
Yup, GeoWorks Writer has everything I need to look great including desktop pub-

lishing features like multi-column layouts, easy importing of graphics (it comes with clip art!) ... even its own award-winning graphical environment* that makes using it as easy as clicking a mouse. And if you think it's amazing alone, just wait until you see it working with the rest of the Personal Office Series team.

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NEWS & NOTES

Redesigning the Classics

Some of Sierra On-Line's classic role-playing games are getting dramatic facelifts. The "new" classics feature the same characters and stories, but animation, background, musical scores, and sound effects have been greatly enhanced to take full advantage of high-resolution VGA color, stereo sound capabilities, and Sierra's new point-and-click interface, which means no more type-in commands and lots of character action.

Space Quest I now joins *King's Quest I*, *Mixed-Up Mother Goose*, and *Leisure Suit Lar-*

ry and becomes the newest Sierra original to be released in VGA. The game has been redesigned to emulate a 1950s sci-fi flick—campy space creatures and all—without changing the story's essence.

However, along with the arrival of a new-and-improved lifelike Roger Wilco, a dynamic soundtrack based on the original *Space Quest* theme, and dramatic new background illustrations, Sierra warns experienced players who *think* they know the game that creators

Scott Murphy and Mark Crowe have whipped up some brand new space magic. *Space Quest I* VGA is available now for a suggested retail price of \$59.95. Look for VGA versions of *Police Quest I* and *Quest for Glory I* to come soon. For more information, contact Sierra On-Line, P.O. Box 485, Coarsegold, California 93614; (209) 683-4468.

JILL CHAMPION

Politically Correct Laser Printing

If you work for a politically correct, environmentally aware "green" office, you've already begun recycling aluminum soft drink cans and used paper, and you've stopped using Styrofoam coffee cups.

You can help reduce the load on overflowing landfills even more by recycling the toner cartridges used in laser printers, thanks to a free cartridge-recycling program from Lexmark, a worldwide manufacturer and marketer of desktop and personal printers, typewriters, keyboards, and supplies.

By providing special prepaid return postage mailers, Operation Resource, as the new program is known, encourages IBM LaserPrinter customers in the U.S. to return used cartridges to Lexmark. The cartridges are then disassembled and sent to various recycling centers.

IBM LaserPrinter customers with questions about Operation Resource can call (800) 848-9894 for additional details.

Helpful Mouse Pads

The Microref SmartPad from Educational Systems is a full-

size mouse pad that comes equipped with a transparent plastic cover into which a variety of template sheets can be inserted for at-a-glance keyboard and mouse operating commands.

Templates, available for *Windows 3.0*, *WordPerfect 5.1*, *Excel for Windows 3.0*, *Lotus 1-2-3* release 3.1, *PC/MS-DOS 2.1-4.1*, and *Word for Windows* (and there's one you can customize yourself), sell for \$9.95 to \$14.95 each. Suggested retail price for the pad alone is \$12.95. A special mouse pad kit, including the mouse pad, one template, and an eight-page booklet on mouse use and care is available for \$19.95.

Educational Systems says the SmartPad is actually one of the best pads going and would be even without templates. Its hardtop surface provides a blend of low friction for high-speed mouse control and texture to ensure traction. The SmartPad could only be better if the mouse could *read* the template!

For more information, contact Educational Systems, 706 Landwehr Road, Northbrook, Illinois 60062; (708) 498-3780.

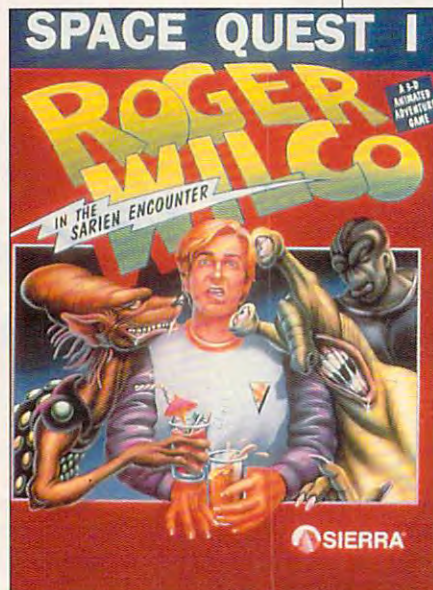
ALAN BECHTOLD

GeoWorks in Progress

The folks at GeoWorks were busy in 1991. Last summer, they released a much-improved *GeoWorks Ensemble* version 1.2 package. The new release builds on *Ensemble's* high performance and ease of use by providing a range of additional features, including a spelling checker for *GeoWrite*, support for more than 300 additional printers, the popular game *Tetris*, numerous templates, and more. Version 1.2 is sent free to all registered owners of version 1.0.

Early in the fall, GeoWorks released three new add-on, easy-to-install font libraries—*Fun*

Space Quest I fans can expect lifelike characters, stereo sound, and some spacey new twists in the classic game's redesign.



Before GeoWorks Designer.™

After GeoWorks Designer.



"I can't believe how easy it was to look this good. You see, before I discovered GeoWorks Designer,[™] my posters were pathetic. But now, wow! Everything I do looks gorgeous. It has style! Energy! It's red hot, a whole new me. And I did it

all myself on my first day with GeoWorks Designer.

Skeptical? Well, GeoWorks Designer comes with over 70 templates for everything from banners to flyers, greeting cards to newsletters. And it includes scads of clip art! Believe me, I'm no artist. All I did was pop my words into a template. Then, voila. C'est tres chic!! It was even WYSIWYG so there was no time-wasting surprises. What I saw on my screen was what came out looking laser printed on my little dot matrix printer. With no ugly jaggies!

Yes, GeoWorks Designer is the graphics program for people who want more than a Print Shop.[™] It makes fast work of small

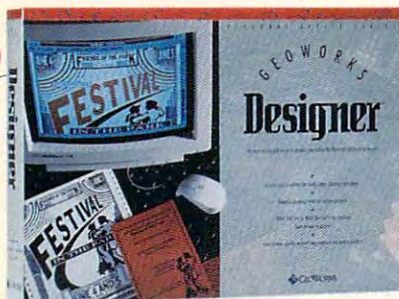
projects, but has all the features you need to get fancy... even its own award-winning* graphical environment that makes using it as easy as clicking a mouse. And if you think it's super alone, just wait until you see it working with the rest of the Personal Office Series team.

So if you're tired of anemic artwork, make a change. Go for GeoWorks.[™] If it can make *me* look this good, imagine what it will do for you."

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*PC Computing's Most Valuable Product, InfoWorld's Product Of The Year, Compute's Editor's Choice, Software Publisher's Association: Critics Choice; Best Creativity/Productivity; Best Consumer Product; Best New Use of a Computer, PC Magazine Technical Excellence Award Finalist.

NEWS & NOTES

Fonts, Newsletter Fonts, and Business Fonts. Art Library, released at the same time, contains a great collection of clip art. The font libraries and the art library retail for \$49.95 each but can be purchased directly from GeoWorks for \$39.95 each or \$99.95 for all four libraries.

GeoWorks had even more surprises in store with the October release of stand-alone versions of *GeoWrite*, *GeoDraw*, and *GeoManager*. Those wanting WYSIWYG applications without purchasing *GeoWorks Ensemble* can now buy *GeoWorks Writer*, *GeoWorks Designer*, or *GeoWorks Desktop* for around \$69.95 each.

As if one new GeoWorks product weren't enough, *GeoWorks Pro* is now available for \$199.99. *GeoWorks Pro* adds Borland's *Quattro Pro SE* spreadsheet to *Ensemble's GeoWrite*, *GeoDraw*, *GeoComm*, and *GeoManager*. Using the *GeoWorks Pro Viewer*, you can remain inside the *GeoWorks Pro* environment while working with spreadsheet files and charts created in *Quattro Pro SE*.

GeoWorks Pro users can navigate through a spreadsheet or cut, paste, drag, and drop any portion of a *Quattro Pro* spreadsheet or chart directly into *GeoWrite* or *GeoDraw*.

If you purchased *GeoWorks Ensemble* after September 22, 1991, you'll receive a free upgrade. Other registered owners will receive a special upgrade offer.

For more information, contact GeoWorks, 2150 Shattuck Avenue, Berkeley, California 94704; (415) 644-0883. STEPHEN LEVY

Brother's PowerNote

Brother International's new PowerNote shouldn't be confused with a laptop PC or word processor. It's not a mere data manager, either. In fact, it's a notebook-sized replacement for the average businessperson's calculator, address and telephone directory, calendar, and portable fax machine—all rolled into one. It's like an electronic notebook loaded with paper and a lot more.

Weighing just five pounds, the PowerNote displays a menu screen that allows easy access to all of its fully integrated features. It can be used to create spreadsheets, perform math functions,

arrange schedules, and store addresses and phone numbers. With an optional fax/modem, it can also exchange ASCII files with PCs and send and receive fax transmissions.

The electronic notebook features 32K of built-in text memory and comes with a built-in 3½-inch 240K disk drive for data storage. Its two-way switchable 14-line x 80-character LCD screen provides optimal viewing in any type of lighting situation, and it can be used with virtually any PC-compatible printer—from dot-matrix to laser. The PowerNote operates with an included AC adapter and also can run up to eight hours by using an optional rechargeable battery. It even comes with a version of the hit arcade game *Tetris* for the busy executive who needs an occasional break.

For more information, contact Brother, 200 Cottontail Lane, Somerset, New Jersey 08875; (908) 356-8880.

ALAN BECHTOLD

Desktop Laptop

Until now, laptop users have had to sacrifice *something* for convenience. While size and portability of laptop and notebook PCs have always been appealing, the best black-and-white VGA displays and fastest microprocessors usually available for these machines have always compromised their computing power. NEC's newest laptop could signal the turning point.

The new NEC ProSpeed 486SX/C color laptop PC offers more power than a 386 33-MHz computer and includes a Super VGA thin film transistor (TFT) active matrix color screen and an EISA expansion slot. NEC says it's the lightest laptop on the market with those specifications.

The ProSpeed 486SX/C laptop supports 256 colors in 640 x 480 resolution and has a built-in 32-bit EISA slot that provides optimal expansion for networking, imaging, and engineering applications. Other features include 2MB of memory expandable to 20MB, a 120MB hard disk drive, an 8K-cache memory, and *Windows* and *DOS 5.0* installed. Suggested retail price is \$8,999.

For more information, contact NEC Technologies, 1255 Michael Drive, Wood Dale, Illinois 60191; (800) 366-3632.

ALAN BECHTOLD

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ments, addresses, the works. GeoWorks Desktop makes using a computer so easy, even I can do it. So of course, my wife and kids have no trouble at all.

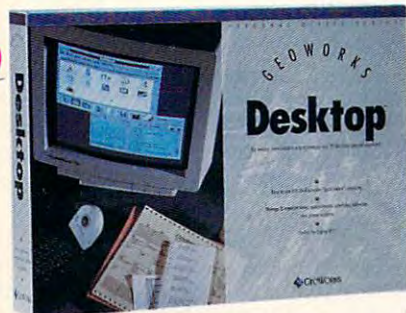
Impossible? Well, GeoWorks Desktop replaces that cryptic DOS C> prompt with an award-winning* graphical environment of menus and buttons that you just point at with a mouse to get things done. For example, one click launches Lotus or any DOS program. And because it turns DOS directories into pictures of file folders, GeoWorks Desktop can organize your hard disk in a flash. Just delete files you don't need by placing them in a "wastebasket," and organize the rest in neat, easy-to-see folders.

Yes, now I can find addresses, notes, appointments, and phone numbers fast. Because GeoWorks Desktop comes with a computerized calendar, notepad, address book and more. All of which are easier, faster, and smarter than my old paper versions. And if you think it's easy alone, just wait until you see it working with the rest of the Personal Office Series team.

So don't waste time with chaos, make a change. Go for GeoWorks.™ If it can organize *me*, imagine what it can do for you."

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Better Installation

Allow me to comment on your review of our product *Strategic Video Poker* (COMPUTE, June 1991), in which you refer to our installation, stating, "An unfriendly installation procedure may cause problems for novices."

The program will install even if you don't specify a subdirectory. However, we decided not to have the installation program create its own subdirectory to avoid conflicts on the user's hard disk.

The user has the option of copying the information verbatim from page 15 of the manual or substituting a subdirectory name after typing INSTALL at the A: prompt. The installation program detects the graphics adapter, installs the appropriate graphics files, and creates a directory.

Thank you for your feedback. Every day we obtain more users who are COMPUTE readers, many of whom mention reading your review. We are continuously enhancing our support for different video modes.

WENDY WEINER, PRESIDENT
LWS SOFTWARE
HAVERTOWN, PA

Stop the Presses

We have a small weekly newspaper that's in need of being brought into the computer age. We're cutting and pasting by hand to generate the newspaper.

The newspaper is 11 x 16 inches in size and has a total of 16 pages. We do have photos and advertising in the paper.

Can you recommend a complete computer system—printer, software, and peripherals—that would allow this paper to enter the modern age of computers? The people who put the newspaper together aren't very computer literate.

RAYMOND PEPIN
FITZBURG, MA

That's a pretty tall order, perhaps better filled by a local computer retailer or consultant, since the person who puts the system together will also have to train your staff in its use.

Probably the minimum configuration would require a 286 or 386 PC for each of your staff members (these are fairly standard, so go for low price), a flatbed scanner (Hewlett-Packard is one of many reputable manufacturers), a laser printer capable of printing typeset-quality output on large format paper (LaserMaster is the only manufacturer that springs to mind), and word processing and desktop publishing software.

We'd recommend XyWrite or Microsoft Word as the word processor (though there are dozens of good ones) and Ventura Publisher as the desktop publishing software (but take a look at PageMaker, too). You'll also want a graphics package, perhaps Aldus Photostyler or ImageIn, for dealing with scanned photographic images.

Total cash outlay? Since you didn't mention your cost requirement, we'll assume that the sky's the limit. Depending on the number of people who require PCs, you could outfit the office for around \$12,000–\$20,000.

These figures assume that you'll use only monochrome equipment. The rule of thumb in desktop publishing is that you can spend as much money as you have—and more—and still find yourself lusting after unattainable equipment and software.

Besides sticking to monochrome, you might save money by investigating resellers of discontinued equipment, dealers in used equipment, and advertising-for-equipment exchanges with local dealers and consultants.

Since "Feedback" is always under attack for infrequently mentioning minority computers, we can also recommend that you consider the Macintosh, the Amiga, and the Atari as desktop publishing machines. Microsoft Word, Ventura Publisher, and PageMaker are all available for the Macintosh, as is the highly regarded QuarkXPress. Adobe PhotoShop and ColorStudio are powerful Mac graphics packages. ProWrite and WordPerfect are two top-of-the-line word processors for the Amiga. PageStream is a leading Amiga desktop publishing package. Good graphics packages for the Amiga are too numerous to mention, since it's primarily a graphics machine. Atari offers a desktop publishing package.

As hardware, each of these computers is excellent. The problem is in dealer availability. If you have questions of a technical nature (and as a beginner, you will surely have lots of them), PC and Mac expertise is far more readily available than Amiga or Atari expertise.

Handbook Redux

As author of *The Computer Buyer's Handbook*, I was very pleased with Mike Hubbart's review of my book (COMPUTE, July 1991). However, I want to respond to two small points he raised.

The most difficult thing about a book of this sort is keeping it current in a fast-changing market. Mr. Hubbart is correct in stating that pricing information (which appeared for comparative purposes on a single page) was out of date six months after printing. However, this kind of detailed information (which is better obtained from periodicals, anyway) plays little part in my narrative and, in any event, will

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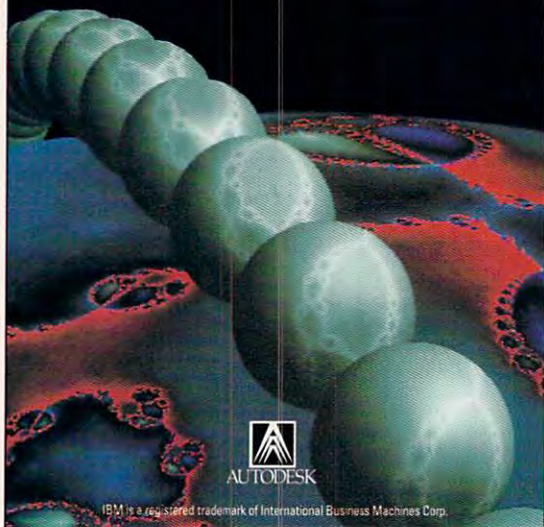
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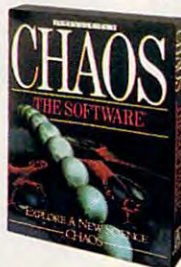
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continue to be updated with every printing of the book.

Because of deadlines, the first edition of the book was released without an index. Although the logical arrangement of the book would seem to make an index unnecessary, one will be included in the second edition, scheduled for release in early 1992.

R. WAYNE PARKER
SEATTLE, WA

By the Numbers

In computers we use binary, octal, decimal, hexadecimal, and now base 32 number systems. I know the names of the systems from 2 to 20, but I don't know the names of the systems above 20. I especially would like to know the name of the base 32 system.

Here are the ones I already know: Binary is base 2, Octal is base 8, Decimal is base 10, Duodecimal is base 12, Hexadecimal is base 16, and Bidecimal is base 20.

E. O. ZEAGLER
BAYTOWN, TX

A call to a university math department yielded this response from a gentleman purporting to be a professor: "A number system based on 32? I'd call it a base 32 number system."

Realizing that this answer was far

too simple, we came up with this response: Base 21 would be unibidecimal; base 32 would be duotridecimal. Base 40 would logically be called quadradecimal. Incidentally, the Latin for fourteen is quattuordecim; for forty, quadraginta; for twenty, viginti; and for twenty-one, viginti unus.

Our thanks to Betty Bixby, who is fluent in Latin, for her help with this reply.

New Math

One of the sentences in the October Test Lab sidebar "Choosing an Interface" (page 38) should have read, "SCSI interfaces [rather than proprietary interfaces] are commonly sold separately, adding to the cost of the drive (typically \$100-\$150 more)."

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

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What computer(s) do you own or use?

- 8088/8086 (IBM PC, XT, or compatible), brand _____
- 80286 (IBM AT or compatible), brand _____
- 80386, brand _____
- Notebook/laptop, brand _____
- Macintosh _____
- Game system, brand _____
- Other _____
- I don't own a computer.

Which video display system(s) do you use?

- Monochrome
- Hercules
- CGA
- EGA
- VGA
- Super VGA



Which peripheral(s) do you own or use with your computer?

- 5¼-inch disk drive
- 3½-inch disk drive
- CD-ROM drive
- Dot-matrix printer
- Hard disk
- Joystick
- Laser printer
- Letter quality printer
- MIDI device
- Modem
- Mouse
- PostScript printer
- Sound card

How much memory does your computer have?

- 512K or less
- 640K
- Extended memory _____
- Expanded memory _____

Which language do you prefer for programming?

- BASIC
- C
- Pascal
- Assembly language
- Other _____
- I don't program on the PC.

Which DOS do you use?

- MS-DOS version _____
- DR DOS version _____

Which graphical user interface do you use?

- Microsoft Windows
- GeoWorks Ensemble
- Tandy DeskMate
- Other _____
- I don't use a graphical user interface.

Which columns do you like the most?

- Arts & Letters
- COMPUTE/NET
- Disk Update
- Editorial License
- Feedback
- GamePlay
- Hardware Clinic
- IntroDOS

- Multimedia PC
- News & Notes
- On Disk
- PathWays
- Point & Click
- Programming Power
- SharePak
- Tips & Tools
- WorkPlace

Which of the following computer-related topics do you like to read about?

- Databases
- Desktop publishing
- Disk management and MS-DOS
- Education
- Games and entertainment
- Graphics (paint, draw, or CAD)
- How to upgrade your PC
- Integrated software
- Money management
- Multimedia
- Local area networks
- New computer technologies
- New hardware
- Pen computing
- Programming
- Spreadsheets
- Telecommunications
- Windows
- Word processing

Where do you use your PC?

- Home
- Work
- School

Where did you get this copy of COMPUTE?

- Subscription
- Newsstand
- Other _____

Which COMPUTE disk(s) do you subscribe to?

- Amiga Resource Disk
- COMPUTE's PC Disk
- Gazette Disk
- SharePak

Have you used COMPUTE/NET?

- Yes
- No

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SHAREPAK

Richard C. Leinecker

FOUR PROGRAMS TO PLEASE

The four programs packed on this month's *SharePak* disk are sure to delight just about everyone. There's *Hi-Lo Joker Poker*, an old game with a new twist; *LINEWARS*, an arcade-style game that lets you blast away, zapping aliens as you go; *ZipZap 7.0*, a useful disk utility for editing files; and *FormGen*, a formatting utility for creating text-based forms and files ready to fill out.

January offers a mix of games and utilities sure to delight just about everyone.



In *Hi-Lo Joker Poker* you need a winning hand to stay alive.



View and modify files and sectors in ASCII or hex with *ZipZap*.

We spend many man-hours putting our *SharePak* disks together. We download hundreds of files from the online services. We select programs with reader appeal, then test them, and pick only the very best. If there's an important feature that should be added or a bug, we contact the authors and get things worked out. Finally we check for viruses and assemble the programs on a disk with documentation and a menu program for the easiest possible installation.

If you're a shareware author, now's your chance to submit programs for 1992. You can send submissions through the mail to COMPUTE's *SharePak* Submissions, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. But there's an even better way: Upload files to COMPUTE/NET on GEnie or America Online.

And if you enjoy *SharePak*, now's a good time to send suggestions and your 1992 wish lists. With your input, we can better serve you by collecting the kinds of programs you want. Just write to me at the above address, or send E-mail to RLEINECKER on GEnie, Rick CL on America Online, or user 75300,2104 on CompuServe.

Hi-Lo Joker Poker

This takes the game of draw poker in a new direction. You start off with ten credits, and each time you don't get a winning hand, you lose one. But for every winning hand, you get credits. The better the hand, the more credits. With skillful play you can amass a pile of credits. And if you're lucky enough to get a joker, it's wild.

The CGA graphics are detailed and tastefully done. You don't have to read a documentation file; all of the instructions can be read while you're playing. You might not need them, though, since the screen has all of the keypresses displayed. But for the ultimate in easy play, use your mouse and just click on the buttons to play the game.

LINEWARS

Jump into your Cobra Mark IV multipurpose general contract vehicle and blast off into intergalactic space in *LINEWARS*. Once in the deep dark void, you'll have to clear out the ali-

en ships in your vicinity. If you don't, it might cost you your life. Your mighty arsenal contains missiles, beam lasers, and an energy shield.

This game is fun—and even more fun if you connect with another player via modems. Then the action really heats up because you're fighting a living person while zapping the unknowns. The game runs in CGA, EGA, and VGA.

ZipZap 7.0

ZipZap lets you view and modify files and disk sectors. The data is displayed as ASCII or hex. That's good because straight hex looks like Greek to most people. Why would you want to modify a file or disk sector? One of the most common uses is to change the volume labels of disks. I've also had to change text within programs when the source code is unavailable.

Sometimes, though, I just want to look through a disk file to see what's there. You can often see what language the program was written in. And you can even see text strings that indicate features that you're not aware of. This handy utility has helped me in a variety of situations, and I wouldn't be without it.

FormGen

Dressing up batch files is a good idea, especially if you're preparing a file for use by someone who is new to computing. This utility lets you create text files that can be displayed from a batch file or your program. It's easy to use, too. Some simple keypresses let you draw lines, boxes, and lots more.

You'll learn the keypresses quickly using the clear, concise documentation file included with the program. It's full of charts and explanations that'll have you creating masterpieces in no time. □

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disk
\$1.19
per program!

Back Issues Available

DEC 89: *Hearts*, play your computer in hearts; *Bass Tour*, super fishing simulation; *MahJongg*, match and stack colorful tiles; *Ed's Chess*, full-featured chess game. (#CDSK1289)

JAN 90: *Directory Master*, customize with this DOS shell; *Quick Type*, improve your typing skills; *Skullduggery*, tricky game of mystery; *MathMagic*, four educational games. (#CDSK0190)

MAY 90: *QHELP* and *QHCOMPIL*, create TSRs to give online help; *Levy Adventure Development System*, create your own adventure games; *GEEWHIZ*, TSR BASIC manual; *Sounds Good*, make sounds for programs. (#CDSK0590)

OCT 90: *Amado*, match scrambled blocks to the computer pattern; *Captain Comic*, great EGA graphic adventure game; *Funny Face*, Mr. Potato Head-type animation faces; *Fusion*, great game similar to *Tetris*; *Power Poker*, create poker hands in two dimensions. (#CDSK1090)

MAR 91: *Cash Control*, simplify financial recordkeeping; *Personal Inventory 2.11*, maintain a record of household items. (#CDSK0391)

APR 91: *Schedule*Master*, manage your daily schedule; *Meal*Master*, menu-driven database system for managing recipes; *The Monuments of Mars!*, great graphic arcade/adventure game. (#CDSK0491)

AUG 91: *TurboPaint 1.5*, full-featured paint program; *Math Voyager*, guide starship by answering math problems; *EARTH-WATCH*, graphically displays 24-hour day-and-night cycles. (#CDSK0891)

COMPUTE's SharePak disk contains the best of shareware—handpicked and tested by our staff—to complement this month's focus. You'll sample entertainment, learning, and home office software at a great savings. Each *SharePak* disk includes two to five programs plus complete documentation for one low price:

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THE
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AWARDS



A TOAST TO THE BEST SOFTWARE OF 1991

This is the fourth year COMPUTE has presented awards for the best hardware and the best home office, discovery, and entertainment software. There were more contenders than ever in this year's competition—all with more to offer as the standards (and stakes) rise ever higher. Many of the products listed here were reviewed in *COMPUTE*. These reviews can be accessed through COMPUTE/NET on GENie and America Online.

HOME OFFICE

Small Business

Excel 3.0

Right off the bat you'll notice that *Excel* 3.0 looks different. Its most impressive new feature is the Toolbar, a horizontal bar underneath the menu bar that contains groups of push buttons that are shortcuts for commonly used commands. An example of how the Toolbar can save you work is the Autosum button. Research showed that adding up rows and columns of figures was the most repetitive task in a spreadsheet, so an Autosum button was created to replace all the clicking, dragging, and menu access. *Excel* 3.0 gives you unlimited access to your installed fonts. *Excel* also has outlining that allows you to collapse long columns of figures into a single cell, redisplaying them on command, but normally keeping them hidden and out of the way. *Excel* has superior graphics, including presentation-quality charts that can be enhanced with on-board drawing tools.

CLIFTON KARNES

Word Processing

Ami Pro 2.0

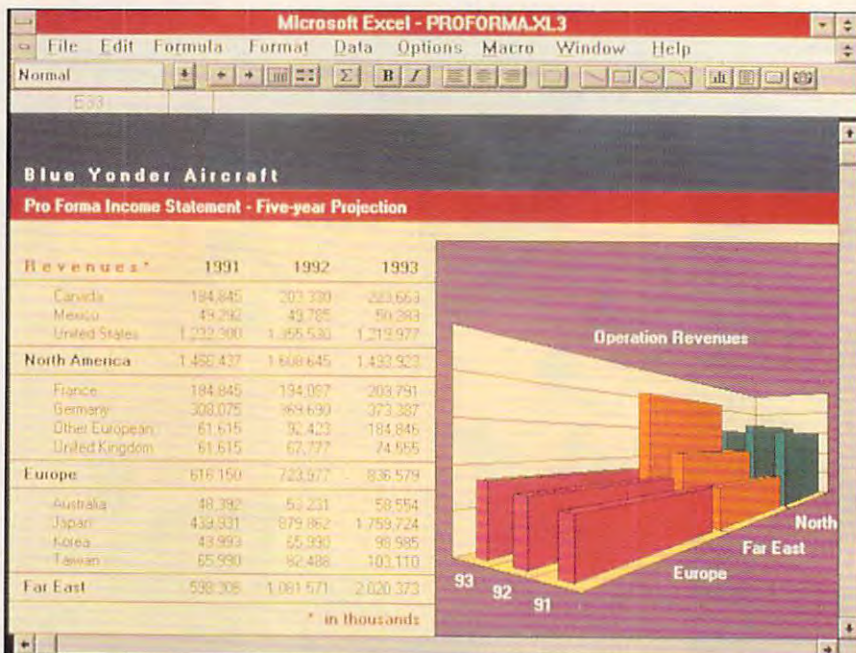
The company that showed the world how *Windows* word processing should be done, *Samna* (now part of Lotus Development) brings out the next generation of its much-vaunted *Ami Pro* before *WordPerfect* can even get its first product to market. The SmartIcons are smarter, the text and image handling are more adept, and the power features—macros, power fields, notes, and more—put *Ami Pro 2.0* at the technological forefront.

ROBERT BIXBY

Finance

Quicken 5.0

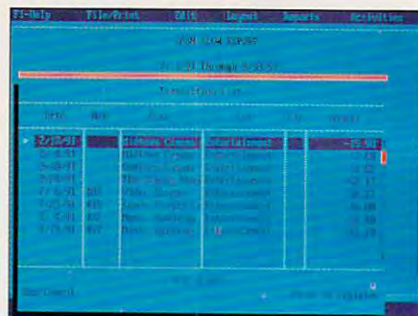
Worry no more about where your money is hiding. With *Quicken* 5.0, you'll know exactly where every penny is being spent and invested. With its pull-down menus and hot-key calculator, *Quicken* is a real timesaver. Practically anyone can set up the software and use it. *Quicken's* checking and budgeting features are so well integrated that you can



Microsoft Excel 3.0



Ami Pro 2.0



Quicken 5.0

easily generate reports indicating whether your cash flow is in balance. *Quicken* can even remind you when it's time to pay your bills. If you need accounting software, *Quicken* can handle that, too. With *Quicken*, you'll also be able to complete your tax accounting chores with ease. Even your accountant will be impressed with the precise expenditure reports you'll be able to provide at the end of the year.

PAM PLAUT

Desktop Presentation/Video

DCTV

Digital Creations' *DCTV* adds a lot of power to any Amiga. It's a graphics enhancer, paintbox, image processor, and full-color digitizer all in one package. Imagine realtime—not frame-by-frame—animation in 4 million colors. *DCTV* displays to a composite monitor, so the signal can be taped directly by a VCR. You can create images using the bundled paint software or use the built-in still-frame digitizer to digitize images from a color video source. Images can be fine-tuned using the includ-

ed image-processing program or saved in 24-bit IFF format for use with other software. *DCTV's* street price is less than \$400, and it can be used with any Amiga from the 500 to the 3000T, bringing desktop video power to folks who can't afford a full-blown Video Toaster system.

DENNY ATKIN

Desktop Publishing/Graphics

Micrografx Picture Publisher

A PC darkroom for photo editing or any kind of raster graphics work, *Micrografx Picture Publisher* puts the emphasis on friendliness and ease of use, but not at the expense of speed. Available in both gray-scale and color versions, the package is designed for high-end desktop publishing and presentation work but priced so that most serious PC graphics users can afford it. It allows masking, transparent effects, posterization, airbrush and smearing, textures, and smart features that recognize ranges of colors for editing instead of just a single color.

ROBERT BIXBY

25 Miles of Terror!

Ultima[®] Underworld[™] The Stygian Abyss[™]

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Some games can't be showcased with a few screen shots and some descriptive text. *Ultima Underworld: The Stygian Abyss* – a game of action, motion and movement – is one of them. We hope this attempt to capture the excitement of the Underworld sends you running to a software store for a look at our demo. Because only there can you truly experience this incredible journey.



Full screen view

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If your favorite retailer doesn't have an *Ultima Underworld* demo yet, ask them to call ORIGIN. We'll send one out right away.

Arcade

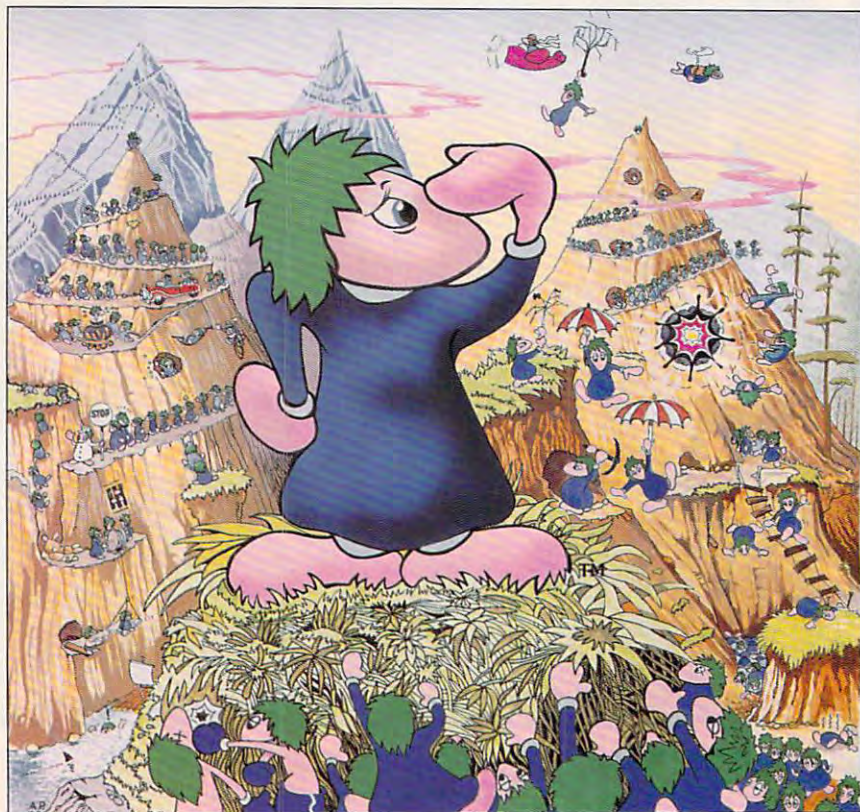
Lemmings

Psygnosis has tapped into the instinct for survival in formulating *Lemmings*, a perfect blend of puzzle, strategy, and action.

As the primary controller for all the characters in *Lemmings*, you must not only plan a mass exodus from each perilous level but also learn the personality traits of your charges, who possess the brain power of common hamsters. Though not the most graphically detailed creatures, the lemmings are flawlessly animated, and when they combust, explode, drown, or grind themselves into hamburger, you'll be quite aware of what they go through. With a sound card, *Lemmings* supplies a satisfactory array of thuds and chirps and—while not traditional Psygnosis disco by any stretch—a charming soundtrack.

Lemmings provides a number of metaphors ideal for conversation among the sociologically minded. When you draw comparisons between *Lemmings* and the me-first, me-now generation, your friends will marvel at your insight and follow you blindly into the world of video gaming.

DAVID SEARS



Lemmings



Red Baron

Simulation

Red Baron

Red Baron, from Dynamix, lets you climb into the sky on wings of fabric and bamboo to soar with the early legends of aviation warfare. It strives for realism successfully, overlooking no opportunity to re-create the actual flying conditions early pilots encountered, extending even to midair collisions, blackouts from oxygen deprivation, and diminishing consciousness from bleeding wounds. In addition to the giant hydrogen-filled Zeppelin gasbags (used as floating observation towers and guaranteed deathtraps), *Red Baron* offers you your choice of 18 historic planes to pilot, including Germany's Fokker and Albatross models and Britain's Sopwiths and Spads. Overall, Dynamix deserves high praise for a superb job of researching and documenting anti-

quoted aircraft, tactics, and tales.
HOWARD MILLMAN

War/Strategy

The Perfect General

If you need to get work done with your computer, lock this game away in a safe place. From the fiendish minds of Mark Baldwin and Bob Rakosky, creators of the highly addictive classic *Empire*, comes the war game for the rest of us. Splendid graphics, digitized sound, and a delightfully simple user interface keep away the drudgery often associated with older hex-based war games. Twelve built-in scenarios range from small battles to full-fledged ground wars. If you beat the other player, you can switch sides and try the battle from his or her perspective. You can play against another player on the same computer or over a modem connection, or you can play against computer players of varying intelligence. It's available for MS-DOS and Amiga, and Amiga players can battle MS-DOS users over the modem—perhaps the ultimate computer war.

DENNY ATKIN

Fantasy Role-playing/Adventure

Ultima VII: The Black Gate

The latest in the venerable Ultima series, *Ultima VII: The Black Gate* takes you and your 386 PC right to the edge



The Black Gate

CRITICS CHOICE

The Best PC Games You Can Buy

HARDBALL II™



"Until recently there have been few baseball simulations worth \$50. I've changed my mind after playing HardBall II ... it hits a grand slam." — Boston Herald

Test Drive III™

THE PASSION™



Rating: 10.0 "The most exciting and realistic automobile road racing simulation available. As much fun for adults as it is for kids." — Chicago Sun Times

STAR CONTROL™

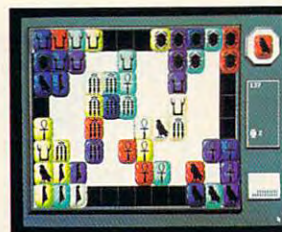


"Best Computer Science-Fiction Game" — Video Games & Computer Entertainment

"This is not just another space game... it's a space game with everything done right." — Compute Magazine

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"Five stars, magnetic... well worth the money." — Boston Herald

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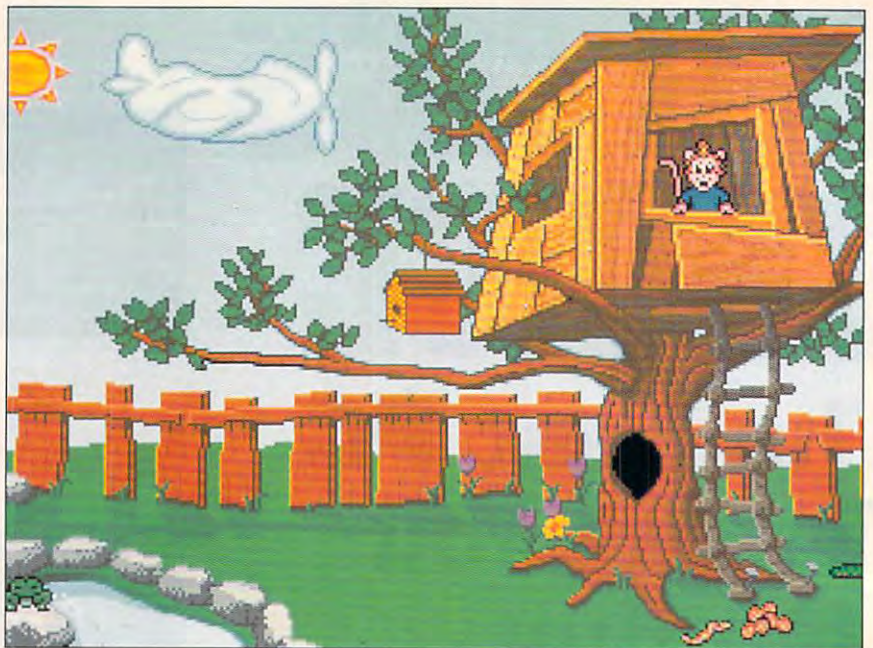
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The Perfect General



4-D Boxing



The Treehouse

of role-playing. Forget the tile-based graphics of earlier Ultimas; this smooth scroller brings gorgeous Britannia to vivid, nearly three-dimensional VGA life. As always, the soundtrack is topnotch, and this version even features sampled speech.

Don't expect an easy time, avatar. You've been away for centuries. Protector of Britannia you may be, but there's new evil afoot that might just be your match. At any rate, the involving and ominous plot will enthrall both Ultima veterans and newcomers to fantasy role-playing. Adeptly crafted nonplayer characters and a superb interface ensure that this visit to Britannia is destined to be the most epic yet.

DAVID SEARS

Sports

4-D Boxing

Almost every element of professional boxing is captured in *4-D Boxing* for you to experience at your PC (except for the lacerations and brain swelling).

The boxers themselves are shaped like some kind of weird cyborg fighters, not the smooth bitmapped figures adopted by most sport games. But once you see them in motion, all negative assumptions about the figures vanish. These guys move like real fighters, bobbing and weaving, throwing the jabs, uppercuts, rabbit punches, and roundhouses that wreak havoc on the head and body of the opponent. This is the most realistic boxing game—and one of the most realistic sports games, period—to come along in some time.

PETER SCISCO

DISCOVERY

Children

The Treehouse

Once your child encounters *The Treehouse*, the fun and learning start right away. An interactive chalkboard boasts six-color click-and-drag drawing capability. A small clock tells time. *Treehouse's* music synthesizer screen displays an orchestra pit with illustrations and simple descriptions of the instruments. The program also plays a sample note from each instrument.

Treehouse includes a very clever music maze game that plays simple musical phrases (two or three notes) and then requires you to pick the correct one out of four options. A correct choice earns a note, and completion of the maze is rewarded with a song. Another *Treehouse* game teaches counting, with chips or cash as options. An animal guessing game teaches deductive reasoning, and an animated puppet theater encourages storytelling, all with excellent graphics and sound.

BETH ANN MURRAY

Young Adult

PC Globe 4.0

Better than a geography book or atlas for its instant visual representations and detailed library of information for 190 countries and dependencies, *PC Globe* will turn any apprentice into a budding world geography expert.

The program starts by quickly drawing a flat map of the world. To begin

your cerebral exploration of countries, you hunt through any of five pull-down menus and choose a continent, region, country, city, or even grouping of countries, such as NATO. Online help is easily accessed with a pull-down menu. Once you've made a choice, the area is highlighted on the map. Choosing it again will bring a closeup view of the region.

The real gem of this program is what comes next. Make a choice in the Database menu, and you'll find everything you ever wanted to know about a place—and more. What's the per capita income, the growth rate, the nation's major product? Learn a country's population breakdown by age, language, ethnic group, religion, and even literacy rate. Find out physical features such as elevations, major city locations, climate, latitude and longitude, and time zones. Get detailed health statistics—life expectancy, infant mortality rate, birth rate, and death rate. Is it a developing country? Industrialized? Part of OPEC? Learn the most current national leaders and the area's political parties. You'll find the major tourist attractions, water potability, visa and health conditions, telex and ham radio prefixes, currency exchange rate, international telephone codes, point-to-point distances and bearings, and much, much more. You can even see a country's flag and hear its anthem.

Maps can be imported to *PC Paintbrush*, *WordPerfect*, *Ventura Publisher*, *Lotus 1-2-3*, and *PageMaker* for printing. Data can be output to ASCII or *Lotus 1-2-3* files for printing. Annual updates are available.

JILL CHAMPION

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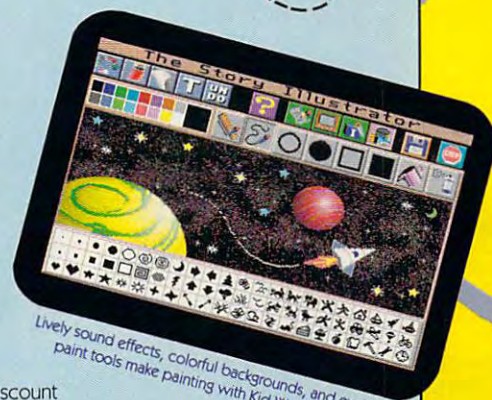
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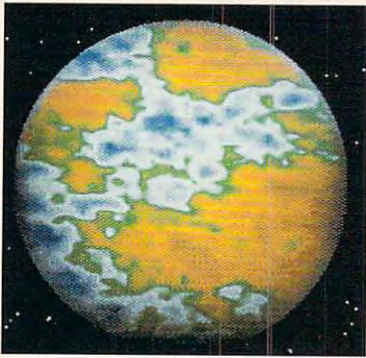
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256-
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VGA Graphics



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paint tools make painting with Kid Works a blast!



Adult

James Gleick's *CHAOS: The Software*

If you're curious about how things work, you'll love James Gleick's *CHAOS: The Software*. With it, you can explore the strange new science of chaos. Create your own fractal graphics; explore the fascinating world of strange attractors; experiment with the complex motions of magnets and pendulums; witness the evolution of order and disorder as you set up your own toy universes; fabricate artificial mountains, clouds, and planets; and more. In short, you can play with the mysterious new phenomena you read about in Gleick's best-selling book, *CHAOS: Making a New Science*. Even without the book, the software program can bring hours of fun to any amateur scientist.

DAVID ENGLISH

Reference

CDTV
bundled with *The New Grolier Electronic Encyclopedia*

Thinking of plunking down \$1,000 for a nice set of encyclopedias? With the current pace of world events, they're likely to be outdated in two or three years, and your shelf full of bulky books will be a nostalgic curiosity instead of a useful reference source. For the same amount of money, you can pick up Commodore's CDTV multimedia player, which comes bundled with *The New Grolier Electronic Encyclopedia* on a CD-ROM disc. The Grolier CD-ROM contains the same information as the printed version and adds digitized quotations, musical samples, and animated sequences. The encyclopedia's sophisticated search engine will help your kids find cross references they

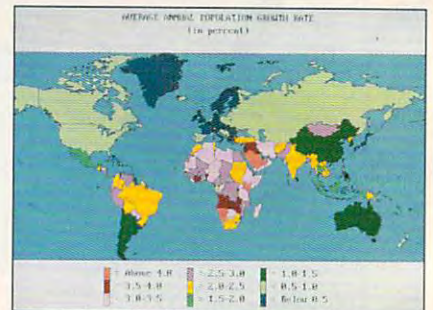
would never have located if they'd had to page through multiple volumes of a paper encyclopedia. And if the information on the disc becomes outdated, you can simply upgrade to the latest version of the encyclopedia disc.

The CDTV player is designed for average consumers, rather than computerphiles, so it can be used by the whole family. Unlike Philips' competing CD-I unit, CDTV can be expanded into a full-blown computer that has thousands of compatible software titles readily available—with the addition of a keyboard and floppy disk drive, CDTV can run Amiga software. Along with the electronic encyclopedia, the unit also ships with a tutorial disc and the CDTV version of *Lemmings*. Approximately 100 discs are already available for the unit, and about half of these are reference and educational titles.

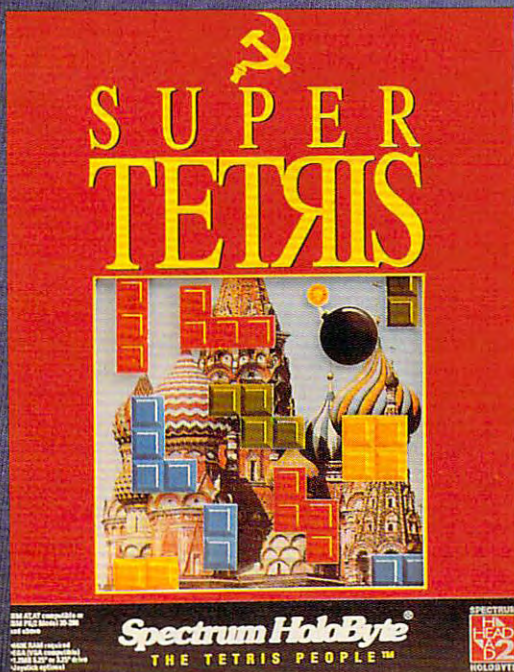
DENNY ATKIN



CDTV



The New Grolier Electronic Encyclopedia



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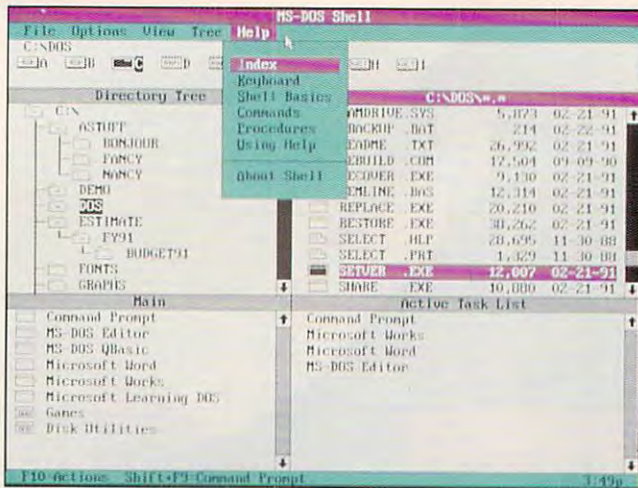
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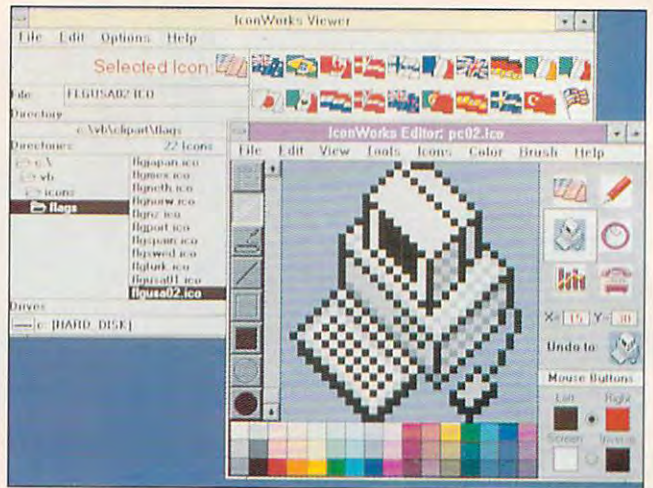
Available for IBM and Mac/MacII. For Visa/MasterCard orders call
24 hours a day, 7 days a week: 1-800-695-GAME (Orders Only)
For technical questions call: 1-510-522-1164 (M-F: 9am-5pm PST)

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MS-DOS 5.0



Visual Basic

TECHNOLOGY

Operating System/ Operating Environment

MS-DOS 5.0

Microsoft's release last June of MS-DOS 5.0 isn't just important news for command line addicts; it's significant for GUI aficionados, too. Just a few minutes with 5.0 will convince you it's the wave of the future. It has impressive memory management facilities that allow you to load DOS itself into high memory on 286 and 386 machines and load device drivers and TSRs into high memory on 386 computers. When you're running a DOS application from *Windows* or *GeoWorks Ensemble*, you'll have more room for your programs. Programmers will be glad to find that an interpreter-only version of *Microsoft QuickBASIC* has replaced *GW-BASIC*. *EDLIN* is superseded by *EDIT*, an excellent text editor with pull-down menus and full mouse support. MS-DOS 5.0's *DIR* command comes with an array of switches that allow you to display directory information in almost any shape or form. *DOSKEY*, a new command line retriever, stores your most recently used commands in a buffer for quick recall. This kind of program is necessary for extensive command line work, and it's great that DOS finally has it. MS-DOS 5.0 is very impressive. No matter which GUI you're running, 5.0 will give it more elbow room and make the time you spend at the command line more pro-

ductive and enjoyable.
CLIFTON KARNES

Utility

Stacker

Until recently, a larger hard disk was the only way to garner more magnetic real estate. But *Stacker*, a hardware-software combo from *Stac Electronics*, changes all that. With it, you can literally double the capacity of your hard disk without paying a performance penalty. When you want to write something to disk, *Stacker* compresses the data before it's written. When you need to access the data again, *Stacker* decompresses the information and sends it to you. *Stacker* works flawlessly and nearly transparently. On a 60MB disk, *Stacker* took about 25 minutes to compress 50MB of files. When the installation

was finished, I had a 120MB hard disk with about 70MB free. Not bad. I ran a large number of benchmarks comparing my *Stacker* and non-*Stacker* volumes and found some surprising results. Using a set of database benchmarks that read and write sequential and random records, I found overall performance of *Stacker* and non-*Stacker* volumes using the coprocessor to be nearly identical. When reading and writing sequential information, *Stacker* is faster than my native hard disk. When reading and writing random information, it is slower.

CLIFTON KARNES

Programming Language

Visual Basic

Until now writing software for *Windows* was difficult, to say the least. With the introduction of *Visual Basic*, Microsoft has made it easy for anyone with *BASIC* programming experience to create software for *Windows 3.0*. An interactive tutorial takes you through the first phases of programming, and lots of examples make learning quick and simple. *Visual Basic* can create EXE files, unlike *ToolBook* or other comparable authoring systems. Since any *Visual Basic* program uses all the *Windows 3.0* facilities, you don't have to worry about printer or display availability. You can also use the *Windows Dynamic Data Exchange (DDE)* functions to form links with other programs or call on *Clipboard* for cut-and-paste operations. Although technically *Visual Basic* isn't an object-oriented lan-

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YOUR DISK
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Tandy MPC

\$2,799.00
TANDY
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Fort Worth, TX 76102
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guage, it does deal with objects. For example, the familiar old PRINT command must be preceded by the name of the object. To print to the printer, the command Printer.Print is used. To print to a text box object, the command would be Text1.Print. It's easy to get used to this new syntax, however.

GEORGE CAMPBELL

Best Personal Computer

Tandy MPC

First off the starting block to move PC-compatible multimedia into the home is Tandy, which introduced its exciting Tandy MPC (for Multimedia Personal Computer) at the end of September 1991. The computer meets all of the requirements of the multimedia standards. The lowest priced MPC, offering a 16-MHz 386SX processor, 2MB of RAM, and a 40MB hard disk, is only \$2,799. MPC is more than a single machine, however. Besides this attractive entry-level product, Tandy's new MPC computers range all the way up to a 33-MHz 386DX with 4MB of RAM and a

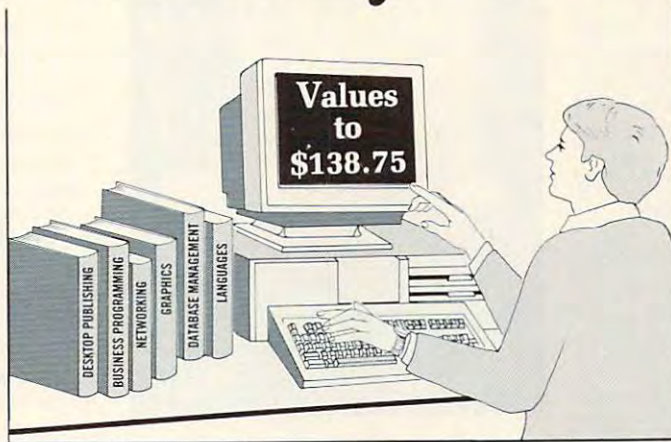
105MB hard disk for \$5,499.

Each of the machines is shipped with MS-DOS 5.0, *Windows with Multimedia*, Tandy CDR-1000 CD-ROM, an advanced sound board, and either VGA or Super VGA graphics. Tandy is also offering upgrade kits with either internal or external CD-ROM drives that will allow basic PCs to become multimedia PCs. If multimedia is the wave of the future, Tandy has a lock on it as a founding member of the Multimedia PC Marketing Council. With its broad support and marketing savvy, Tandy is perfectly positioned to make its MPC-computer the multimedia platform of choice.

ROBERT BIXBY



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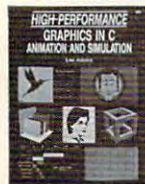
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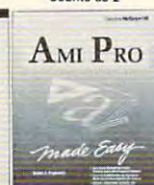
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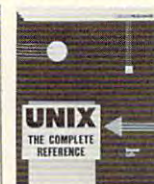
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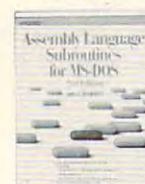
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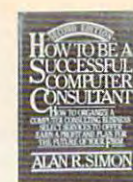


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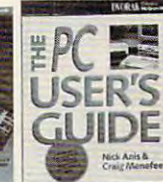
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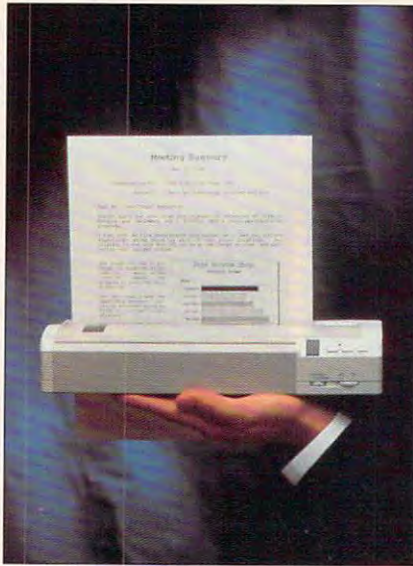
Best Peripheral

Laser Library

The year 1992 might well be the year of the CD-ROM, as consumer electronics companies and computer manufacturers rush to embrace the latest means of information and entertainment presentation—the five-inch CD. There is no better sign that CD-ROM has arrived than the introduction of a CD-ROM system—the Sony Laser Library—designed for consumers by the consumer electronics giant Sony.

This system has everything you'll need to enter the world of CD-ROM from your PC. And if you do move on to *Windows*-based multimedia products in the future, it's quite capable of meeting the basic specifications. At the heart of the Laser Library is an external Sony CD-ROM drive, a solid performer that meets all current demands for CD-ROM use. If you're contemplating adding a CD-ROM drive to your home computer system, you'll have plenty of models and types to choose from this year. The Sony Laser Library isn't the least expensive, but its superior design and engineering, menu interface, easy installation, and high-quality CD-ROM applications provide solid value for your investment.

PETER SCISCO



Citizen PN48 Notebook Printer

Best Printer

Citizen PN48 Notebook Printer

For printing on the go, Citizen's tiny PN48 Professional notebook printer will do the job and do it well. Touted as the world's smallest laser quality printer, it's small enough and light enough (only 2½ pounds, including the battery pack) to carry in a briefcase with a laptop PC. It will quietly print just about any-

thing—envelopes, stationery, labels, transparencies.

There's no compromise on features, either. The PN48 uses thermal fusion printing for laser quality at a speed of 80 cps, or about a page per minute. It has a friction-feed lever for automatic or manual paper loading, and the bottom feed allows straight-through paper handling for envelopes, labels, and transparencies. The control panel includes an LED display of the print status and a menu selection button for choosing customized print settings. These settings include Roman and Courier fonts; from 2.8 to 20 characters per inch (cpi) or proportional spacing; and a variety of typestyles (bold, italic, outline, shadow, underline, emphasized, superscript, and subscript, in any combination).

You can choose between form-feed or line-space paper adjustment to begin printing anywhere on a page, and darkness and contrast can be adjusted for printing on different paper widths. A rechargeable ni-cad battery pack gives about 25 pages of printing per charge and can take as little as three hours to recharge. When plugged into a power source, the PN48 Notebook Printer will recharge the battery while you print.

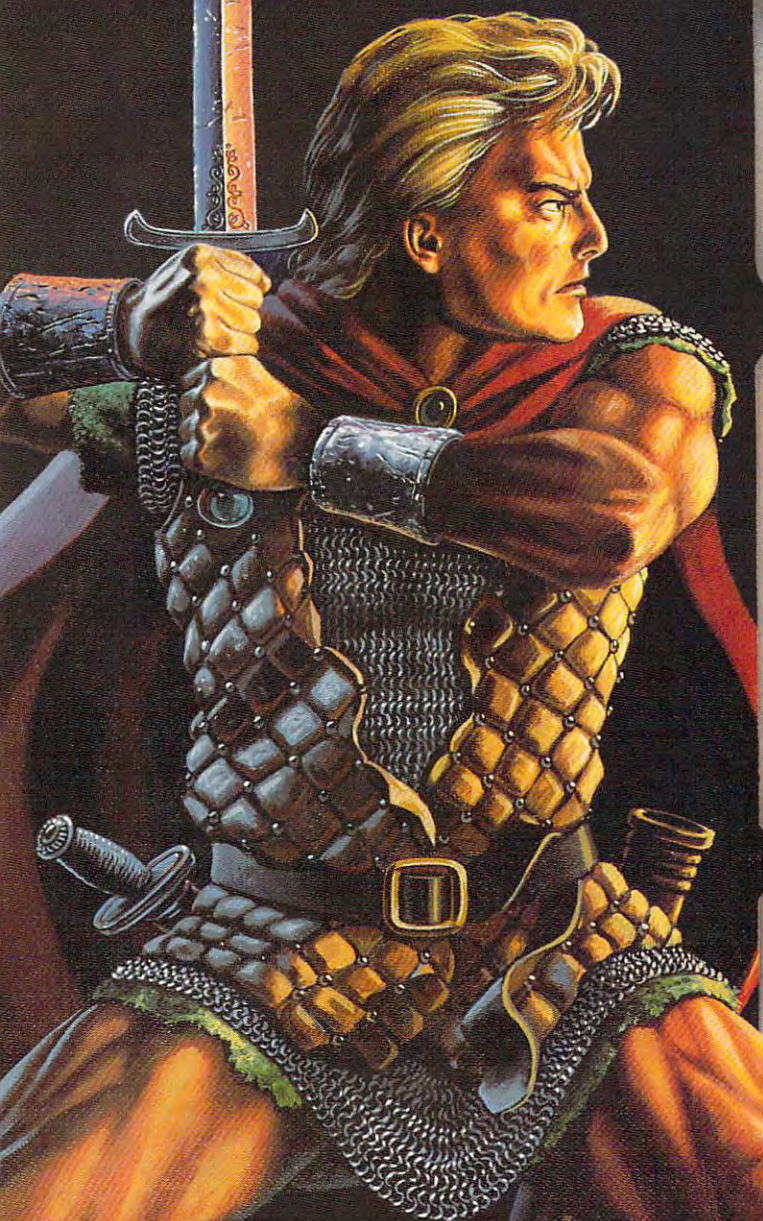
JILL CHAMPION



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Darklands™

Heroic Adventures in Medieval Germany

TEST LAB

Scanners have won their rightful place on the desktop. Publishers no longer have to make do with clip art from third parties, artists are able to transfer their work instantly to electronic formats, and writers can import text from printed sources almost as easily as cutting and pasting it from another application.

The strong demand for low-cost scanning alternatives has resulted in a crowded field of manufacturers and marketers, each trying to outdo the rest by offering convenience and high-powered applications as premiums with the purchase of a hand scanner.

This month's Test Lab covers hand scanners with a focus on graphics. Today's scanner manufacturers offer a wide variety of prices, capabilities, and bundles. Some might include low-cost DOS software; others take advantage of the *Windows* environment. Some scanners even work with OCR (Optical Character Recognition) software. If you see a package here that looks attractive, check with the manufacturer for additional options.

Few peripheral devices place such heavy processing demands on a personal computer as scanners do, and you may discover that installation is not as simple as slipping in a card. Editors found themselves reading installation manuals carefully (for some it was the first time they'd ever had to read one), trying *Windows* in different modes, editing PIF files, and in one case, trying different computers to make their scanners operate properly. Although scanners are, in the main, user-friendly after installation, more work needs to be done to make them easier to install. Fortunately, most scanners come with free technical support and friendly, helpful support personnel.

Whether you're a teacher, an artist, a writer, or a desktop publisher, if you're in the market for a hand scanner, you've never had more choices or lower costs.

THE COMPLETE PC
1983 Concourse Dr.
San Jose, CA 95131
(800) 229-1753
List price: \$349
Warranty: 2 years, replace
or repair

THE COMPLETE HALF-PAGE SCANNER/GS

Steady-handed I'm definitely not, as the family photo album will clearly show. However, I found that the Complete Half-Page Scanner/GS offers smooth, dependable scanning—and up to 256 shades of gray.

I approached this product evaluation with a combination of eager anticipation and trepidation. On the one hand, I was eager to see how this unimposing device could scan line art for a newsletter or photos for a family history. On the other, I had struggled enough with interrupt and address conflicts to know that I could be letting myself in for some tedious tinkering with DIP switches, jumpers, and software settings. The installation proved to be reasonably easy—default settings worked on one computer but not on another.

This scanner comes with its own special version of *Image-In*, a *Windows* program used for both image scanning and image enhancement. Unfortunately, my first attempts at scanning with this product left members of my family looking like the Coneheads, owing to an intermittent blurring effect. Line art I scanned also came out with odd intermittent blurs or "garbage." Some experimenting with *Windows* settings revealed that this odd effect occurred on my computer only with *Windows* operating in Standard and Enhanced modes. Running the program in Real mode solved the problem, and my family looked as normal as possible—



at least without any appearance of cranial abnormalities.

In combination with the *Image-In* software, this scanner gives you a number of attractive features. You can scan images with resolutions up to 400 dots per inch or with up to 256 shades of gray, adjust brightness, and manipulate the scanned image in a number of ways. Edit the gray-map; enhance edges; and sharpen, blur, rotate, or flip the image. You can save your scanned images in a number of popular formats, including PCX, TIFF, BMP, and PostScript EPS.

The scanner itself performed well. I found the design comfortable and the controls workable. In addition to the button that initiates the scan, the scanner includes a brightness control, a gray-levels switch, and a resolution switch. For optimal scanning, the resolution and gray levels must be set in concert: To scan at 256 gray scales required that the scanner be set for 100 dpi; to scan at 16 gray scales, 200 dpi; and to scan in monochrome, 300 or 400 dpi.

I found the documentation very good for the most part, offering helpful illustrations, tips, coverage of the available features, and even a short course. Particularly useful to me were the examples of images modified with the program's various features. A section devoted to troubleshooting

would be a welcome addition to the next version of the program.

As I managed to use the scanner only in Real mode with my PC, I found it a disadvantage to move from *Image-In* to a program like *WinRix*, which requires Enhanced mode. However, I can live with this limitation, and the folks at The Complete PC assure me that this package is designed to work in Enhanced mode.

The smooth operation, numerous software features, and reliability of The Complete Half-Page Scanner/GS make up for the limitations I experienced. And as I'm not involved in heavy-duty desktop publishing, the price and features suit me well and make this an attractive package.

MIKE HUDNALL

Circle Reader Service Number 301

DFI CHS-4000 COLOR HANDY SCANNER

Are you an aspiring desktop publisher looking for color scanning capabilities, but you don't want to shell out a pile of money for a color flatbed scanner? Take heart. The CHS-4000 Color Handy Scanner from DFI offers full-color desktop scanning capabilities as well as superb black-and-white scanning. It's easy to use and flexible in its operation.

Installation of this scanner is reasonably uncomplicated. The Handy Scanner's bus board plugs into an empty 16-bit slot in your PC. Attach the scanner to the board, and then use the scanner's *Exerciser* software to scan images and save them in PCX format. The *Exerciser* program is bare-bones—a simple menu with options for setting the scan mode, vertical and horizontal resolutions, brightness, hue, contrast, dither pattern, gamma correction, and display mode (monochrome, EGA, or VGA). You can

also save and load PCX files from the menu, as well as start your scan.

Although very simple compared with full-blown imaging software, the *Exerciser* software will let you get started with your Handy Scanner right away. And because you can save your files as PCX files, you can import them later into most desktop publishing and illustration programs or convert them to different file formats like TIFF or EPS.

In addition, the Handy Scanner package includes a copy of *PC Paintbrush IV Plus*, which you can use instead of the scanner's *Exercise* program; however, you should be aware that *PC Paintbrush IV Plus* requires an expanded memory driver to work properly. If you're running extended memory in a 386-class PC, you can create expanded memory support by using the EMM386.SYS driver from your DOS directory.

Other system requirements include one megabyte of memory and four megabytes of available hard disk space. You should also have a VGA display capable of 256 colors at 640 x 400 resolution to view the results.

With practice and patience, you'll soon be producing high-quality color scans with the Handy Scanner. The unit itself provides plenty of constructive feedback during operation through its use of LED indicators. And though the software is without frills, it's suitable for grabbing images that can later be enhanced.

PETER SCISCO

Circle Reader Service Number 302

DFI
2544 Port St.
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(916) 568-1234
List price: \$695
Warranty: 1 year, replace or repair

NASA PHOTOS ONLINE

NASA has supplied COMPUTE with some pretty spectacular photos, which have been scanned so that you can see them online and download them if you like. Simply log on to COMPUTE/NET on America Online or GENie. You'll see just how well a scanner can perform. We've uploaded tons of Super VGA NASA pictures. There's also a shareware viewing program called *VPIC*. When you download these files to take a look, you'll be surprised at their quality, and you might decide to go ahead and get a scanner after all. To find COMPUTE/NET, just log on to America Online or GENie and use the keyword *COMPUTE*.

To capture the pictures and convert them to GIF files, we used a Howtek color flatbed scanner. It's a terrific piece of hardware that helped us get professional results.

KYE GENISCAN GS-B105G PLUS

Take a quick image-grabbing safari with the GS-B105G, stalking new *Windows* wallpaper or newspaper articles for the family newsletter. You'll see the merits of a multipurpose scanner.

The GS-B105G scanner will scan in resolutions from 100 to 400 dpi, and in the self-explanatory modes of black-and-white, low dither, high dither, and VGA-



TEST LAB



KYE INTERNATIONAL
2605 E. Cedar St.
Ontario, CA 91761
(714) 923-3510
List price: \$399
Warranty: 1 year, parts and labor

true 256 gray scale. You adjust these settings via switches on either side of the scanner. A thumb wheel controls contrast, and an astutely placed start button rounds out the physical controls.

Manipulating images couldn't be simpler, using the included *iPhoto* software. This *Windows* application concentrates on processing your raw data through a number of filters. Although color or black-and-white photographs already scan with remarkable clarity and speed thanks to the hardware when set for 256 gray scale, you reserve the right to enhance, average, sharpen, or blur your scanned image. These effects turn your PC into a photo-processing lab.

Most people don't run *Windows* under true 256-color mode for the sake of speed. To see fair reproductions of your stunning full-gray images, convert them to 16-color BMP files with *iPhoto*. A nifty *iPhoto* option makes the step down in quality less noticeable with choices of gray, pseudo color, and fire-light (red and yellow scale) remapped palettes. Toy with the Hue and Saturation sliders to tweak the colors into acceptability.

You'll find a second scanning program—a gray-scale version of *Color Maestro*—bundled with the GS-B105G. This software offers more features common to paint programs and doesn't require *Windows* to run. I found *Color Maestro* less satisfactory, though, because of its extreme slowness and constant disk accessing.

How many times have you found yourself with only hardcop-

ies of a document after a terrible hard drive crash? Install the included optical character reader (OCR) software, *CAT OCR*, and replace your files with a few passes of the GS-B105G. Output your OCR work in *WordStar*, *WordPerfect*, and ASCII formats. If *CAT OCR*'s reasonably effective reference font doesn't meet your standards for speed or accuracy, you can build your own specialized font-recognition library. This process takes only minutes.

Windows veterans will need the concise manuals only for advanced work; neophytes will be scanning everything in sight just moments after a cursory reading. A marvel of simplicity and winning design, the speedy GS-B105G software and hardware bundle makes scanning as effortless as using a mouse.

DAVID SEARS

Circle Reader Service Number 303

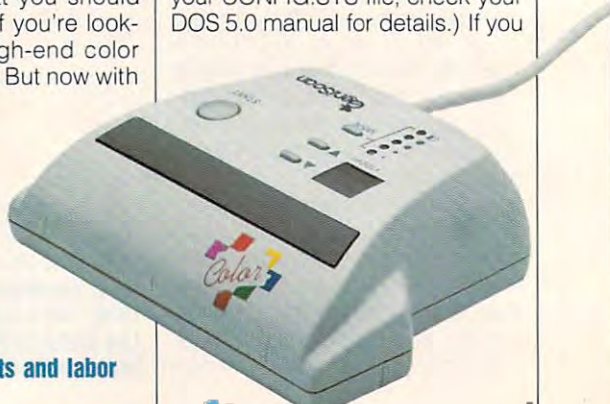
KYE GENISCAN GS-C105 PLUS

Does anyone really need a color hand scanner? A year or two ago, I would've said that you should consider one only if you're looking to dabble in high-end color desktop publishing. But now with

Windows and multimedia playing a larger part in our software lives and high-resolution monitors multiplying like rabbits, we have more ways than ever to use scanned color images.

KYE International offers two inexpensive color-hand scanner packages that let you enter the age of color without having to take out a second mortgage on your house. The \$649 GS-C105 package includes a 256-color hand scanner, the DOS-based *Color Maestro* program, and an interface card. The GS-C105 Plus package costs just \$50 more and adds two programs: *CAT OCR* for OCR text scanning and the *Windows*-based *iPhoto* for sophisticated gray-scale and color image manipulation (including support for 24-bit display adapters). While only a masochist would want to do a lot of OCR work with a graphics-based hand scanner, *iPhoto* adds extra file formats, editing tools, and image-processing capabilities that you might want to take advantage of.

But be warned—you must have expanded memory (also known as EMS or LIM memory) in order to perform 256-color scans. If you don't have expanded memory but you do have DOS 5.0, you can use DOS's built-in expanded memory manager, EMM386, to convert your extended memory to expanded memory. (Put a RAM switch after DEVICE=C:\DOS\EMM386.EXE in your CONFIG.SYS file; check your DOS 5.0 manual for details.) If you



KYE INTERNATIONAL
2605 E. Cedar St.
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List price: \$699
Warranty: 1 year, parts and labor



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TEST LAB

don't have DOS 5.0, you can use *QEMM-386*, *386Max*, *BlueMax*, *Turbo EMS*, or another expanded memory manager to convert your extended memory to expanded. Without expanded memory, you'll only be able to capture 2- and 16-color images. In addition, *Color Maestro* supports many of the higher-resolution modes of the popular Super VGA cards, and *iPhoto* supports any resolution that's supported by *Windows*.

Despite uneven documentation and the occasional software glitch, the GeniScan GS-C105 Plus will reward the patient user with excellent-quality color images. For frequent use, consider a \$1,200-\$2,000 flatbed color scanner. But for occasional use and a relatively inexpensive introduction to color scanning, take a good look at either of KYE's color-scanner bundles.

DAVID ENGLISH

Circle Reader Service Number 304

LOGITECH SCANMAN MODEL 256

Plug a scanner into your computer, and you plug into a whole new level of versatility. I've had no regrets since hooking up a

LOGITECH
6505 Kaiser Dr.
Fremont, CA 94555
(510) 795-8500
List price: \$449
Warranty: limited lifetime hardware warranty

Logitech ScanMan Model 256 gray-scale scanner as part of a desktop publishing setup.

Scanning materials for publication is not easy, but Logitech's scanner sports excellent controls and includes *Ansel*, an outstanding image editor.

ScanMan installs easily, with the only stumbling block being possible conflicts with I/O base addresses and IRQs. The ScanMan adapter board fits in either an 8-bit or a 16-bit slot, but using the latter is preferred because it permits the ScanMan to use IRQ 11 or 12. This ensures you'll avoid conflicts with mouse and COM ports, but if trouble arises, you'll find plenty of help in the manual.

Once you have installed the system, fire up *Windows*, run *Ansel*, calibrate your scanner, and start scanning.

Scanner controls include a resolution switch, to select resolu-



tions ranging from 100 to 400 dpi; an image mode switch, to choose either black-and-white mode or 16-, 64-, or 256-gray-scale modes; and a contrast dial, to minimize problems in your original. ScanMan also includes a scan speed indicator to help you avoid losing data by scanning too fast.

Working with black-and-white line art is less difficult than working with gray-scale images, but the image-editing software provides excellent tools for both.

Once an image is scanned, *Ansel* permits you to enlarge the image and modify it pixel by pixel. A black-and-white logo scanned for use in a newsletter or brochure cleans up nicely with *Ansel*.

Ansel also allows you to rotate, flip, and crop images; and the software includes a "deskew" option that helps you straighten an imperfectly scanned image. Gray-scale images can be lightened, darkened, sharpened, smoothed, or equalized. By working with a combination of these tools, you can produce images that look beautiful—on your computer monitor. Transferring these images to the printed page with satisfactory contrast and clarity takes experimentation.

Printing controls are extensive. If your printer allows it, you can print the gray scales, or you have the option of using dithering or error diffusion to simulate gray shades. You have full control over output size, and you can select from a series of borders if you'd like your artwork framed.

A HAND-HELD SCANNER FOR TEXT

Typist is the hand scanner from Caere, the OCR people. It's designed for entering short sections of text from printed sources. When I used it, Typist was somewhat slower than Caere's claim of 250 words per minute on a 386SX-based PC but still much faster than typing. Typist can scan line art and 256 gray scales as well as read text in any of four directions. You can set the direction for it to read, or you can leave it to Typist to determine which direction is best. In column text you can set the OCR to pay attention to only the first, middle, or last column of text. Typist can scan a wide page of text in a series of horizontal bands, detect the overlap, and zip the text together.

Typist requires 4MB of memory because OCR work is incredibly difficult. Typist, like almost every other OCR system, stumbles when it runs across italic text (or any other unusual type style). It can't make out one italic letter in ten, which is not intended as a knock against Typist—it's practically an industry standard. Likewise, a contrast setting that is too dark or too light will result in a bad reading. There's little chance of experiencing problems from a crooked scan because Typist's head is outfitted with wide rubber rollers that keep your scans straight.

—ROBERT BIXBY

Circle Reader Service Number 311

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Circle Reader Service Number 195



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Exporting to other applications is easily accomplished. Files can be saved in TIFF, EPS, PCX, and BMP formats. In saving your files, you can control the resulting document's dpi and image size.

Although ScanMan's scanning window is only four inches wide, larger documents can be accommodated using *Ansel's* stitch feature, which permits you to scan items in segments and match the segments up onscreen. It's not easy, but with a steady hand and some practice, you can put together seamless images.

The ScanMan 256 gray-scale scanner hardware/software combination is a solid value and a worthy desktop publishing tool.

TONY ROBERTS

Circle Reader Service Number 305

MARSTEK M-800W

For black-and-white scanning, this Marstek model provides adequate, if not exceptional, capabilities. It boasts several good features, such as easy installation and sound software support. But those features must be balanced against weak documentation and unimpressive use of the *Windows* environment.

The M-800W will scan at 800-dpi resolution, an impressive capability for desktop publishers and others looking for high-quality images to enhance their documents and publications. The size

MARSTEK
17795 Skypark Blvd., #F
Irvine, CA 92714
(714) 833-7740
List price: \$299
Warranty: 1 year, parts and labor

of the image to be scanned is limited by your computer's memory—I recommend at least four megabytes of system memory. If you run an expanded memory driver, the size of the images can be somewhat larger than if you're running extended memory.

Other system requirements include *Windows*, but here, too, there are limits. You can run the scanner software only in Real or Standard mode, which defeats the purpose of a multitasking environment (unless you limit yourself to running only *Windows* applications—perhaps a possibility for desktop publishers who might live exclusively in the *Windows* environment).

Although the installation process is rather straightforward (insert a bus card into your computer, plug the scanner into the card, and then install the *Image-In* software), the overall documentation isn't nearly clear or complete enough.

The manual covering the hardware runs a brief seven pages. There is no troubleshooting section, nor is there any clear indication of how interrupts or DMA conflicts are to be resolved. I experienced parity errors on my system until I managed to reconfigure the hardware by trial and error—not exactly the way you want to ap-

MIGRAPH
200 S. 333 St., Ste. 220
Federal Way, WA 98003
(206) 838-4677
List price: \$895
Warranty: 6 months, repair or replace (hardware)

proach a problem involving high-tech hardware such as a hand scanner. The *Image-In* software documentation is little better, apparently having been either translated or written outside of the United States.

As for performance, the M-800W produces well-defined black-and-white halftones from color originals and produces very good images of line art. The scanner also can import text, provided you have software like *Perceive Personal*, available from Marstek for \$695 (a coupon included with the M-800W allows you to purchase the OCR software for \$129).

If you don't require a top-of-the-line scanner for your black-and-white images or line art or if your budget excludes the top-end scanners from your system, the Marstek M-800W may suit your needs. You'll have to live within some limitations, but if you can accept the boundaries, this scanner will expand your graphic horizons.

PETER SCISCO

Circle Reader Service Number 306

MIGRAPH CS-4096

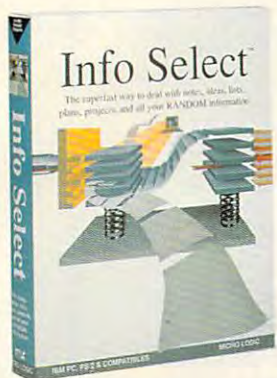
Are you looking for great color capabilities in a hand-held scanner? Migraph's color scanner goes so far above and beyond what most hand scanner users would want or need, delivering a 4096-color scan at 200 dpi (fixed), that it's a



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little disappointing to discover that the second-best scan is 8 colors at 400 dpi (you can set the scanner to any multiple of 10 dpi between 100 and 400 for all scan levels but the 4096-color scan).

This 8-color scan is called color line art. The scanner is capable of scanning monochrome line art, also. There are settings for color and monochrome dithered graphics as well, but these didn't work properly on my machine, and technical support was at a loss to speculate as to why. The 4096-color images can be saved as 256-color images to save some space.

The software that accepts and displays the scanned image is a very simple *Windows* program that does little more than give you access to the necessary software settings for the different levels of scanning. You can set resolution and adjust your color settings to make the scanned image more realistic.

The scanner is shipped with *Picture Publisher*, which used to be published by Astral but is now a Micrografx program. Unfortunately, drivers are not available that would allow the scanner to scan directly into *Picture Publisher*. In order to transfer the image between the two programs, you

SCANNING FORMATS

Many of the file formats used to store scanned information are raster formats. These include PCX (used in *PC Paintbrush*), BMP (used in *Windows* wallpaper), and TIFF (Tagged Information File Format). A raster format maps out, or codes, the dots of an image. Sometimes it's also called a bitmap format. A vector format, on the other hand, describes an image not in terms of dots but in terms of mathematical-shape descriptions. Some of the vector formats are CGM (*Harvard Graphics*, *Lotus Freelance*, *Pixie*), PostScript (actually a language), and WPG (*WordPerfect*—these files can be either raster or vector).

MOUSE SYSTEMS
47505 Seabridge Dr.
Fremont, CA 94538
(510) 656-1117
List price: \$795
Warranty: 2 years (lifetime tech support)

must store it on disk or transfer it via the *Clipboard* (*Picture Publisher* is also a *Windows* program). I found this to be a terrific bother and was often presented with insufficient memory and insufficient disk space messages while trying to effect the transfer. The CS-4096 also ships with *ImagePrep*, a screen-capture, file-conversion and -compression, and image-processing program.

The CS-4096 blinks its lights if you scan too rapidly. This is one enhancement I'd like to see added to all hand scanners. Most give so little feedback that hand scanning is pure trial and error. The installation is simple and straightforward, and (though this experience may be unique to me) for once I didn't have to change jumpers to make a board work. Somehow Migraph had set the jumpers to work perfectly with the IRQs and DMAs in even my fully packed computer.

The principal use of this scanner (particularly its 4096-color scan) would be preparing images and backgrounds for presentations on the computer screen. The lesser levels are useful and provided clear images, but the software used to capture these images can be cumbersome, and you must use more than one software package to create things like 256 gray scales. By the time you read this, the product will probably be shipping with the new, award-winning version of *Picture Publisher*. I hope that a driver will also be available that will capture images into that program so that they will be immediately useful.

ROBERT BIXBY

Circle Reader Service Number 307



MOUSE SYSTEMS PAGEBRUSH/COLOR

The PageBrush/Color hand scanner puts full-color desktop scanning within reach of PC publishers and desktop graphic artists. Supporting both 24-bit color scanning and 8-bit black-and-white scanning, this unit proves itself both versatile and easy to operate.

Installation consists of plugging a bus board into an empty 16-bit slot in your PC. Attach the scanner to the board; then install the *ImageQuest* scanner software. Using the PageBrush/Color requires *Windows 3.0*, which simplifies the installation process. Other system requirements include one megabyte of memory, a VGA display capable of 256 colors at 640 x 400 resolution (for best results, your video board should have a *Windows* driver, and *Windows* should be set to 256-color mode), and a hard disk with a minimum of four megabytes of free space.

An LED indicating the scanner's resolution flashes when the scanner is activated. It stops flashing when the scanner is warmed up.

Welcome feedback is supplied as you operate this device. If you happen to move the scanner too quickly, the top Mode light blinks. The light will go off if you have lost any part of the image data because of unsure or too-quick movements. If this happens, you'll have to begin the scanning process again.

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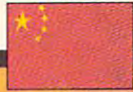
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If you create a black-and-white scan, you can select from five levels of resolution—from pure black-and-white and four modes of dithered gray scales. Experimenting with the setting will let you translate color images into clear black-and-white images for simple desktop publishing chores. Color images are scanned in 12-bit color, which can be saved as 24- or 12-bit color or TIFF files or as MAC files.

Effective image capture and processing requires not just a good scanner and software but also flexibility in processing the scanned images. To that end, Mouse Systems includes a copy of *ImagePrep* from Computer Presentations with the PageBrush/Color scanner. This software package allows you to process your images professionally. Using *ImagePrep* in conjunction with the scanning software allows you to enhance and fine-tune scanned images and save those images in a variety of formats—including EPS, PCX, CPI, TIFF, and others.

The PageBrush/Color scanner produces adequate scanned images for use in a variety of applications. Its ease-of-use is enhanced by solid image-processing software. With practice, you can soon be creating full-color images for business presentations, desktop publishing, graphic illustration, or multimedia applications.

PETER SCISCO

Circle Reader Service Number 308

NISCA NISCAN/GS

I had the good fortune to be assigned the NISCAN/GS gray-scale hand scanner for this review. A very workmanlike product, this scanner was comfortable in the hand and generated images of high quality at up to 256 gray scales.

The NISCAN/GS ships with *Image-In*, a software product with which I have had a love-hate relationship for some time. It's ex-

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remely powerful software that (to me, anyway) seems dedicated to preventing me from doing what I want to do. Although I've worked with it for some time, I still find myself saving images and working with them in another program simply because the other program is easier to use.

This difficulty doesn't extend to the scanning tools in *Image-In*, however. The scanning tools, including a very useful preview window, are designed perfectly to allow you to make settings, capture an image in one of several resolutions, save it, and then work with it in another program. I regret spending so much space talking about the software that accompanies the scanner, but so much of the scanning experience is directly related to the usability of the software that you simply can't ignore it. And this is particularly true of the Nisca product because the scanner has only one control on it: a push button to hold down while actively scanning. Beyond saying that the scanner is comfortable and looks solidly built, there is little to say about the product itself.

Image-In allows you to set the horizontal and vertical resolutions independently, between 100 and 400 dpi, providing for some interesting distortions. It provides for monochrome (purely black-and-white), three different kinds of dithering, and 4- and 8-bit gray-scale scanning (16 and 256 shades of gray, respectively). You can adjust brightness and contrast. The preview was my favorite feature, however. Seeing a



bad scan as it's happening is a great help in learning to hold your hand steady and pull the scanner across the image smoothly and at the right speed.

The software allows you to save the image in several different formats, including PCX, TIFF, Windows bitmap, MacPaint, EPS, Microsoft Paint, EyeStar, and GEM Paint. You can save images at any resolution and at any scaled size. If the file format supports compression, *Image-In* will compress the saved image.

Installation was simple, and I had little trouble operating the NISCAN/GS, thanks to *Image-In*.

ROBERT BIXBY

Circle Reader Service Number 309

SHARP JX-100

Sharp's JX-100 is neither a flatbed scanner nor a hand-held scanner but a marriage of the two, inheriting both strengths and weaknesses in the bargain.

With its 3.93 x 6.29 inch scanning area, the JX-100 almost fills a VGA screen with vibrant 256-

All Benchmark/Performance Testing is conducted by Computer Product Testing Services (CPTS), an independent testing and evaluation laboratory based in Manasquan, New Jersey. Every effort has been made to ensure the accuracy and completeness of this data as of the date of testing. Performance may vary among samples.

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TEST LAB

SCANNER OUTPUT TEST PROCEDURES

The scanner output samples for both the line-art and the photo images were generated using a setting of 200 dpi (dots per inch). We set light/dark controls on all scanners for the midrange point. For all line-art scans, we used the black-and-white or line-art setting, where available; for all photo scans, we used the photo or grayscale setting. When storing scanned images, we used PCX files where possible.

Output width was set at five inches for all images to make comparisons equal. The images received no retouching, alteration, or cleanup of any kind—they were outputted exactly as they were scanned. Incomplete or "clipped" images reflect a scanner's maximum capture area at 200 dpi in a single-pass scan.

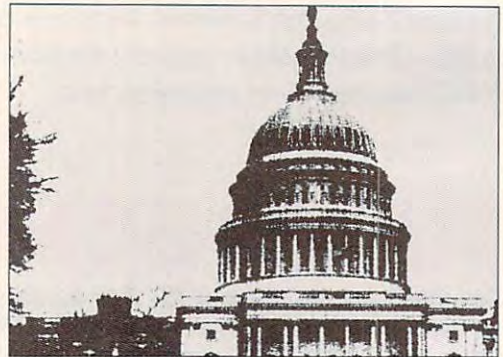
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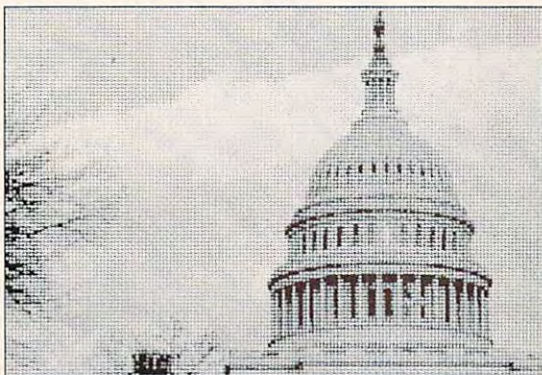
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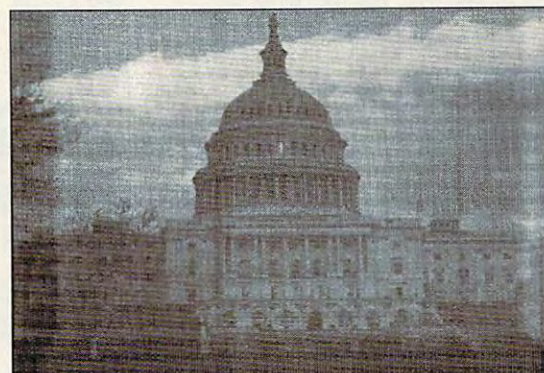
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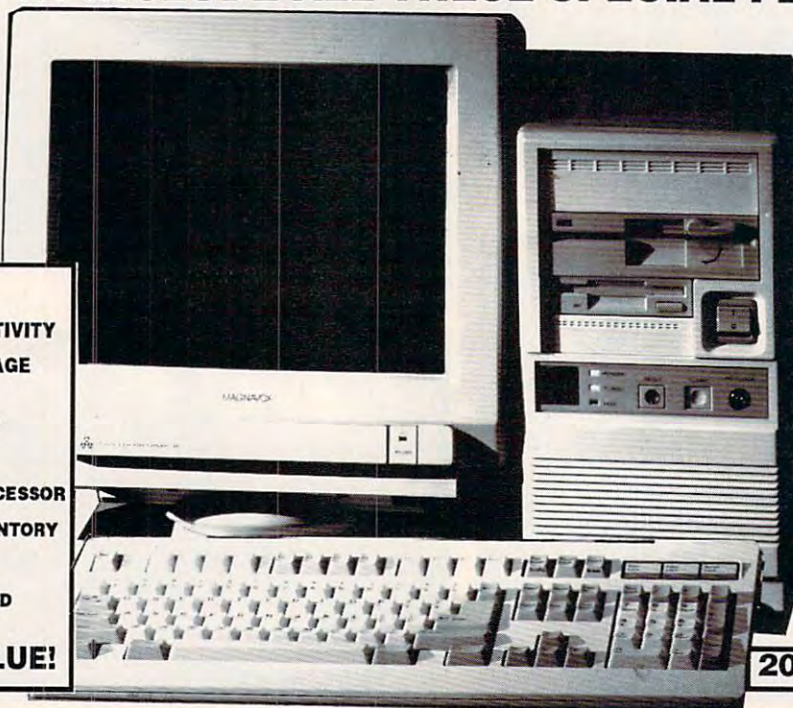
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TEST LAB

EQUIPMENT AND MATERIALS USED FOR OUTPUT SAMPLES

To produce the output samples you see here, we used a 25-MHz 80386-DX computer with 4MB of RAM, a 1MB Super VGA video adapter (Tseng chip set), an analog color monitor, and a Microsoft mouse. For image capture, we used the scanning software supplied with each scanner. To ensure accurate and even scanning, we used SCAN:ALIGN from SCAN:ALIGN, Inc.

A cartoon, measuring 4 x 4 inches, of a girl at a computer served as the master image for black-and-white line-art scanning. The source for this image was *Dover Clip Art* from Alde Publishing's *Spectrum* CD-ROM. A borderless color photograph, measuring 3½ x 5 inches, of the nation's Capitol served as the master photo image for gray-scale/halftone scanning.

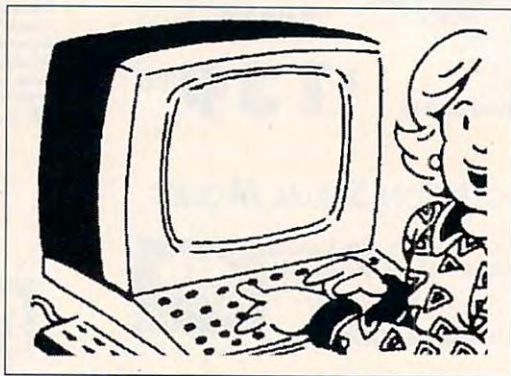
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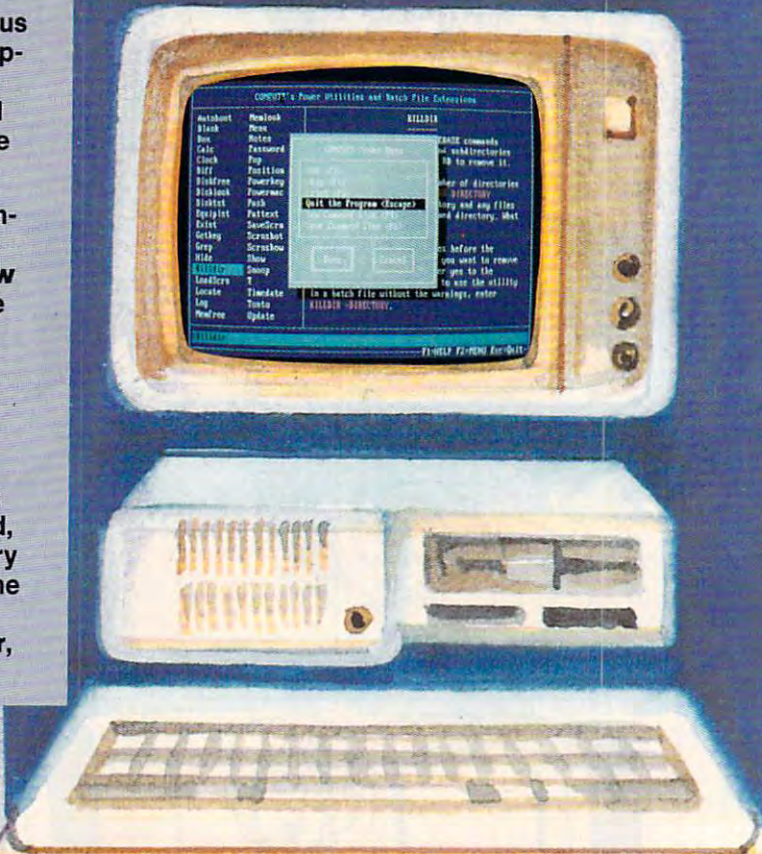
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color after you issue a single command. Like full-size flatbed scanners, the JX-100 requires time to work its magic—sometimes several minutes' and several passes'

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worth. For this reason, you'll want to take advantage of the prescan option that can display the image to be scanned in speedier gray scale or black-and-white. Or better yet, just peer through the transparent acrylic view port in the top of the scanner.

For documents too small or too awkward to comfortably accommodate the scanner, though, you'll need to turn the JX-100 face up and rely on the prescan

mode to position the subject for proper scanning.

Unlike a hand scanner, the JX-100 scans neatly every time. You don't have to drag the scanner over the image, so it's impossible for the scanner to slip and make annoying errors.

This color scanner doesn't take up any of your computer's valuable expansion slots, but if you don't have a PS/2 mouse or an extra serial port, you'll have to do your scanning with no mouse at all—the JX-100 uses a serial port. Thankfully, *ColorLab*, the bundled *Windows*-based scanning software, provides for just such situations with reasonable keyboard support. You might miss using your mouse, but the fun of color scanning offers some compensation.

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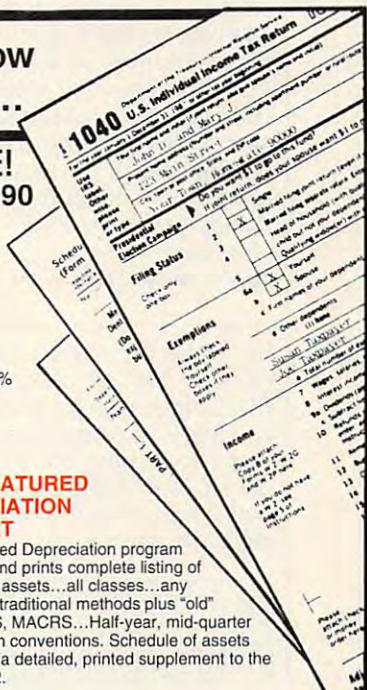
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TEST LAB

ColorLab supplies you with the essential image-processing tools of scaling, antialiasing, and dithering. For image filters you can choose from Sharpen, Smooth, Remove Noise, Enhance Edges, and Trace Contour—also fairly standard effects. You may save images in a variety of formats including BMP, CPI, TGA, TIFF, PCX, GIF, and DVA. The dpi setting defaults to 200, but with the Zoom option, it's possible for you to adjust down to 50 or up to 400. The JX-100 has no switches, buttons, or thumb wheels—all scanning adjustments are made using the software.

The JX-100's vinyl slipcover lets you pack the scanner along with your laptop, and its light weight makes it a welcome stand-in for a less portable flatbed scanner. Charge the ni-cads in the laptop and hit the library! All those reference books with gorgeous color pictures that you always wanted to scan but could never check out to take to the nearest flatbed—scan them tomorrow. The small but powerful JX-100 fairly begs to accompany you on your next image-collecting excursion.

DAVID SEARS

Circle Reader Service Number 310

For further information about this month's Test Lab, see the COMPUTE area on GENie and America Online. In addition to regular Test Lab information, you'll find our HDBENCH.EXE, proprietary benchmark software developed especially for the Test Lab.

Next month:
Color
Printers

FURTHER INFORMATION

THE COMPLETE HALF-PAGE SCANNER/GS

Type: black-and-white
Scan width: 4.1 inches
Max dpi: 400
Settings: line art, halftone, gray scale
Max shades of gray: 256
Environment: *Windows*
Output formats: EPS, GEM, MSP, PCX, TIFF

DFI CHS-4000

Type: black-and-white, color
Scan width: 4.13 inches
Max dpi: 400
Settings: gray scale, dithered monochrome
Max shades of gray: 64
Environment: DOS
Output formats: PCX

KYE GENISCAN GS-B105G PLUS

Type: black-and-white
Scan width: 4.0 inches
Max dpi: 400
Settings: line art, halftone, gray scale
Max shades of gray: 256
Environment: DOS
Output formats: CUT, IMG, MSP, PCX, TIFF

KYE GENISCAN GS-C105 PLUS

Type: black-and-white, color
Scan width: 4.13 inches
Max dpi: 400
Settings: halftone, gray scale
Max shades of gray: 64
Platform: DOS
Output formats: CUT, IMG, MSP, PCX, PIC, TIFF, TXT

LOGITECH SCANMAN MODEL 256

Type: black-and-white
Scan width: 4.13 inches
Max dpi: 400
Settings: line art, halftone, gray scale
Max shades of gray: 256
Environment: DOS, *Windows*
Output formats: IMG, PCX, TIFF

MARSTEK M-800W

Type: black-and-white
Scan width: 4.13 inches
Max dpi: 800
Settings: line art, halftone, gray scale
Max shades of gray: 64
Platform: *Windows*
Output formats: IMG, MSP, PCX, PNT, TIFF

MIGRAPH CS-4096

Type: black-and-white, color
Scan width: 4.0 inches
Max dpi: 400
Settings: line art, halftone, gray scale
Max shades of gray: 256
Environment: *Windows*
Output formats: PCX, TIFF

MOUSE SYSTEMS PAGEBRUSH/COLOR

Type: black-and-white, color
Scan width: 4.13 inches
Max dpi: 400
Settings: dithered
Max shades of gray: 64
Environment: *Windows*
Output formats: TIFF

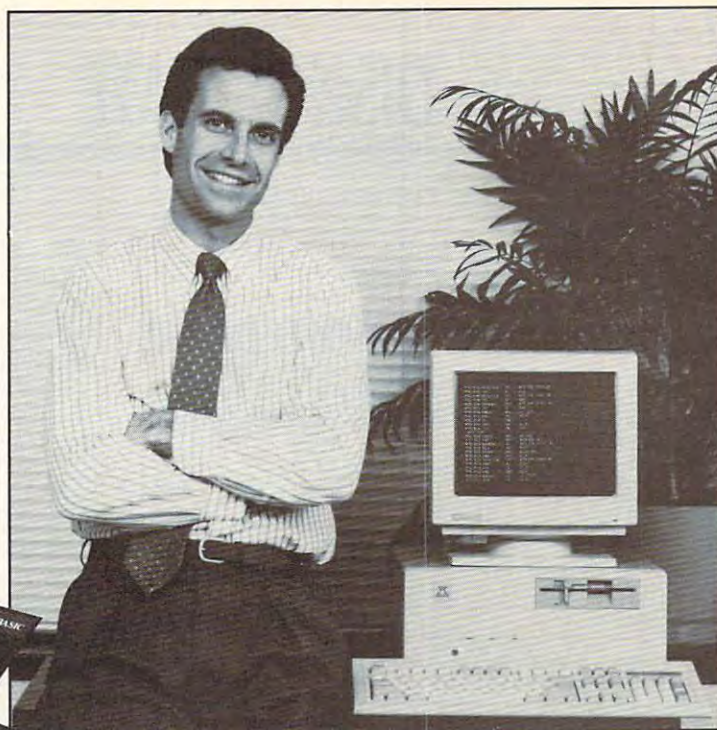
NISCA NISCAN/GS

Type: black-and-white
Scan width: 4.2 inches
Max dpi: 400
Settings: line art, halftone, gray scale
Max shades of gray: 256
Environment: *Windows*
Output formats: EPS, IMG, MSP, PCX, TIFF

SHARP JX-100

Type: black-and-white, color
Scan width: 3.39 inches
Max dpi: 400
Settings: line art, halftone, gray scale
Max shades of gray: 256
Environment: *Windows*
Output formats: BMP, CPI, DVA, EPS, GIF, PCX, TGA, TIFF, WMF

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DISK UPDATE

Richard C. Leinecker

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On the GENie bulletin board, there's a section called Talk to the Editors. Just leave a note with your question or comment, and we'll answer you as soon as possible. You can give feedback to the sysop from the main COMPUTE/NET menu or even send E-mail to RLEINECKER.

On America Online, you can leave a note addressed to screen name Rick CL in the message area called Talk to the Editors. You can also send E-mail addressed to screen name Rick CL.

In your message, be sure to describe the problem thoroughly, tell us your DOS version, and list your computer equipment (CPU, hard drive type, floppy drives, graphics card, and so on).

COMPUTE/NET gives you the flexibility to drop us a line anytime it's convenient for you without having to call our offices during business hours. It's also probably less expensive to contact us online than to call during the day.

The Other Side

We've had some calls about the program *AltPage* that was published on our August *PC Disk*.

The reports we've received indicate that many times the output seems to break pages

at odd times or sometimes not until more than a single page has been printed.

The result might be pages that are short, maybe 20 or 30 lines. Alternately, there might be run-on pages.

All of the programs on the disk were tested carefully, and we never experienced these problems. It took some time, but we eventually re-created the circumstances that led to these situations.

We found that a text file with embedded form feeds would produce short pages in unpredictable patterns.

With other formatting and control codes, we found that there could be run-on pages.

In the documentation, the author explicitly instructs you to remove any formatting and control codes, including form feeds. He even provides a special program called *Strip* that cleans up your text file in preparation for *AltPage*.

If you're experiencing any difficulties similar to these, make sure your text files are clean, straight ASCII files. Running the *Strip* program is a good idea if there's any doubt in your mind.

MicroText Extras

Our August disk has a program called *MicroText* that may not run properly on your system. That's because there are two files the program creates when you first run it that were included on the distribution disks. They should've been left off so that *MicroText* could create them when you first run the program.

The files are *COLORS.DAT* and *PRINTER.DAT*. If you're not having any problems, don't do anything.

If you are having problems, you'll need to delete these files. Make sure you're in the directory that contains the *MicroText* files. If you use the default installation path, it will be

C:\COMPUTE\AUG91\MICROTXT. Next, delete the two files named *COLORS.DAT* and *PRINTER.DAT*.

The next time you run *MicroText*, it will prompt you for information it needs to create these files for your system.

CMOS to Floppy

There is a small problem with our *CMOS* menu program if you install the programs to a floppy disk. If you type a drive letter, a colon, and maybe a backslash (for example, A:\) when you enter the installation path, you'll get an error message saying that the path could not be created.

The problem is fixed now, but unfortunately, for the August and October disks, you'll have to use a work-around to solve the problem.

Instead of installing to A:\ or B:\, you'll need to specify a directory. You might try A:\COMPUTE or B:\COMPUTE. Then the program will install to the directory without any problem.

Go Directly to the Source

Here at COMPUTE, we're very happy to help you with any problems you're having with the programs on our *PC Disk*. But there might be a way for you to get faster and more personal service.

You can contact the shareware author directly and cut us out of the loop.

Many times we call the authors to get answers to your questions. While we're glad to do this, something may get lost in the translation.

If you call or write the author, he or she can interact with you directly, and your question might be more effectively answered.

I've written letters to many shareware authors, and they usually respond within a couple of days. They're usually very eager to please. □

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PROGRAMMING POWER

Tom Campbell

WITH WINDOWS, THE MESSAGE IS THE MEDIUM

I've been involved with *Windows* on and off since before version 1 was released, although not as a programmer until recently. My first encounter was on the technical team of a Macintosh database project that was considering a port. We had a state-of-the-art IBM XT, with a stunning 512K of memory, a giant 10MB hard disk, and the still-acceptable Hercules card for graphics.

The *Windows* development system was everyone's first brush with C, and we were shocked at how crude the programming environment was compared to the Mac's truly elegant Pascal development system. We were also among the very few people even to this day who weren't shocked and dismayed at how complex a programming challenge it was. Yet I've never seen an overview article that described—from a programming standpoint—just how staggering a change *Windows* is compared with DOS.

Messages, Medium Rare

The message is the medium: If you've read it once, you've read it a million times. GUIs are the wave of the future. GUIs, like Macintosh System 7 and *Windows* 3.0, are object oriented. Well, that's not quite true. Let's get some terms straight and cut to the heart of the programming matter while we're at it.

First, remember that there are something like 50 million DOS machines out there. Second, note that while about 4 million copies of *Windows* have been distributed, that doesn't mean they're in daily use. Many of these copies came free with new ma-

chines. Finally, keep in mind that DOS does the job for millions of people and spending \$2,000 to upgrade their machines to the 386SX and four megs that *Windows* requires won't give them a commensurate increase in productivity.

And it might just do the opposite, since those few applications that exist in both DOS and *Windows* incarnations almost always look like completely different programs. That means that retraining poses a time-consuming and expensive problem. Yes, GUIs may be the wave of the future, but for now, DOS is a firmly entrenched standard.

As far as object orientation goes, the press has confused the nearly tangible feel of the user interface (menus, file folders, and so on) with the programming techniques used to write applications for it. This probably goes back to *Smalltalk* (well known as the granddaddy of *Windows*) and the Mac *Finder*, which was indeed both a visually oriented graphical user interface and the archetypal object-oriented programming system.

Learning Curves

Nonetheless, programming and using *Windows* is fun. If you plan to do it in a "real" language such as C, C++, or *Turbo Pascal*, you've got to know up front that you'll spend at least six months becoming familiar with *Windows* programming issues. Maybe even a year.

You could program in *Tool-Book* or *Visual Basic*, but neither of these languages has what it takes to be a complete *Windows* language. If you choose an object-oriented language like *Turbo Pascal* or C++, chances are overwhelming that you'll need to know that language's object paradigms even before you read the *Windows* program-

ming tutorial. You'll also need to spend an extra \$60-\$100 on reference materials, unless you already own the *Microsoft SDK for Windows*.

No other programming system on the market has adequate *Windows* reference documentation. And unless you're either dirt poor or merely self-destructive, you'll need to meet regularly with other *Windows* programmers to learn things you missed in the manuals (or, more likely, that the manuals failed to mention). CompuServe is a good place; plan to spend a minimum of \$50 a month in online time if you join.

Pointers and Handles

When you write a *Windows* program, you must know that the message is the medium, to make the inevitable cheap joke at Marshall McLuhan's expense. Your program, if it's to look like any other program, is seldom in complete control of anything. Instead, it's constantly reacting to messages sent to it by *Windows*, other *Windows* programs, and sometimes even itself.

Your program has to be ready to quit automatically when the user shuts down *Windows*, redraw any of its screens when the user decides to resize the main window, and let go of just about any piece of memory it can get its hands on.

The simple act of writing to a dynamically allocated piece of memory (for example, copying the contents of a string into a buffer) means that you have to lock that piece of memory for only as long as it takes to write the value and then unlock the memory as soon as possible—whereupon the memory manager is free to write that piece of memory temporarily to disk so some other *Windows* program can use it.

Before you start programming in *Windows*, take a deep breath and get ready for a steep learning curve.

Think about the complications arising from doing this to a pointer. A pointer represents a fixed address in RAM. Copying it to a disk file is fine, except that the memory manager has marked it as reusable at this point and a few milliseconds later it could represent something entirely different. Trying to write the pointer now would probably mean a crash.

The fact that memory can be moved and locked this way means that memory is usually allocated as a handle, not a pointer. A pointer points to an address in memory. *Windows* doesn't want you to think of that memory as your own, so handles, which are pointers to pointers, are often used as a way to make life easier for *Windows*.

Handles are easier for *Windows* to swap to disk, but they're alien to the novice *Windows* programmer. If data abstractions in your programming system are handled correctly, as they are in *Turbo Pascal* and in some C++ class libraries, the inconvenience of using handles is limited to a very few instances of direct access to the handles, and instead is bound into procedure calls or macros that do the dirty work.

Messages aren't as easily hidden. Some class libraries, like *Turbo's* brilliant ObjectVision, manage many of them behind the scenes. Others add more messages to the confusion. So will you. Sending yourself a message might come in handy, for example, where pressing a letter key in a spreadsheet-style matrix would begin data entry, whereas most other keys would be ignored. An alphabetic letter message over an empty cell would be preceded by an enter edit mode message, exactly as if you'd double-clicked with the mouse.

Printers and Fonts

One of the nasty rumors spread about *Windows* is that you don't have to worry about making printer and screen images match up anymore. That's hype. *Windows* works with jillions of printers; you could conceivably be using a daisywheel printer as your sole hardcopy device. More typically, your printer probably doesn't come with fonts that match the *Windows* screen fonts.

If the printer does graphics, you can come close to matching, but your program is entirely responsible for getting font widths to match. Usually, thank heavens, all other graphic elements move transparently from screen to hardcopy. But you become responsible for chores that God intended the operating system to handle, not you. *Windows* gives you no assurance that the Helvetica condensed text appearing onscreen will appear condensed or even as Helvetica on the target printer.

If you've created a draw program and the text is situated snugly inside a rectangle onscreen, there is no assurance—unless your program digs deep into the font metrics of both screen and printer—that it'll still be inside when printed. Now, perhaps, you see the reason Apple and Adobe want TrueType to succeed. This isn't just feature creep. Just as much as the tens of thousands of journeyman programmers who flood these companies with plaintive tech support questions regarding mismatched screen and printer fonts, the coders who create the operating environment want to get out of the device driver business.

Windows 1 came with an abundant set of painstakingly crafted printer drivers. It was great! The output from my humble ProPrinter looked as

good as that from the Mac's Imagewriter. Microsoft didn't enjoy writing all those device drivers, though, and decreed with version 2 that they were the responsibility of the hardware manufacturers. (Understandably so. Device drivers for *Windows* are difficult enough that most programmers take the easy way out and make a pact with the devil to shorten development time.) Sure enough, I couldn't even do Helvetica on my ProPrinter when *Windows 2* came out. And sure enough, *Windows 2* went nowhere. Version 3 brought Microsoft back to its roots. Helvetica has finally returned.

Be True to Your Type

By providing an extensive set of font files with *Windows* and System 7 that will allow screen and printer fonts to be generated from the same raw material, these problems will be history. NeXT has been doing it for years now with Display PostScript. Anyone who's used a PostScript printer knows that its speed could be described as glacial on a good day, so how could it come even close to acceptable performance onscreen? Simple. Knowing that the screen (output) resolution is fixed allows the interpreter to omit tons of clipping, error-recovery, and bounds-checking code.

The *Windows* version, TrueType, is said by those in the know to be hauntingly similar to Display PostScript, and it will be licensed to developers for a pittance. What this means to you is that you'll be able to deal with text as cleanly as you now can with graphics and that *Windows* will begin to fulfill its long-overdue promise as a programming system that will actually save you time when writing for a variety of output devices. □

TIPS & TOOLS

Check your serial and parallel ports, send commands directly to your printer, and protect your computer from malicious entry.

Small Can Be Useful

They come in the mail and through COMPUTE/NET on GENie and America Online. Over the past few months I've been inundated with requests for short machine language programs that do simple tasks. I have several ready. One program sets your monitor's border color, two send printer codes, and one lists your input/output ports.

Make sure the DOS program called DEBUG is in your path or the current directory. In these examples, the italic text is what the computer prints; the roman text is what you should type. One way to be sure you get these programs exactly right is to have someone read the numbers to you as you type them in. Another way suggested by one of our readers is to read the numbers into a tape recorder and then play them back as you enter the program code.

The first program changes the screen border color.

DEBUG BORDER.COM

File not found

```
-e 100 be 81 00 2b c9 2b db ac
-e 108 3c 20 74 fb 2c 30 3c 09
-e 110 77 0b 86 c3 b1 0a f6 e1
-e 118 03 d8 ac eb ef b8 01 10
-e 120 8a fb cd 10 b4 4c cd 21
-RCX
CX 0000
:28
-W
Writing 0028 bytes
-Q
```

To use the program, just type BORDER *color*. In place of *color*, type a number from 0 to 15. Check in your GW-BASIC or other BASIC manual for the color codes. If you use the DOS CLS command, it will reset the border to the default color. To get around this, you can create a batch file that first clears the screen and then sets the border color.

Here's what my file called CLEAR.BAT looks like. It would help if the program were in your DOS directory or somewhere else in your path.

```
ECHO OFF
CLS
BORDER 4
```

The next program, FF.COM, sends a form feed to the printer to eject the current sheet of paper. Once again, type the text that's in roman, and the computer will print the text that's in italic.

DEBUG FF.COM

File not found

```
-e 100 be 81 00 2b d2 ac 3c 20
-e 108 74 fb 2c 30 3c 09 77 0b
-e 110 86 c2 b1 0a f6 e1 03 d0
-e 118 ac eb ef b8 0c 00 cd 17
-e 120 b4 4c cd 21
-RCX
CX 0000
:24
-W
Writing 0024 bytes
-Q
```

To use the program, just type FF *printerport*. It will send a form feed to the printer connected to the port you specify. Make sure the printer port has a value between 0 and 2. If you don't specify a printer port, it will output to printer port 0.

The following program is similar, but it sends a linefeed rather than a form feed to the printer port specified.

DEBUG LF.COM

File not found

```
-e 100 be 81 00 2b d2 ac 3c 20
-e 108 74 fb 2c 30 3c 09 77 0b
-e 110 86 c2 b1 0a f6 e1 03 d0
-e 118 ac eb ef b8 0a 00 cd 17
-e 120 b4 4c cd 21
-RCX
CX 0000
:24
-W
Writing 0024 bytes
-Q
```

To use the program, just type LF *printerport*. It will send a linefeed to your printer. Make sure the printer port has a value between 0 and 2. If you don't specify a printer port, it will output to printer port 0.

The next program tells you what ports your computer has available to you.

DEBUG PORTS.COM

File not found

```
-e 100 e4 21 50 2a c0 e6 21 e4
-e 108 21 8a d8 be e8 01 2b c0
-e 110 8e c0 bf 00 04 b7 10 bd
-e 118 04 00 ba de 01 e8 5a 00
-e 120 bf 08 04 b7 80 bd 03 00
-e 128 ba e3 01 e8 4c 00 ba e8
-e 130 01 2b c0 8e c0 26 a1 cc
-e 138 00 26 0b 06 ce 00 0b c0
-e 140 74 29 2b c9 b8 24 00 cd
-e 148 33 0b c9 74 1e ba eb 01
-e 150 0a c9 74 14 80 c1 30 88
-e 158 0e f9 01 80 f9 34 74 06
-e 160 c6 06 f4 01 32 90 eb 03
-e 168 ba fb 01 b4 09 cd 21 ba
-e 170 e8 01 b4 09 cd 21 b4 4c
-e 178 cd 21 8b cd 26 83 3d 00
-e 180 74 42 53 8b da 8b c5 2b
-e 188 c1 04 31 88 47 03 5b b4
-e 190 09 cd 21 84 df 75 25 52
-e 198 ba d7 01 c6 06 dc 01 33
-e 1a0 90 f6 c1 01 75 06 c6 06
-e 1a8 dc 01 34 90 83 fd 03 75
-e 1b0 06 c6 06 dc 01 37 90 b4
-e 1b8 09 cd 21 5a 87 d6 b4 09
-e 1c0 cd 21 87 d6 83 c7 02 83
-e 1c8 fd 04 75 06 80 f7 18 e2
-e 1d0 ab c3 2a ff e2 a6 c3 2d
-e 1d8 49 52 51 20 33 24 43 4f
-e 1e0 4d 31 24 4c 50 54 31 24
-e 1e8 0d 0a 24 4d 6f 75 73 65
-e 1f0 20 43 4f 4d 31 2d 49 52
-e 1f8 51 34 24 50 53 2f 32 20
-e 200 4d 6f 75 73 65 24
-RCX
CX 0000
:106
-W
Writing 0106 bytes
-Q
```

To use the program, just type PORTS. It will show you which serial and parallel ports are installed. It will also tell you which IRQs are assigned to each port. If you

Suppress that nagging FORMAT prompt, print a page with a WordPerfect macro, and more.

don't see an IRQ number after a port, there's no IRQ assigned to the port. Normally you'll see something like this: COM1, IRQ4. But if there's no IRQ assigned to COM1, you'll see COM1. The program also tells you what COM port and IRQ your mouse is on.

You can find all of these programs, including source code, on COMPUTE/NET. Just connect to America On-line or GENie and use the keyword to find us. Then look for the software section and download these files.

RICHARD C. LEINECKER
REIDSVILLE, NC

Perfect Views

Sometimes when I'm working on a page in *WordPerfect* 5.1, especially after placing a graphic, I want to see what that page will look like—without printing the entire document. *WordPerfect* allows you to print a single page, but doing so requires several keystrokes. I have reduced the several-keystroke process to a single-keystroke macro.

Follow these steps to create a macro that will print a single page in *WordPerfect* 5.1 with one keystroke: Beginning at the *WordPerfect* document screen, turn on Macro Define by pressing Ctrl-F10. At the *Define macro:* prompt, press Alt-P. If no Alt-P macro exists, *WordPerfect* will ask you to describe the macro. Type *Print a single page* and press Enter. If a macro named Alt-P already exists, *WordPerfect* will ask if you want to replace it. Press 1 for Replace and Y for yes; then type *Print a single page*. (Note: If you don't want to replace the Alt-P macro, you can define this macro with any Alt-letter combination you want.) The flashing *Macro Def* tells you that *WordPerfect* is now recording your keystrokes. Press Shift-F7 for Print; then press 2 for Page.

Turn off Macro Define by pressing Ctrl-F10. Now, each time you press the Alt-P combination, the page on which the cursor lies will print.

I have shortened the process for using some of *WordPerfect's* other features also. Alt-F takes me to Base Font for a quick font change and Alt-L turns off Justification Full and left-aligns my letters.

WILLIAM HARREL
VENTURA, CA

Easier Formatting

Using the undocumented /h parameter with the FORMAT command disables the *Insert new diskette for drive* prompt and thereby speeds up the tedious process. Make sure, though, that the right disk is in the drive before you type this command because the format will start immediately.

VINCENT A. LAPOINT
MOUNTLAKE TERRACE, WA

Protect Yourself

Here's a four-line protection scheme that doesn't require typing in a password. What it does require is that a floppy disk with a named file (called KEY.BAT in this example) be in a certain disk drive (drive B: in this example). Place these lines at the beginning of your AUTOEXEC.BAT file.

```
:START  
IF EXIST B:KEY.BAT GOTO END  
GOTO START  
:END
```

Make sure that you have a file on a floppy called KEY.BAT in drive B: when you boot. Otherwise, it'll stay in an infinite loop. It's not foolproof, but it works for casual users.

WILLIAM M. SHOCKLEY
RIVERSIDE, CA

Small and Useful

Typing a file and using Ctrl-S to pause is a pain, so I use L.BAT to list files.

ECHO OFF TYPE %1 MORE

With DOS 5.0's useful DOSKEY utility I've converted my batch file to a DOSKEY macro, which follows.

DOSKEY 1=TYPE \$1 \$B MORE.

To use either one, just type L *filename*.

Another batch file I've been using to speed up my keyboard is S.BAT.

ECHO OFF MODE CON: RATE=32 DELAY=1

RICHARD C. LEINECKER
REIDSVILLE, NC

Conserving Memory

Add the line DOS=HIGH to your CONFIG.SYS file, and DOS 5.0 will load into the first 64K of extended memory, freeing conventional memory for applications.

If you have a 386 or better you can add the UMB command (DOS=HIGH,UMB) so that programs such as device drivers and TSRs can run in upper memory as well. First you need to install the EMM386.EXE memory manager and you need to direct your drivers and TSRs to high memory by using the DEVICEHIGH command in CONFIG.SYS and LOADHIGH in AUTOEXEC.BAT.

TONY ROBERTS
GREENSBORO, NC

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

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INTRODOS

Tony Roberts

LEARN TO PLAY THE NAME GAME

Judging by the questions I'm asked, file naming can be a difficult task. Computer users want to know: "How should I name my files?"

There's no pat answer to this question; it's partly personal preference, partly convention, and partly dictated by the software you use.

In the MS-DOS world, filenames consist of an eight-character root name plus a three-character extension. A period is used to separate the root from the extension.

The extension part of a filename often is used to indicate the type of file and may provide a clue as to which program created the file.

The extensions EXE, COM, BAT, and SYS all indicate files that are used by DOS itself. Files ending with EXE or COM are executable or command files, and as far as you're concerned, there's no difference between them.

From a programming standpoint, these files differ in the location of the program's data segment. Also, COM files can be no larger than 64K.

Graphics programs add various extensions to files to provide information about the type of graphics contained therein. You'll see files labeled with PCX, BMP, GIF, EPS, DRW, and TIF extensions. Each of these indicates a different way of encoding graphic data.

Spreadsheets typically add extensions of their own to files to indicate work sheets, charts, macros, and so on.

Today's software is getting better at accepting and working with data created by other applications. Page layout software, for example, usually can

import graphics files from any number of sources and text files from a variety of word processors.

When naming files in your word processor, keep in mind the final destination of those files. If you're just writing and printing a few letters in *WordPerfect*, you can use any extension that suits you. But if you're writing a document you intend to import into *PageMaker*, you'll want to use a WP5 extension, which tells *PageMaker* how to decode and interpret your *WordPerfect* file.

Enough about extensions. What about the first eight characters of the filename? This is a matter of personal, or perhaps company, choice. In any case, you'll find that adopting some uniform system for file naming will help you and your cohorts figure out what's stored on your disks.

DOS is often criticized for its short filenames, but I wouldn't look for a change in filename length anytime soon. Here's how I make the best of the situation.

First, I invent client codes and project codes. I do a bit of work for Electrical South, which repairs circuit boards and electronic controllers. Every document I produce that relates to Electrical South, begins with the two-letter client code ES.

Taking this first step makes it easy for me to find all the files associated with Electrical South—no matter where they happen to be scattered across my hard disk. Using a file-find utility, I just search for ES*.*.

Running the search turns up such files as ESSKED.XLS, an *Excel* spreadsheet in which I set up a newsletter production schedule; ESBACKUP.SET, a *PC Tools* control file created when I last backed up all of my ES files;

ESNL0891.PM4, a *PageMaker* document containing the "Electrical South Newsletter" for August 1991; ESBULL.EPS, an encapsulated PostScript file of a bull's eye that was used in the newsletter; ESRASH.XY3, a *XyWrite* document about Ken Rash (which also appeared in the newsletter); and ES0715.MEM, a memo to the Electrical South president (written on July 15).

I can remember what's in each of these files without having to open it up. I add date codes to my filenames especially when I create letters and memos and when I create issues of periodic projects such as newsletters.

I try to pack as much information as possible into every filename. The system works as long as you're willing to follow it, and it sure beats ending up with a disk full of files with names such as REPORT1.DOC, REPORT2.DOC, and REPORT3.DOC.

If your filenames include a numbering scheme such as chapter numbers or dates, here's another tip. For numbers less than 10, remember to add a leading 0 so your files will alphabetize properly in a directory.

Use CHAP05.TXT rather than CHAP5.TXT, or TR0925.LTR instead of TR925.LTR. If you fail to add the 0, your files will appear to be out of order in an alphabetized listing.

You'll find CHAP5.TXT sandwiched between CHAP49.TXT and CHAP50.TXT in your directory. This occurs because the computer treats all characters in a filename as text and alphabetizes them accordingly. When you alphabetize, CHAP49 is placed before CHAP5.

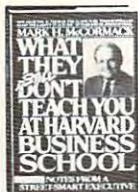
With these simple file-naming tricks, you can by-pass DOS's file-length limitations and create an efficient file retrieval system for your hard drive. □

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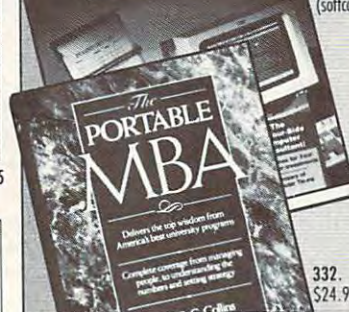
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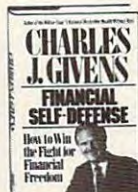
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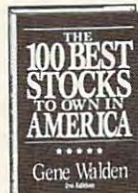
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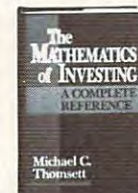
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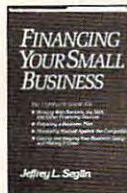
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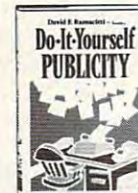
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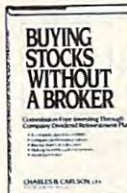
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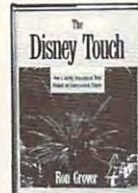
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HARDWARE CLINIC

Mark Minasi

YOU LOOK MARVELOUS

I just finished developing my new course on fixing laser printers, so I've got printers on the brain.

Lasers are no longer something owned only by the rich and powerful. An HP LaserJet series IIP can be had for about \$800—not much more than I paid for an Okidata 93 dot-matrix printer back in 1983. And the IIP/IIIP line is well worth considering. The IIIP actually prints graphics faster than the III. The HP printers are reliable and produce high-quality output. But sometimes problems can creep in, and sometimes we do things that invite problems.

How a Laser Printer Works

Laser printing is a multistep process. Understanding the process is more than just a techie exercise; it's essential to understanding what can go wrong and how to fix it.

I'll explain this in detail later, but here's basically how it works. First, the printing drum is cleaned, and an image is painted onto it with electrostatic charges. Then print toner moves to the charged areas, and the toner is transferred to a piece of paper. Finally, the toner is permanently fixed onto the paper with a heated metal roller.

The heart of the print process is the photosensitive drum, an aluminum cylinder coated with a photosensitive material. The drum's job is to pick up laser printer toner—a fine black dust that's the ink of the laser printing process—and deposit it on the paper. The drum turns during the printing process. As it touches the paper, it transfers the toner (and therefore the desired image) onto the paper.

Before that can happen, how-

ever, the drum has to be physically and electrostatically cleaned. There's a metal blade called the cleaning blade that gently scrapes across the drum, removing any stray toner particles. Then a bright light called an erase lamp shines on the drum, essentially blanking the drum and erasing any prior images. A uniform negative charge of -600 volts is then applied to the drum, preparing it for the new image to come.

That -600-volt charge is applied by a very important thin wire called the primary corona located in the disposable laser cartridge. The corona must actually emit a -6000-volt charge in order to get the -600 volts applied to the drum. The drum is now clean and ready to receive the image. The image is drawn on the drum with a mirror that directs a narrow laser beam across the drum. Anywhere the laser touches the drum changes in voltage from -600 volts to -100 volts. The drum then rotates past a fine layer of toner particles. The toner particles are attracted to the -100-volt areas; they prefer more positive voltages, and -100 is more positive than -600. By the way, the voltage can be adjusted at this point with the toner density control inside your laser. More or less voltage makes for a darker or lighter image.

The desired image now exists on the drum in the form of fine toner particles. Toner is about 50 percent iron oxide and 50 percent plastic. You can actually get toner out of materials by rubbing a powerful magnet across the material. Next, the laser printer transfers the toner to paper by giving the paper a strong positive charge (+600 volts). That charge is applied by the transfer corona, another important thin wire permanently mounted

in the printer. The toner then jumps from the drum to the paper. Once the toner is on the paper, the paper runs past the static charge eliminator, which reduces the paper's charge.

Now the image is on the paper. But it's only rendered as dusty black toner on a page—touch it, and it'll smear. That's why there's one more step: fusing. The paper moves past a heated metal roller called the fusing roller that melts the toner onto the paper, fixing it in place. The fuser is kept at 180 degrees Celsius (356 degrees Fahrenheit), explaining why the paper is so hot when it comes out of the laser printer. By the way, it's the fusing roller that makes you wait when you turn your laser printer on. The system doesn't call itself ready until the fuser has reached at least 160 degrees Celsius.

Symptoms and Solutions

Now that you know how a laser printer works, you can see what can go wrong. There are lots of potential problems, but I only have room to cover the most common ones.

- Symptom: vertical white streaks on the page. Since the paper is transported from top to bottom through the laser printer, the paper also passes the coronas from top to bottom. If a part of the corona is covered with toner, it can't transmit all of its charge, leaving either the drum (if it's the main corona) or the paper (if it's the transfer corona) with insufficient charge. That leads to a vertical stripe with little or no charge, thereby leaving no toner—or a white stripe on the paper. The solution is to clean the coronas.

As I mentioned earlier, the main corona is in the toner cartridge, so if you're lazy, you can simply change the cartridge. Otherwise, you can use the brush that's located inside your laser printer (at least, HPs

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HARDWARE CLINIC

have them) to clean your corona. Take a look inside your HP manual for details.

The transfer corona sits in a metal trench inside the laser printer. To see it, open your laser printer (I'm talking II, IID, III, or IIID here—you can't get directly at the transfer corona on a IIP or IIIP). Fairly close to the front of the printer, there's a metal trench that runs the width of the printer. It's protected with a webbing of monofilament threads. Shine a flashlight into the trench, and you'll see a hair-thin wire. That's the transfer corona. Dip a Q-Tip into some rubbing alcohol and carefully clean it end to end. (As my friend Brock Meeks says, "Once you clean the Corona, it's Miller time.")

- Symptom: smearing on the page. What keeps the toner from smearing? The fusing roller. It's covered with a Teflon-like coating to keep stuff from sticking to it, but it can become scratched, or junk can become baked onto it. In either case, the heat doesn't get transferred to the page. Try cleaning the roller with a soft cloth and some alcohol, but let the thing cool down before you mess with it!

You can also get smears when you try to print double-sided on lasers that are designed only to print single-sided. It's tempting to create double-sided documents by running paper through the laser twice, but it's not a good idea. For one thing, there are rubber rollers that grip the paper in order to pull it through the printer. Ordinarily, they grip the underside of the paper and cause no trouble. But if you're printing on both sides, they end up gripping the underside of the paper—even though the underside of the paper has printing on it. The rubber rollers smear the already-printed side.

- Symptom: horizontal streaks on the page. If you see a regular horizontal line on your output, it's probably caused by an irregularity in one of the many rollers that the paper must pass by on its journey from the paper cartridge to the output bin.

To identify the roller, you'll need to measure the distance between the lines. If the horizontal lines are always spaced the same distance apart, then that distance is the circumference of the bad roller.

Use the following numbers as a handy-dandy key. Just measure the distance between the regular horizontal lines with a ruler, and then read off the name of the bad roller. Whether or not you want to try to replace the problem child is up to you; getting to some of those rollers is a bit hairy. In my experience, however, the most common distance is 3.75 inches: the circumference of the photosensitive drum.

Repeating Horizontal Problem Guide

Distance in inches between defects, and roller

- 0.50 Registration assembly transfer roller
- 1.50 Upper registration transfer roller
- 1.75 Lower registration transfer roller
- 2.00 Developer roller (in cartridge)
- 2.56 Lower fusing roller
- 3.16 Upper fusing roller
- 3.75 Photosensitive drum (in cartridge)

- Symptom: black line down the side of the page. I don't know why this happens, but you see it when the toner is low. Replace the cartridge.

- Symptom: paper jams. Trying to print double-sided can cause problems. The first time you run the paper

through the printer, the paper is given a slight curl. Turn it upside down and run it through the printer again, and that slight curl can become a paper jam. Another cause of paper jams is printing on the wrong side of the paper. There are, believe it or not, two different sides to a sheet of paper, called the wax and the wire. Paper will have a "print this side up" indication on the wrapper—pay attention to it. Paper can acquire a curl in humid environments, but the wrapper keeps the paper dry, so don't take paper out of the ream until you're ready to use it. Using cheap paper can also lead to paper jams. In addition, old laser printers can have rollers that are no longer perfectly round, leading to jams.

Looking Your Best

Now you know what to do when something goes wrong. How can you make sure that everything goes right? First, clean the coronas. And use a fresh ream of paper, not one that's been sitting in your laser printer's cartridge for the last two weeks soaking up moisture and developing a curl. Distribute the toner in the cartridge. Take the cartridge out of the printer and rotate it 15 times. Then shake it side to side 15 times. To help the laser's toner-transfer process, you can clear its throat by printing three to five totally black pages.

You can do that with a short LaserJet program. I'll be discussing laser language in an upcoming column, but for those who know how to use it, keep this command sequence handy: <esc>&10E<esc>&10L<esc>*p0x0Y<esc>*c2400a3300B<esc>*c0P<esc>E. That will print a black page.

Next time we'll learn how to speak the mystical PCL5. □

INTRODUCING

COMPUTE NET

COMPUTE NET

COMPUTE RoundTable

Welcome to Compute/NET
Hosted by Rick Leinecker
with assistants
Tom Campbell
Stephen Levy
Peer Plaut

GENie

1. COMPUTE Bulletin Board
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3. COMPUTE Software Libraries
4. About the RoundTable
5. RoundTable News (910702)
6. About COMPUTE and the COMPUTE Editors
7. Feedback to the Sysops
8. RoundTable and Library Help
9. COMPUTE Products
10. Coming Soon in COMPUTE
11. COMPUTE Back Issue Database
12. COMPUTE Test Lab
13. Software Publishers' Catalogs
14. COMPUTE Online Game

COMPUTE/NET on GENie had a terrific grand opening. The comments ranged from "I've never seen a RoundTable open up with so much information" to "This makes my modem and computer system worth their price."

This month we're sponsoring some contests. Do you know your computer trivia? Then try our computer trivia game. And that's only one of the games we have ready. There's a scavenger hunt and a logic game. And if you win, you can get free magazine subscriptions, disks, books, or connect time.

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COMPUTE/NET

Richard C. Leinecker

ABSOLUTELY FREE SOFTWARE!

I thought that would get your attention. I've picked four great, useful, and free programs found on COMPUTE/NET to feature this month. To get the programs, first connect to GENie or America Online. Use the keyword *COMPUTE* to navigate to the COMPUTE/NET area. Then go to the software library areas and download the files.

Hi-Lo Joker Poker (filename HI-LO.ZIP) is a new version of an old game that's just plain fun to play. The CGA graphics combine with a nice interface for an easy-to-learn, enjoyable experience.

ScreenEdit (filename SED-IT.ZIP) can give your batch files a professional look. It's a text-mode paint program that lets you create excellent screens that can be loaded in right from a batch file using a special program included in the SEDIT.ZIP archive. And programmers will appreciate *ScreenEdit's* ability to save screens as source code for BASIC, C, or assembly language.

Hard Drive Bench (filename HDBENCH.ZIP) gives any hard drive a real workout and lets you know how it did. Results from XTs, ATs, and 386SXs are shown so you can see just how a system's hard drive and controller compare. If you're shopping for a computer, you can use this program to help you test your next hard drive system on the showroom floor. (Make sure you ask permission before running *Hard Drive Bench*—or run the risk of getting some very surprised looks.)

PC Doctor (filename PCDOC.ZIP) shows you what's inside your system's memory and alerts you to the status of your hardware ports. You can see a list of installed

device drivers, memory-resident programs, and environment variables. You can even peer into any part of memory and change it with the built-in memory edit feature.

You can get all of these programs from COMPUTE/NET. All but *PC Doctor* are completely free—no shareware fee.

Some who are new to telecommunications might be having trouble getting things to work. With all of the memory conflicts that TSRs introduce and all of the hardware conflicts that add-on cards throw in, it's no wonder. I'll offer some advice that will help most people who are experiencing problems.

Make sure your telecommunication software is set for the right serial port. If you have trouble, try setting your software to a different COM port. You have to watch the baud rate. If your modem is only capable of 1200 baud and you try 2400 baud, you won't get any error messages. Instead it will seem as if nothing is working. So make sure you're using the correct data transmission speed. If everything looks right but you can't make a connection, try a slower rate.

Find out what port and IRQ your serial cards, mouse, and modem are using. This isn't always easy. Watch your computer's screen when it boots and note if the mouse and other drivers tell you what port and IRQ they're using. You can also consult the manuals for any cards you have installed. I strongly suggest that you run a diagnostic program like *Check-It*. It will give you a list of IRQs and ports.

Every COM port needs an IRQ. These are hardware-generated interrupts that are triggered by an external event. In the case of a modem, the IRQ is triggered when a character comes in over the line. Once the IRQ is triggered, a special

piece of code decides what to do with the incoming character. Without interrupts your serial devices couldn't communicate with the computer.

IRQs can service only one external device at a time. You can have one IRQ for two devices as long as you're not trying to use them both at the same time. For instance, IRQ4 can be used by COM1 or COM3. You can have both serial ports safely installed in your system as long as you don't try to use both of the ports simultaneously.

There's a program in this month's "Tips & Tools" column that will display a list of your serial ports, their IRQs, and your mouse configuration. If you don't want to type it in, download it from COMPUTE/NET (filename PORTS.ZIP).

Once you've identified your equipment and all of your ports and IRQs, you're ready to fix most communications problems. Mice are the biggest culprits when it comes to conflicting with serial communications. Make absolutely sure your mouse isn't trying to use the same serial port as your modem. Then, make sure that COM1 and COM3 are using IRQ4 and that COM2 and COM4 are using IRQ3.

If there's a conflict, you're going to have to get out your manuals and set the board's jumpers and DIP switches to fix the problem. It's not hard to do, and you probably can't do much damage. Just be careful when you slip the cards in and out of the slots.

I hope you're not having hardware problems. If you are, these suggestions should help. You can send questions and comments to me on GENie, address RLEINECKER; America Online, screen name Rick CL; and CompuServe, user ID 75300,2104. □

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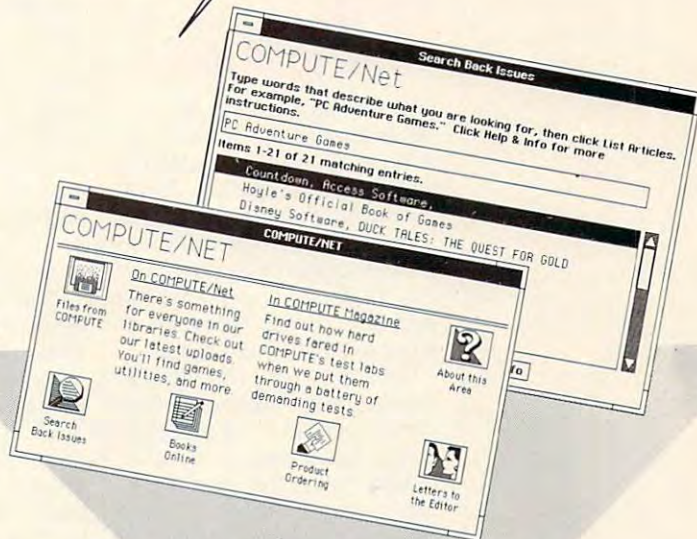
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5698/PC

POINT & CLICK

Clifton Karnes

SUPERCHARGE YOUR DESKTOP

The Norton Desktop for Windows (Symantec, 10201 Torre Avenue, Cupertino, California 95014; 408-253-9600; \$149) is nothing if not ambitious. It's a complete replacement for both *Program Manager* and *File Manager*. In addition, the package comes chock-full of excellent *Windows* utilities.

You can run *The Norton Desktop* either as your default *Windows* shell or as an application. Either way, you'll immediately notice that your desktop is very different from the one you're used to. Along the left side you'll see an icon for

The Norton Desktop for windows gives your system a real drag-and-drop facelift.



each drive on your system. Along the right side are icons for *Printer*, *Backup*, *Viewer*, and *SmartErase*. Across the top of your screen, you'll find *The Norton Desktop* menu bar. If you choose to run Norton's *Quick Access*, you'll also have Norton's improved version of *Program Manager*.

Clicking on a drive icon calls an instance of *Drive Window* (Norton's file manager) for the selected drive. The icons along the right side of the screen are targets for *Drive Window* files. The *Printer* icon prints a file, and the *Viewer* icon allows you to view any of 30 different file formats.

The interesting thing about these target icons is that you

can drag a file from a *Drive Window* to one of them and drop the file on the icon to activate the feature. For example, to view a file named *BALANCE.XLS*, you click on the filename in the *Drive Window* and drag its icon to the *Viewer* icon and release it. *The Norton Viewer* will pop up with *BALANCE.XLS* displayed.

In addition to being able to drag and drop files from a *Drive Window* to these icons, you can drag and drop files onto the desktop.

For those attached to *Program Manager* and its icons, there's *Quick Access*, which works like *Program Manager* but has many added features. Perhaps the most useful of

these is its ability to store groups as icons on other groups. This can make organizing programs and documents much easier.

In addition to the package's two major applications (*Drive*

Windows and *Quick Access*), *The Norton Desktop* is packed with a huge number of utilities including *Backup*, *Scheduler*, *SmartErase*, *Shredder*, *Sleeper*, *Launch Manager*, *SuperFind*, *System Information*, *BatchBuild*, *KeyFinder*, *Icon Editor*, and *Disk Doctor*.

There are so many useful programs here that it's hard to know where to begin. For me, the most impressive application in this group is *SuperFind*. It searches for files either by name or by text content, and it's fast. The real power of the program, however, lies in what you can do with the files you find that match your criteria. You can view, copy, move, sort, or delete them,

and you can use them as elements in a batch file that *SuperFind* automatically creates for you. *SuperFind* by itself is almost worth the price of the package.

Of the other utilities, most are good, and some are exceptional. One that's very useful is *KeyFinder*. With it, you can quickly find the keystrokes you need to produce all those weird characters in the extended ANSI set. You can also copy and paste these characters into your program.

The Norton Desktop is an impressive achievement, but it has a few rough edges. The first is its extremely slow loading speed. If you find yourself moving from DOS to *Windows* several times a day, the program's sluggish boot time will become a negative. *The Norton Desktop* is also glacially slow when saving its current configuration.

When I installed *Desktop*, *Quick Access* completely ignored the icon spacing I'd set up in *Control Panel* and clumped my icons very closely together. With *Control Panel*'s easy to change icon spacing, but with *The Desktop*, you have to edit the program's INI file manually and reboot.

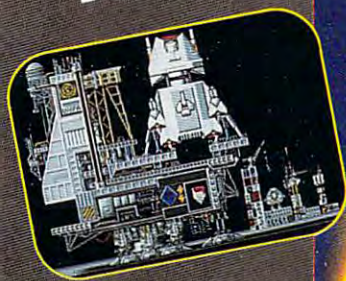
Another problem with icon management is that unlike *Windows*, which always lines up icons neatly beside each other, *The Norton Desktop* doesn't seem to know where any minimized program icons are, and it's continually plopping its icons on top of other ones. More than once I've tried to rerun a program because *The Desktop* had obscured its icon.

These criticisms aside, *The Norton Desktop* is an excellent product, especially considering its lowball price of \$149. Even if you don't opt to use it as your default shell, the utilities alone are well worth the package's price. □

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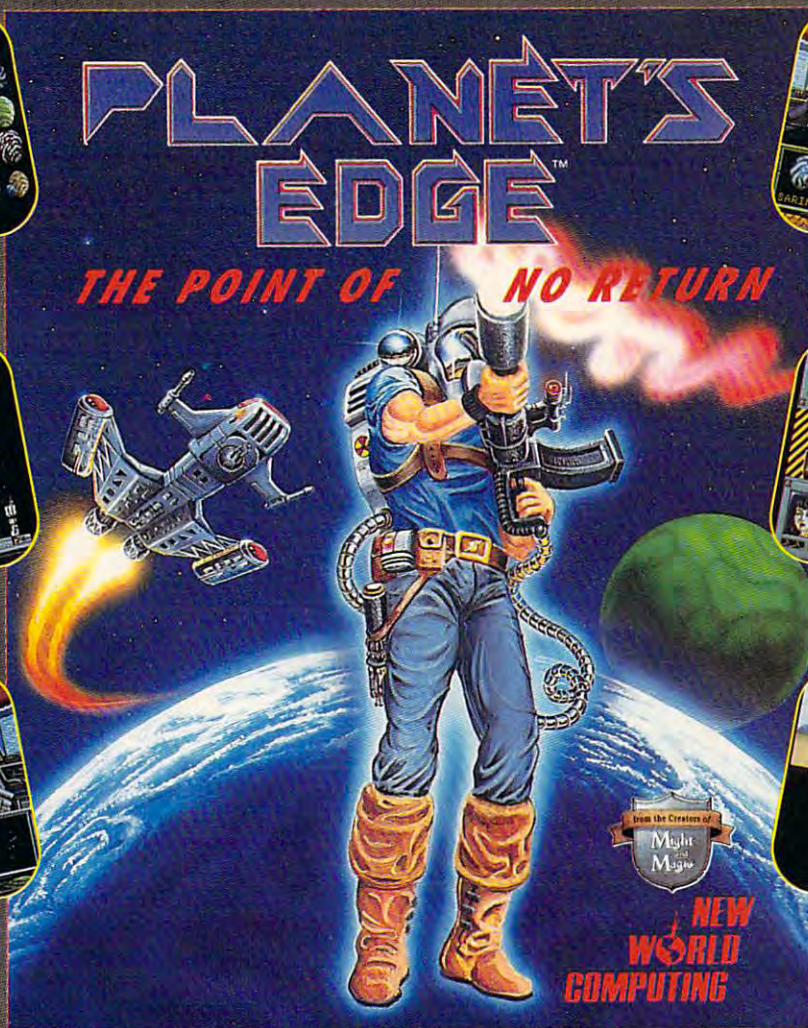
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COMPUTE CHOICE. If you're planning to add a CD-ROM drive to your home PC, look to Sony's disc-packed laser library for a solid—and entertaining—investment.

Peter Scisco

SONY LASER LIBRARY

What better sign that CD-ROM has arrived than the introduction of a CD-ROM system designed expressly for consumers by the consumer electronics giant Sony? The Sony Laser Library system has all you need to enter the world of CD-ROM from your PC. And if you do move on to *Windows*-based multimedia products in the future, it's quite capable of meeting the basic specifications.

At the heart of the Laser Library is an external Sony CD-ROM drive, a solid performer that meets all current demands for CD-ROM use. I used the drive with a variety of applications, including those that came with the system, and experienced no problems.

Unlike Tandy's low-cost CDR-1000 drive, the Laser Library employs a CD caddy for handling both audio CDs and CD-ROMs. There is some discussion in the industry as to whether a caddy is the most efficient, or even the most consumer-friendly, means of inserting discs into a CD-ROM drive. Portable audio CD players usually sport a flip-top design. Still, the Sony caddy posed no problems, even after weeks of use.

Sony deserves applause for making such a complex device as simple as possible to install, use, and upgrade. A folding Read Me First guide lays out the basic steps for installing and running the system. Sony even includes a dual-head screwdriver for installing the adapter card into your PC.

The Host Adapter card is a half-size board compatible with XT- and AT-bus personal

computers. Sony's installation guide, with its well-organized illustrations and clear instructions, leads even the most technophobic user through the process of removing the computer cover and properly inserting and setting the board. More sophisticated users will find IRQ and base address information in the System User's Guide, in case there are conflicts with other I/O devices.

Once you've installed the card and replaced your PC's cover, you're ready to hook up the CD-ROM drive. Connection is made through one of two 40-pin bus connectors; just click the supplied cable into place. Once you've plugged in the power cord, you're ready to install the Laser Library software.

The installation program is also well designed and works according to the most recent "standards." It searches your hard disk to make sure you have enough room to install the Laser Library files and then prompts you to insert one of the six CD-ROMs that come with the system. From this disc, the system creates a DOS menu for launching CD applications.



If you have *Windows* 3.0 on your system, the Install program will create a Laser Li-

brary group and assign each CD-ROM application an icon within that group.

During the setup procedure, you can specify whether you want the Library menu to appear each time you start your computer. If you skip this option, you can call the menu to the screen by typing LL at the DOS prompt. The menu itself is simply arranged and can be manipulated from the keyboard or with a mouse. The six CD-ROM applications are listed, with a scroll bar to the right. Highlight the application you want to launch and press Enter, or double-click on the application name—it's that easy. A dialog box appears onscreen to ask for the correct disc. Once you've loaded the application, using the CD caddy, it launches automatically.

The CD-ROM applications included as part of the Sony Laser Library represent a wide range of use and practicality, and they're an excellent value:

a CD-ROM drive and software valued at more than \$1,000, all for less than \$700.

Disk 1 is *Compton's Family Encyclopedia*. Though not the multimedia version, this is still an excellent electronic resource. Thousands of articles, pictures, and definitions are cross-linked. Students of all ages will appreciate the Researcher's Assistant feature, which suggests assignments on 100 different topics.

Disc 2 is *Microsoft Bookshelf: 1991 Edition*, a full-featured reference library complete with *The American Heritage Dictionary*, *Roget's Electronic Thesaurus*, *The Concise Columbia Encyclopedia*, *The World Almanac and Book of Facts 1991*, *Bartlett's Familiar Quotations* (my favorite), and *The Concise Columbia Dictionary of Quotations*.

For language students, disc 3, *Languages of the World*, allows you to pursue your avocation with electronic vigor. Translate words and phrases into 12 languages, including Chinese and Japanese. You can also search for idioms and compare word use throughout the selected languages.

Disc 4 is one of two in the library that comes close to multimedia. The program, *National Geographic Mammals*, is a database of photographs, drawings, and text related to the earth's family of mammals. Most exciting, however, especially for younger children, are the video clips of several different mammals.

Mixed-Up Mother Goose on disc 5 is a departure from the reference materials. Aimed at young children, this interactive game leads the player on a journey through the land of Mother Goose. Children will delight in meeting such favorite charac-



ters as Humpty Dumpty and Little Miss Muffett.

Sony rounds out the library on disc 6 with *Software Tools World Atlas*, a comprehensive database of maps and related information. You can print descriptions and maps to a file or send them to your printer, and you can import your maps into many popular word processing and desktop publishing packages.

You aren't limited to these discs when using the Laser Library. You can delete, add, or edit items on the menu as your CD library evolves. But though Sony has worked hard to make it easy to add disc titles to the menu, the process can be fraught with frustration.

As more CD-ROM publishers include automatic installation to the Laser Library as an option on their discs, adding to the menu should become simpler. Sony has done what it can to establish a menu for a system that so far has avoided standards. The company provides an 800 number for technical support. I found the technicians ready to help me sort through the variations of CD-ROM installations and launches.

Separate from the discs, Sony included one feature I thor-

oughly enjoyed while reviewing this unit—an audio CD player program. You can bring to the screen a detailed image of a Sony CD player; all of the buttons on the image are live. The play button starts the CD, the programming buttons let you set the order in which you play the CD tracks, and the eject button stops play and ejects the caddy from the CD-ROM drive.

For those who need a break from silence or office Muzak, the CD player can be run as a TSR. Having access to CD-quality audio from artists of your choosing is far better than being limited to the classic rock stations that litter the airwaves these days. The CD drive itself can be linked through a stereo amplifier to power regulation-size speakers. If you want to keep the music to yourself, Sony includes headphones.

If you're contemplating adding a CD-ROM drive to your home computer system, you'll have plenty of models and types to choose from this year. The Sony Laser Library isn't the least expensive, but its superior design and engineering, menu interface, easy installation, and high-quality CD-ROM applications provide solid value for your investment. □

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WORKPLACE

Daniel Janal

WELL-CONNECTED TRAVEL

Nearly half of Terry Kalil's work life is spent on the road—at conventions, meetings, airports. In today's world, that isn't unusual. But it does present an interesting problem. How do you manage a staff when you've been gone 80 out of the past 200 workdays?

As public relations manager for Great Plains Software, the leading developer of accounting and business management software for small- and medium-sized businesses, Kalil spends at least 16 weeks on the road meeting with strategic partners such as Apple, Borland, and Lotus to discuss marketing opportunities and with resellers and reporters to announce new products and strategies. Technology helps.

"I could not travel as much as I do . . . without technology," she says. "The company is very skilled at taking advantage of the technology."

One of the biggest aids is a voice mail system that op-

erates on the company's personal computers. "Our company thrives on voice mail. It is a critically important tool," she says. "We use the telephone for more than 'It's Terry; call me.' We leave full messages—and get full answers in return."

Voice mail is a powerful tool for Kalil. She uses it to instruct her staff and answer their questions. She also uses voice mail to report to her manager and respond to questions coming in from the public. "I use voice mail like I use Post-it notes. I attach a note to the original message and send it off. I can delegate by forwarding. I'm not losing productivity because I have to wait to get home."

With voice mail, she can even discuss sensitive issues. Kalil was at a conference recently when she had to discuss salary adjustments for her staff. Since she was thousands of miles away and payday was the next day, she had to conduct the process entirely over the phone. Security is built into the system so that unauthorized listeners can't hear messages, by accident or on purpose.

She can save time by broadcasting messages to anyone or everyone in the company headquarters or at its 57 remote field sites in North America. For instance, when a national C.P.A. contest rated Great Plains at the top, she sent a message to all company personnel. "We played an audiotape of our announcement, complete with the company president's extemporaneous remarks. I got calls from people saying, 'I felt as if I were there. I heard the popping of the balloons.'"

By using voice mail actively, she's been able to establish positive relationships with new contacts and maintain camaraderie with office mates.

"Because we spend so much time on the road, we have adapted," she says. "If you rely on technology, you end up being a better communicator. There are people I've never met whom I've had extensive conversations with. When we meet, we feel [as if] we know each other. We are like old friends and know each other well."

Although voice mail doesn't afford you the opportunity to pick up important cues like body language, Kalil says that if you are a good listener, you'll hear the subtle cues delivered by voice inflections and other means. "If you are a good communicator, the telephone or E-mail is not a hindrance." She has this advice for voice mail users:

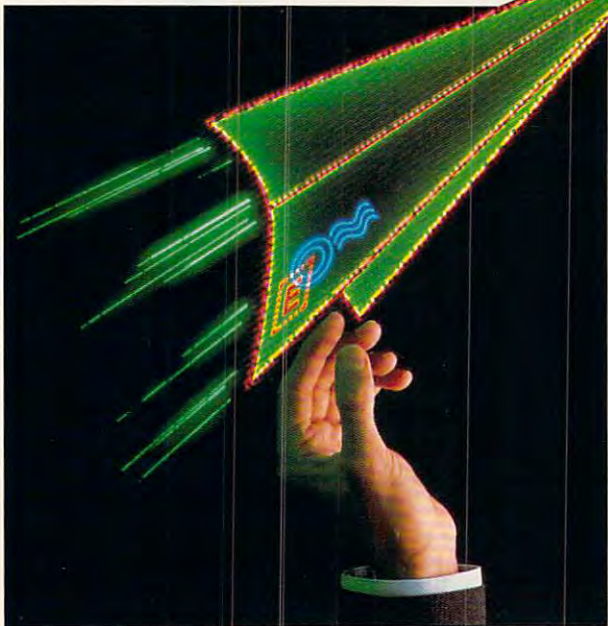
1. Be a good listener.
2. Be personable, not formal.
3. Laugh. Let them hear a smile in your voice.
4. Show empathy.
5. Use the memo approach by stating the subject up front.

Other tools in Kalil's traveling arsenal include a Compaq portable computer. "A laptop is never more than inches away from my hand," she says. Her laptop puts her in touch with the company's *cc:Mail* and MCI Mail.

"At 5:00 a.m. I can sign on and know what our daily sales figures are. I can write press releases, approve copy, and send thank-you notes to my administrative assistant to type. I type it into the system, and people at the main office get the work done."

For those times when she must actually see material for final approval of layouts or copies of articles that will appear in the media, Kalil relies on the powers of the fax machine: "How did we live without them? I feel so connected to the business with it. I'm never out of touch," she says. "Maybe I'm a communications junkie." □

Just because you're on the road doesn't mean you're out of touch: voice mail and E-mail to the rescue.



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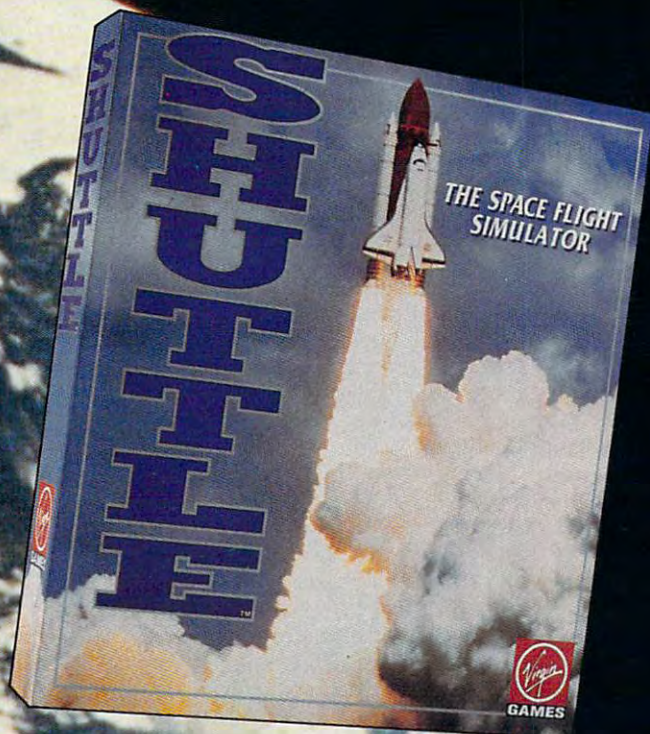
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THE BARGAINS
OF THE COMPUTER AGE
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AT A FLEA MARKET NEAR YOU.

COMPUTER FLEA MARKETS

Buying computer equipment is never easy—especially when you're trying to build a home office. Salespeople are notoriously unhelpful, prices are high, and stores often have only a limited selection of hardware and software. You can spend months looking for a system that meets your particular needs and your pocketbook's limits.

Fortunately, there are alternatives. Mail-order vendors offer good prices and a variety of hardware and software. The trouble with mail order is that some people prefer not to spend their hard-earned money on something they can't examine before the sale. Most buyers are happy ordering by mail, but some people still don't like mail order, no matter how many happy endings they've heard. For these folks and everyone else, there's another way to get a good deal: computer flea markets or fairs.

Computer fairs have a long history. In the 1970s and early 1980s, personal computers were rare and exotic machines torn from the pages of *Popular Science*. It was seat-of-the-pants computing in those days. Then, computer fairs were where people with a common love for uncommon machines came together to share discoveries.

Today, user groups and entrepreneurs sponsor computer shows and flea markets for the same purpose. Amateur radio operators also host gatherings called hamfests that usually include computers and other gear.



Flea markets can be found throughout the country. Some are run at parks or drive-in theaters; others at hotels and motels. The best way to find out about them is to ask at your local user group meeting or on bulletin board systems (BBSs). Some regional computer magazines list them, and the bigger fairs advertise in newspapers and on radio. You can still find equipment and programs you haven't seen in years, as well as hardware and software at prices you won't believe.

Sound too good to be true? Well, a computer flea market is not a perfect environment; there are problems. These shows can be very crowded. If you have a touch of claustrophobia, you don't want to go to indoor shows. One I attended was closed by the state fire marshal because of over-

crowding. Though you might think that would be the end of the show, you would be wrong. Dealers just kept selling in a light spring rain as they moved their wares from the exhibition hall to their trucks.

There are other problems. Shows are not the place to go if you don't know what you're looking for. The dealers are often there because they know computers and they want to make extra money to supplement their day jobs. They may know more than the guy in the computer store who's trying to sell you a computer based on the color of its case, but they often don't have time to explain things.

If you don't know what cable you need to get your printer and computer talking, they might be able to help you. Usually, however, there's too much going on for them to do so. On the other hand, if you know specifically what you're looking for, you can probably find what you need in a hurry.

It's best to do your homework—and not just so you can confidently say that you want a serial mouse and not a bus mouse. You're going to see more computer goodies per square foot than you've ever seen in your life. You may go in planning to buy a box of floppy disks and walk out with a VGA monitor, an 80486 motherboard, and an Apple IIe. Leaving your cash at home won't help; many dealers take plastic.

You should also be careful of other traps. The folks who sell at a flea market are as honest as anyone, but they

BY STEVEN J. VAUGHAN-NICHOLS



Brain Drain.



can be hard to find if you need help. If something goes wrong with your new modem or other peripheral, you may be out of luck.

You need to be cautious of buying used, homemade, or no-name equipment. Used goods might not work as advertised. While someone with technical skill can build a perfectly fine 80386 computer in the garage, that person might not be able to help you if something goes wrong with it in a week or a month. One reason IBM can charge so much for its machines is that it stands behind its products 100 percent. The Romans had a phrase you should remember: *caveat emptor*—let the buyer beware.

Brand-name computers and components can also be found at these shows for incredible deals—40 percent below list price is not uncommon. Dealers usually can sell goods with these remarkable discounts because, in the ever-changing world of computers, yesterday's PC can be as hard to sell as yesterday's newspaper. These orphaned systems often fall into the hands of flea-market merchants, but that doesn't mean they're worthless. They're just harder to sell in sufficient volume to justify giving them room on the shelves.

When you're buying an older sys-

tem, you should bear one potential pitfall in mind: Some systems and peripherals are too slow for modern software. A real IBM XT may be a steal if all you're going to run is a word processor or a text-based spreadsheet, but you're wasting your money if you want to run desktop publishing software under *Microsoft Windows*. An older system simply doesn't have the horsepower necessary to run these programs effectively. If it will run them at all.

Conversely, you might be tempted to purchase an old version of a software product. But look it over carefully. You might discover that it can't do the job you need done.

Rules to Save By

Still want to try out the flea markets? You should. You won't find better deals anywhere. But to make sure you get your money's worth, here are a few rules you should keep in mind.

The first rule is not to buy anything at first glance. I did this the first time I attended a computer flea market, and only ten seconds later, I was sorry. I was looking for a copy of *Datastar*, an old CP/M database program, for my faithful Kaypro computer (this was in 1986, and you couldn't find CP/M software anywhere). Just inside the door

was a man selling old CP/M software for \$20 a package. I grabbed a copy of *Datastar* immediately, congratulating myself on my good fortune. There wasn't a happier person around—until I turned the corner and found another person selling every CP/M program I'd ever heard of for \$10 a pop.

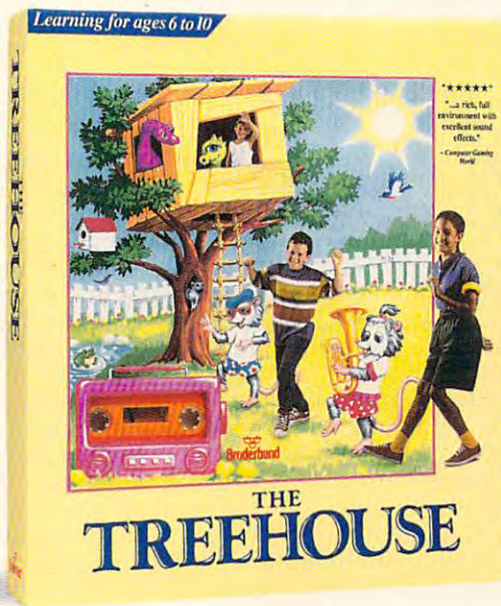
The second rule is a relative of the first. Go through the entire show before you lay money down for anything. No matter how great the deal sounds, there may be a better one on the next table. If you're looking for a part or a program for an older computer, don't grab the first thing that comes along. You'll find that flea markets are the only places where you can find a selection of things to buy, even for your senior citizen system.

Another rule is that if a vendor takes credit cards, use them. You may have to pay more for the privilege (a 5-percent premium isn't uncommon), but don't let that stop you. For a few additional dollars, you buy the opportunity to stop payment if your purchase turns out to be a dud. Some credit cards extend the manufacturer's warranty on anything you buy with them.

Whenever you're shopping for bargains, it's a good idea to get to the market early and park as close as you can

Brain Gain.

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to the site. You stand a better chance of beating the hordes if you arrive with the morning light. Computer people aren't early birds.

You should bring along some packing materials to wedge around equipment in the rear seat. Most of the time you won't need it, but now and then you'll find a piece of used equipment that doesn't have any packaging.

Always look carefully at anything you buy. There may be a very good reason that top-of-the-line brand-name computer costs so little; it may have been dropped at the store. If you don't have a chance to see if a machine works and it shows signs of having been through hard times, don't buy it no matter how great the deal. It doesn't matter how inexpensive something is if it doesn't work.

Now Get Your Wings

I know that's a lot of things to worry about. But trust me. If you go to one of these shows, you'll go back again. Prices tend to be 20 to 40 percent less than in the stores. You'll never find more hardware and software in one place. You may even find something that you didn't know you needed.

If your computer isn't a part of the PC and Macintosh mainstream, these

shows are often the only way you can get anything for your machine. Besides, there's the adventure of the flea market experience: You never know

what you'll find when you walk through the doors. Computer treasure is waiting to be found at a flea market near you. See you at the show. □

OTHER ROADS

Flea markets aren't the only way to furnish a home office with inexpensive software and hardware. Used computers can be a real boon to entrepreneurs on a tight budget. Even systems that have only been run once by a little old lady from Pasadena should cost only 60 to 85 percent of their original price. Finding such systems can be a real headache, however, and that's where computer brokerage services come in.

Companies like the National Computer Exchange (800-622-6639) and the Boston Computer Exchange (617-542-4414) arrange for buyers and sellers of used equipment to make deals with one another. While cutting-edge systems are rarely found on the exchanges' virtual floors, older but still useful systems are easy to find.

D.A.K., C.O.M.B., and other distributors of discontinued and overstocked merchandise frequently offer brand-new hardware at far below original cost, sometimes bundled with brand-name software.

Users desperately seeking low-priced software should give shareware programs a try. This kind of software, available from

online services like CompuServe and local BBSs, can be tried on for size before you buy. If a program doesn't fit your needs, just delete it from your hard disk, and you'll owe its maker nothing.

Shareware can be both inexpensive and powerful. The staples of computing work—word processing, spreadsheets, and databases—can be handled by such shareware products as *Galaxy Lite*, *PC-Calculator*, and *Wampum*. Their names may not be as well known as *WordPerfect*, *Lotus 1-2-3*, or *dBASE*, but these and other shareware programs may be exactly what your home office needs, and they're available at a fraction of the cost of shrink-wrapped software.

You may not need to go to shareware, though, for top-quality programs. Companies like Ashton-Tate, now part of Borland, are marketing programs like their flat-file database, *RapidFile*, and their integrated software package, *Framework XE*, for less than \$150. Many other companies have followed their lead in supplying consumers with inexpensive, full-featured office software.

ARTS & LETTERS

Robert Bixby

ART AND ARTIFACT

I recently finished putting the final touches on our November feature on fine art, written by fine artist Lee Noel Jr., formerly of *COMPUTE*.

The material he provided was exciting and arresting—art that could be appreciated by anyone. In fact, you probably have had in your possession a work by one of the artists; Joni Carter's work has appeared on postage stamps.

A couple of the artists were involved in creating the soft-

ware that creates their artwork. Another was working on the hardware level, stringing together machines, sensors, and output devices to create something that would result in an experience for the viewer.



ware that creates their artwork. Another was working on the hardware level, stringing together machines, sensors, and output devices to create something that would result in an experience for the viewer.

At the same time I was working on the feature, I was reading a pile of science fiction books—Joe Haldeman and Larry Niven—culled from the local used-book emporium. So it

was inevitable that I began to think about pushing the limits. When Isaac Asimov created Andrew, the wood-carving robot in his classic science fiction story, there was no question in the minds of people who saw Andrew's carvings whether he was creating art. But Andrew itself was only a tool produced on an assembly line. Only because of a defective positronic brain was Andrew creative.

Many people who program—perhaps most—eventually sit down to create a graphics program. I wrote a few and enjoyed the process, and here's why. The interest in text and data files lies in their meaning, and there are only a few things you can do to words with a text editor and still have words that make sense. By contrast, you can do almost anything to a graphic, and it can still be visually interesting.

In my efforts, I created something I called a wallpaper processor. It would rotate an image 90 degrees and superimpose it on the original

image, move the image to the right a set number of pixels and then repeat the process. Depending on the original image, the result would look like the very busy wallpaper favored in the early part of this century, with intricate patterns repeating every inch or so.

I won't make a case that my wallpaper processor created art (although I managed to publish some of it in literary maga-

zines), but if it were art, would the art be *my* art? Or could a case be made that the computer created the art and my only contribution was a signature?

What if, instead of giving the computer a set of fairly complex but rigid instructions, I had informed the computer about aesthetics—showing it how to achieve balance without symmetry, to use a variety of shading techniques to provide an interesting set of textures? I might even have designed an expert system that mimics the creative processes in an artist's mind.

Alan Turing, the English computer visionary who was a member of the team that breached the codes of the German Enigma machine during World War II, devised a test to determine whether a computer was capable of thought. His test involved having a person interact via teletype with either a computer or another human being (a teletype was the only input device they had at the time). If the human operator was unable to tell whether the interaction was with a computer or a human being, then you could say the computer was capable of thought and was, in a sense, human.

It seems to follow that a computer that can create original art indistinguishable from human art—even human art created on a computer—is an artist and human in this way.

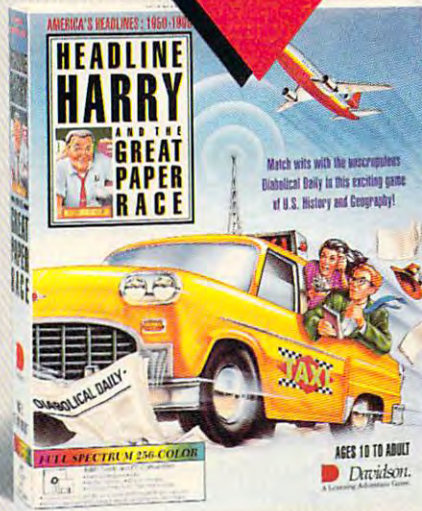
I don't think Alan Turing considered what to make of the programmer who created the program that was capable of thought. As a creator of something indistinguishable from humanity, is the programmer elevated above the human level? As frightening as these things are to think about, they are close at hand. It's easy to tell van Gogh from his brush, but it's more difficult to distinguish the creative programmer from the capabilities of the program code. □

What God hath wrought:
It's difficult to separate the creative programmer from the capabilities of the code.

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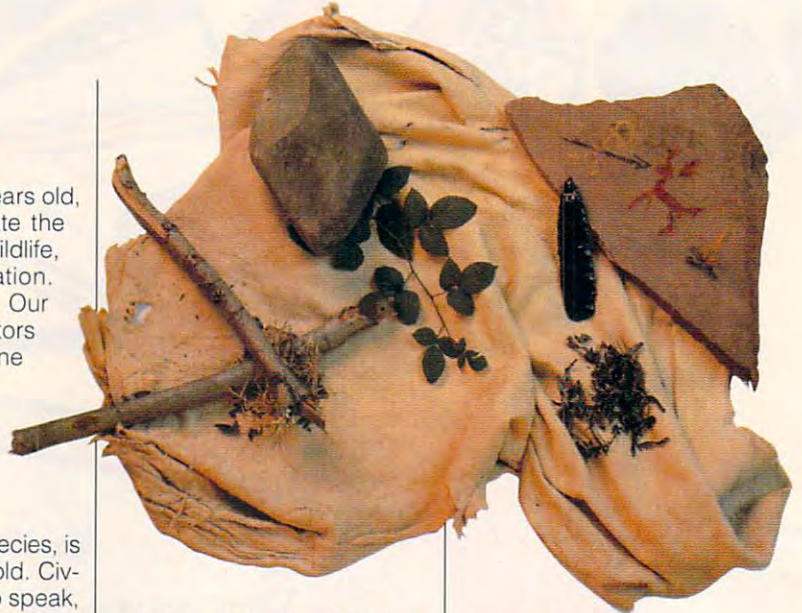
SID MEIER'S CIVILIZATION

It's less than 10,000 years old, this impulse to cultivate the land, to domesticate wildlife, to settle in one location. That's not much time. Our earliest primate ancestors appeared on the scene about 18 million years ago, with the first members of the genus *Homo* arriving 16 million years or so later. *Homo sapiens sapiens*, our subspecies, is barely 100,000 years old. Civilized humanity is, so to speak, a most modern invention.

Yet that handful of civilized millenniums represents a climb from cowering in darkness to reaching for the stars. While civilizations have risen and fallen over the past 8000 years, the impulse to civilize, to develop natural and human resources for the betterment of the population, has remained for the most part constant.

Sid Meier's Civilization gives you the opportunity to create, rule, and manage a civilization. Ruling and managing are, as players quickly discover, quite different things. As the game begins, you control a single band of settlers with little or no technology; to win the game, yours must be the first civilization to colonize a planet in another stellar system. This game has range.

Civilization may, in fact, be the most open-ended and flexible computer game ever developed. Each step along the pathway to a fully functioning, happy and healthy, well-managed civilization can lead in several directions. Decisions made early in the game can generate consequences that



stretch across centuries. There is no right or wrong way to play the game.

Paradoxically, this freedom imposes a greater responsibility on the player than most games would dare. There's more at stake here, or at least there seems to be. Sid Meier has done a wonderful job of creating the illusion of genuine consequence within what is, after all, interactive electronic entertainment.

Don't get me wrong—you can have quite a good time with *Civilization* by playing quickly, taking a "smash-and-grab" approach. Devote your entire attention and productive ability to cranking out military units, seeking enemies, and making war. Such an approach, though, may be foredoomed. Your opponents are likely to be craftier, more intelligent (in the context of the game, at least), and more organized than you.

Their own attention to economic and cultural development may ultimately provide them with more effective weapons of war than yours. (Bear in mind, too, that even a "quick"

game can take several hours to complete—unless your civilization is rapidly overrun by other more vibrant cultures.)

Conquest and warfare certainly play a major part in *Civilization*. This is a terrific war game, yet more. Culture and government, religion and commerce demand the same degree of attention as production of weapons and military units; they may well prove more valuable to the ultimate destiny of your civilization.

Meier's accomplishment here is, ultimately, the creation of a game whose peaceful developmental aspects can be as fulfilling as its warlike aspects, perhaps even more fulfilling. How many war games can you think of in which you have the choice between producing weapons of mass destruction or building Shakespeare's theater? The presence of that option indicates Meier's growth as a designer; that plowshares can in some ways be as fundamental to success as swords indicates the sophistication of the game.

There is a science fictional—

or perhaps fantastical—aspect to *Civilization*. The game doesn't promise to duplicate civilization as our history knows it. Rather, players have the tools for civilization and the chance to make of them what they will. While all players—you and up to six computer opponents—start at the same level, the evolution of individual civilizations does not follow parallel tracks any more than it has in our own history. Forms of government, ideologies, technologies—all can collide. I have played games wherein I constructed lovely civilizations of a roughly medieval level of technology, only to see them invaded and conquered by opponents in tanks and aircraft.

Likewise, I have found myself in control of modern technologies that provided the means for laying siege to the entire world. Sid Meier's game makes vivid the clash of cultures that dramatizes so much of human history.

Placing chariots and catapults in the path of armored personnel carriers without the confrontation seeming forced or false, in the manner of a war game construction kit, is a tribute to the game's persuasive abilities. You'll find yourself not only suspending your disbelief but also coming to care for the societies you create.

Through it all, the management aspects of a civilization will demand your attention. Infrastructure is crucial. You will provide your people with housing, food, and care, or they will let you know of their displeasure. The infrastructure requires maintenance and upgrades. Simple roads give way to highways or rail lines. Primitive sailing craft able only to hug the shore evolve into huge oceangoing transports,

battleships, carriers, and subs. You'll find libraries and universities here as well as barracks and depots. Ideas prove as crucial as ordnance to the growth and expansion of your civilization.

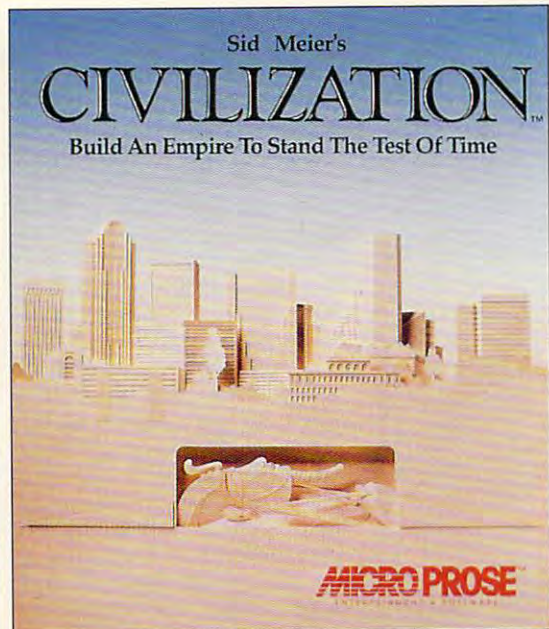
Best of all, there's a sense throughout of the interrelationship among ideas. Decisions made early in the game echo throughout its progress, both to your advantage and against it. Each path you choose both opens and closes other opportunities. You quickly learn to choose carefully.

Meier is also aware that civilizations play out their lives on planetary surfaces, often despoiling them in the process. Here, you are charged not only with exploiting the world's natural resources but also with renewing and restoring them.

There's even an interactive encyclopedia of sorts, with entries specific to the game. Design and aesthetic decisions are well supported by information resources, both within the game and in Bruce Shelley's elegantly written documentation.

Will you make the right decisions? There's no clear answer to that question. Sid Meier is as aware of the dilemma of design bias as any designer I know. It's not by accident—nor solely by marketing intent, I think—that MicroProse calls the game *Sid Meier's Civilization*. Insofar as is possible, though, Meier has minimized his overt presence in the game. You don't have to "think like Sid" in order to prosper. He has created a sort of electronic pocket universe with clearly defined rules and proscriptions. Within those limits, you're on your own, able to find your way according to your own inclinations and abilities.

While the game is primarily



intended as entertainment, it has an educational aspect that cannot be overlooked. Meier isn't teaching here—nor, except in a couple of environmental areas, is he preaching.

Rather, he provides players with a self-contained continuum to explore and lets the reasonable and realistic rules of that continuum do the teaching. You learn by experience what works and what doesn't. If the lessons learned don't directly apply to the real history of our planet, you might at least allow that they may deepen your appreciation of the intricacies of history and the odds against which civilizations have always struggled.

Civilization is a bold stroke from one of the boldest of our interactive game designers. This game challenges the worthiness of your intellect as well as your instincts and provokes interplay of ideas while providing fun. In short, it's a most civilized entertainment. □

IBM PC and compatibles with 286 microprocessor or greater; 640K RAM; EGA or VGA; hard drive; supports Ad Lib, Roland, and Sound Blaster; mouse recommended—\$69.95

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Steven Anzovin

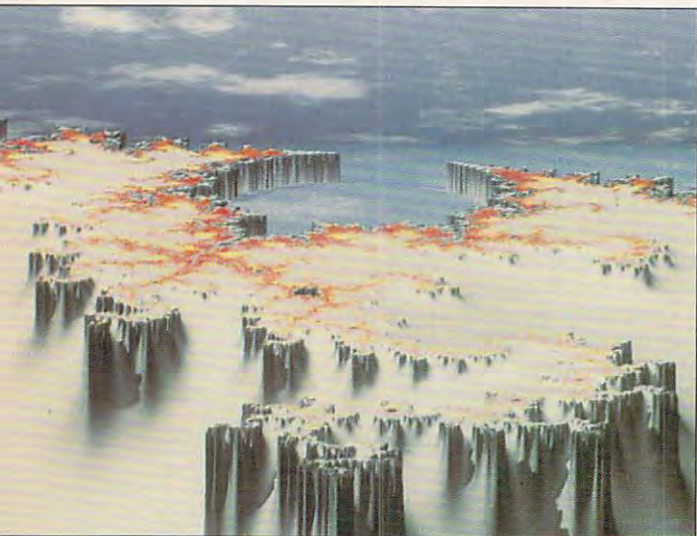
FRactal COMPACTION

As the Incredible Shrinking Man discovers at the end of the classic science fiction film, there are always new levels of wonder in the universe, no matter how small you get. Legions of computer users are discovering this truth as they play with the curious mathematical entities called fractals. Fractals, you see, are pretty much the same at every scale, from the cosmic to the miniscule.

A coastline provides a good example of fractal geometry. From space, the coast of California has a certain rough irregularity. A mile above the land, the coast has a similar roughness. Get down on the beach on your hands and knees, and the irregular boundary between sand and surf looks remarkably like the coast seen from space. That self-similarity is an essential property of fractals.

A number of software programs make it possible to explore fractal geometry on your home computer. It isn't necessary to master the mathematical mystery of IFS attractors, metric spaces, and affine transformations in the Euclidean

Monument Valley mesas or Antarctic wilderness? The wonder of fractal art lies partly in its relationship to nature.



plane to have fun with fractals (though you'll understand the theory better if you got past analytic geometry in school).

Most programs let you take a colorful image, like the well-known Mandelbrot set (kind of a mathematical black hole with an infinitely complex boundary), and simply zoom in and out at will. At any level, you can find whirling vortices, flaming dragons, Amazonian river systems, and complex Escher-like tilings. Their rhythmic, psychedelic quality is fascinating.

Two absorbing fractal exploration programs are *The Beauty of Fractals Lab* for the Macintosh, based on the book *The Beauty of Fractals* by Peitgen and Richter (Springer-Verlag, 175 Fifth Avenue, New York, New York 10010; 212-460-1500; software \$49.00, book \$39.00). The image that accompanies this column is from *The Beauty of Fractals*. For PCs and Macs there's *Desktop Fractal Design System* by Michael F. Barnsley (Academic Press, 465 South Lincoln Drive, Troy, Missouri 63379; 800-321-5068; \$49.95), companion software to Barnsley's book *Fractals Everywhere*, also by Academic Press (\$44.50). It's considered by fractal mavens to be one of the few classics in the field.

Beauty creates beautiful abstract graphics. It even has a cool 3-D option but requires a color Mac with a math coprocessor. *Desktop* has fewer options but runs on any AT-class machine with 640K and EGA or VGA. It's more of a teaching tool for using fractals to model real objects like ferns, clouds, and even human faces.

Fractals are good for more than creating calculation-intensive eye candy on your PC, however. Another essential property is that they can be described with relatively small amounts of information—as little as a single mathematical formula.

Thus any computer image

that can be described with fractal geometry can be stored in a very small amount of space. Barnsley's company, Iterated Systems (5550A Peachtree Parkway, Suite 650, Norcross, Georgia 30092; 404-840-0633), has a fractal-transform compression process called P.OEM that compresses a 768K 24-bit color image down to 10K with little loss of detail.

The weirdest, most fractal-like thing about P.OEM images is that their resolution is practically unlimited. You can even view them with more detail than in the original image. The transform process adds all the extra detail! Iterated Systems and Jones and Bartlett Publishers have copublished a 1.44MB floppy disk called *Floppy Book* (Jones and Bartlett Publishers, 20 Park Plaza, Boston, Massachusetts 02116; 800-832-0034; \$24.95) that contains 100 "pages" of full-screen 24-bit images and text. That's packing about 77MB of data onto an ordinary 3½-inch floppy.

P.OEM PC floppy books can also contain compressed video (two minutes per disk), digitized sound, and ASCII text. They might well supplant CD-ROMs as a digital publishing medium for single books rather than entire encyclopedias or databases. The floppy book is faster (you can load the P.OEM file to your hard disk for access speeds no CD-ROM player can match), it's cheaper to duplicate, and every computer has a floppy disk drive.

You don't need special hardware or software to read a P.OEM floppy book, but you need special hardware to make one. The compression development kit costs up to \$13,000, but you can have Iterated Systems or a service bureau compress your files for a low piecework rate, starting at \$25 per picture. □

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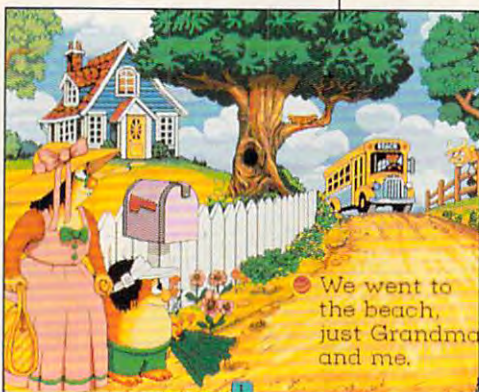
MULTIMEDIA PC

David English

SELLING THE SIZZLE

The date: October 8, 1991. The place: the Hall of Meteorites at the American Museum of Natural History in New York City. This was it, folks—the day that multimedia officially came to the PC. Now that multimedia has arrived, what does it mean for the average consumer? Will historians look back on this event as the official wedding of television and computer technologies? Or will multimedia be just another niche market for people with

Brøderbund's *Just Grandma and Me* is just one of 60 new multimedia titles.



money to burn? Maybe I'm biased, but I think we're onto something big here.

It was hard not to be impressed. The first speaker was James Burke, best known for his two rapid-fire history-of-technology series on PBS, "Connections" and "The Day the Universe Changed." With Burke comparing multimedia to Gutenberg, Martin Luther, and the American Revolution, you couldn't help but feel you were witnessing a real-life day the universe changed.

Microsoft's Bill Gates followed Burke with a more down-to-earth view. He was clearly delighted with the 60 titles on display—though most of the titles weren't quite ready to ship. (The official name for a multimedia software product is title, not

program or application.) Gates also demonstrated how you'll be able to paste a sound from a multimedia application into a *Word for Windows* document. An icon is placed on the page, and the reader can click on the icon to play back the accompanying sound.

So what kind of titles can you expect to buy for your new Multimedia PC? Brøderbund showed *Just Grandma and Me*, the first installment in the new Living Books series. It's similar to *The Playroom*, but it's structured more like a traditional book. As you would expect, it includes full digitized voices

and some very clever animation. The Voyager Company demonstrated a similar title, *Amanda Stories*, which was more free-form in its organization and more whimsical in its content. In the same vein, Sierra On-Line showed the multimedia version of its award-winning *Mixed-Up Mother Goose*.

All three titles will have young children begging in the aisles for a Multimedia PC.

For those who prefer to create their own multimedia presentations and applications, AimTech has *IconAuthor*, a high-end authoring program that lets you mix graphics, text, sound, animation, and video into a seamless whole. From Autodesk you can buy *Autodesk Animator*, *Autodesk Animation Player for Windows*, and a large selection of clips (mostly animation with some digitized audio and MIDI clips). It's all on one CD-ROM, and it's called *Autodesk Multimedia Explorer*. Midisoft is offering *Midisoft Studio for Windows*, a powerful MIDI recording/editing program that

can display standard music notation as you play.

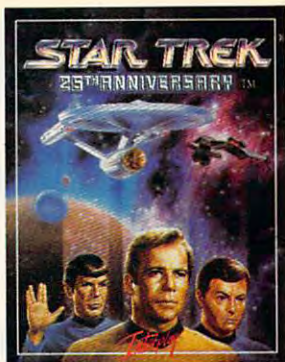
Other notable new titles include Microsoft's *Multimedia Beethoven: The Ninth Symphony*, which contains the full audio recording of the symphony, as well as the orchestral score and a detailed analysis by UCLA music professor Robert Winter; InterOptica's *Great Cities of the World, Volume 1*, which takes you on a multimedia tour of ten international cities; Metatec's *Nautilus*, the first subscription-based multimedia service available on CD-ROM; and HyperGlott's *Learn to Speak Spanish*, with 30 interactive lessons featuring the digitized voices of native Spanish speakers.

In addition, software companies have converted many of today's top programs to multimedia, including Britannica Software's *Compton's MultiMedia Encyclopedia for Windows* and *Guinness MultiMedia Disc of Records 1991*, Interplay's *Battle Chess* and *Dvorak on Typing*, Sierra's *Jones in the Fast Lane* and *King's Quest V*, Access Software's *Links*, the Software Toolworks' *World Atlas* and *Chessmaster 3000*, Passport Design's *Master Tracks Pro* and *Encore*, and Microsoft's *Works for Windows* and *Bookshelf for Windows*.

Of the software developers I talked to who are converting their programs to CD-ROM, most plan to offer their CD-ROM versions for less money than their disk-based versions. Expect to see \$59.95 programs available for as little as \$39.95 on CD-ROM. (Not only is it cheaper to supply software on CD-ROM, but it virtually eliminates the problem of illegal copying.) If the software companies can get enough titles out there at rock-bottom prices, multimedia could really take off. Fortunately, we're off to a great start. □

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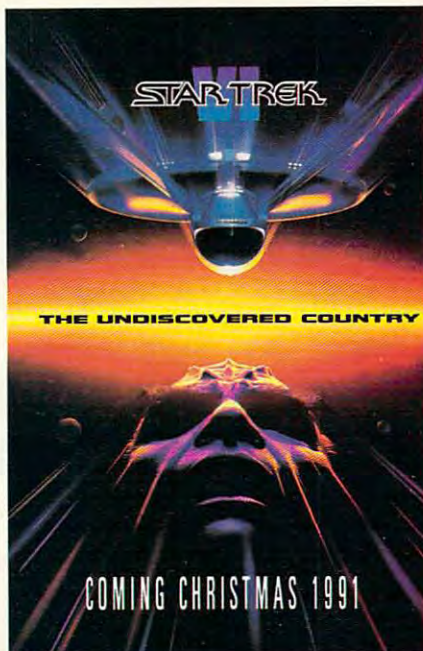
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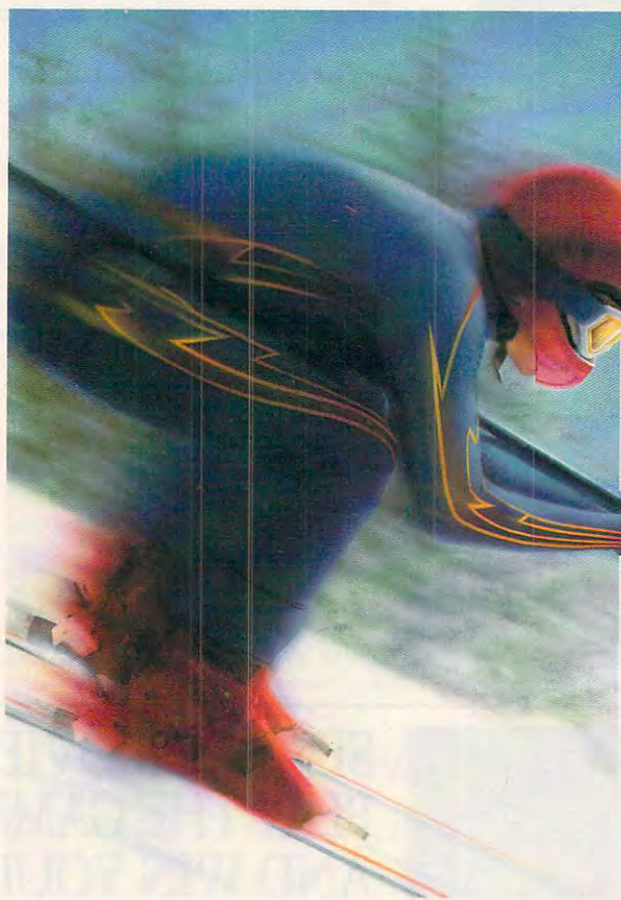
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GAMES GONE GLOBAL

THE GAMES OF THE ELECTRONIC WORLD HAVE UNIVERSES HIDDEN INSIDE

Nations rise; kings fall. Some civilizations leave impressive relics of past glories, while others vanish without a trace. But they're all at the mercy of your PC's on/off switch. Press it, and they're only ephemeral bits of magnetic particles on a floppy disk.

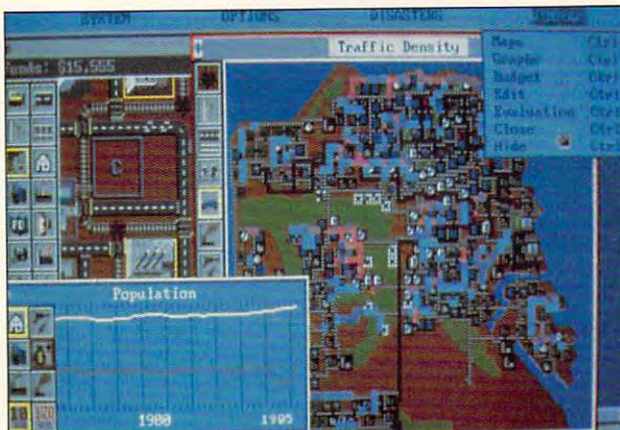
Game designers can squeeze the globe and its billions of inhabitants, along with their wars and explorations, their laws and creations, onto a piece of plastic no bigger than your hand.

We may get to play with these worlds, but they're not ours to keep. They're the children of game designers like Chris Crawford, Sid Meier, Will Wright, and others. And they act and think a lot like their parents.

Balance of Power, a geopolitical simulation where you go toe-to-toe with the Soviets, is still one of the best examples of designer hubris. Though *Balance of Power* evokes the sense of brinkmanship, few other pieces of software are so marked by their creator's hand.

Play from the American perspective, for instance, and you can find yourself going to the thermonuclear threshold because the Russians are trying to push military advisers into Mexico. Not only is it absurd that any Soviet regime would be so audacious, but when they won't back down under pressure, the situation slides to the ludicrous. The only way to survive is to be DPC, Designer Politically Correct. Don't want to play by Crawford's rules, which can quickly force you into a set piece of wimpy behavior? Too bad. All you can do is pack it in (or more likely, spark an atomic conflagration) when you try to get tough.

Crawford's not the sole example of the global game designer point of view. Will Wright, maker of the ultra-popular *SimCity* and its sequel,



SimCity from Maxis, a politically correct simulation.

SimEarth, abridged cities, then planets. In *SimCity*, where you manage urban populations, you can quell citizen complaints by simply building a sports palace, a cynical attitude that evokes images of Roman circuses. Mass transit is OK, while automobiles are an evil you need to dispose of as soon as possible. More DPC.

SimEarth, a stunning but often passive model of world building, harbors a bias against nuclear power in its advanced levels. To its credit, though, *SimEarth* lets you promote any species—even dinosaurs—to intelligence, a remarkably liberal viewpoint.

Sid Meier, MicroProse's premier designer, recently released his newest work, *Civilization*, a game in which you guide your culture from the pre-Bronze Age to the Space Age. Though your choice menu is impressively long and complex, the race to supremacy is decidedly Western and very technological.

What can you expect? Computer games, after all, are made by people. People with opinions.

Writers bring personal perspective to their work, sometimes inflamed views that are meant as much to sway as to report. All creative endeavors—and game design is just such an undertaking—begin with an opinion.

Perhaps what fools us is that

these games run on computers, which brook no shading, only blacks and whites. Or maybe it's the word *simulation* that tricks us into thinking the genre must be neutral and neutered. But game makers—and thus their games—are anything but objective.

"There's definitely a designer's perspective, but I think of it as more of a question of what you want to emphasize," says Sid Meier. "[Political and economic games] are in

the more subjective topics. When you talk about politics or history, of course there are different opinions. But dealing with another level of bias is, in some ways, more interesting."

Chris Crawford puts it more plainly. "I've never claimed that my games are free of bias. In fact, a game designer has a moral responsibility to put his perception of the world into the game. But he'd better make sure that the opinions are as broadly based as possible."

"My view of a city is what's reflected in the program [*SimCity*]," chimes in Will Wright. "It's very subjective, but . . . so is any form of entertainment. It's not something you find just in computer games. No matter how hard you try to be neutral, you still have a point of view."

It's no surprise, then, that we're not completely content with the PC worlds we borrow, especially those that explore emotional topics like politics, religion, and the environment. The key is this Chris Crawford comment: "Any good piece of art exaggerates reality."

So take Crawford, Meier, Wright, and other ambitious game designers with a grain of salt, accept what they let us play with, and argue with it if you like. Just don't expect games to be as soulless as the computers that play them.

GREGG KEIZER

PRINCIPLES OF GOOD GAME DESIGN

PLAY ENOUGH GAMES, AND YOU'LL PROBABLY DEVELOP YOUR OWN PHILOSOPHY OF GAME DESIGN

You saved up for months to buy a new game for your PC. You read the reviews, investigated the bestseller lists, asked your friends and relatives, and settled on a package.

As you lay your money down, you wonder if your diligence will be rewarded. Will the game be as incredible as everyone says? What makes a good game, anyway?

Ask game designers and they can talk for hours. Various themes surface in their answers—good games are fun, they balance challenge with success, they tell good stories, they have whiz-bang features. Good games are simple; they help you expand your mind.

Play enough games and you'll probably develop your own philosophy of game design. Certainly it will include a few of these principles.

Fun Comes First

Name: Paul Reiche III

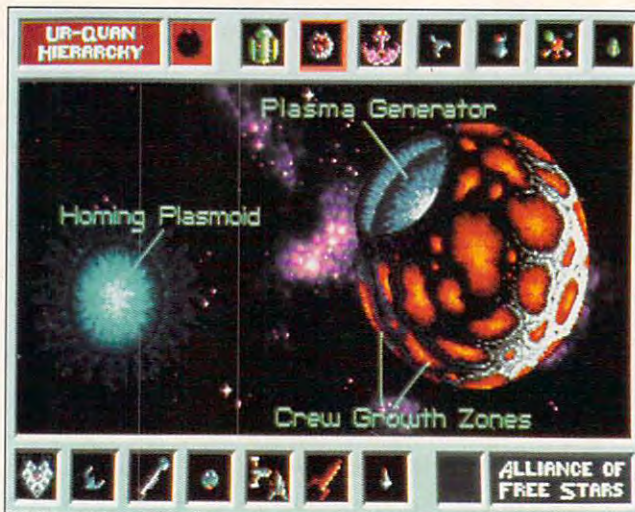
Recent Release: *Star Control* from Accolade

Other Games: *Archon* and *World Tour Golf*

For Paul Reiche III, good game design starts with good fun. "I don't have any highbrow ideas of games as statements of social change," says Reiche. "To me the litmus test of a good game is how much fun it is."

His answer may sound obvious, but Reiche goes into great depth about this basic principle. He explains that designers can describe their newest games ad nauseam but never say, "The fun part is. . . ."

"Consequently," he says, "any fun in the game is completely accidental. A good game has to have a fun core, which is a one-sentence description of why it's fun."



Star Control creator Reiche designs games based on fun.

Exercising his sense of fun, Reiche spends time thinking about games we play in the real world. He picks out the fun core of the game. In hide-and-seek, for example, the fun part of being the hider is finding a good place to hide. Then he thinks about how that can translate to a computer game.

Besides looking to the real world for standards of fun, Reiche examines successful games of the past. His latest release, *Star Control*, was inspired by an old 8-bit Atari game called *Star Raiders*. Look at the graphics of *Star Raiders* and you'll smugly roll your eyes. But the game was great fun back then, and it's still fun today. "I think those games are overlooked as a source for fundamental game design," says Reiche.

He also plays games with friends. "We have a game night once a week when we play games we want to play or games that look interesting," he says. "We usually don't play computer games. We usually play board games."

Reiche's philosophy—that a good game design is simply a fun game—may seem too basic. But, as Reiche's contemporaries Brent Iverson and Dan Bunten agree, fun is the essential element of an excellent

game. Isolating that element, though, can require many hours of sifting through unnecessary game details.

Of his own design process, Bunten remarks, "We go through these designing-playing-designing-playing-type iterations to follow the thread of what's fun and build on the foundation of what we think is needed." Iverson echoes this philosophy with his admission, "There are cases where you design something that looks good on paper and there's only one small part of it that's

fun. You have to focus on that and throw the rest away."

Perhaps *fun* is too intangible a term to pin down—successful game designers can't readily define what fun is even though they continue to produce engaging games. As an old hand at designing popular games, Paul Reiche takes his "fun" seriously enough to build some of the most entertaining diversions around, with or without a working definition.

We Crave Simplicity

Name: Dave Jones

Recent Release: *Lemmings* from Psygnosis

Other Games: *Menace* and *Blood Money*

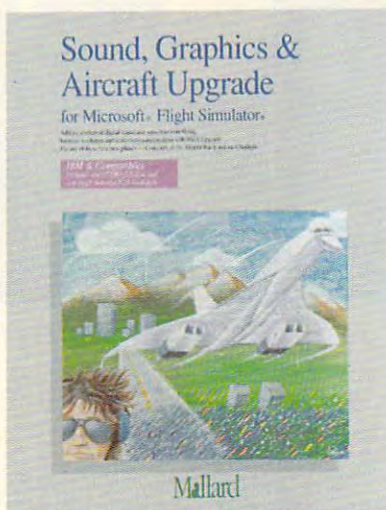
When Dave Jones and his cohorts built *Lemmings*, they decided to emphasize simplicity. They thought the best-designed games were also the least complicated.

"*Tetris* is the ultimate example of the most ultimately simple game, but it's so addictive," said Jones. "*Lemmings* is complexly simple. That's what's fun about it." He found, however, that attaining simplicity posed great difficulty. "We took a good six months to design

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AS CONSUMERS HAVE DEVELOPED MORE SOPHISTICATED PALATES, GAME DESIGNERS HAVE SPICED UP THEIR WRITING SKILLS

this game," muses Jones. "That's an unusually long time."

Lemmings almost defies description. A group of rodents move irresistibly forward. You endow these creatures with special skills that help them overcome obstacles. Of course, the skills are limited and the solutions are not always obvious.

In the interest of good game design, Jones whittled down the skills from a collection of 20 to a group of 8. "The simpler you can make the control of the game, the more playable it is.

"We thought that with these eight skills we could throw anything at the players. When we started to take skills out, we figured they could do these things with these three skills. Can this lemming replicate what this skill can do with two or three other functions?"

The final product is a game that many designers call ingeniously simple but obsessively interesting. Origin Systems' Richard Garriott adds his opinion to the body of praise for this *Psygnosis* hit. "I would not have been able to predict *Lemmings* would be such a popular game, but it's slick and simple." Even the jaded Jones admits that this is the only game he has ever wanted to play after finishing the project.

Perhaps simplicity is an aspect of game design that more designers should note. Reiche extols the virtue of an uncomplicated game: "The really blisteringly original games are incredibly simple."

To Jones, however, the best game design would sprinkle glamour over innate simplicity. "The ultimate game would be one that's as playable as *Lemmings* but has the [cinematic-style] graphics of *Wing Commander*," he says. "That is something

that people have to work towards and that is very difficult to do."

The Plot's the Thing

Name: Roberta Williams

Recent Release: *King's Quest V* from Sierra On-Line

Other Games: *The Colonel's Bequest* and *Mixed-Up Mother Goose*
Roberta Williams designs games

and more, we're concentrating on plot, the characters, and proper writing technique."

Williams equates her adventure games with movies and books. Her creations aspire to be as well crafted and as absorbing as those you would find in a motion picture. Players must be able to identify with the characters. Puzzles must fit into the plot without drawing attention to themselves.

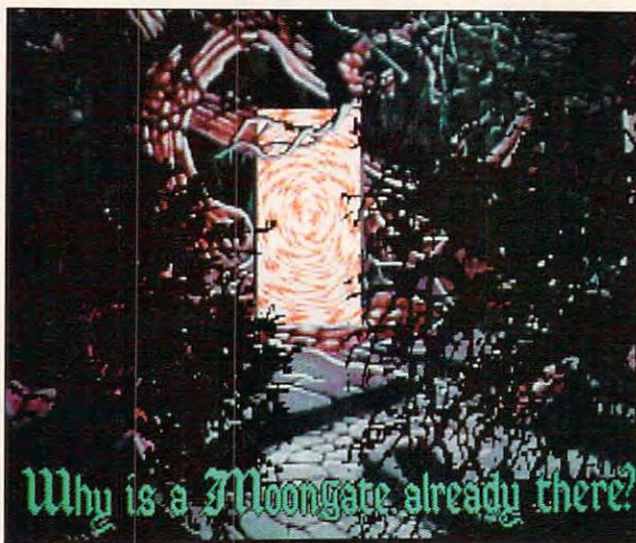
Balancing a game's plot with an acceptable amount of interactivity is one of the toughest tasks in designing a good adventure game. "In the case of an adventure game, the protagonist is controlled by the player," Williams explains. "The writer has no control over what the protagonist does. The protagonist is kind of like a wild horse that you have to catch and rein in."

The only time she can direct the protagonist is during program control sequences. These are the parts of the game

where the player is forced to find clues through overheard conversations and cutaway scenes. These sequences keep the game moving.

"It's at those points that you can rein the players in and make them dance to your tune," she says. "But then they're off and running."

With both good plots and good writing techniques, Williams designs games that double as escape hatches from everyday life. That escape, combined with the sheer pleasure of winning, is what she finds fun in the *King's Quest* games.



Sophistication helped make Origin's *Ultima* successful.

that have a discrete, victorious end. A good game, in her view, takes you to that final victory in an interesting way.

"More and more, we're thinking in terms of the plot," she says. "And is the protagonist a likable person? And who is the antagonist?"

Adventure games have changed a lot since she began her long-lived *King's Quest* series. "In the old days, when I first started designing adventure games, there wasn't much plot," Williams says. "You kind of ran around beating up trolls and gathering treasure."

As consumers have developed more sophisticated palates, game designers have spiced up their writing skills. According to Williams, "More and more, [games are] turning into interactive fiction, and more

Technology First

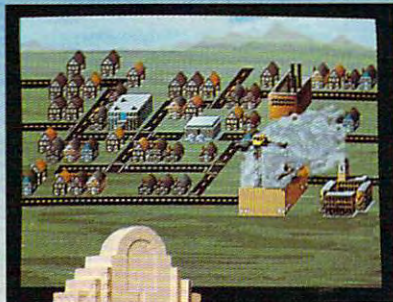
Name: Richard Garriott

Recent Release: *Ultima VII, The Black Gate* from Origin Systems

Other Games: *Ultima* series, *Martian Dreams*

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A GOOD COMPUTER GAME IS PRETTY MUCH THE SAME THING THAT GAMES WERE ALWAYS MEANT TO BE: SOMETHING TO WILE AWAY SOME TIME WITH

Like King's Quest, Richard Garriott's Ultima games have been around for a long time. Unlike King's Quest, however, Ultima's key to success is its technological sophistication—plot comes later.

"When I sit down to design a game, I usually have a few basic goals that I am very much aware of from the onset," Garriott says. "The message of the game and the major technological achievements I want to take on—I usually have these well in hand conceptually before I put a line of code in."

For Garriott, technological issues drive the game design process. He says he can write a good story and try to make the computer tell that story, but without close attention to the limits of the machine, he won't know how much code he'll have to write. He won't even know if the idea is possible.

"On the other hand, if you first develop the technology, then you can say, 'Okay, I can design a story that does that.' The story is well within the scope of the technology."

As he redesigns the technology for each new Ultima, Garriott carves the plot out of the new possibilities. For example, in each of the Ultima games, Garriott has been able to show the world of Britannia in more detail. By *Ultima V*, he could put furniture in the rooms, so he included a harpsichord the player could play—just because it was possible. Since he couldn't justify the harpsichord on aesthetic grounds alone, he rigged the instrument so that when players press a certain key, a secret passage opens and reveals one of the major parts of the game.

By creating more detail and more possibilities, Garriott has built a series that wraps players in the fantasy of an-

other world. He says the fun part of the Ultima series is that immersion in a separate reality, a reality that grows richer and richer with each installment.

"Ultimas are fun," Garriott says, "because everything from the moment you open the box is there to compel you to believe that you might really be going to a real place. The fiction of the whole game is there to support the reality of your escape to the world of Britannia."



Roberta Williams' King's Quest series is interactive fiction.

And Still More Fun

Name: Dan Bunten

Recent Release: *Command HQ* from MicroProse

Other Games: *M.U.L.E.* and *Robot Rascals*

Bundle up all the elements of a good game and give them a vigorous shake. What sifts through is a special kind of growth that comes from having a good time.

"Fun is not a fatuous activity," says Dan Bunten. "Fun is the meter on your emotional state. Fun is the summary feeling that you've got, but what's contributing to that are unexpected opportunities for growth."

According to Bunten, fun takes on an important role as an indispensable part of our lives. "It's a characteristic of intelligent species to engage in activities for which there seems to be no reward," he says.

"As a culture, we class those activities as play. Those are things that don't have any extrinsic reward. The reward is all intrinsic."

He explains why we need fun. "As intelligence rises, the need for stimulation also rises," he says. "For every brain, there is an optimum level of arousal that your brain wants to get to." If your brain doesn't reach that level during the day, you've got to play.

By consuming your daily quota of stimulation, you promote your psychological and spiritual growth. You can also expand your intellectual capacity. "Some things have a certain amount of depth that pushes you, makes you think a little deeper than you have, makes you study a little more, makes you connect with things outside of the game environment."

According to Bunten, when you become completely absorbed by a game that pushes you to your intellectual edges, you feel like what you've done is more deeply significant than what you would have done otherwise. He asserts, "Because of the richness of the environment, the connection to outside, real-world experiences, you come away with a more profound experience than you would have had without those elements—even if the entertainment value is equivalent."

Good games are good for you, by Bunten's account. Fun is a vitamin for the mind, essential nourishment for your intellect. Or perhaps Reiche comes closer to the truth when he says, "A good computer game is pretty much the same thing that games were always meant to be: something to wile away some time with."

But whatever your rationale, whatever your excuse, don't worry. A little fun never hurt anybody.

HEIDI E. H. AYCOCK