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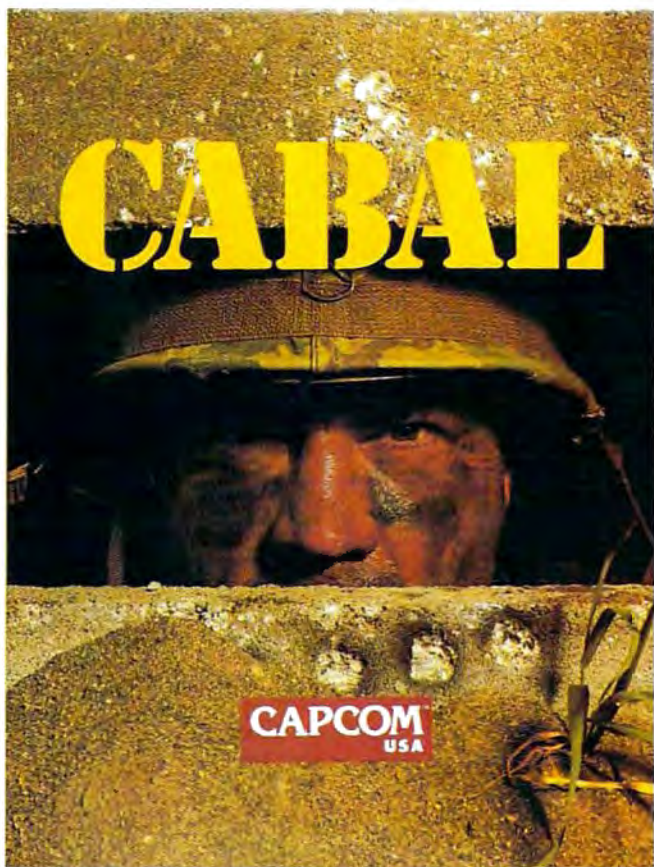
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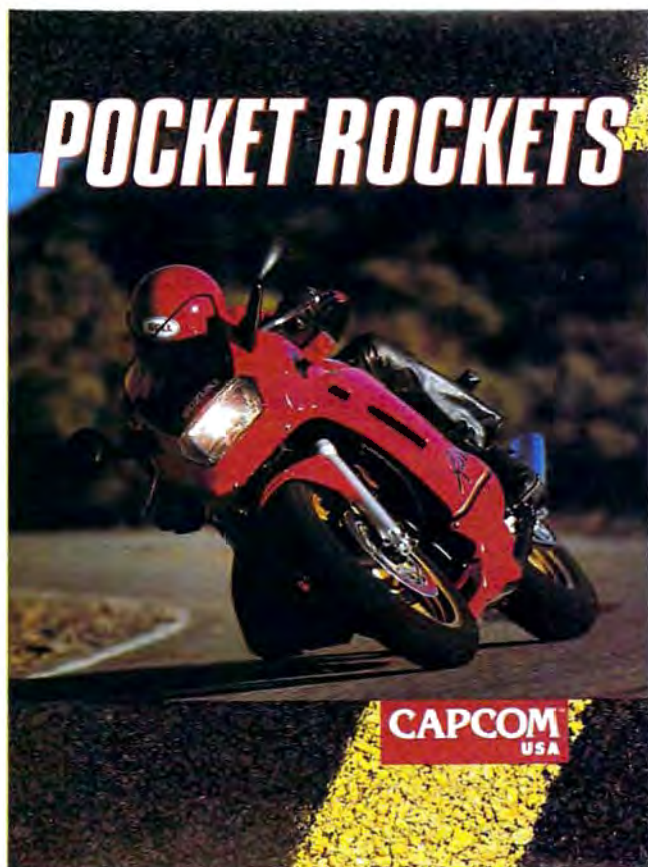


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COMPUTE!

THE CHOICE OF HOME PC ENTHUSIASTS SINCE 1979

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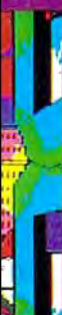
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EDITORIAL LICENSE

P E T E R S C I S C O

Strange as it may sound, standing in the middle of the Las Vegas Convention Center surrounded by the fury of COMDEX isn't the best place to be thinking of hardware. Not if you want to grasp a realistic perspective of computer life at home. Not if you want to maintain your equilibrium amid an avalanche of the hottest hardware since the gunfight at the OK Corral.

Even so, that was my position last November, roaming the aisles of COMDEX and wondering how all this wonderful computer technology was going to affect home-based computing. It's hard enough figuring out how a 486-based computer that harnesses the power of digital video interactive technology does what it does, without having to imagine how such a machine can possibly benefit my neighbor down the street who's still puzzled over how to program a VCR.

Maybe it would help to start with the basics. And that means spelling out what my opinions are about hardware. The COMPUTE! hallways are seldom free of good-natured (though I suspect sincerely felt) ribbing and taunting from a spectrum of experienced personal computer users. During an especially good day, the verbal exchanges rise to the level of serious discussion. We like to think we always ride that high road, but, as with anybody else, our arguments sometimes dip to the playground level. (My bits are badder! Oh yeah? Well my bus is bigger! Hah! Stick that in your throughput!) Still, it's stimulating and a heck of a lot more interesting than what usually passes for conversation in late-twentieth-century America.

Myself, I'm a minimalist. Or maybe a better term would be *skeptical minimalist*. That is, I believe that the more you get out of a minimum amount of equipment, the better off you are. The latest and greatest technological gadgetry seldom lives up to its hype. Besides, most folks can't af-

ford the latest-generation computer equipment anyway. I have a simple rule: Stop to think about your computer purchases. If you think you can get along without it, you probably can. That rule doesn't make me the most modern computer user (I can't see beautiful VGA color on my home computer, and the most complex simulations and applications are beyond the power of my machine), but it certainly keeps me happy.

Not everybody is comfortable making that sacrifice, and that's fine. The newest hardware means hard choices. Is the 386SX the home machine for the 1990s, or can you get along with an AT-class machine or less? Myself, I spend most of my computing time at home writing, and too much of it playing games. I bring work home with me when deadlines demand it, and I track family finances. My 8088-based system has served me well for several years, and I have no compelling reason, except for the gee-whiz factor, to change. My writing wouldn't get any faster. The few minutes I would save crunching

interest in home video strong enough to warrant an Amiga? Instead of upgrading your desktop system, maybe it would be better to pick up one of the new laptops. Sometimes it isn't a whole new hardware solution that you need, but only a peripheral. I don't use a mouse at home, but I might buy one because I think it could help my preschool-age son gain better control over the software he likes to play with.

The most important consideration you can make when contemplating new hardware is to take careful stock of your intended use of that equipment. Maybe you need the speed and processing power of a 386 if you're a freelance designer working with a topflight CAD package. Or maybe you want to buy a PC compatible that will take your home business into the next century and give you access to all of the anticipated software. Or, maybe you had planned on an AT, but with the drop in 386 prices you think the 386 is a better deal. Go ahead—buy it if you have the money, and don't feel guilty.

Maybe you're a little bored with your current state of computing. Have you tried telecommunicating? A modem is a lot cheaper than a whole new system, and it opens up great new avenues for exploration. Maybe you're eager to try some of the bigger software programs available, but you dread swapping all those disks in and out. A hard disk will cost you less than \$300 and free you from floppy frustration. If you're a game player looking for a new facet to entertainment, a sound card will enhance many of the latest games.

When it comes to hardware, take a hard look. Evaluate your needs and balance them against your desires. The glitter of a new CPU is always tempting; the promise of speed, color, and a new generation of software is hard to resist. The promising technologies of today—digital video, CD-ROM, 32-bit power—will still be around tomorrow. And the siren song of full-blast PC power will by then have faded to a chorus of consent. □

NEW HARDWARE MAKES FOR HARD CHOICES

my small spreadsheets or searching my personal databases don't outweigh the expense of an upgrade.

The same goes for other systems. Do you need a Mac SE, or is your Plus getting the job done? Are you happy with your C64, or is your budding in-

I never thought I'd have so much fun getting good grades.

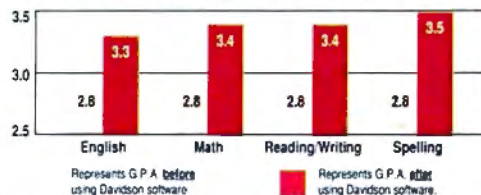


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NEWS & NOTES

HYPERWHERE?

Spinnaker Software may link Macintosh HyperCard stacks to the PC world with a hypermedia conversion/generation application called *Plus*.

During a demonstration at November's COMDEX, Spinnaker showed how to move files from a Macintosh IIcx equipped with a SuperDrive to an IBM PS/2 Model 70 running OS/2. On the Apple machine, the presenter opened a HyperCard stack under *Plus*, converted the stack to an OS/2-compatible *Plus* stack, and then saved the file to a 3½-inch OS/2-formatted disk in the SuperDrive. Finally, he opened the file on the PS/2, using the OS/2 version of *Plus*.

To make this transfer, you must have *Plus* on both machines. There is no direct route between HyperCard on the Mac and *Plus* on the PS/2.

Spinnaker said the OS/2 and Macintosh versions will probably hit the market first, followed by the Windows version. Pricing has not been set, but the company plans to ship the product in the first half of this year.

—PETER SCISCO

Parents' Choice Awards

The 1989 *Parents' Choice* annual awards honored Hi Tech Expressions' *Letter Go Round*, Hartley's *Picture Parade*, and Tom Snyder Productions' *Taking Responsibility* as the best in the software category. The nonprofit publication specializes in reviews of children's media.

Educational experts in Evanston, Illinois, evaluated the nominated software by watching children use the programs. The judges weighed how well the programs worked and how well they held a child's attention. *Parents' Choice* Editor-in-Chief Diana Huss Green pointed out that you have to capture and hold children's interest before you can teach them. Price was also one of the criteria.

You can get a sample issue of *Parents' Choice* for \$2. For more information, contact *Parents' Choice*, Box 185, Waban, Massachusetts 02168; (617) 966-5913. If you order a sample issue, ask for the award issue and get more details on the winners.

—RICHARD C. LEINECKER

Gee Wiz

The personal computer's rodent family took on a new member last November with the release of WIZ from CalComp of Anaheim, California. WIZ combines a mouse with an intelligent graphics pad and software templates.

The WIZ mouse has three buttons with six programmable settings. The pad is a little larger than a standard sheet of paper and includes a clear plastic cover under which you can slide the templates. From the template menus you can select various commands without having to pull down menus.

Available in PC as well as Macintosh versions, the WIZ offers 1000 dots-per-inch resolu-

tion. It will sell for \$199 through the middle of February; then the price will climb to \$249. PC and Macintosh templates for a variety of word processing, desktop publishing, CAD, and drawing programs retail for \$49. An optional pen for easier drawing retails for \$75.

For more information, contact CalComp at 2411 West La Palma Avenue, Anaheim, California 92081; (800) 225-2667.

—PETER SCISCO

The WIZ combines a mouse with an intelligent graphics tablet.



DEEP THOUGHT

Chalk one up for humans. In October, Garri Kasparov, the world's premier chess master, beat Deep Thought, the world's premier chess-playing computer program.

In spite of this defeat, the silicon competitor boasts several prestigious victories over human grand masters. Jim Adams of the Association for Computing Machinery predicts that a computer will be the world champion within four years. Look out, Kasparov.

Deep Thought was developed by a team of five Carnegie-Mellon University graduate students. In November, Deep Thought headed for the 20th Annual North American Computer Chess Championship in Reno, Nevada, where it tied for first place with Hitech, another Carnegie-Mellon chess-playing computer.

—RICHARD C. LEINECKER



The HeadStart III-CD (right) runs CD-ROM software on an AT-class platform.

OH, SAY YOU CD?

Looks like CD-ROM for PCs is finally out of the starting gate with the release of two home PC platforms from HeadStart Technologies.

The LX-CD has a suggested retail price of \$1,995, without a monitor. It features a 5¼-inch CD-ROM drive with stereo sound, a 40-megabyte hard disk, a high-density 3½-inch floppy disk drive, VGA graphics, headphones, serial and parallel ports, and a mouse. It is powered by an 8088 microprocessor at 4.77/10 megahertz, comes with 768K of RAM and 256K of video RAM, and offers five expansion slots and a 101-key keyboard.

The HeadStart III-CD is an AT-class machine running at 8/12 megahertz with one megabyte of RAM. It adds to the LX-CD features a second serial port, a joystick port, an additional expansion slot, and a portable external modem. It retails for \$2,995 without a monitor.

With both systems, users get a library of software on CD-ROM discs, including MS-DOS 3.3H (a special version for HeadStart that allows for partitions greater than 32 megabytes), GW-BASIC, *Publish-It!*, *Splash!*,



PCs, touchscreens, and videodiscs work together in this adult-literacy program.

Leading to Reading

An experimental program helps improve the reading comprehension of adults with only basic reading skills. Through newspaper articles, the program teaches readers how to tie sentences together and grasp the overall meaning of a story.

Displaying articles from the morning edition of the *Philadelphia Daily News*, the program asks students to relate an action, feeling, thought, or situation to something else in the same paragraph. The voice synthesizer says unfamiliar words or sentences for the students, and the touchscreen lets them use the program without typing.

Developed by an IBM scientist and researchers at Temple University in Philadelphia, the system uses an IBM personal computer, a videodisc, a voice synthesizer, and an IBM InfoWindow touchscreen monitor to display text and video onscreen.

Dr. Don Nix, the IBM researcher who created the program, said that comprehending the overall meaning of the separate sentences in an article is a common problem with low-proficiency readers.

"The text appears as a set of disparate sentences. The *One Thing Leads to Another* program helps the students make inferential connections necessary for reading comprehension," Nix explained.

In addition to the newspaper articles, students can also watch full-length feature films on the computer screen. Written text accompanies the films and explains the onscreen action.

—DENNY ATKIN

Twist & Shout, *The New Grolier Electronic Encyclopedia*, *Microsoft Bookshelf*, and several other packages.

HeadStart said that it had agreements with software publishers to release future CD-ROM disc-based packages at under \$100. The company did not say that it would make its CD-ROM technology available on a 386 platform, although a spokesperson said the firm was considering it. Many industry observers think the 386 is a more suitable piece of hardware for CD-ROM applications.

—PETER SCISCO

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LETTERS

Wow! I Could've Had a V20!

I've been hearing a lot of rumors about the V20 chip from NEC, and I'm hoping you can clear the air a little. It's supposed to be a pin-for-pin replacement for the 8088 processor. Do you know of any 8088 computers for which this doesn't work, say a Sanyo MBC-550?

I've heard that the V20 runs faster than the 8088 and can run old 8080 software and, with an emulator, CP/M programs.

Can you tell me the facts about this chip?

LEONARD HARRIS
MARIPOSA, CA

The NEC V20 microprocessor is a pin-compatible replacement for the 8088 microprocessor. Depending on which application you're running, you should see a 3-30 percent speedup with the V20. NEC's technical hotline said the V20 should work in any 8088-based system, including your Sanyo MBC-550. The only system we know of that won't work with the V20 is the Amiga 2088 BridgeCard. See "Upgrade Fever" on page 36 for more information on the V20 and other PC speedups.

You can run some CP/M programs on a V20 system with a software emulator. However, it has been a couple of years since we've seen such an emulator advertised.

Out in the Cold?

I have had an IBM PS/2 Model 30 for over two years. I bought it to write, and I find that the machine lives up to and beyond what the local IBM agent promised me.

The problem? My kids are keen to use the machine, but Dad owns the only member of the PS/2 family that has an MCGA monitor. So when it comes to those handsome programs reviewed and advertised in your valuable magazine, the MCGA monitor apparently leaves us out in the cold. Few of those programs seem to know of or care about our kind of monitor.

The result: inferior graphics.

Am I too pessimistic? Can my machine be adapted?

GEORGE RUSHE
PAGET, BERMUDA

A subset of the VGA graphics standard, MCGA gives you the 320 × 200, 256-color graphics mode, but not the EGA emulation and high-resolution 640 × 350, 16-color mode. However, most VGA games use the lower resolution in order to take advantage of the extra colors available, so they should work fine on your MCGA system. If there's no MCGA option on the game's setup screen, try the VGA setting.

Purple Faces

I own an IBM XT with a CGA card and a Sakata RGB monitor. If I upgrade my color card to EGA or VGA, will it still be compatible with the monitor? I'm a pixel-freak, but my system really frustrates me. While the resolution is excellent, the color makes me want to puke. Imagine human characters with purple faces. From the looks of them, they also want to puke.

That is why I envy Amiga users. Is there any way my system can match the Amiga when it comes to graphics and sounds?

CARLO R. MONTOYA
CEBU, PHILIPPINES

You can use an EGA card with a CGA monitor in the low-resolution, 320 × 200 16-color mode. You'll need an EGA monitor to run games that use the 640 × 350 pixel high-resolution mode, though. To use VGA graphics modes, you'll need a VGA or multisync monitor in addition to the VGA card.

To bring your system's graphics and sound performance more in line with that of an Amiga, you'll want to add a VGA card and monitor and a sound board. We'll have an in-depth comparison of some of the hottest PC sound boards on the market in our April issue.

COMPUTE!

THE CHOICE OF HOME PC ENTHUSIASTS SINCE 1979

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Finding the Winners

In January, we gave out COMPUTE! Choice Awards, and, since then, readers have been asking us how to find these prizewinning products. So we've put together a list to help you locate the best software of 1989.

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The Learning Company
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Fremont, CA 94555
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College Explorer

The College Board
College Board Publications
Box 886 Dept. PO8
New York, NY 10101-0886
(212) 713-8165

DOS 4.x

Microsoft Word 5.0
Microsoft
16011 NE 36th Way
Box 97017
Redmond, WA 98073-9717
(206) 882-8080

Kings of the Beach

Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
(415) 571-7171

King's Quest IV

Sierra
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Coarsegold, CA 93614
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PC Globe 3.0

PC Globe
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Tempe, AZ 85282
(602) 894-6866

PC Tools Deluxe 5.5

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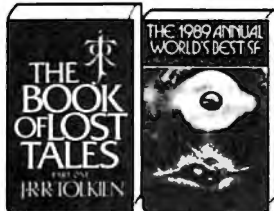
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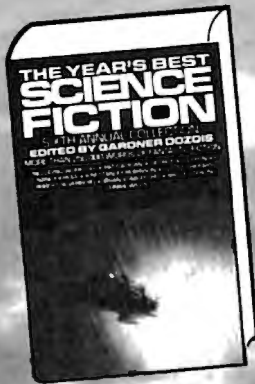
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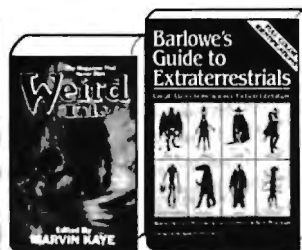
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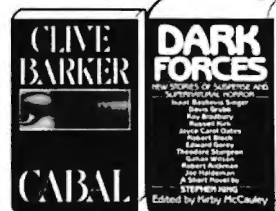
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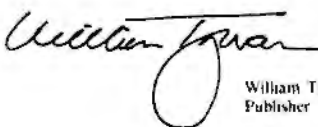


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Publisher

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New York, NY 10169

APPLICATION FORM
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- Are you ☐ Male ☐ Female
 - What is your marital status?
☐ Married
☐ Single
☐ Widowed
☐ Separated or Divorced
 - What is your age?
☐ Under 25
☐ 25-29
☐ 30-34
☐ 35-39
☐ 40-44
☐ 45-49
☐ 50-54
☐ 55-59
☐ 60-64
☐ 65+
 - What was your total household income (from all sources) in 1989?
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☐ \$25,000-\$34,999
☐ \$35,000-\$39,999
☐ \$40,000-\$49,999
☐ \$50,000-\$64,999
☐ \$65,000-\$74,999
☐ \$75,000-\$99,999
☐ \$100,000+
 - What is the highest level of education that you have attained to date?
☐ Attended High School
☐ Graduated High School
☐ Attended College
☐ Graduated College
☐ Post-Graduate Study
 - What group below best describes your occupation?
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☐ Craftsman/Foreman
☐ Other Employment
☐ Student
☐ Not Employed
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MS-DOS

POWER UP

The Norton Commander (Peter Norton Computing, 100 Wilshire Boulevard, 9th Floor, Santa Monica, California 90401; 800-365-1010; \$149) is back. With version 3.0, *Commander* boasts a slightly updated look and scores of new features.

When version 2.0 was released, it received universal acclaim. Easy disk navigation and file management combined with a sleek menu system made this elegant program *the* DOS shell to have. Version 3.0 keeps the look and feel of 2.0, but it takes that version's strong points and expands on them.

One especially useful feature of 2.0 was its viewers for *dBase* and *Lotus* files. If it's easy to view and search your databases and work sheets, managing them is much simpler. Everyone liked these viewers, and this feature was widely copied by other shell programs.

There are too many file viewers supported in 3.0 to list here, but every major spreadsheet, word processor, and database is represented, as are PCX graphics files. (Maybe we'll see viewers for GIF- and IFF-graphics formats in the next release.)

Mouse support has been beefed up, too. The mouse was a strong point with version

2.0, but in 3.0 you can do almost anything with it. Shift-click and Alt-click combinations have been added to increase the number of mouse-executable commands, and there are more selections on the program's pull-down menus. But even with all this mouse power the DOS command line is always at the bottom of the screen, ready and waiting for you to start typing.

The new *Commander* communicates. If you have a laptop and you want to transfer files between it and your desktop, *Commander* can do it. You simply connect the two machines with a special null-modem cable (Norton Computing sells one for \$29.95), run *The Norton Commander* on both computers, and start moving data. *The Norton Commander* also communicates via MCI mail. With 3.0 and an MCI account, you can start whipping out electronic mail.

Besides the added viewers, more mouse support, and new communications skills, there are many small improvements that make the program faster or easier to use. For example, menus and dialog boxes now have drop-shadows, and there's a screen-blanking function with a user-adjustable timer. If you want to blank the screen without waiting for the

timer, simply move the mouse pointer to the upper right corner. While the screen is blanked, you'll see stars and rapid cursor movement just to remind you (or anyone who happens upon your computer while you're away) that the machine is active.

To sum up: *Commander* is back, and it is still *the* DOS shell to beat. If you want to take a break from the command line, don't miss it. If you already have 2.0, upgrade!

Mouse Race

In the race to build the best mouse, Microsoft just lapped the competition. Its new 400 Series mouse (Microsoft, 16011 NE 36th Way, Redmond, Washington 98073; 206-882-8080; \$150) combines high-resolution mouse hardware with a dynamic ballistic driver for unparalleled speed and control.

The new mouse has the same Dove-bar design that caused such a stir when it was originally released, but the mouse's internal workings pump up the resolution from 200 to 400 points per inch (ppi). This means that, even in high-resolution displays, this mouse has excellent control.

And the new driver is now

fully ballistic. The mouse travels a greater distance when you move it quickly than when you move it slowly. This makes sense when you think about it. If you're moving the mouse fast, you're probably trying to get someplace else on the screen. If you're moving it slowly, you're usually trying for accuracy.

When you move the 400 Series mouse quickly, it crosses a normal 80-column text screen with less than 1 inch of mouse movement—a mere flick of the wrist. If you move the mouse slowly, the same cross-screen journey takes more than 3½ inches.

The accuracy of the mouse at slow speeds is a result of its 400-ppi resolution. Its ballistic movement comes from its new driver. This driver detects an increase in mouse speed and moves the mouse faster when you cross the speed threshold. What makes this driver handle so well is that it has 16 of these thresholds, so the software is constantly adjusting to the speed you move the mouse.

You can customize the mouse driver's operation by choosing among four speeds and three ballistic profiles. If you don't like the supplied ballistic profiles, you can custom-design your own. You can't go wrong with this mouse.

New Ride

Speaking of mice, almost every Microsoft product supports the mouse, and most come with Microsoft's latest driver software. You may have ignored these up-to-date drivers because you assumed they wouldn't work with your mouse, but there are some good reasons you should give them a try.

New applications often require new drivers, and the driver you're using (and possibly even the latest one a non-

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Microsoft mouse maker supplies) may not work with new products.

For example, if you're using the *PC Tools Deluxe* shell with a Keytronics driver and you use the mouse to change screen colors, the program crashes and your system hangs. You'd probably attribute the crash to any number of things, but chances are you'd never suspect your mouse driver.

The newest version of *Microsoft Word* is another example. Load anything but the latest mouse driver (which Microsoft supplies with the program), and you'll get random garbage on the screen in graphics mode.

So, if you're offered a newer driver with a Microsoft product, try it. Chances are it will work with your mouse. The problem you'll run into is that it won't work *well*. At least not at first.

With most non-Microsoft mice, the Microsoft driver will be sluggish. You can adjust the sensitivity of the driver and cure this problem, but unfortunately, the information you need to do this appears in the mouse manual that comes with the Microsoft mouse. If you receive an updated driver and you don't have a Microsoft mouse, you're out in the cold. Here's some help.

There are two ways to set the mouse's sensitivity. You can indicate both horizontal and vertical sensitivity with *MOUSE.SYS /sn*, where *s* is sensitivity, or speed. Or you can specify horizontal and vertical sensitivity separately with *MOUSE.SYS /hn /vn*, with *h* and *v* the horizontal and vertical sensitivities, respectively. The value for *n* can range from 5-100, with higher numbers making a faster mouse. You use the same syntax whether you install the mouse as a device driver or a TSR.

My experience with non-Microsoft mice suggests a sensitivity of about 55. If you want to be more precise, you can try a horizontal value of 56 and a vertical one of 54. Start with these and experiment.

Shareware-for-a-Day

Xtree's Software Amnesty for Everyone (SAFE) program (see the October 1989 "Power Up") was a huge success, according to a company spokesman. SAFE allowed those with pirated copies of Xtree to become fully registered users and re-

ceive a manual, all for \$20.

Registrations have netted Xtree thousands of new registered users. Many of these, the company hopes, will buy upgrades. And many may spring for Xtree's hot new *Xtree Pro Gold*, a disk and file manager with some powerful features (more on *Xtree Pro Gold* in an upcoming "Power Up").

Amnesty may be catching on. Although it isn't commenting on the results, XyQuest ran its own *XyWrite* amnesty program this past August, and the company says it's pleased with the response.

Now Unison World, the publisher of *PrintMaster*, is running its own program, and it's rumored that a major publisher (WordPerfect?) will announce amnesty plans soon. — Clifton Karnes

DOS PROMPT

Recently, while organizing my office, I stumbled across several software gems—offbeat or little-known programs that tend to be overlooked. I thought I'd devote this month's "DOS Prompt" to sharing a few of these with you.

Micro Libraries

It will be awhile before the cost of CD-ROM devices drops to a level where they'll be practical for the mass market. But a line of products already exists which provides quick access to large resource-oriented files found on CD-ROMs, requiring only a hard disk.

The Micro Library Series (INDUCTEL, 18661 McCoy Avenue, Saratoga, California 95070-9970; 800-367-4497; \$49.95 each) combines a memory-resident utility with several disk-based dictionaries, to place a wide range of research information, quite literally, at your fingertips.

At the heart of the Micro Library Series is the KAS (Knowledge Access System). This terminate-and-stay-resident (TSR) "lookup engine" lets you quickly find and display information stored in compressed disk files designed to take advantage of its advanced indexing and data-retrieval capabilities. Current offerings in the Micro Library Series include a 100,000-plus word *Funk and Wagnalls Standard Desk Dictionary*, *The Concise Dictionary of 26 Languages*, a nationwide ZIP code directory, and several McGraw-Hill tech-

nical dictionaries, encompassing individual lexicons devoted to computer terminology, physics, biology, electrical engineering, chemical terms, and mechanical engineering. More KAS-compatible dictionaries and databases are on the way.

The KAS lookup engine is compatible with a number of popular MS-DOS programs (*WordPerfect*, *Lotus 1-2-3*, *Microsoft Word*, *WordStar*, *MultiMate*, and the PFS series, among others), which means you can be working in one of these applications, "hot key" to KAS, look up the information you need, and then quickly return to the interrupted task. As an alternative, you can run the Micro Library System in a multitasking session, using *DESQview*, *Microsoft Windows* (2.0 and 386), or *Software Carousel*.

In TSR mode, the KAS lookup engine requires 128K of RAM. The individual dictionaries comprising the various library files consume anywhere from 1.2 to 5.6 megabytes of hard disk space. Until CD-ROM systems become a viable option, which won't happen anytime soon, the Micro Library Series offers a practical alternative to meeting your online research needs.

Losing the TSR Blues

Speaking of TSRs, they can be a pain. Many's the time my PC operations have come to a screeching halt because two incompatible TSRs collided with one another in system RAM. Two shareware utility programs I recently downloaded from a local bulletin board service (BBS) have all but eliminated this problem for me.

Mark and *Release* work together to avoid TSR conflicts. If you use *Mark* to place a memory marker in RAM before loading a TSR, running *Release* can locate that memory marker and remove its associated TSR from RAM. Using *Mark* and *Release*, you could, for example, issue the following DOS command before loading *SideKick* in your system: MARK SK. If you subsequently needed to use another memory-resident program that you know clashes with that Borland TSR, typing RELEASE SK would flush *SideKick* from RAM.

As I mentioned earlier, *Mark* and *Release* are shareware programs, which means you should be able to find them on a local BBS and download

them. They also are available through several commercial online information services. On GEnie, for example, *Mark* and *Release* can be found in section 5 of the IBM PC Roundtable, in a file that is called TSRCOM29.ARC. (You'll have to use a second shareware program, *ARCE.COM*, to uncompress this file before you'll be able to run *Mark* and *Release*.)

Mini-Multitasking

Multitasking is currently a hot topic in the PC community. With the emergence of products like *DESQview*, *Microsoft Windows*, and the OS/2 operating system, users have become sensitized to the limitations inherent in the one-machine/one-task philosophy that has dominated the DOS market for nearly a decade. Not everyone, however, needs the advanced features built into the three multitasking environments listed above. For many people, a less expensive, lower-tech program that supports only limited multitasking capabilities will suffice. One alternative available is *PC-MIX* (Proware, 110719 Plano Road, Suite 100, Dallas, Texas 75238; 214-349-3790; \$49.95).

PC-MIX allows you to load as many as three application programs into RAM at the same time. Furthermore, if enough memory is available, two of these can be processing in the background while you use the third in the foreground of a multitasking session. *PC-MIX* recognizes and will use expanded memory, so the total RAM requirements of your three applications can exceed the infamous DOS 640K memory barrier.

As you might expect, given its low-tech approach and surprisingly low price, *PC-MIX* does have some limitations. For example, it's not a windowing environment. Rather, the foreground application completely takes over your monitor. Also, *PC-MIX* can have trouble managing graphics applications and programs that bypass DOS's standard BIOS routines when writing to the display screen. If you use primarily BIOS-compatible text-based applications, however, and are interested in endowing your PC with limited multitasking capabilities, you should look into *PC-MIX*.

That's it for now. Remember, I want your input on this column. Send any questions,

comments, suggestions, and so on to COMPUTE!'s editorial offices (324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408), or drop me an electronic note on either CompuServe (73047, 1122) or DELPHI (NIMS). See you next month.

— Jack Nimersheim

64/128

I read a lot of computer magazines every month, including several covering the MS-DOS world. Rarely do any of these magazines even mention the Commodore 64, mainly because their readership, understandably, wants to read about the machines they own. Recently, though, I've seen the 64 mentioned twice, and both instances were a little infuriating.

One magazine was reviewing Commodore's PC40-III. The reviewer cited Commodore as the company that put the Commodore 64 into over a million households. A million? Last I heard, sales had surpassed 7 million. Even with two in some households, there must still be 64s in at least 5 million homes.

A more recent reference has a respected columnist calling the 64 "dopey." Now, compared to some of the \$9,000 machines some of these people recommend, the 64 is indeed quite dopey. But he was suggesting that low-end MS-DOS machines continue to sell because they are all that some users need. Just like the dopey 64.

The 64 itself is anything but dopey, especially in comparison to the machines to which it's being compared. Those machines are predominantly monochrome or have lousy four-color graphics. They also have plinks and bleeps for sound, nothing like the 64's SID chip. Admittedly, these machines have more memory, but the operating system and the

programs often chew up most of that memory. And only recently have the machines been as low as three times the 64's price.

Empire

Well, it's finally here. Available for years on mainframe computers, *Empire* (Interstel, P.O. Box 57835, Webster, Texas 77598; 713-486-4163; \$39.95) showed up a few years ago for the Atari ST and the Amiga. Now it's been released for the Commodore 64/128.

Empire's box warns, "This program is highly addictive! Considerable otherwise productive time might be lost." It sounds like hype, but the warning is completely accurate. I've played this game for hours on other computers, and now on the 64; and on all the machines, this game is deadly. One turn leads to another, then to another, then to another, and so on and so on and so on.

Empire is a strategy game in which three nations vie for control of a world. You play one force, while either the computer or other players control the other two. You begin with only one army, and you can see a limited portion of the land. As you move around, more of the continent becomes revealed to you. Eventually, using army, navy, and air force movement, you learn the layout of the world and the location of the enemy nations.

Many games give lip service to the need for combined arms, but *Empire* makes it mandatory. You must build transports if you hope to conquer anything, and these transports need protection from destroyers and aircraft. In turn, the transports are useless without land forces to carry, and land forces need naval bombardment and air strikes to help them. Within minutes after starting, you'll be moving your forces like a veteran. Within half an hour, you'll be hopelessly addicted.

COMPUTE! Publications Features Editor Keith Ferrell told me he had to remove the MS-DOS version of *Empire* from his hard drive because he couldn't stop playing it. All you 64/128 owners will want to make sure the game stays in another room, used only as a reward for getting other work done. As far as I'm concerned, *Empire* is the most addictive computer game ever.

— Neil Randall

APPLE II

Apple II educational software is abundant these days, to be sure, but toss out the pre-school stuff and the drill-and-practice programs and you're left with much, much less than you expected when you bought your computer.

That's why Davidson's new entry, *Math Blaster Mystery*, is such a welcome addition. This package, aimed at ages 10 and up, is a departure from the rote software that Davidson is best known for.

The program offers up four activities, each of which comes in four progressively more difficult levels. The first one, Follow the Steps, takes you through the steps necessary to solve a math word problem. Even kids horrified by the phrase *word problem* can manage to find the solution when taken by the hand and led through the problem.

The second activity, Weigh the Evidence, tests your ability to plan ahead, for you have to stack and restack numbered blocks in numerical order on scales to arrive at a preset value. It sounds easy until you start shifting numbers and then discover you've foolishly made the same move three times already, and you're no closer to the answer than when you started.

Math Blaster Mystery's third activity is Decipher the Code, a Mastermind-style game where you fill in the blanks in an empty formula. Drop in the right values or mathematical symbols, and you'll have a complete formula. Forget how to solve equations, and you're in for a long night.

The package's last activity, Search for Clues, is an interesting (though ultimately feeble) attempt to put graphics to work while you play a guess-the-numbers game. The game is great—the clues keep you going but make you work—but the animation is bleak and the graphics are really unneces-

sary. Still, they brighten the screen.

Math Blaster Mystery has all the usual Davidson touches. It works on all Apple II computers, supports the mouse (a terrific device for this program, and strongly recommended), and keeps records of all who use the software.

Check out *Math Blaster Mystery*. It costs \$49.95 and is published by Davidson, 3135 Kashiwa Street, Torrance, California 90505; (213) 534-4070.

Classic Crossword

Some old Apple software titles are classics, true gems that shine despite their age. One such program is *Crossword Magic*. First published in 1981, and today still available from Mindscape, *Crossword Magic* shows its age but still does the job.

Enter clues and their answers, and *Crossword Magic* builds the puzzle. You can play the puzzle on the computer after it's been created or on paper after it's been printed out. You can restrict the size of a crossword or let it expand automatically to fit the words you enter.

Crossword Magic puts together impressive puzzles—fitting in words of up to 20 characters, offering several useful options at puzzle print time, and even letting you edit a completed puzzle.

For a program that solidly fills a niche, consider *Crossword Magic*. The program sells for \$49.95 and is published by Mindscape, 3444 Dundee Road, Northbrook, Illinois 60062; (312) 480-7667.

— Gregg Keizer

AMIGA

One of our editors recently received a call from a worried reader who was on the verge of buying an Amiga 2000 when

he noticed the MS-DOS emphasis in *COMPUTE!*'s new format. Was the Amiga market dying?

The answer is a definite No. *COMPUTE!* has stepped up its MS-DOS coverage to reflect changes in the home computer market in general. But the Amiga market is still strong and growing, and its future looks good.

For one thing, Commodore is finally marketing the Amiga. By now, you've probably seen the multipage ads in *Life*, *Newsweek*, and *Time*, or the "Stevie" commercials.

Other good signs came from the November COMDEX show, where Commodore announced the Amiga 2500/30, an enhanced 2500 with a 25-MHz 68030 coprocessor card. The 2500/30 retails for \$4,699 and is faster than Steve Jobs' NeXT workstation in many applications.

With national advertising, hot new hardware like the 2500/30, and price cuts of 10-15 percent on most of the Amiga line, Commodore's future looks bright.

COMAL Is Cool

One of my favorite computer languages is now available for the Amiga: COMAL. You'd think the last thing the Amiga needed was another programming language, with APL, ARexx, Assembly, BASIC, BCPL, C, C++, Draco, Fort, FORTRAN, ICON, LISP, Logo, Modula-2, Pascal, and PILOT already available. But COMAL is a unique language that combines the ease of BASIC with the structure of Pascal.

COMAL's statements are similar to those in Amiga Basic, but the language also has procedures, a CASE statement, and turtle graphics similar to those found in Logo. While AmigaCOMAL is an interpreted language, an inexpensive compiler is available.

If you used COMAL on the Commodore 64, you'll find it easy to port your programs to AmigaCOMAL, since it follows the Common COMAL standard. New in AmigaCOMAL is the ability to write packages (collections of external functions that you can reuse in other programs) in COMAL itself. More seasoned Amiga programmers will be thrilled to learn that COMAL makes it easy to link in machine language and C functions.

If you're frustrated by Amiga Basic, but you can't see

getting into C, grab Amiga-COMAL. The COMAL interpreter is available for \$99.95 plus \$3.00 shipping, and the add-on compiler and developer's documentation cost an additional \$34.95. Or send a self-addressed, stamped envelope with 45 cents postage for a booklet with more information on COMAL. Send orders and inquiries to COMAL Users Group USA Limited, 5501 Groveland Terrace, Madison, Wisconsin 53716.

Faster Print

Electronic Arts has finally released an upgraded version of *DeluxePrint II* that supports Workbench 1.3 printer drivers. The program hit the Amiga market earlier this year with a resounding *thud* when people discovered it only supported the 1.2 drivers.

The new version also adds support for large font directories. While *DeluxePrint II* 1.1 is a solid performer, it still has some quirky behaviors, such as its insistence on having a floppy disk in DF0: even if you started the program from your hard drive.

Still, if you want to print greeting cards, banners, letterheads, or signs, you can't beat *DeluxePrint II*, especially if you have a color printer. EA will send the 1.1 upgrade free of charge to version 1.0 owners who send both their art and program disks to P.O. 7578, San Mateo, California 94403-7578. *DeluxePrint II* 1.1 retails for \$79.95 and is available from Electronic Arts, 1820 Gateway Drive, San Mateo, California 94404; (800) 245-4525.

Ami Tidbits

Accidentally delete your book report? Can't remember where you stored that letter to Aunt Marg? Or do you just wish that you could access all of your programs from one menu? Then check out *Dunlap Utilities*, from Progressive Peripherals & Software. This package does everything from salvage deleted files to dialing your telephone. *Dunlap Utilities* (\$79.95) isn't easy to install, but once it's set up, you'll never wonder *Do I have a utility to do that?* again. For more information, contact Progressive Peripherals & Software, 464 Kalamath Street, Denver, Colorado 80204, or call (303) 825-4144.

— Denny Atkin



CD-ROM drives are expensive, sure, but the software is so interesting and reasonably priced.

In just this past year, *The Whole Earth Catalog* came out on CD-ROM, as did a large collection of *Voyager's* Neptune pictures. Mediagenic's *the Manhole* was etched into this high-capacity media, as was a collection of Microsoft software.

Now, KnowledgeSet has released the *Guinness Disc of Records*. If you like lists of the oldest, the fastest, the largest, the hairiest, and so on, you'd probably enjoy the easy browsing and exhaustive lists in this package. The disc retails for \$99, so it's not too expensive, either. Compare it to software packages in general or to the cost of a software package that holds an equivalent amount of data. Either way you look at it, you come out way ahead.

Does that make CD-ROM drives any more worthwhile for home computer users? Only if a CD-ROM drive is within your budget. It's probably still not something vital to your home computing projects. Keep an eye on new releases, though. As more software comes out on disc, the drives will probably drop in price. And the selection of titles will probably be wonderful.

Mac Revival

That old beige Macintosh of yours has been whirring and clicking on your desk for quite a while now, waiting for you to upgrade it or donate it to charity.

Unless you hate color, consider an upgrade. Computer Care has released *Mac Rescue*, a package that turns Macintosh 128K and 512K enhanced units into Macintosh Pluses. Included in the upgrade is a snap-on daughterboard

and an SCSI port.

Better than that, the package gives you 6 SIMM slots so you can upgrade your memory to 1, 2, 2.5, or 4 megabytes of RAM. The slots are designed so that you can recycle any surplus SIMMs you have from past upgrades.

Look out System 7.0, the little beige Macintosh is ready for you.

The price of the upgrade depends on whether you have the 128K ROMs. Without any extras, *Mac Rescue* retails for \$317. If you need the 128K ROMs, you can buy them from Computer Care for \$145. Added memory is not included in the price, either. For more information, contact Computer Care at Ford Centre, Suite 1180, 420 North Fifth Street, Minneapolis, Minnesota 55401; (800) 950-2273.

New Thingz

Informix Software has upgraded *Wingz*, last year's most highly touted graphics-oriented spreadsheet. *Wingz* 1.1 includes enhanced 3-D graphs, more power in the HyperScript programming language, and a 525-page manual on HyperScript. If you are a registered *Wingz* 1.0 owner, the upgrade is free. If you haven't registered yet, you can get a free upgrade when you send in your registration card. Contact Informix at 16011 College Boulevard, Lenexa, Kansas 66219; (913) 599-7100.

Good Software has acquired *NuPaint*, a paint program that features high-powered graphics tools. Options include Masking Tape for protecting areas from stray paint marks, the Razor Blade and the Trowel for trimming stray dots, and the Mixing Bowl, which softens an image. The program retails for \$139.95, and you can contact Good Software at 13601 Preston Road, Dallas, Texas 75240; (214) 239-6085.

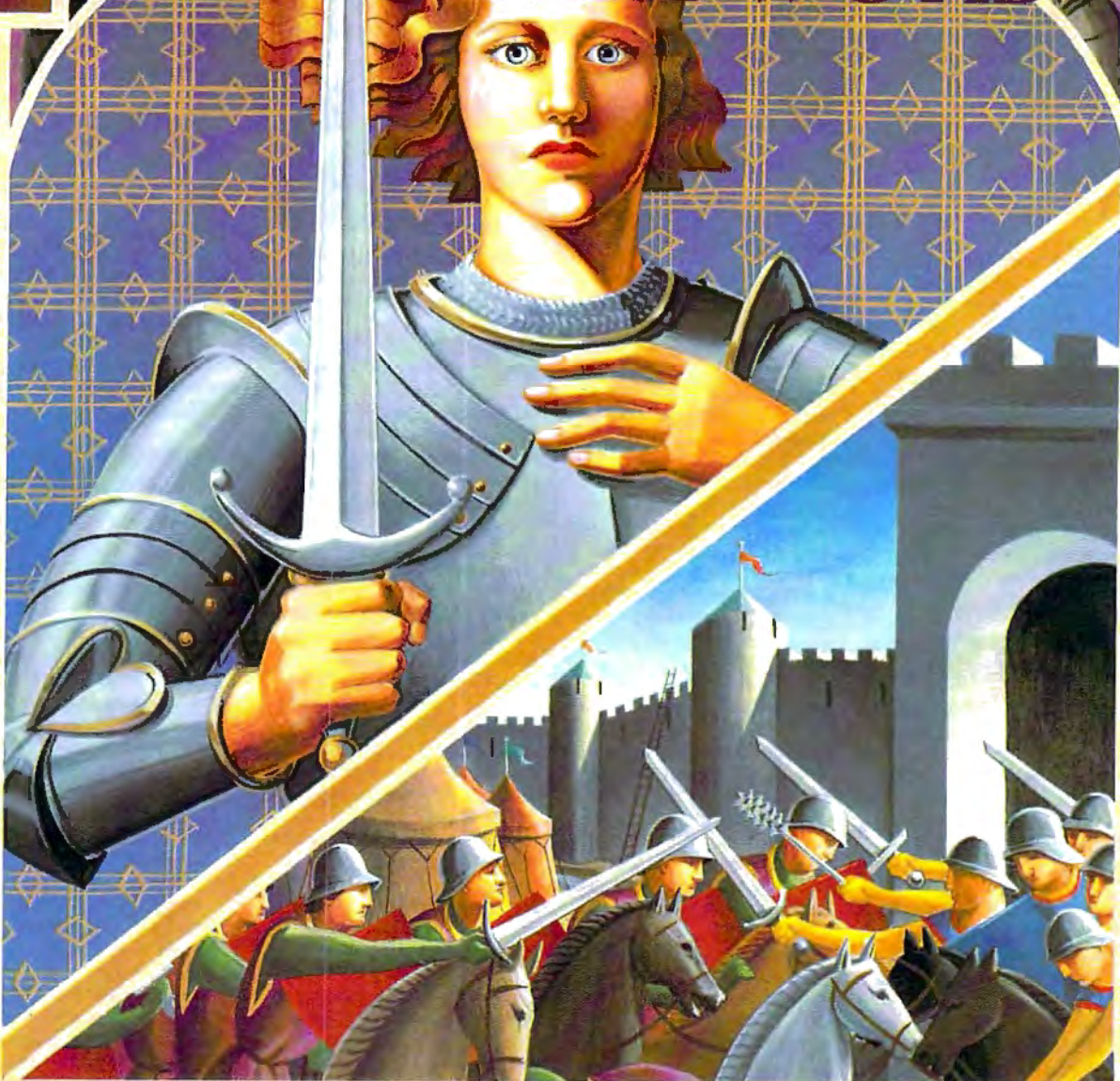
Deluxe Recorder is a good companion to Electronic Arts' *Deluxe Music Construction Set*. *Deluxe Recorder* is a home MIDI-recording program, and its recordings can be imported to *Deluxe Music Construction Set*. You get instant sheet music from the keyboard very easily. Priced competitively, *Deluxe Recorder* retails for \$149. Contact Electronic Arts at 1820 Gateway Drive, San Mateo, California 94404; (415) 571-7171.

— Heidi E. H. Aycock



• J O A N O F A R C •

SIEGE & THE SWORD



You are the young Dauphin, Charles VII, born to be king of France. The year is A.D. 1429 and your country is torn by warfare. The hated English and Burgundians have already occupied much of fair France. But now the tide is turning.

Leading your armies is Joan, a 17-year-old maiden from the tiny village of Arc. A visionary, she is intensely dedicated to serving you in your struggle to unite all of France.

Before victory can be yours, however, you will face dozens of crucial battles and decisions, any of which could mean freedom for your people . . . or cruel slavery. You'll need the wisdom of a king . . . the valor of a soldier . . . and the spirit of a saint.

In this stirring adventure, you have the opportunity not simply to relive history but to rewrite it!

- ✦ 5 types of realistic medieval action sequences, and you control them all.
- ✦ 73 authentic provinces and towns.
- ✦ 31 historically accurate characters, each with different strengths and weaknesses.
- ✦ Up to 20 options on each turn.



Defend your guard from enemy knights.



Joan bravely rallies your armies!



Fight English soldiers hand-to-hand.

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IN FOCUS

KNOWLEDGE IS POWER, OR SO FRANCIS BACON SAYS, AND POWER IS THE KEY TO A GOOD COMPUTER SYSTEM. SO, THIS MONTH, WE OFFER YOU KNOWLEDGE THAT CAN TRANSFORM YOUR PC INTO A MORE POWERFUL SYSTEM—A FASTER, SMARTER WORKAHOLIC WONDER WITH PLENTY OF CARGO SPACE AND THE MUSCLE TO DO WHAT YOU NEED IT TO DO. FIRST, TAKE A LOOK AT OUR BLUEPRINTS FOR A BUILD-IT-YOURSELF AT COMPATIBLE ON PAGE 20. THE ONLY OTHER TOOL YOU NEED IS A SCREWDRIVER. IF THE SIGHT OF A TOOLBOX MAKES YOU QUEASY, WE HAVE THE CURE FOR YOUR MALADY IN OUR TREATISE "UPGRADE FEVER." THIS PRESCRIPTION FOR PC POWER STARTS ON PAGE 36. THE BURNING QUESTIONS IN 1990: SHOULD YOU BUY AN 8088 OR A 386? HOW MEGABYTE-MASSIVE SHOULD YOUR HARD DRIVE BE? AND WHERE DOES MULTIMEDIA FIT INTO THE HOME COMPUTER SYSTEM? GET ADVICE ON THESE ISSUES FROM A REPORTER WHO WATCHES THE INDUSTRY FOR THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS; READ "MY VIEW" ON PAGE 32. BOOT UP OUR FEBRUARY SHAREPAK DISK AND IMPROVE YOUR COMPUTING ENVIRONMENT WITH MUCH FASTER KEYBOARD REPEATS AND VIRUS-FREE DISKS. READ ABOUT OUR LATEST LIBRARY OF SOFTWARE TOOLS ON PAGE 34. "RESOURCES," ON PAGE 44, DIRECTS YOU TO MORE INFORMATION ABOUT YOUR COMPUTER. SO, ROLL UP YOUR SLEEVES; WE'RE TAKING A CLOSER LOOK AT

COMPUTER HARDWARE UNVEILED

BUILD YOUR OWN AT

FORGET THE
AMMETER AND
OSCILLOSCOPE,
DROP THE
ELECTRICAL PROBES
AND DREADED
SOLDERING GUN.
TODAY YOU CAN
ASSEMBLE A
PROFESSIONAL-
QUALITY PC
WITH A
SCREWDRIVER.

BRUCE W. HAASE



Not more than a dozen years ago, if you wanted a personal computer there was only one way to get it—build it. That process required knowledge of electrical engineering and a high level of mechanical aptitude, and the resulting machines were meager by today's standards.

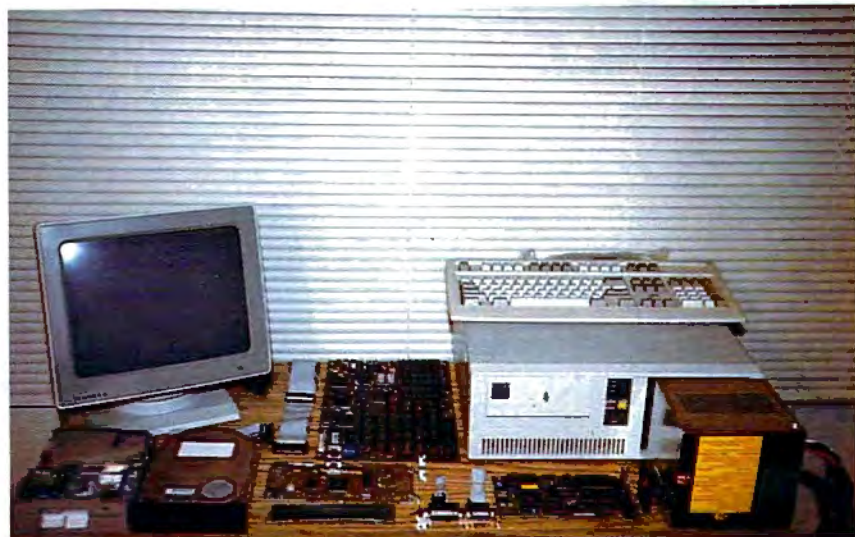
Nowadays, you can buy a PC at almost any department store. But the system of choice for the home professional is no longer the IBM PC or XT compatible (although these systems are still around and extremely reasonable in cost). The AT-class personal computer has taken the lead as the top MS-DOS platform for personal use. Although several times more powerful than an XT, the AT costs only a few hundred dollars more.

What's more, assembling a computer is no longer reserved for the technological elite. If you're sharp, you can pick up a manufactured system for about the same price as a home-built computer, but you'll never gain the experience, knowledge, and confidence about your system that a computer builder gains. Think of how your friends will react when you bring them by the house, point to your new computer, and proudly say, "I built it myself."

Taking Your First Steps

The first step toward building a computer is the same one you take when buying one: Analyze your computing needs. What are you going to do with your computer? Draw up a list of the software that you're using or are planning to use. Will you be doing word processing? Will you also be doing accounting? What about graphics programs? Is there any graphic art or desktop publishing in your computing future?

It's a good idea to check whether your current or proposed software requires any specific hardware. Many software developers have moved toward the 80286 as their minimum



After receiving your components, check them against your order list to make sure you have everything you need. Be sure to check for damaged items.



Begin by preparing the case. A "baby" AT case with a flip-open top is easier to work with than the standard slide-cover case.

hardware platform. This is especially true for graphics-intensive programs, like desktop publishing packages, and it goes double for those programs designed to run under a graphical user interface like *Windows*. A hard disk drive

is another hardware option to consider. You can always add one later, of course, but it's more economical to have it from the start.

These are all commonsensical questions, yet it's surprising how many





BUILD YOUR OWN AT

first-time buyers order a computer based on what their friend, their sister, or their co-worker uses. The *personal* in personal computer means just that; what works for someone else may not be best for you.

After you've defined your minimum needs, you can embellish your list. Think of applications that you want to explore in a year or two. Think of hardware options that, although not absolutely required, would be nice to have.

From here, you can rate your needs and wants. Before talking to any salesperson, I always categorize my list. Hardware items go into one of three columns: must have, nice to have, and luxury. That, balanced against what money I have available, forms the basis for what I buy.

This project had a cap of \$1,500. My software requirements included word processing, desktop publishing, spreadsheets, and database management, and the performance I was seeking mandated an AT platform. Based on those criteria, my must-have list included an 80286 processor, a 20-megabyte hard disk, 640K of RAM, a monochrome graphics adapter and monitor, a single 1.2-megabyte 5¼-inch disk drive, one parallel and one serial port, and a 200-watt power supply.

In my nice-to-have list, I included a 40-megabyte hard disk, one megabyte of RAM, EGA graphics, an additional floppy drive (3½-inch, 1.44-megabyte), a 101-key AT-style keyboard, a mouse, and a printer. When I finished my luxury list, I had bumped the capacity of my hard disk to 80 megabytes; upgraded my graphics to VGA; added another megabyte of RAM, a tape backup system, dual parallel and serial ports, and a scanner/fax board; and went for a tower case rather than the baby AT case I had planned to use.

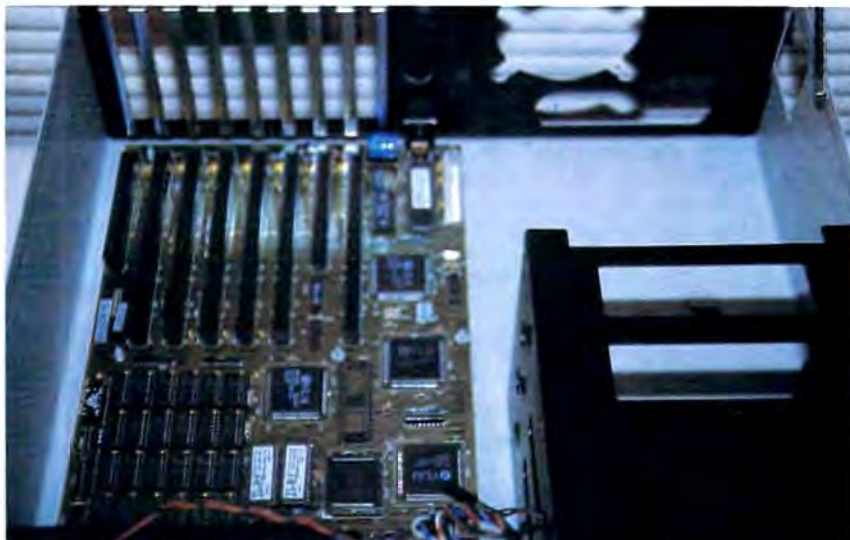
Buying Spree

I could have purchased any of the items on my list from a local computer dealer, but I usually buy from one of several national distributors that specialize in computer components. If you decide to go that route, browsing through almost any computer magazine will reveal two or three names.

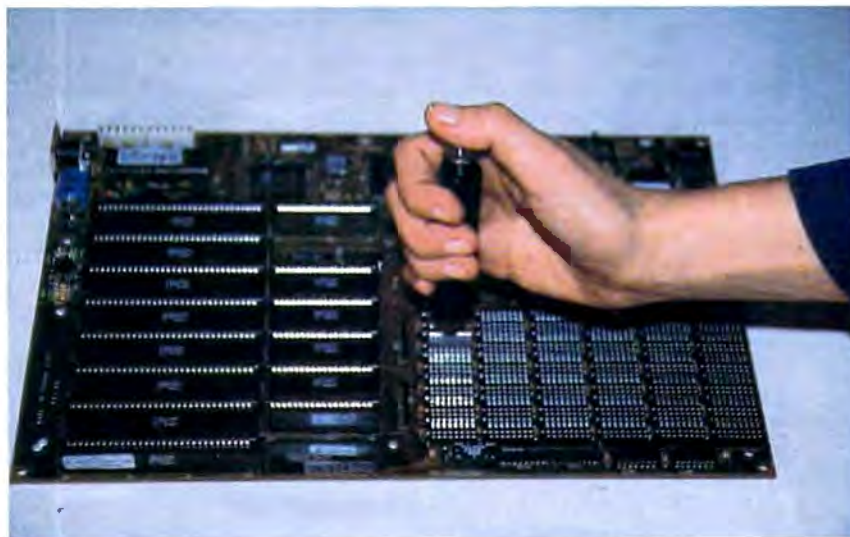
Few dealers can beat the price of a mail-order house. National suppliers sell hundreds or thousands of separate peripherals and components each month, while local dealers sell a few dozen or less. Dealers are sometimes paying more for an item than mail-order houses are selling it for. So, while it never hurts to try your local dealers



Equipped with AMI BIOS, this motherboard design allows for up to four megabytes of RAM.



Be sure to check the motherboard's fit after you've installed the standoffs.



Using an insertion tool, populate your motherboard with RAM chips before you install the board in the case.

first, you may find the best price by mail.

Another possible way to save yourself some money is to inquire about the availability of kits. A distributor's kit, containing all the items required to build your PC, may match your requirements. I've found that the price of kits are usually 10 percent or more under the price that I would pay for the same items individually.

For this project, I was able to buy a kit from a national supplier that contained everything on my must-have list, excluding the hard drive, monitor, and printer. The kit cost \$599.95; the hard drive (a Seagate 20-megabyte ST225 with a Western Digital AT controller card) cost \$339.95; a 14-inch, high-resolution monochrome monitor cost \$119.00. For the complete system, I spent under \$1,060. I had \$440 to put toward other options.

I could have bought a less-expensive kit, but this one included a very good 12-MHz motherboard, AMI BIOS with setup, diagnostics, and hard drive utilities installed in ROM. I also got the latest version of *PC-Write* and a separate diagnostics program called *QA-Plus*. As an added bonus, my kit came with a deluxe 101-key keyboard (one of the items on my nice-to-have list.)

Mail Call

When your equipment arrives, the first thing you should do is compare the list of what you ordered against the shipping statement. Make sure everything matches; if there are any discrepancies, immediately call the representative from whom you ordered. You should also check for obvious damage to your components. If all is OK, put everything aside until you have time to build your machine from start to finish.

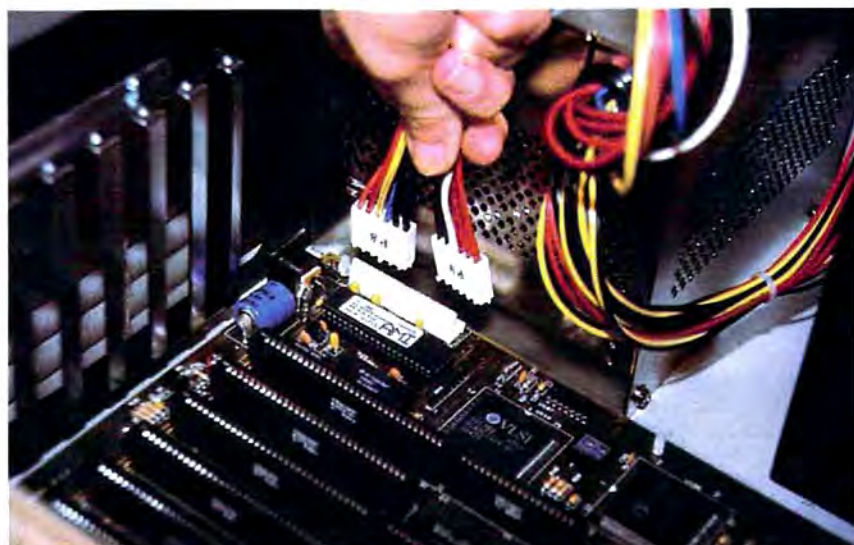
The time it takes to assemble a personal computer depends on your experience and the complexity of the machine. For your first effort, figure on one full day.

Getting It Together

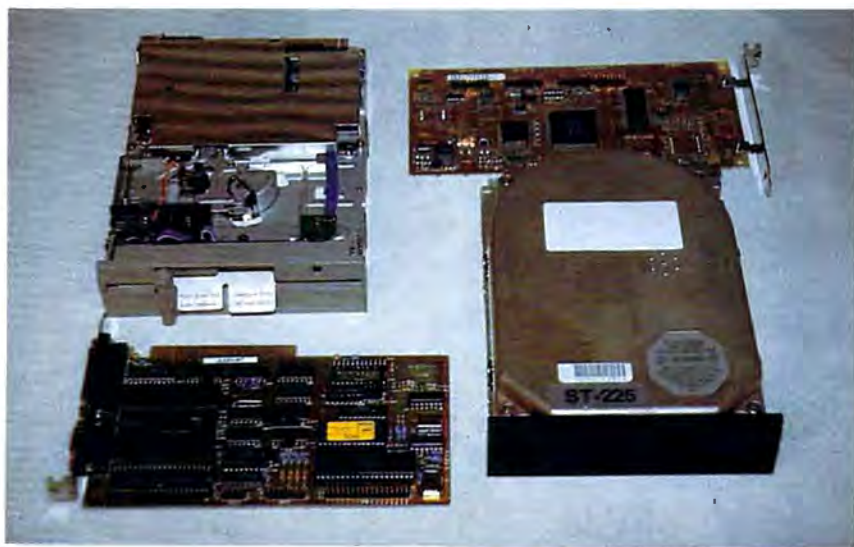
Before you start snapping and screwing parts together, prepare your work area. Carefully remove all of the components from their individual boxes. Most items have an antistatic wrapper. Leave the wrapper on until you're ready to install that particular piece. Static electricity is sure death to a computer card. Make sure that the humidity in your assembly area is sufficient to eliminate any possible static problems. If you have a problem with static, you'll probably want to buy an antistatic work mat. ▶



After the motherboard is in place, it's time to install the power supply. Most power supplies slide into position and fasten to the rear of your case.



Your power supply has two, six-wire cables that attach in tandem to the motherboard. Be careful to connect them correctly, or you'll fry the motherboard.



After you've placed the motherboard, the next components to go in are the floppy disk drive, hard disk drive, and their controller cards.



BUILD YOUR OWN AT

Before going any further, find all the documentation and instructions that came with each item, and read everything before starting. (With my kit, I received instructions on the case, the motherboard, each peripheral card, the drives, the monitor, and general assembly.) If you follow the instructions step by step, things will go smoothly; if you don't, you'll be in for a lot of grief.

If you didn't order a complete kit, you may not get step-by-step assembly instructions. In this case, it's even more important that you read and understand the documentation before you begin. Either way, with a kit or with separate components, make sure to puzzle out the exact steps and procedures you're going to use.

Oh, Mother

Begin by preparing the case. Again, be sure you follow the instructions to the letter. If the instructions say to remove the cover or to install the speaker first or to remove the drive-bay cage before you do anything else, then do it.

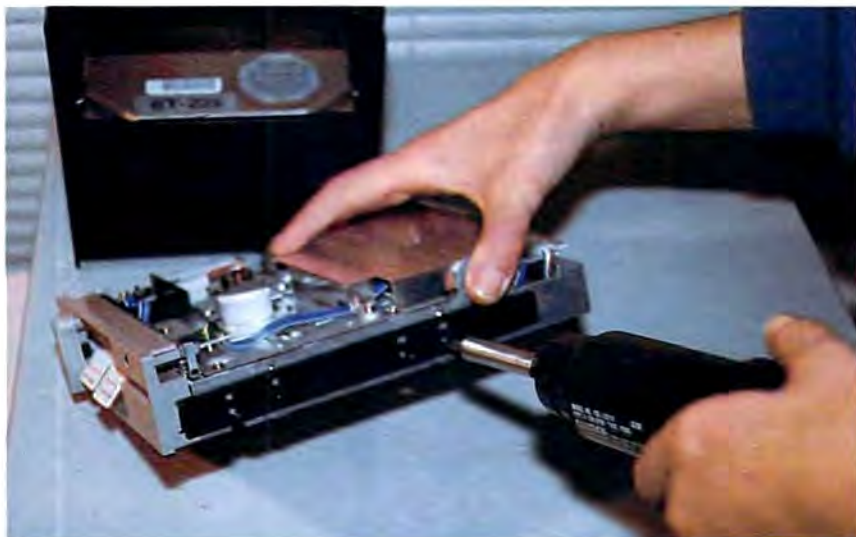
After you've readied the case, you need to do some preliminary work on the motherboard. Check to make sure that the holes in the motherboard line up with the standoffs that you've installed in preparing the case. (Standoffs support the motherboard and prevent damage.) Carefully lower the motherboard into position; it must line up with the case's back plate and fasten to the standoffs securely. If you've ordered both the case and motherboard from the same place, you shouldn't have a problem. But if there is a mismatch, you'll have to make provisions to ensure that the motherboard is seated securely into the case.

Before you engineer a solution to the mismatch problem, be sure you examine the situation carefully. If the modifications can't be made easily, either the case or the board will need replacing. Phone your suppliers before you go any further. Neither vendor is going to be happy if you return the equipment after an unsuccessful modification.

Assuming that the motherboard fits, take it back out of the case. The motherboard runs under a wide variety of parameters. It must know about your computer's memory (both speed and amount), the monitor, the drives, the math coprocessor if there is one, and any other options specific to your system. By setting the DIP (Dual Inline Package) switches and pin jumpers, you can tailor the motherboard to your particular configuration. If you change a DIP switch, never use a pencil point.



Most AT computers use plastic rails that you attach to the side of the drives. The drives slide on these rails into the drive cage.



Affix the rails to the sides of the drives before you place them in the drive cage.



Once you've placed the drives in the cage, the entire assembly can be installed in the case.

RAMBO III

NOT MILITARY. NOT
MERCENARY. AND
YOU'RE DEFINITELY
NO TOURIST...

SOVIET COMMANDER:
"WHO ARE YOU?"

RAMBO: "I'M YOUR WORST
NIGHTMARE."

Remember that line?
Now YOU can deliver it
to the enemy—in per-
son. Thirty miles over
the Afghanistan border, Soviet forces are tortur-
ing your friend and mentor, Colonel Trautman.
You're the only man alive with enough guts,

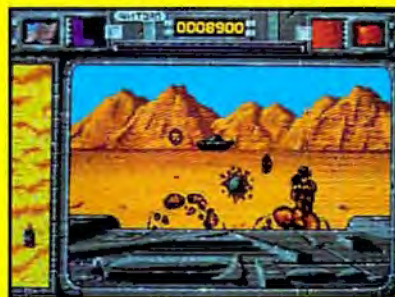
Amiga game screens.



*It takes more than muscle to de-activate
electronic gates, cross treacherous
mine fields, and find the keys to Traut-
man's cell.*



*Ever fly one of these things? With the
enemy breathing down your back, that
Hind chopper's the best way out of this
hell hole.*



*It's just you and your hijacked tank
against anti-tank missiles and chop-
pers. Sight in and rearrange that
balance of power!*

NOT MILITARY. NOT MERCENARY.
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RAMBO III



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BUILD YOUR OWN AT

The graphite in pencils is death to computer circuitry.

Take this time to familiarize yourself with the pin connectors located on the motherboard. These pin connectors are what the speaker, turbo light and switch, keyboard lock, and reset button plug into, so you'll want to know their whereabouts. By the time you get around to making these connections, your view of the motherboard may be obstructed by other components.

Now you're ready to populate the motherboard with RAM. (Always do this *before* you permanently install the motherboard in the case. Otherwise, you'll put too much pressure on the motherboard.) Use caution when handling and inserting chips, because DRAM chips are very susceptible to static discharge. Make sure that you ground yourself and that static electricity levels are acceptable.

You can install chips by hand or with an insertion tool. I recommend a chip insertion tool, which will cost you under ten dollars. Computer chips have legs (pins) that slant outward from their base. This design stops chips from working their way out of their sockets, which is apt to happen from heat expansion. An insertion tool gently squeezes the legs of a chip into a parallel row, allowing easier insertion into the socket. A chip's legs are fragile; it's easier to bend or break a leg by hand than by using an insertion tool.

Regardless of your insertion method, it's easy to put a chip in backward. Usually, there's a notch on the socket and a matching notch on the chip to help ensure correct chip orientation. Once you've installed them, check the chips and look for any that are facing the wrong way or that are not completely seated in a socket.

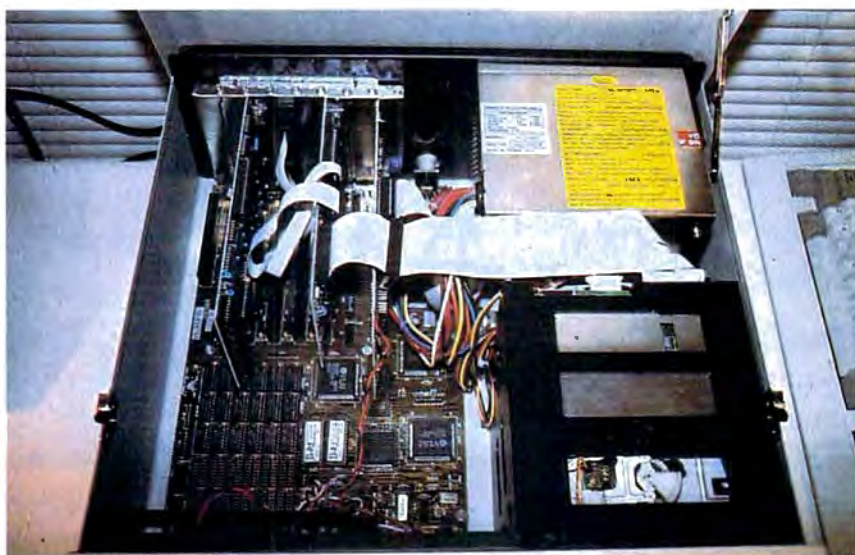
Finally, you're ready to install the motherboard. Position it over the standoffs, and make sure that the bus-extension slots on the board face the rear of the case. Adjust the board to allow sufficient clearance between the rear edge and the case. Extension cards have a tongue on their back plate that slides between the computer case and the motherboard. If you don't allow enough clearance between the case and the edge of the motherboard, you'll discover later on that you have to undo everything to adjust the board.

More Power to You

Your next step is installing the power supply. Most power supplies slide into position and fasten to the rear of your case. They have two, six-wire cables that attach in tandem to the mother-



Seat each expansion card by firmly pressing it into its slot; then fasten the the card's back plate to the case.



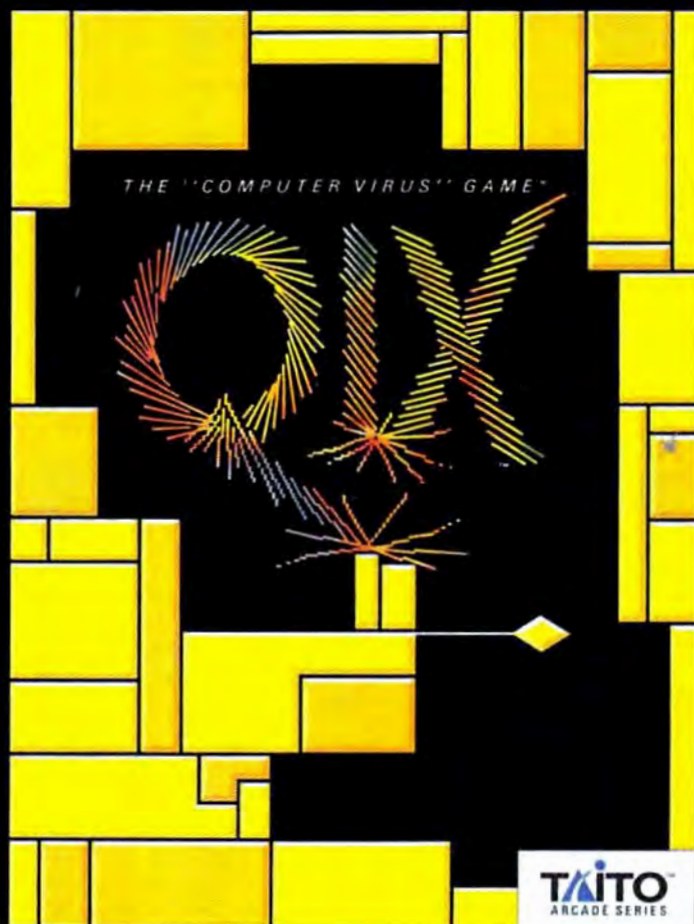
Once you've connected all of the cables and power leads, you're ready to close the lid on your computer and give it a test run.



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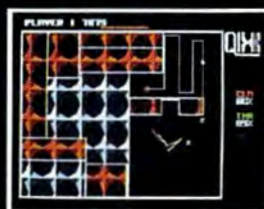
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BUILD YOUR OWN AT

board. Make sure that you connect these correctly; if they're wrong, your motherboard will fry the first time you turn on your PC.

After you've placed the power supply, but before you install any extension cards, locate the motherboard's pin connectors you found earlier and attach the wires from the case. Also, if your PC has a separate battery source to maintain the board's clock/calendar function, attach the battery leads and fasten the holder to the case.

Now you can install the drives. Most ATs use plastic rails that are attached to the side of the drives. The drives slide on these rails into the drive cage. Some computer cases may require that you first remove the drive-bay cage, install the drives into the cage, and then remount the entire assembly. Once you've installed the drives, connect the power cables from the power supply. Make sure that you attach a separate grounding cable to each drive.

Your expansion cards come next. Before installing them, review the documentation on each card. You'll probably need to set each card's DIP switches and jumpers before you install it. With cards that have cables, such as the floppy and hard drive controller, you may find it easier to attach the cables before you install the card. Seat each card by firmly pressing it into its expansion slot; then fasten the card's back plate to the case.

Finally, connect the cables from the controller card to the drives, and then connect any remaining cables, install the clock/calendar batteries (if required), and check over your work. That's it. You're temporarily finished with the inside and are ready to power up your creation.

The Case Is Closed

Close the computer's case (or slide the case's cover back on), plug in the power-supply cord, the monitor, and the keyboard; then insert your DOS disk into Drive A. Because ATs store their setup information in the CMOS (Complimentary Metallic-Oxide Conductor), when the computer boots up for the first time, that information won't be correct. Some motherboards come with a setup program burned into ROM; others require a setup disk. In either case, after you supply the right information regarding drives, memory, monitor, and other peripherals to CMOS, you'll have to reboot your PC.

On the second boot, you'll want to do a low-level format on your hard drive before you go any further. When you've finished with that, reboot again;

you should see the familiar time-and-date prompt.

Congratulations—you're done with the basic assembly. If you've encountered problems, now you can start debugging them. If your system fails to boot, remove or open the cover and check all of the cables. If your PC failed to recognize the A drive, make sure that you have installed the correct cable connector to the drive. If the system fails to recognize the hard drive, remember that you must perform a regular format after performing a low-level format. Most kits include a troubleshooting guide. If you have one, compare the message that you receive during boot-up with the error messages in the manual and follow any corrective steps recommended.

If, after these steps, you're still stymied, call the supplier. A quick call to technical service can probably help you clear up your problem.

There are just two more steps to follow in completing your project. Every component you've installed in your computer has a specific and unique address and interrupt. You can get this information from the documentation. Write down the final addresses and interrupts used on a piece of masking tape, and stick this list to your power supply. Later, when you install another device or card, you'll have a list of what interrupts and addresses are already in use. Finally, if you weren't tidy when you attached the drive cables and the inside of your box resembles a bowl of spaghetti, take a few minutes to reposition the cables.

Bonus Round

You're now the proud owner of a super home-brewed personal computer. You've built an AT-class machine that rivals many commercially available models. The computer that I put to-

A WORD TO THE WISE

You don't need a degree in electrical engineering to build a computer, but it pays to be familiar with the language. This glossary explains some of the terms that you're likely to encounter during your construction project.

address. The tag (or name) of a particular storage location. Addresses are used by a computer in the same fashion that people use street addresses to find businesses or houses.

AT. A personal computer based on an Intel 80286 CPU. This computer architecture was released by IBM in 1986 as the IBM PC AT. The AT has a 16-bit CPU and a 16-bit data path.

BIOS (Basic Input/Output System). ROM chip(s) containing the instruction set for data flow and interfacing all devices such as keyboard, drives, and monitor.

bus. The channel or path designed for flow of the computer's information stream.

bus slots. (Also called *extension-card slots*.) Provided for extension cards that need to be plugged into the computer's bus. Bus slots are located on the motherboard.

CMOS (Complimentary Metallic-Oxide Semiconductor). Used on AT computers to store system information needed during boot-up—for example, the type and quantity of drives, the amount of RAM, and the current time and date.

CPU (Central Processing Unit). The heart and soul of a computer. The CPU contains an arithmetic logic and a control unit.

DIP switch (Dual Inline Package switch). Used to change the computer's bus or an extension card's logic or data flow. DIPs are set to on or off.

extension card. (Also called *device driver card*, *controller card*, *peripheral card*, or *interface card*.) Separate circuit cards that are used to link peripheral devices with circuits or devices on the motherboard.

interrupt. A signal or message given to the computer that a device or address location needs attention. The computer stops (interrupts) whatever program it is running, responds to the signal, and then returns to its previous program or functions.

jumper. A small connector used to join two circuit pins. Depending on the setting, (*on*, *off*, *open*, or *closed*), the computer bus or an extension card's circuitry and logic are changed.

motherboard. (Also called a *systems board* or a *planer board*.) The main circuit board. All circuitry is either on or attached to this board.

OEM (Original Equipment Manufacturer). The actual manufacturer of a computer, as opposed to the company that sells it.

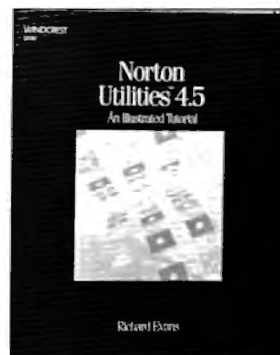
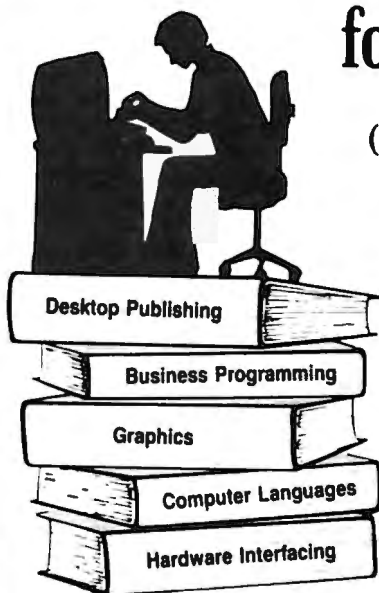
RAM (Random Access Memory). That part of a computer's memory where information is stored and obtained through specific addresses.

ROM (Read Only Memory). Computer memory whose content isn't alterable by instructions.

standoff. A small metal or plastic riser used to keep the motherboard from touching the computer case.

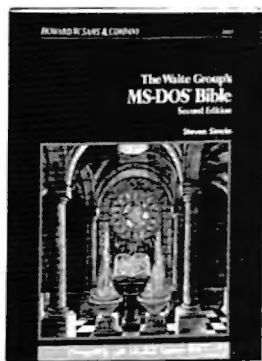
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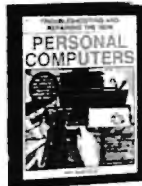
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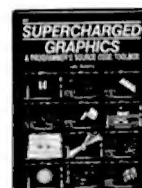
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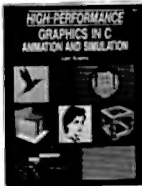
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BUILD YOUR OWN AT

gether for this article has a Landmark Speed rating of 15.6 and a Norton SI rating of 13.4. The hard disk rating was 1.9 with total performance coming in at 9.5—not too shabby.

I still had over \$400 left out of my \$1,500, so I looked around for ways to augment my new computer system. I dropped \$165 on a Star Micronics NX1000 printer; another \$89 went toward a mouse (which was bundled with a paint program); I added a 3½-inch, 1.44-megabyte floppy drive for another \$120; and, for about \$28, I asked my supplier to substitute a tower case for the case that came with the kit. The total cost then came to \$1,460. That left just enough for paper, a printer stand, and a printer cable.

I would have liked more memory. Memory chips have fallen dramatically in price during the last year. You can buy a megabyte of RAM for under \$140. But, figuring that memory prices will continue to fall, I decided that if future applications required more memory, I could always add it.

Know It All

By building your own computer, you gain the knowledge and skill required to modify or upgrade your computer as your needs change. Installing a VGA card, a modem, or another floppy disk drive won't throw you into a panic. You'll also discover that you've gained a better understanding of the fundamentals required to diagnose any problems that may crop up. If your hard drive fails, for example, you'll know how to check both the disk and the controller. If a video card flakes, no problem. You say you have a parity error? Just check the RAM chips, find the culprit, and replace it.

Almost anyone can build a computer these days, given the inclination and the patience to carry the job through. If you can analyze your needs, translate that analysis into a priority list, read and follow instructions, and identify the business end of a screwdriver, then you should be all right. You may not save a lot of money, but the experience is worth the effort. Good luck, and good building!

This article is a generic guide to assembling a personal computer. The author makes no claims as to the article's validity or accuracy regarding any specific computer assembly kit or computer configuration.

Bruce W. Haase is a writer and computer consultant in Muskegon, Michigan, where he teaches a local seminar in personal computer building.

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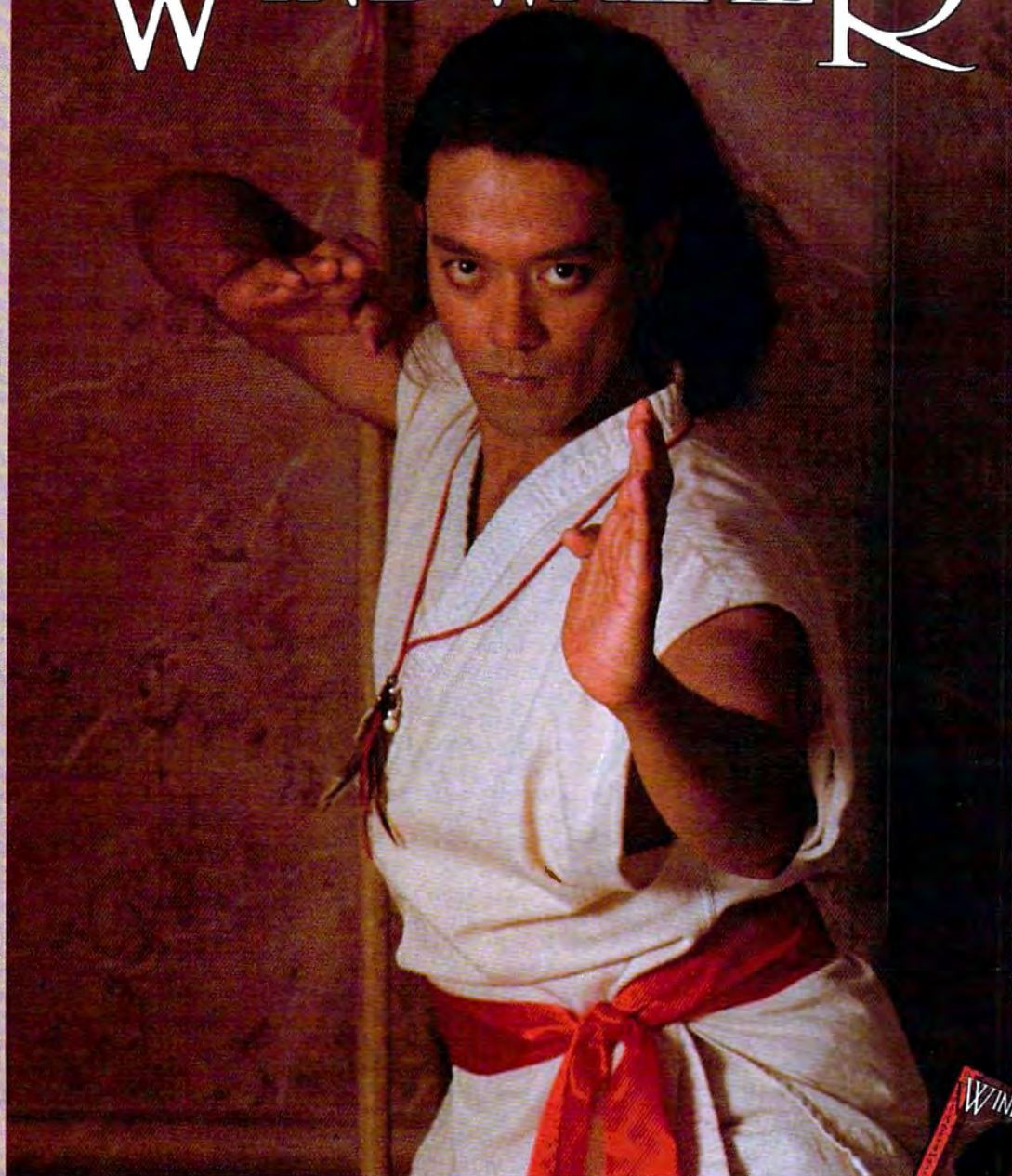
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MY VIEW

JOHN VOELCKER

PUZZLING OVER WHICH CHIP IS BEST AND WHAT'S NEXT

For me, the worst part about buying a PC is the knowledge that as soon as I get it home, unwrapped, set up, and ready to go, I'm staring at an obsolete piece of equipment.

No matter what you buy, or when, the PC world moves so fast that your purchases are superseded almost monthly. Maybe your office bought you a 386 machine. Great! Now, it's time to tell your boss that the 486 boxes are even faster.

On the home computing front, the pace is less frenetic. Still, it helps to know what's coming up, so you can balance lower cost against equipment that stays modern longer.

This year, your big choice is between the 286- and the 386SX-based machines. Intel makes both chips, but the company has a hammerlock on the 386SX (several other companies make 286s). Intel wants you to move up to a 386SX-based PC and has spent a lot of advertising money to tell you that.

Right now, the cost difference between a 286-based PC and a 386SX-based PC is about \$500—a lot of money for a home user. And both classes of PC will get cheaper.

There's no doubt that both ma-

chines perform the basics quite adequately—word processing, graphics, spreadsheets, and so on. The 386SX may be faster for some functions. Its main advantage, though, will come a few years down the road: 386SX machines will run operating systems written specially for the 386, while older AT-class machines never will.

Does this matter? Sure—if you're planning to keep your PC for at least five years. By that time, the 386 version of OS/2 should have been around for a while. (It hasn't even been introduced yet.) Plenty of software will run with it, and memory should be cheap enough that you'll be able to afford the 8 or 16 megabytes it requires.

But what if you're just starting or you think you'll be switching up within a couple of years? I'd say—somewhat hesitantly—not to worry about the 386SX. Bank that \$500 instead, and plan to put it toward your next PC, in 1992 or 1993.

Notice I didn't even mention 8088 machines. They're classics; they made the PC market what it is today, just like the Model-T did for cars. Unfortunately, their performance is starting to look like the Model-T's as well. Too many of my friends have been aggravating their ulcers by stewing while their spreadsheets recalculate on their old PC XT's.

Unless you're so strapped for money that you must have a PC and printer for well under \$1,000, a 286 has to be your minimum. If cash is a problem, maybe you should look for a used PC AT. With even introductory software getting larger and demanding more memory and more processing power, it just doesn't make sense to saddle yourself with an 8088.

For 1990, a hard disk goes almost without saying. Sure, you can get twin-floppy machines. But why? The more appropriate issue is how big your hard disk should be. Should you go for 20 megabytes? Or 40 megabytes? More? This year we should see the bigger disks—up to 85 megabytes—get cheaper, but I wonder how much cheaper they'll get. I'm happy to

stick with 30- or 40-megabyte drives.

What about laptops? I love them, but you should think very carefully about whether you want to pay that much extra for portability. Having said that, though, laptops are getting steadily better, and if you need portability, 1990 may be the year that you can justify buying one.

Some of the newest laptops can run four hours or more between recharges, because of cleverly designed low-power circuitry. Backlit super-twist LCD screens have expanded the range of lighting conditions in which you can use laptops. They're still not as good as a conventional monitor, but you're not as likely to get eyestrain headaches as you used to be.

This year's buzzword is *multimedia*. Simply, multimedia integrates PCs with video, audio, storage CDs, hypermedia, and a host of other really whizzy hardware that we haven't invented yet.

A few multimedia-like products have appeared, but it's still largely a nascent field. As usual, Apple seems to be the farthest ahead. Look at the video called "Knowledge Navigator," and you'll see what multimedia offers us in the future. You'll go home completely dissatisfied with your own PC, but the video gives one company's vision of what PCs (or, more likely, Macs) will be able to do with multimedia five or ten years hence.

By then, who knows what the hot chip will be, what size the typical hard disk is, and what laptops will cost?

We'll probably find that the promise of multimedia was only partially realized and that new promises will be made. It's still neat to dream.



Photo by Kern

John Voelcker writes about technology, the auto industry, and the arts from New York City mostly on an Apple Macintosh. □



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Flu Shot

Ward off computer viruses with *Flu Shot*. Quickly check your hard drive for uninvited code or add a line to your AUTOEXEC file for protected boots. Suspected viruses will be reported when you boot, and, while the program is running, any changes in key files will be flagged. Requires 256K and DOS 2.1 or higher.



Fastbuffer

Tired of waiting on slow key-repeat rates? Speed them up with *Fastbuffer*. Save your monitor from burnout with the blank-mode option that's also included. You can disable this memory-resident program at any time. Source code is included. Requires 128K and DOS 2.1 or higher.

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

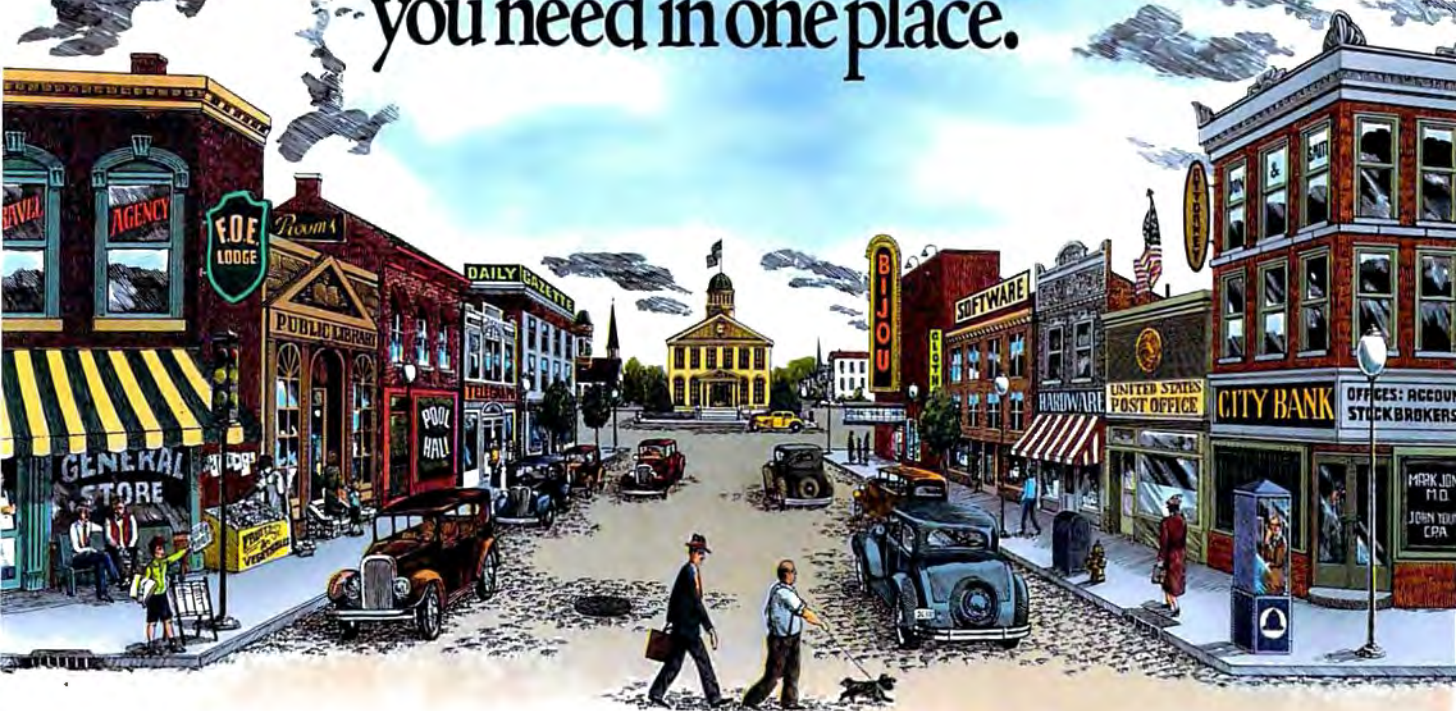
Shareware Agreements

COMPUTE!'s *SHAREPAK* is a collection of shareware and public domain programs. Public domain programs are free; you can use them and pass them around as much as you like. On the other hand, shareware isn't free; you pay the shareware author if you decide to use the program. Here's how shareware works.

If you like a program on the disk, you should register yourself directly with the shareware publisher (not with COMPUTE!). Each program includes a license agreement that explains whom to contact and how much the program costs. Shareware prices are very low compared with similar commercial programs.

Registering means you pay the software author for a program he or she developed, plus it entitles you to technical support and information about upgrades. You'll find shareware publishers are easy to work with and eager to help.

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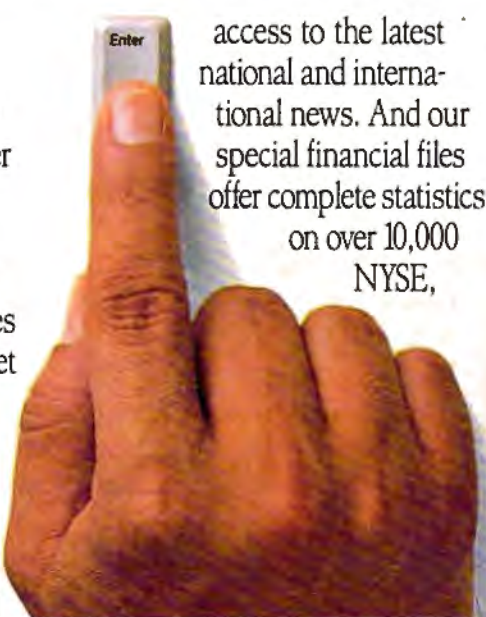


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UP GRADE FEVER

AUBREY PILGRIM

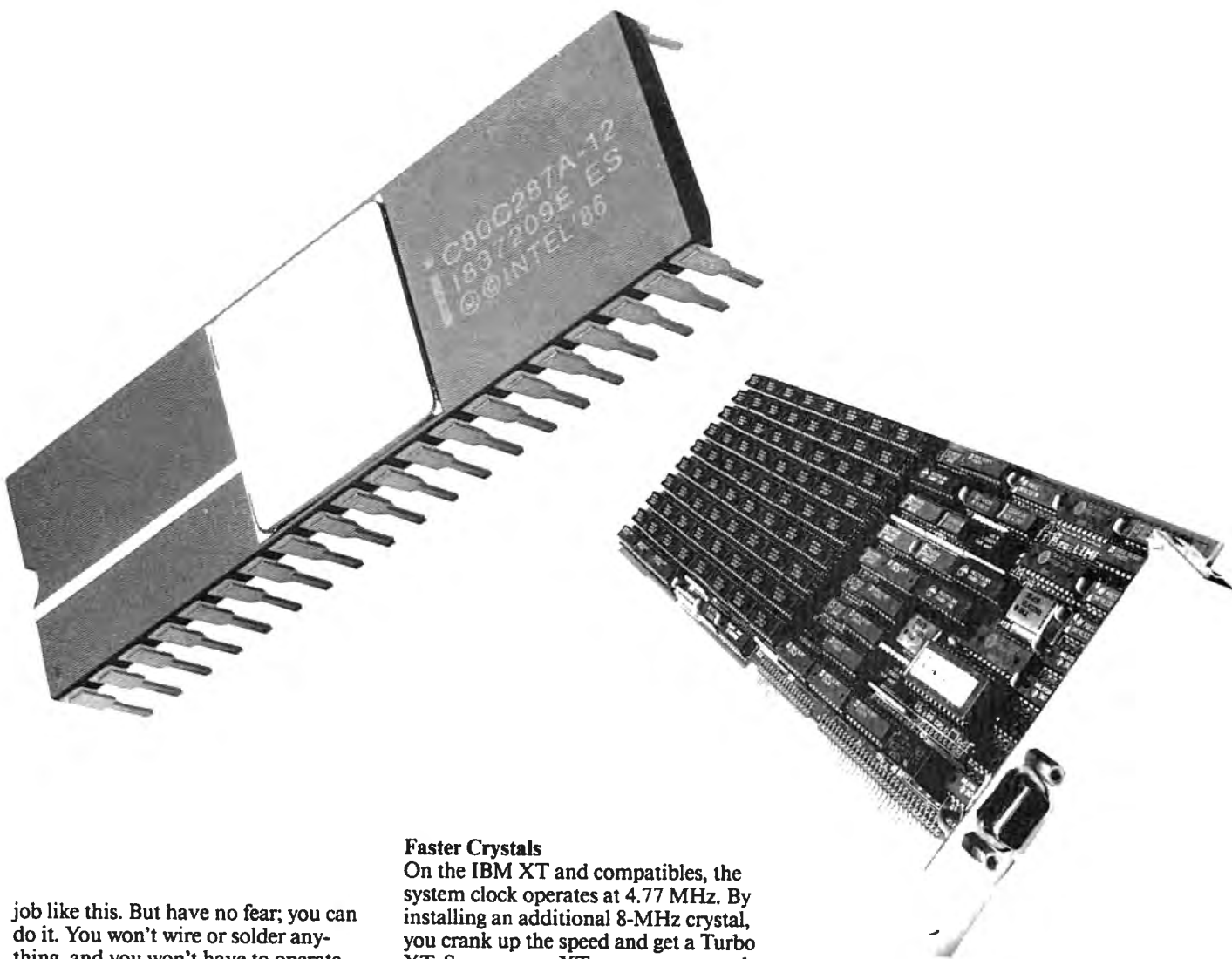
WHEN UPGRADE
FEVER HITS, HEAL
THYSELF

You may be getting along fine with your old PC, but there are always easier, better, and more efficient ways of doing things. Your old PC may take a half-hour to digest a large spreadsheet. A new 386 computer could do the same chore in a fraction of the time. You'd really like one of these monster machines, but you don't have \$4,000 to spend on a 386. Well, I have some good news for you: You can upgrade your old clunker without downgrading your budget.

Do It Yourself

Several shops and mail-order companies will gladly upgrade your computer for you. But, if they want to stay in business, they have to make money. Instead of paying for their overhead costs, pull out your toolkit and develop a closer relationship with your PC.

If you're not too familiar with the innards of your computer, you may have some reservations about tackling a



job like this. But have no fear; you can do it. You won't wire or solder anything, and you won't have to operate any fancy equipment. You can assemble or disassemble an entire computer with a pair of pliers and a screwdriver. Most of the PC's components and parts are merely plugged in to sockets or connected to cables.

Upgrade Options

Once you've chosen to upgrade do-it-yourself style, you have to choose a method. Here are some options. For more information about the following products, see "Companies Mentioned."

The NEC V20

If you have a PC or an XT, your computer is running an 8088 microprocessor chip. There is a very inexpensive and easy way to speed it up and increase its performance by as much as 30 percent. Just remove your 8088 CPU and install a NEC V20. This chip is a direct replacement for the 8088, but its internal construction handles some types of data much more quickly.

Most electronics stores sell the V20 chips for \$7-\$12, depending on the speed of your system. JDR Microdevices is one company that sells these chips.

Faster Crystals

On the IBM XT and compatibles, the system clock operates at 4.77 MHz. By installing an additional 8-MHz crystal, you crank up the speed and get a Turbo XT. Some newer XTs operate at speeds as high as 12 MHz. Replacing your old motherboard with a turbo board costs less than \$100.

The original PC AT used a 12-MHz crystal, and that speed was divided in half so that the system operated at 6 MHz. Many people discovered that they could replace the 12-MHz crystal with a 16-MHz crystal and boost the speed to 8 MHz.

Unlike the PC and the XT, the AT comes with two separate crystals. It's a very simple matter to change the one that controls the clock speed. Many of the 286s now operate at 10 MHz, and some run as fast as 20 MHz.

If you have an older AT or 286 that operates at the snail's pace of 6 MHz, you can buy and install a 16-, an 18-, or even a 20-MHz crystal, boosting your computer's speed to 8, 9, or 10 MHz. You may have some problems if you go above 18 MHz, but the crystals cost less than \$2 each. Buy them all and try them for the highest speed. If you have problems, just plug in a lower-frequency crystal.

The crystal is a small cylinder that plugs into a socket. Most electronics companies supply the crystals.

New Plug-in Board

Of all the boards you could choose to put in your computer, the ones that will be most useful are multifunction boards. These boards bring all kinds of goodies to your system, such as extra memory, video-display adapters, parallel and serial ports, print spoolers, game ports, floppy disk drive controllers, and other treats. The beauty of a multifunction board is that it offers several of these enhancements in the same package but only takes up one slot. The boards are very easy to install, and several companies offer different versions of the multifunction boards for \$30-\$79.

Installing a Coprocessor

If you crunch numbers or fold, spindle, and mutilate large spreadsheets, you could benefit from a math coprocessor. Depending on the program you run, a coprocessor can speed up math procedures so they run 5-100 times faster.

Almost all motherboards are designed with an empty socket beside the CPU. Most computers are sold without the math coprocessor that fits in this

UPGRADE FEVER

socket because some programs can't use this chip, and it's an expensive component.

The coprocessor chips all have an 87 at the end of their chip designation. For the 8088 family, the math coprocessor is called 8087. For the 286, it's 80287; for the 386, it's 80387. The new Intel 486 CPU will have the math coprocessor built into the microprocessor. You can find it somewhere in there among the 1.2 million transistors that make up this chip.

The coprocessor chips are priced according to their operating speed. For instance, an 8087 designed to operate at the standard 5 MHz costs about \$95. An 8087-1 that operates at 10 MHz costs about \$175; an 80287-10 at 10 MHz, about \$240; and an 80387-16 at 16 MHz, about \$350.

that can be used to upgrade a 286 to a 386. It costs between \$850 and \$1,500, depending on options and memory. The Master 386 from AOX can also turn a 286 into a 386.

Of course these boards won't give you all of the advantages of the real thing. But they give you most of the advantages of a 286 or 386 at a reasonable price. See "Companies Mentioned" for more information.

New Motherboards

The motherboard is the main board in your computer. It plays host to the CPU, the memory, the BIOS, the bus, and many other components. It also has slots so that you can plug other boards into it.

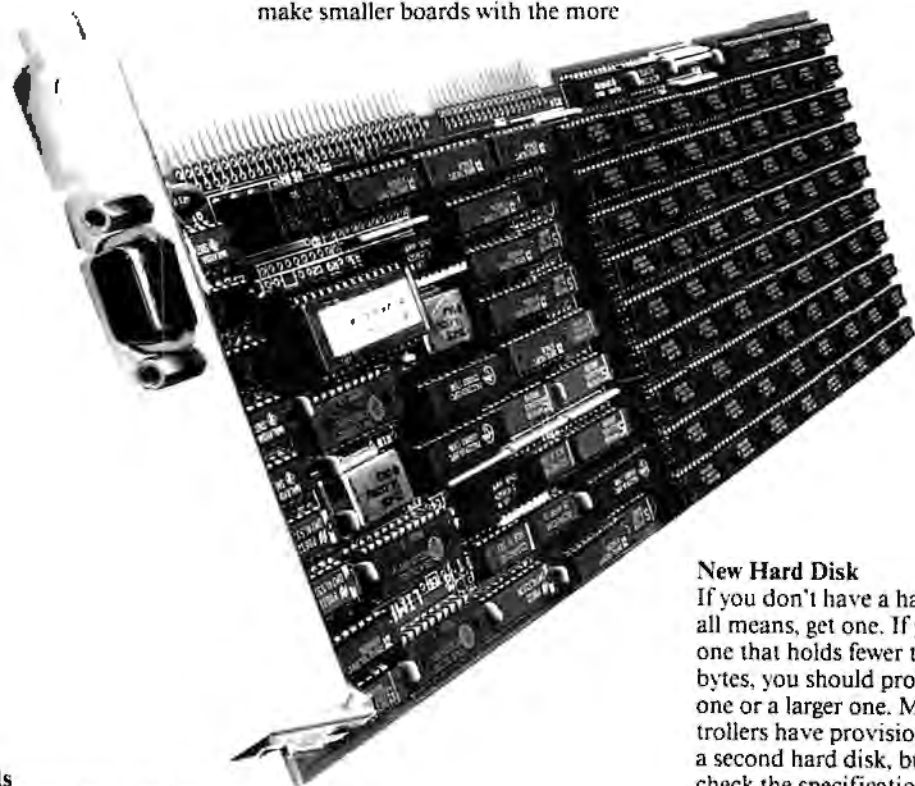
The standard 286 and 386 motherboards are considerably larger than the XT motherboard, so the trick is to make smaller boards with the more

powerful motherboard.

Depending on the amount of memory and other options, a baby 286 motherboard costs \$300-\$600. A baby 386 costs \$900-\$1,500.

New Floppy Drives

A 1.2MB floppy drive reads, writes, and formats 5¼-inch disks in both the high-density and the old-fashioned 360K varieties. Likewise, a 1.44MB drive reads, writes, and formats 3½-inch disks in both 720K and 1.44MB densities. These high-density drives cost between \$75 and \$125, only a few dollars more than a 360K or 720K drive. A 1.2MB drive stores three times more data than a 360K drive stores, and a 1.44MB drive stores four times more than its older cousin. Why would anyone buy a 360K or 720K drive anymore?



Accelerator Boards

Several companies have developed accelerator boards that you can plug into your old motherboard. Some of the less expensive boards can transform a PC into a much more powerful and faster 286. Veritek has one for \$300. Other accelerators cost as much as \$700 or more.

Quadram's 386XT turns a PC into a 386 machine. It costs about \$900. That may seem like a lot, but the 386 CPU alone costs about \$300. Intel's Inboard 386/PC costs \$600-\$1,200, depending on the amount of memory you get on the board.

Intel also has an Inboard 386/AT

powerful processors. Chips and Technology, as well as several other companies, has developed chip sets using very-large-scale integration (VLSI), which combines several chips into single chips. Companies have used these chip sets to design "baby" 286 and 386 motherboards which can fit in an XT.

If you remove your old XT motherboard and install a baby 286 or 386, you get all of the functionality and power of the bigger machines. At the same time, you can use most of your old components such as disk drives, plug-in boards, and peripherals with your new,

New Hard Disk

If you don't have a hard disk, then, by all means, get one. If you have an older one that holds fewer than 30 megabytes, you should probably get a second one or a larger one. Most hard disk controllers have provisions for controlling a second hard disk, but you should check the specifications of yours.

A Perstor controller increases the capacity of your hard drive. It stretches the storage on a Seagate ST 251 40-megabyte hard disk into 78 megabytes. See "Companies Mentioned" for more information.

Make sure that your hard disk is backed up at all times. You never know when it might fail, or you may accidentally erase a file that is critical. There are several good backup programs. One comes free with your copy of DOS—the BACKUP and RESTORE commands. Others cost money, but their speed, versatility, and convenience make them worthwhile. ▶

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UPGRADE FEVER

More Memory

My first computer, a little Morrow CP/M machine, had a whopping 64K of random access memory (RAM). That was plenty for the few applications that were available back then, but now programs require much more. Some new programs such as *Lotus 1-2-3* version 3.0 will require about two megabytes. If you have less than 640K of memory on your motherboard, you should consider increasing your RAM. Anything beyond 640K is expanded or extended memory, which you need for megabyte-hungry programs like that new version of *Lotus 1-2-3*.

New Monitor

New monitors have a much higher resolution than those of the early days with CGA. The prices have come way down, too. A good, high-resolution VGA color monitor costs about the same as a monochrome monitor did a few years ago. VGA will be the new standard, so consider the many options.

Monochrome monitors can give excellent resolution, but you may prefer color. Even if you do nothing but word processing, it may be worth the money. Besides, many applications require color.

New BIOS

The Basic Input/Output System (BIOS) resides in read only memory (ROM) plug-in chips on the motherboard. As the name suggests, it controls the input and output of data. In the early days, a BIOS was fairly simple. The original IBM PC didn't even support hard disk drives. BIOS chips have improved to meet more sophisticated needs as applications have proliferated. If you have an older machine, you probably need a new BIOS. Award Software is one company that sells BIOS upgrades.

Gadgets and Gizmos

A modem links you to the rest of the world. You can communicate with

other computers, with electronic bulletin boards, and with telecommunications services; and you can even manage your banking with it. Downloading software from a bulletin board can more than pay for the modem in a very short time.

Facsimile machines send pictures of text and graphics through telephone lines to other facsimile machines. Think of fax machines as instant mailboxes because you can send a letter to someone instantly. Now that companies have developed plug-in Fax boards, you can easily add this capability to your PC.

Scanners bring pictures into your PC, and they're very handy for desktop publishing. Some scanners simply translate an image into pixels, whether that image is of artwork or text. Other scanners can recognize characters well enough to import text files that you can edit. These are the more expensive species of scanner.

If you use your computer very much, then you know the importance

later-model keyboards, you can flip a switch when you change from an older system to a newer one.

A mouse can be as important as your keyboard. It simplifies many computing tasks and is essential for graphics-intensive programs. More and more software supports the mouse as an input device, so now is a good time to consider buying one.

For any of these peripherals, try your local computer store or your favorite mail-order company.

Alternatives to Upgrading

You could avoid all the trouble and expense of upgrading by buying a new computer. Depending on your old computer and on what you want from your new one, selling your first love might be a viable alternative.

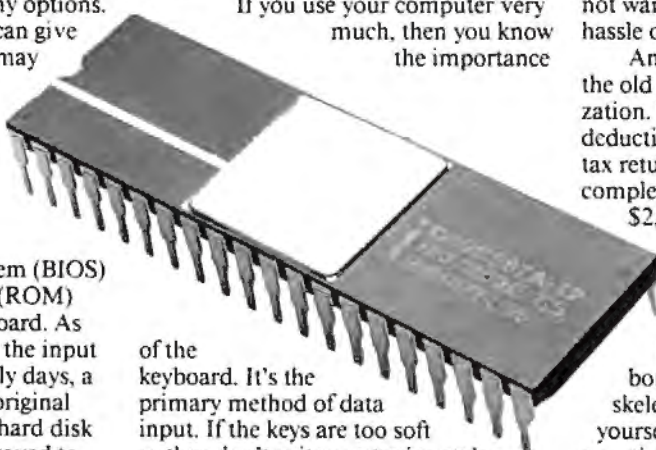
But you might not get what you think it's worth. The computer that you paid \$2,500 for a few years ago may bring less than \$500 today. You may not want to go through the bother and hassle of advertising and selling it.

Another alternative is to donate the old computer to a charitable organization. You might come out ahead by deducting it as a gift on your income-tax return. Then, consider buying a completely new system. For less than \$2,000, you could find a 286 clone with high-density floppy drives, a 30MB hard drive, and an EGA monitor.

You can buy a bare-bones XT clone for about \$250 or a bare-bones 286 for about \$500. From the skeleton system, you could upgrade it yourself. Do it a little at a time if you're on a tight budget.

You probably never thought you'd hear this about working with computers, but dig in. Get your hands dirty. You'll love that indescribable feeling of pleasure that comes with turning on a powerful computer and having it instantly respond to your commands.

Is an upgrade worth it? Well worth it. See chart on page 42.



of the keyboard. It's the primary method of data input. If the keys are too soft or they don't suit your typing style, you should consider upgrading.

If you upgrade from a PC or XT motherboard to a 286 or 386, you may have to buy a new keyboard. The PC and XT keyboards look exactly like the 286 and 386 keyboards; they even have the same connector. But the older keyboards have different electronics—they won't work with a 286 or 386. On some

Companies Mentioned

AOX
486 Totten Pond Rd.
Waltham, MA 02154
(800) 232-1269

Award Software
130 Knowles Dr.
Los Gatos, CA 95030
(408) 370-7979

Chips and Technology
521 Cottonwood Dr.
Milpitas, CA 95035
(408) 434-0600

Intel
5200 NE Elam Young Pkwy.
Hillsboro, OR 97124
(800) 538-3373

JDR Microdevices
2233 Branham Ln.
San Jose, CA 95124
(800) 538-5000

NEC Electronics
401 Ellis St.
Mountain View, CA 94039
(415) 960-6000

Perstor Systems
1335 S. Park Ln.
Tempe, AZ 85281
(602) 894-3494

Quadram
One Quad Way
Norcross, GA 30093
(404) 564-5522

Veritek
1205 Linda Vista Dr.
San Marcos, CA 92069
(619) 744-2313

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Battletech-Infocom

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MS-DOS
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Ghostbusters II-Activision

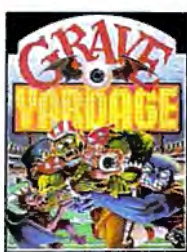
Relive the hit film—sample slime, pilot Miss Liberty, battle Vigo. Arcade action, adventure, strategy challenge—and laughs!



MS-DOS
5.25"
~~\$49.95~~
Sale \$34.95
BX-2150

Space Rogue-Origin

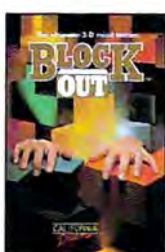
3-D flight simulation and intriguing role-playing escapades. Seek your fortune, face alien foes, solve the mysteries of deep space.



MS-DOS
5.25" & 3.5"
~~\$44.95~~
Sale \$29.95
BX-2140

Grave Yardage-Activision

Zombies, ogres, and goblins on the gridiron. Real football action that's—well, unreal. Everything is legal, and the ball is alive...



MS-DOS
5.25"
~~\$39.95~~
Sale \$27.95
BX-2325

Block Out-California Dreams

3-D mind teaser tests your reflexes and coordination. Hundreds of variations. Easy to play, difficult to master, impossible to quit!



MS-DOS
5.25"
~~\$49.95~~
Sale \$34.95
BX-2327

Street Rod-California Dreams

Be a hot rod hero on some classic wheels. 25 cherry cars to customize any way you like. Drag and road racing. Watch out for the cops!



MS-DOS
5.25"
~~\$44.95~~
Sale \$29.95
BX-2206

Neurobics-Ocean Isle

Workouts for the mind. 6 challenges to your memory, concentration, and problem-solving, with over 25 levels each. For all ages.



MS-DOS
5.25" & 3.5"
~~\$44.95~~
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BX-2144

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Data East

Tag Team Wrestling BX-1000

Guerilla War BX-1688

Ikari Warriors BX-1691

Victory Road BX-2319

Gamestar

Championship Golf BX-1806

Championship Basketball BX-LEFB

Boxing II BX-LEEJ

Infocom

Hollywood Hijinx BX-1374

Moonmist BX-1516

Plundered Hearts BX-1335

Sherlock BX-1318

Gamma Force BX-1306

Lane Mastadon BX-1303

Zork II BX-1528

Zorkquest BX-1309

Zorkquest II BX-1564

Nord and Bert BX-1312

Border Zone BX-1324

Call for your free catalog.

All games shown are for MS-DOS computers. Please call for availability on other systems.

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PRODUCTS COMPANY

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UPGRADE FEVER

Accelerator Cards

Put the pedal to the metal with one of these easy-to-install accelerator cards.

Caroline D. Hanlon

An accelerator card replaces the 8088 or 80286 chip in your PC with a faster 286 or 386. With one of these cards, you get many of the benefits of upgrading without the cost of a new system.

An accelerator card is generally easier to install than a motherboard, and doing so usually doesn't affect your computer's warranty.

Company	Board	Speed (MHz)	Populated	Cache	Add-ons	Installation Requirements	Restrictions	Warranty	Prices
American Micronics	ZX386 Upgrade	16, 20, 25, 33	○	○	Up to 8MB of RAM	Designed for Zenith 241 and 248 machines	○	1 year	\$1,350
AOX	MASTER 386	16 or 20	○	○	○	Plugs into any 16-bit expansion slot	○	2 years	\$795 (16 MHz) \$995 (20 MHz)
AOX	Micro-MASTER 386	20, 25, 33	○	32K	○	Installs in a standard 16-bit PS/2 slot	Requires a full slot; designed for the IBM PS/2 models 50, 60, and 50Z	1 year	\$1,495 (20 MHz) \$1,795 (25 MHz)
Intel	Inboard 386/PC	16	1MB		Up to 5MB of RAM; socket for 16-MHz 387 math coprocessor	Compatible with PCs and XT's; contact Intel for other versions		5 years	\$895
Kotlan	Ten Time	8-33	512K	512K to 10MB	Expands RAM to 10MB	Requires a full slot in AT bus	Requires 120-ns chips	1 year	\$1,095 (512K) \$1,595 (2MB)
MicroWay	287Turbo	8, 10, or 12	○	○	○	Plugs into the existing 80287 coprocessor socket on the motherboard	○	1 year	\$250 (8 MHz) \$300 (10 MHz)
MicroWay	287Turbo-PLUS	10 or 12	○	○	○	Plugs into the 80287 socket on the motherboard and doesn't use an expansion slot	○	1 year	\$375 (10 MHz) \$475 (12 MHz)
MicroWay	Super-CACHE-286	12	○	32K	Includes a socket for an optional 8- or 12-MHz 80287 math coprocessor	Requires a half-slot		1 year	\$399
Orchid Technology	Tiny Turbo 286	8	○	8K	○	Requires a half-slot and a 16-bit bus	○	4 years	\$349
Orchid Technology	Tiny Turbo XTra	12	○	8K	○	Requires a half-slot and a 16-bit bus	○	4 years	\$449

How to Read the Chart

Speed refers to the maximum processing speed you can expect after installing the accelerator card. Add-ons refers to whether you can add another card to the accelerator card. Size of slots and installation requirements are given to help you determine if the card will work with your ma-

chine. Restrictions let you know what the card requires to work properly. Prices are for unpopulated (without memory) cards. Most companies offer technical support, and that's a good place to check if you have any questions about a card before, as well as after, you buy.

Orchid Technology	Tiny Turbo AT	12 or 16	O	32K	O	Requires a full slot and 16-bit bus	Requires true IBM AT running at 6 or 8 MHz	4 years	\$599
SMT Peripherals	XT286 Speed Card	10 or 12	O	8K	Not on board, but compatible with most add-ons	Requires short (8-bit) slot	O	1 year	\$349 (10 MHz) \$379 (12 MHz)
Sota Technology	SOTA 286i	12.5	O	16K	Accepts up to 8MB of RAM on daughter card with AT-style BIOS and realtime clock	Requires one-third of a slot for board and a full slot for board with memory	Requires 100-ns static RAM chips for 0 wait-state operation; memory requires 100-ns SIMMs for 0.5-0.7 wait-state operation	2 years	\$445
Sota Technology	SOTA 386Si	16	O	16K	Accepts up to 8MB of RAM as daughter-board with AT-style BIOS and realtime clock	Requires one-third of a slot for the board alone and a full slot for the board with memory	Requires 100-ns static RAM for 0 wait-state cache operation; memory requires 100-ns SIMMs for 0.5-0.7 wait-state operation	2 years	\$645
Veritek	GO FAST!	12	O	8K	Accepts 80286 math coprocessor running at 6, 8, or 12 MHz	Installs into an XT; GO FAST! is a short card	O	1 year	\$399

For more information about any product listed in this chart, contact the manufacturer at the address listed below.

American Micronics
18005 Skypark Cir.
Suite A
Irvine, CA 92714
(714) 261-0693

AOX
486 Totten Pond Rd.
Waltham, MA 02154
(617) 890-4402

Intel
5200 NE Elam Young Pkwy.
Hillsboro, OR 97124
(800) 538-3373

Konan
1829 W. Drake Dr.
Tempe, AZ 85283
(602) 345-1300

MicroWay
P.O. Box 79
Kingston, MA 02364
(508) 746-7341

Orchid Technology
45365 Northport Loop W
Fremont, CA 94538
(415) 683-0348

SMT Peripherals
310 Via Vera Crux
Suite 112
San Marcos, CA 92069
(619) 591-0268

Sota Technology
551 Weddell Dr.
Sunnyvale, CA 94089
(408) 745-1111

Veritek
1205 Linda Vista Dr.
San Marcos, CA 92069
(619) 744-2313



RESOURCES

UPGRADE YOUR SMARTS BEFORE YOU TACKLE YOUR PC'S

Catalogs and Classifieds

Often, the decision to upgrade your PC depends on how well your present machine serves your computing purposes. Once you've decided to upgrade, you have to figure out how far to go.

Here's where catalogs and classified ads come in. Use these resources to help you weed out what's affordable and what's not, what's a good value and what's nowhere near worth the money.

Say, for example, that you need a faster computer. You have to run your microprocessor at 16 MHz or you'll fall asleep over your spreadsheet program. There's more than one way to speed up a computer. Don't just buy an accelerator card; it may not be the best upgrade path. Check the catalogs and classifieds for your options, and choose the one that gives you the most features for the least money. For example, you could invest in a math coprocessor if most of your speed-intensive work is related to number crunching. On the other hand, it's cheaper (though much trickier) to add a faster crystal to your system.

Try software and small-scale enhancements, too. Sometimes you can get all the extra power you need from a disk-cache program or from a better hard disk-management strategy.

You'll find yourself in safer waters, though, if you make friends with someone who can advise you technically. No matter how cheap an upgrade option is, it will cost you big bucks if it breaks your computer.

Assess Your Needs

Before you upgrade, ask yourself these five questions to figure out why you're dissatisfied and what would make you happier:

1. Do I spend too much time twiddling my thumbs while my PC processes my data?

BOOKS

Look for books that discuss either why you should upgrade or how you can get more power out of your PC. Tomes on these topics are harder to find than books about PCs in general. However, your search will be worthwhile. Try these volumes on building your PC's muscles.

- *Supercharging Your PC*, by Lewis Perdue; Osborne McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710; (800) 227-0900
- *Maintaining, Upgrading, and Troubleshooting IBM PCs, Compatibles, and PS/2 Personal Computers*, by Mark Minasi (due out in May); COMPUTE! Books, Chilton Book Company, One Chilton Way, Radnor, PA 19089; (800) 345-1214
- *The PC Configuration Handbook*, by John Woram; Bantam Electronic Publishing, Bantam Books, 666 Fifth Ave., New York, NY 10103; (212) 765-6500
- *Upgrading and Repairing PCs*, by Scott Mueller; Que, 11711 N. College Ave., Carmel, IN 46032; (800) 428-5331
- *The PC Upgrader's Manual*, by Gilbert Held; John Wiley and Sons, 605 Third Ave., New York, NY 10158-0012; (212) 850-6276

MISCELLANEOUS

User groups and telecommunications services are loaded with experts and advisors on a variety of computing issues. Whether or not to upgrade is probably one of the hottest topics on the roster of debates. You'll have no trouble finding someone (or hundreds of someones) to give you advice. The trick is to evaluate that advice with your own needs in mind.

On telecommunications services, look for people who not only know what they're talking about, but who also know how to speak at your level. If you know exactly what you want and you're an experienced user, you need to talk to someone who can appreciate your needs as a power user. Beginners need advisors who can speak their language. If you wander around the telecommunications services extensively, you'll find discussions that resemble religious wars over which microchip is in and which will be extinct in a few days. Use these battles as background; most are based on opinion as much as on fact.

In user groups, watch for the people who enjoy taking less experienced members under their wings. Also, keep an eye out for special seminars on upgrading.

Besides people contact, try software contact. *COMPUTE!'s PC Magazine* will publish an article on upgrading your computer in March that will be accompanied by a program that tells you how much your dream computer will cost. In the process, you'll learn a lot about your options.

2. Does the computer seem too slow all the time or only during certain tasks?
3. How much money can I spend?
4. What do I want to be doing with my PC next year at this time?
5. What do I want to be doing with my PC three years down the road?

If your computer is too slow, you should consider an upgrade (question 1). Question 2 identifies specific bottlenecks. Money, as always, dictates how much upgrading you can do (question 3). Questions 4 and 5 refer to the future. The future can be expensive if you don't account for it.

How to tell if an integrated software package is right for you.

Look How Things Have Changed.

When integrated software first appeared, it had limited functionality, was difficult to learn, cumbersome to use, and cost between \$300 and \$500. Today most integrated products have a more complete set of features, are easier to learn, and are priced between \$149 and \$259.

Amazingly, critics say Eight-in-One™, a product costing only \$60, is the easiest to learn, easiest to use, yet has the highest performance. Who needs an integrated package the most? And what can you do with them?

Home Office and Small Business People Have Discovered a Secret.

Working in a home office or small business usually means that you do a little bit of everything - write reports, do financial analysis, schedule appointments, track customer information, and anything else it takes to run a business without lots of people. If you have all of the tools you need in one integrated software package you get several immediate advantages.

Imagine having a collection of robust applications, poised in a single program, ready to tackle all of those tasks you always thought that a computer should be good for... to put a graph into a letter and have it finished three minutes later... to instantly check your next appointment, or automatically dial a customer on the telephone while you're in the middle of working on a spreadsheet.

With integrated packages you can save a lot of time. Since you probably teach yourself how to use software (unlike working in a large corporation where you'd get training and support from the department down the hall) you'll appreciate how much more quickly you'd become productive using one integrated package rather than many separate programs. Because when you learn one tool, you've learned them all.

And you can save a lot of money too - over \$1000. Because you won't have to buy many separate packages like a word processor, spreadsheet, database, graphics, and communications program, just to get all of the tools you could find in one complete, affordably priced, integrated package.

What Do You Get In The Best Integrated Packages?

The best integrated packages put a complete solution at your fingertips. They provide you with all of the useful tools that you need to do your job - a word processor, spreadsheet, database, outliner, desktop organizer, communications module, graphics program and powerful spell checker and thesaurus.

Well designed integrated packages are obvious-to-use. All of the options are right there on the screen. And each tool should work in the same way, so that after spending a few minutes working with one of the applications, you've virtually mastered the entire program.

What's more, the best integrated packages are lightning fast. Doing things like recalculating a large spreadsheet or spell checking a letter should never slow you down. So with a high quality integrated package you take full advantage of the power of your computer. Many users say they get their work done in half the time.

Surprises in Eight-in-One.

Here's why over 150,000 people in home offices and small businesses have switched to Eight-in-One in the last two years.

With Eight-in-One you get more useful tools than you find in other integrated packages. You not only get a powerful spreadsheet, word processor, database, graphics, and communications program, but also a desktop organizer, outliner, spell checker, thesaurus and pop-up calculator.

You might expect the most expensive packages to have the highest performance. But Eight-in-One actually outperformed Microsoft Works® and PFS: First Choice™, costing more than twice as much, in a recent test conducted by a nationally recognized independent software testing laboratory.

Eight-in-One is the only program that's truly obvious-to-use. Knowing what to do next is always apparent from the on-screen prompts and drop down menus. According to Eight-in-One users, this experience goes beyond "easy learning". They say it's more like not having to learn at all, because everything is so obvious on the screen.

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-Home Office Computing

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-PC Magazine

"Eight-in-One may be the only computer program you'll ever need ..."

-New York Times

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-PC Magazine



Computer Editor's Choice

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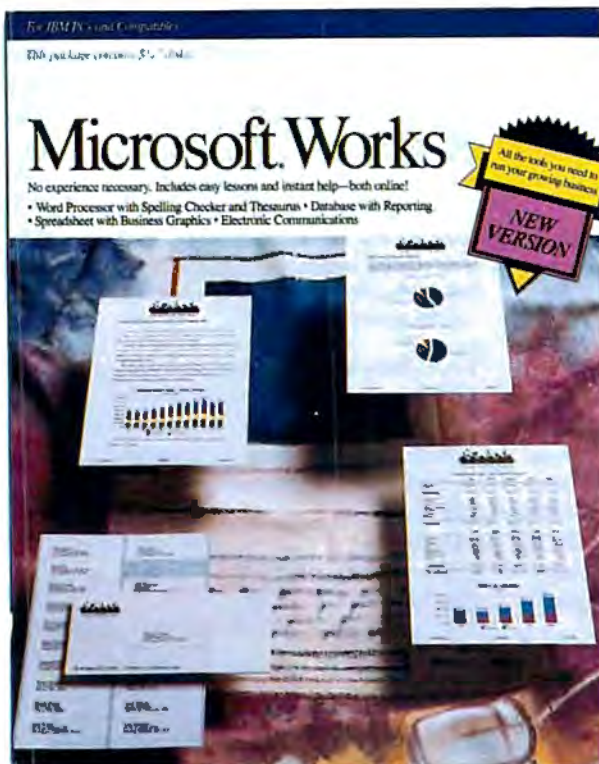
POWER AND
INTEGRATION
GIVE YOU
THE WORKS

COMPUTE! CHOICE

PETER SCISCO

For new and intermediate computer users, the value of a good integrated package can't be overestimated. The comfort of a single interface provides uncomplicated access to several companion applications while it shortens the time it takes to learn any one of them. The newest overhaul to *Microsoft Works*, version 2.0, provides all of these benefits and more. Its seamless integration, powerful applications, detailed help features, and comprehensive on-line tutorials show once again why, when it comes to low-cost integrated software, this package remains king of the hill.

Works makes use of IBM's Com-



mon User Access (CUA) structure, which is a set of rules governing how applications are displayed on-screen. Programs that use CUA can be loosely compared to Macintosh programs (minus icons), which have always incorporated and shared that computer's common interface design. What that means for you is that once you've grown comfortable with one of the *Works* modules, you'll have an easier time getting up to speed on its other applications.

The *Works* interface centers around a menu bar at the top of the screen, with pull-down menus that are accessible using a mouse or keyboard commands. When the program loads, the File menu appears automatically—a difference from earlier versions in which you had

to pull the menu down after you loaded the program. This slight but pleasing improvement saves a couple of keystrokes and implies that Microsoft pays attention to *Works* owners. After all, what's the use of loading the program if you don't intend to work on a file?

Beyond the interface lies a powerful group of applications that will serve the needs of any home computer user—and small-business user, too, for that matter. For under \$150, you can have all the software you'll ever need (except for the latest hit game). The word processor is handy and boasts a spelling checker and a thesaurus, the spreadsheet is large enough for any but the most complex number-crunching tasks, the database is flexible and easy to use, and the

TTM



communications module makes getting online easier than ever.

Works doesn't require the latest 386SX computer to run; it's happy chugging away on a PC or XT compatible, which will make a lot of new computer owners happy as well. It will also run off of floppy disks; in fact, the whole set of applications will fit on one 3½-inch 720K disk, making the package ideal for use on a laptop. *Works*' basic hardware requirements of 512K of RAM and DOS 2.0 or higher are minimal enough to be considered standards today for home computers.

Installation is a simple process of moving through the program's setup procedure. Whether you're installing *Works* for the first time or upgrading from a previous version, you'll find the clear and concise setup instructions a breeze to follow.

After you've installed the program, you're ready to go to work. If you're new to *Works*, you may want to install the online tutorial. This series of lessons will guide you through any program, even from inside an application. Microsoft deserves high marks for this comprehensive and elegant solution to the intimidating learning process that new buyers often face.

The first application that most users will investigate is word processing, and the updated *Works* sports several welcome advances over version 1.05. Foremost among the improvements is the way the program displays text onscreen. In earlier versions, *Works* showed different character styles (bold, italic, and so on) in bold typeface. Version 2.0 uses different colors to identify italic, subscript, superscript, and underlined text. Even better is the program's new graphics capability, which allows a WYSIWYG display so that the type style you select is visible on the screen. That

makes it a lot easier to see which style you've used on a particular word or phrase.

Running *Works* in graphics mode is quite a bit slower than running it in text mode, so you'll probably want to use the graphics mode only on a case-by-case basis. Although you can choose the graphics mode during setup, it makes more sense to install the program as a faster text-based application since you can select between text and graphics at any time.

Works now lets you add automatically numbered endnotes to your document. Although the manual refers to them as footnotes, they fall at the end of the document.

To aid navigation through long documents, you can place bookmarks in the text to which you can return. Bookmarks are key words that you attach to specific parts of your document; from the Select menu you can highlight the Go To command, which will display bookmark names. Simply select the bookmark to which you want to return and the program whisks you there.

The spreadsheet in *Works* retains its serviceable demeanor and adds a few nice touches that make it an even better financial tool. A Fill Series command, which lets you fill a selected group of cells with a series of numbers or dates, has been added to the Fill Down and Fill Right commands. This speeds data entry and eliminates many entry errors.

Manipulating spreadsheet data is easier now with a function that sorts rows on any number of columns or fields. This function was previously available only in the database module. As you arrange spreadsheet figures in ascending or descending order (you can also sort cell labels alphabetically), you gain new perspectives on what

the numbers mean—and that's crucial for any home office or home budget. To ease your path into spreadsheets, Microsoft has included two sample files: a home-budget worksheet and an amortization schedule. You can adapt both to suit your needs, or you can study the way they're put together and create your own.

Printing spreadsheets, especially large ones, has always been a pain. *Works* contributes a little analgesic with its Preview feature. Select Preview from the Print menu to see a miniature version of your document (spreadsheet, word processing file, database, or chart) as it will appear when printed. By changing the dimensions of your paper from portrait to landscape, you can get a view of your document as it would be printed sideways. (The actual printing depends on whether you've configured your printer correctly; I wish these things were more automatic.)

The Preview feature saves time as well as paper. No more printing several copies of a document until you get it looking just right; just preview the file and press the P key to start the printing job if you're satisfied with the layout.

Works' third module, the database, provides all the sorting, reporting, filing, and tracking that any small-business or home computer user will ever need. Unlike earlier versions, fields can be several lines long—up to 256 characters. Again, Microsoft has gone out of its way to

lead you into the sometimes-intimidating world of databases by including several templates, such as a check register, an appointment book, and an address file.

To bolster its attractiveness to business users, the database module adds form-generation capabilities to its list of reporting functions. This feature is invaluable for creating blank forms for home-office or small-business use. Form-making software has developed quite a following in the past couple of years, and with this feature *Works* again solves the problem of figuring out how many different software packages to buy to get the most out of your computer.

The final *Works* module, communications, retains the ease of use that made version 1.05 such a pleasure. If you're new to *Works*, you'll appreciate the Record Sign-On feature. Activating this command records all of the keystrokes necessary for logging on to your favorite online services—no more aggravating charges for time spent keying in your sign-on, and no more complicated scripts to master in order to automate the sign-on process. A scrollable buffer lets you review text that's scrolled offscreen. You can also load the captured text into another application, such as the word processor.

The task of any integrated package is just that—the pulling together of separate applications so that the benefits of each are compounded. *Works*' integration is graceful, and improvements to this newest version make sharing data between applications even easier. Foremost among these improvements is *Works*' ability to display overlapping windows—up to eight at once. In earlier versions, you also could have eight files active at once, but only one window could be displayed on the screen at any one time. With version 2.0, you can size, arrange, zoom, and position windows on the screen to suit your needs.

A number of other software programs have proved the benefit of multiple windows, and it's extremely gratifying to see *Works* embrace this strategy as well. It's also a nice piece of irony that the company that is bringing us *Windows* is just now incorporating that technology in one of its premier products.

Pasting one file into another (a spreadsheet or chart into a word processor, for example) is exceptionally easy and requires just a few keystrokes. You can open files from any of the modules and have them visible

on the screen—no need to close a spreadsheet to write a letter or to exit the database to chart some figures. Coupled with the Preview function mentioned earlier, the integration of information produced from any of *Works*' modules becomes a seamless and graceful procedure—the definition of integrated software.

If *Works* were limited to its four applications and the integration between them, it would still be a top-



The *Works* tutorial eases the learning process and quickly gets you working.

flight package. But Microsoft has gone even farther, taking steps to ensure that this is the only productivity software package many computer owners will ever need to buy.

Works will exchange information with other software programs by letting you save spreadsheet, word processing, and database files in ASCII format for importing into other applications. Of course, you lose your format codes when you convert to ASCII. For more direct conversion of word processing files, you can buy a supplemental *Word Processing Conversion Program*, which offers the choice of DCA and RTF formats so that you can convert files to and from such programs as *WordPerfect* and *Displaywrite*. I'll take Microsoft to task on this point. If I have to spend extra money on a conversion program, I should get a more direct path than DCA and RTF. For example, I should be able to convert a *Works* file to a *WordPerfect* file without having to convert it to DCA format first. Either that, or Microsoft should include the *Conversion* program with the *Works* package at no additional cost.

An online calculator is useful for quick calculations, especially in spreadsheets (although it's available in all of the modules). My only complaint is that after you've made one calculation, the calculator menu drops from the screen and you have to call it up again to make a second calculation. Hopefully, in its next upgrade, Microsoft will provide a calculator

that will remain on the screen until the user chooses to close it. Come to think of it, the company should make the calculator window movable as well, so it won't cover up the part of the work area that you need to see.

The new version of *Works* offers several file-management capabilities. From the File menu, you can copy, delete, and move files and directories. For all those times that you used to drop out of *Works* to perform everyday DOS functions, you can now stay aboard. Even better, you can launch other software applications from within *Works* by selecting Run Other Programs from the File menu. This is a much smoother way of launching other applications than the old way of going from *Works* to DOS and from there to your other software program. On a 512K AT compatible, I had no problems running a small calendar program and *GrandView* from *Works*, but I didn't have the space to load *XyWrite III Plus*. If I didn't have to load a laser printer driver or if I had 640K or more of RAM, I might not have experienced any trouble.

Another useful desktop accessory is the alarm clock, which sounds an alarm (you can set more than one) and displays a message on your screen at a time that you specify. For those who spend most of their working hours inside of this program, it's a small addition that adds up to a great benefit.

All in all, Microsoft's revamped *Works* puts new life into this venerable workhorse. Its simple design, user-friendly interface, graceful presentation, and short learning cycle are all designed for people who demand a lot from their software—including a low price. *Works* isn't the least expensive integrated package on the market, and it lacks some features (such as an outliner for the word processor) offered by other packages such as Spinnaker's *Better Working Eight-in-One*. But if you're looking for a powerful set of software that incorporates the best in interface design for the PC, *Works* remains the best of the lot.

Microsoft Works version 2.0

IBM PC and compatibles with 512K of RAM—\$149
Upgrade from version 1.05—\$50 (free if version 1.05 was purchased after October 1, 1989)

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 PRODUCTIVITY
IMPACT**DAVID D. THORNBURG**

As we enter the last decade of the twentieth century, it's clear that our lives have undergone significant changes in the past ten years. Nowhere is this more evident than in business. External changes—the decline of our aging manufacturing base and the rise of the service sector—mask more fundamental changes that strike the very heart of all businesses, large and small, manufacturing and service-based. These changes affect how we do our jobs, and they change our expectations about our work environment.

To a large extent, these changes have been facilitated by technology. For example, the almost universal access to inexpensive calculators has eliminated the mechanical slide rule on the engineer's belt. The photocopier has reduced the need for carbon paper. The word processor has changed the job of the secretary who, in many cases, has accepted new responsibilities that go far beyond typing.

Now that computers have become indispensable desk accessories, we can see the forces that have set in motion the next phase of our technological development.

The nineteenth-century industrial model that provided the foundation for our growth was connected to a prevailing paradigm based on Newtonian physics—that is, the notion that, like a falling body, the movement of markets could be predicted and that business would be attracted to the strong center provided by the industrial giants.

As the twentieth century progressed, we underwent a revision in our model of the universe, in which Newton's ideas broke down on close inspection. Einstein's notion of mass as energy, Bohr's ideas on the duality of waves and particles, and Heisenberg's principle regarding the inherent uncertainty of quantum events all forever destroyed the clockwork universe epitomized by classical physics.

This paradigm shift in physics is now being reflected in business. Technology, of course, is making this transformation possible, but it is the shift in our perspective that is critical. To see this, imagine a quantum experiment in which a photon (light particle) is directed to a diffraction grating. When it hits the grating, it behaves like a wave and is sent off in a new direction. Our traveling photon then may hit a photocell, where it will be detected as a particle. Depending on its interaction with other objects, the photon can behave like a wave or like a particle.

Now take a look at modern business communication, using a fax machine as an example. The document starts in one office in particle form (as a sheet of paper). It is then placed on the fax machine, where its information is sent as electronic signals (as waves) to the receiving machine, on which it then reappears as a physical sheet of paper (in particle form). Contrast this form of communication with the older Newtonian pure particle model, in which a letter is placed in an envelope and is sent through the mail. As the cost of carrying physical mail has increased, the cost of electronic transmission has decreased, making the new process less expensive than the old one. As a side benefit, a message can be faxed halfway around the world in less than a minute. As mil-

lions of inexpensive fax machines are purchased every year, the Newtonian postal service runs the real risk of losing its high-profit first-class mail to this electronic technology.

Another characteristic of the new physics is that time, space, and matter coexist and interrelate in subtle ways. From the perspective of relativity theory, we see the office in a new light. Thousands of people have decided that their office is wherever they happen to be at the moment. Airplane cabins have been turned into airborne offices. Some people are listening to recorded courses on goal achievement, others are working with their laptop computers, and still others are on the telephone. The home office now exists at 30,000 feet and is moving at close to the speed of sound.

When laptop computers first came out, they were regarded as toys. The Tandy Model 100 and its early NEC counterpart may look pale compared with today's products, but the success of this market has had less to do with technology than with attitudes. The original personal computer of the 1970s was personal in ownership but not in use. The computer was on a desk, not in our immediate possession. Today's laptops and palm-sized machines are truly personal. You can use them at a desk, on an airplane, or while you're sitting under a tree.

Along with the rise of the truly personal computer, we've seen advances in the area of compact hand-held copiers. And Motorola's newest cellular phone looks more like the hand-held communicator from "Star Trek" than the bulky cellular portables of the past. One's computer, calculator, telephone, and copier can now fit in an attaché case.

In thinking about the impact of technology in your business, think less about the hardware and more about the prevailing paradigms of physics. There will be a lot of changes in the next decade, and you can benefit from them if you keep your imagination alive. □

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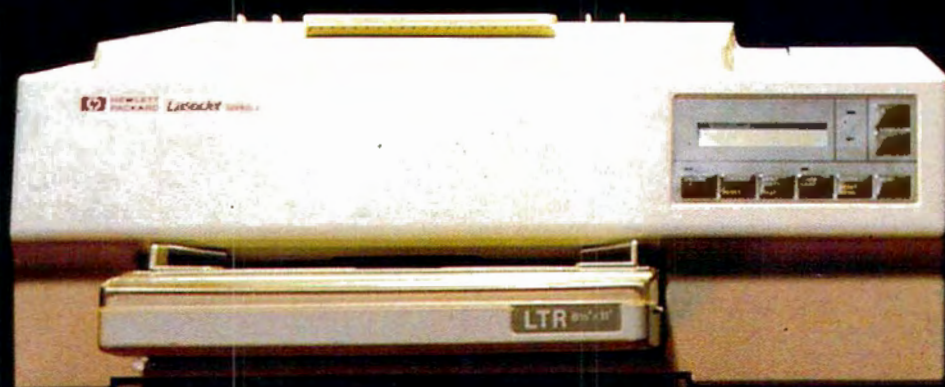
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THE RIGHT LIGHT

ROBERT BIXBY

For a number of months, I've had a Star Laserprinter 8 at my right hand, and now I wonder how I survived without it. While it has performed well as a simple text printer, it has also helped me create typeset-quality documents, camera-ready illustrations for my latest book, graphics for friends who publish magazines, and endless résumés.

It's several times faster than a dot-matrix printer, it endlessly grinds out perfect pages without complaint, and—best of all—it has banished the banshee scream of the dot-matrix printer. But, balancing against its advantages is the fact that the printer is expensive enough to give most people pause. Is it worth the expense?

The answer is a qualified Yes. Yes, if you are a desktop publisher. Yes, if you run a home office where the quality of your printed documents makes a big difference or if you produce and revise flexible instructional aids. Writers and graphic artists, too, cherish laser printers for readable, camera-ready output. In short, anyone who values output with a high-quality appearance should consider a laser printer. Computer hobbyists who primarily print program listings might be better off sticking with their trusty Gorrilla Banana printer.

Printing for Dollars

Generally, you can spend \$2,000 (and up) on Hewlett-Packard and compatible laser printers, and the least expensive PostScript models are

about \$4,000. Only a few laser printers cost more than \$20,000.

The cost of home laser printing is coming down. In September, Hewlett-Packard recognized the home laser-printer market when it released the LaserJet IIP (*P* stands for *personal*). It lists at \$1,695 but will probably carry a \$1,200 price tag on the street, which puts it well within the range of the ink-jet and 24-pin dot-matrix printers. The drawbacks of this machine are few: It only generates four pages per minute, and it has a limited number of fonts. For home computers, though, the IIP looks like a natural winner. And, if the past is any indicator of the future, this printer will probably face stiff competition very soon.

Not very long ago, as you may recall, Apple released a printer aimed at the same market: the Apple LaserWriter IISC. Considering the \$2,800 price quoted by one dealer, it's easy to see why it wasn't finding a place in homes across America.

Languages: PostScript Versus PCL

Although a few laser printers come with specialized languages like TEX and DDL, these are relatively rare. There are two basic types of plain-vanilla laser printer: the PostScript-compatible and the Hewlett-Packard-compatible. Because they were available early in the market, the most popular models are the Apple LaserWriter (with PostScript) and the Hewlett-Packard LaserJet (which uses PCL). PostScript printers are smarter and considerably more expensive than PCL printers because Adobe Systems, creator and

SHEDDING LIGHT ON LASER PRINTERS

owner of the PostScript language, charges a heavy premium for using the language on a printer.

What is PostScript? It's a computer language not very different from BASIC. The PostScript laser printer accepts instructions from the computer as ASCII symbols, interprets them (just as a computer interprets a BASIC program), and then tells the printer engine how to draw the image on the paper. A PostScript file is sent to the printer as a series of instructions: *Draw a line from this point to that point, or begin text at this point and use this font.* Because of its dependence on a stream of ASCII text from the computer, a PostScript printer can be very slow. PostScript may be a logical, ingenious way to tell the printer what to do, but it slows down your processing speed.

The only serious alternative to PostScript printers are Hewlett-Packard-compatible printers, which use PCL (Printer Control Language) to transmit information to the printer. These printers are much dumber than PostScript printers, which only means that your program must interpret the printing instructions.

PostScript printers are typically shipped with *outline fonts* in ROM. These describe an ideal font which the PostScript language then adjusts in size and density according to the information sent by the computer. PCL printers like the Star and the Hewlett-Packard typically have only two or three fonts, such as Courier (a typewriterlike font) and line printer (a smaller, less attractive font) and occasionally a Times font. Cartridges are available with additional fonts. Another way to obtain additional fonts is with font packages like Bitstream Fontware or FontPacks from VS Software. They offer wide selections of highly attractive fonts.

How Does It Work?

Inside the laser printer's engine is a laser beam and a drum (some printer drums are actually belts). The surface of the drum is coated with a compound that is ionized by light. The drum is analogous to the page you are printing. The laser scans the drum, applying an electrical charge to the scanned area.

The drum is exposed to a fine powder called *toner*, which clings to the scanned, charged areas of the drum. Then electrically charged paper passes by the drum. The paper is more highly charged than the drum, so the toner is transferred to the paper electrostatically. The paper is then heated. When the toner melts, it binds to the paper. The drum is then scraped clean and its residual charge is led away by tiny wires. After this process, the drum is ready to be scanned by the laser to create the next page.

Deciding Factors

Whether you opt for PostScript or not will depend on your computer, your applications, and your needs. There are ways to use a PCL printer with a Macintosh, but Mac owners would be wiser to go the PostScript path. If you use a graphics-intensive package that outputs PostScript files, you should also consider a PostScript printer. And finally, because PostScript was designed as a graphics language, you should consider a PostScript printer if your output is primarily graphics.

If you will be using your laser printer like a daisywheel printer, if you don't need many fonts, or if low price is more important to you than features, PCL printers will probably be your best

How Much Is This Monster Really Going to Cost?

The canny shopper will remember that every purchase has hidden costs. Your laser printer will incur two ongoing expenses: toner and paper. These costs will depend almost entirely on how often you use your printer.

Use photocopy paper; it's available at business outlets everywhere. You will pay between \$3 and \$10 per ream (a ream is 450-500 sheets of paper). You would be wise to use top-quality, name-brand paper.

Toner cartridges cost between \$80 and \$100. They hold up for about 3000 pages. That comes to just over 3 cents per page on top of the cost of the paper. If you print graphics with large black areas, the toner will run out faster. On the other hand, if you print mainly text, your cartridge will probably last longer.

Whether you should refill toner cartridges is a matter of dispute. Some manufacturers warn that this practice jeopardizes the printer. Having seen refilled cartridges fail, I can assure you that a streaked, smudged laser-printed page is worse than no page at all. If you want to try it, though, expect to pay about \$50. Many computer publications feature advertisements from companies that offer this service.

When you replace the cartridge, you must go through a complicated cleaning ritual involving cotton swabs and specialized brushes. Everything you need is included either with the toner cartridge (if it's new) or inside the laser printer itself. If you don't observe the cleansing ritual, you'll eventually find clots of paper fibers and toner in inconvenient places.

The bottom line is that if you print a ream of paper a month, you'll pay around \$72 for paper and around \$200 for printer cartridges each year (this puts the cost of operation at about \$22.75 per ream of paper).

The life span of the print engine brings up another hidden cost. It won't last forever. Most are rated at between 300,000 and 500,000 pages (though some manufacturers claim that their print engines live through millions of pages). At 500 pages a month, you'll wear out your print engine after 600-1000 months, a period of about 50-83 years.

To determine your annual cost of operation, multiply \$272 (the yearly cost of paper and toner if you print only one ream of paper each month) by the number of reams of paper you print per month. This figure represents a rough estimate, of course.

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Laser Quiz

Now that we've covered the features of laser printers, let's decide whether you need one for your home. To find out, take this quiz. Choose the best answer for you; the number in parentheses represents your score for each question.

1. What level of text quality do you require?

- ☐ Legible (1)
- ☐ Legible with control over italics and boldface (2)
- ☐ Sharp with a choice of typeface, size, and style (3)
- ☐ Sharp enough to withstand reproduction for desktop publishing (4)

2. What quality of graphics do you require?

- ☐ Graphics quality is unimportant (1)
- ☐ Simple, draft-quality graphics (2)
- ☐ Camera-ready line drawings and bitmapped graphics (3)
- ☐ Camera-ready photographs and other detailed graphics (4)

3. How important is print speed?

- ☐ Of no importance (1)
- ☐ Not very important (2)
- ☐ Very important, but quality is more important (3)
- ☐ Maximum speed is essential (4)

4. How well can you tolerate loud, unpleasant noises while you work?

- ☐ Would you mind repeating that—a little louder this time? (1)
- ☐ I have ear plugs; I can cope (2)
- ☐ Noise irritates me, but it's not unbearable (3)
- ☐ My home office must be very quiet (4)

5. How much money can you spend initially?

- ☐ Nilch (1)
- ☐ I have a good income, and I'm investing most of it in my family (2)
- ☐ I'm willing to pay for quality, even if it means going into debt (3)
- ☐ Money is no object (4)

6. How much can you afford to spend on upkeep and continuing costs?

- ☐ Nilch (1)
- ☐ Up to \$20 per month (2)
- ☐ \$20–\$50 per month (3)
- ☐ The sky's the limit (4)

7. Are you a technofreak and do you buy new technology the minute it comes out?

- ☐ I don't trust technology (1)
- ☐ I am if a Commodore PET is considered emerging technology (2)
- ☐ It's all I can do to keep up, but I like new things (3)
- ☐ I just purchased a NeXT and a second WORM drive (4)

8. How would you describe your desire to own a personal laser printer?

- ☐ Mild (1)
- ☐ Tolerable (2)
- ☐ Acute (3)
- ☐ Desperate (4)

9. How often and how far do you move your printer?

- ☐ My computer, printer, and I are frequent fliers (1)
- ☐ My printer often travels back and forth between home and office (2)
- ☐ Occasionally, from room to room (3)
- ☐ Only enough to dust (4)

10. Essay Question. For extra credit, in 100 words or less, write a short essay intended to convince your spouse or significant other that your budget can easily absorb the cost and upkeep of a laser printer.

Scoring Your Quiz

If you scored 9–17 points, maybe the computer age isn't for you, let alone the laser printer. Consider the space, atomic, machine, dark, iron, bronze, or stone ages.

If you scored 18–26 points, odds are that another type of printer will better suit your needs or budget. A nine-pin dot-matrix will give you draft-quality to near-letter-quality text, plus some draft-quality graphics. Some people use these printers to compose their printed projects and then rent time at a laser-printing

service for the final version.

For people who print no graphics at all, a daisywheel printer offers letter-quality text for an affordable price.

If you scored 27–33 points, take a serious look at laser printers. There's probably one out there that meets your needs and fits your budget. But there are other options that are cheaper. Examine the ink-jet printers from Hewlett-Packard and the 24-pin dot-matrix printers from just about anyone. You'll sacrifice quiet and speed, but you'll save money.

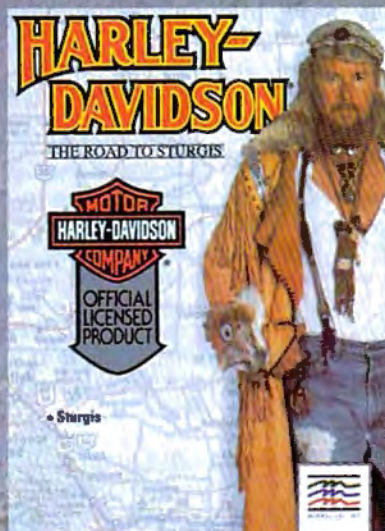
If you scored 34 points or more, what are you waiting for? Get out there and start shopping. Technofreaks might even seek out the color laser printers that are on the market now.



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choice. Generally, however, the PCL printer can print anything a PostScript printer can print, assuming your software supports PCL printers.

If you buy a PCL printer and have second thoughts later, there is a conversion kit that adds PostScript capability, but you'll spend nearly as much installing this kit as you would on the difference between the printer types.

Just as an aside, I should tell you that it is possible to use an Apple LaserWriter with a PC without installing an AppleTalk card (an interface card that lets the PC communicate with the Apple printer). Dealers, either through ignorance or mendacity, will insist you need to buy this card, but a specially designed serial cable will accomplish the same end at a much lower cost. Check the LaserWriter manual for the cable specification. Beware, though, of the information for setting up your serial port on the PC. LaserWriter manuals (once again, either through ignorance or mendacity) have given incorrect instructions. They specify seven bits, but you should enter the number 8 in the bits position in your MODE command. I imagine this combination of misinformation has sold quite a large number of AppleTalk cards.

Speed and Resolution

The typical laser printer prints at an advertised rate of 8 ppm (pages per minute), which usually works out to 6 ppm in real life. This rate refers to the speed at which the printer will turn out identical pages. This measure doesn't take into account the time-consuming process by which the printer or computer composes the page. If you print consecutive pages of a manuscript, for instance, the speed drops considerably. Print speed is like gas mileage; what the manufacturer lists is never what you get in the real world.

Although the printer can generate text at 8 ppm, a page of graphics can take ten minutes or more. A page of text is mostly white space; the letters take up a relatively small part of the page. With graphics, this speed has no meaning.

Much faster laser printers are available: Printronix has announced a 12-ppm PostScript model. The price: nearly \$8,000. Xerox Canada has developed 50-ppm and 92-ppm models. Obviously, these are for output-intensive applications rather than for personal use.

All of the most popular brands print at a density of 300 dpi (dots per inch), for a total of 90,000 individual dots per square inch. A few laser printers will give you 400 dpi (160,000 dots per square inch) and 600 dpi (360,000 dots per square inch). For higher resolutions, you will need a Linotronic typesetter at a print shop (minimum resolution: 1200 dpi). Don't worry, though. Most people are satisfied with 300 dpi.

Memory

If you print text exclusively, you will probably need a minimal amount of RAM, 512K in most cases. But if you print only text, you could save a considerable amount of money by purchasing a dot-matrix or daisywheel printer. If you print graphics, or if you download many fonts, you want a laser printer with a lot of additional memory. A Hewlett-Packard with 512K will manage about half a page of graphics before returning a printer error.

Like every other kind of memory, laser-printer enhancement cards are exorbitantly expensive. Slowly but surely, the price is falling. This winter, the prices ranged from \$300 for one megabyte to \$900 for four megabytes. All prices quoted here are rock-bottom mail-order prices. You can pay as much money as you like for the comfort of having a local dealer stand behind your equipment.

Will you need a hard drive? A few laser printers offer the option of a hard disk, primarily for the purpose of storing additional fonts. With the cost of these printers tending toward five figures, most home users will probably pass on this option.

Two Bins or Not Two Bins

Many laser printers support multiple paper bins. One bin holds plain bond paper for drafts and more casual correspondence, and another bin holds finer paper for more formal communications. You can easily remove the paper trays and insert different grades of paper. In a personal laser printer, this feature won't be very useful. If you are in law, however, a second paper tray for 14-inch paper would make sense. Most printers also support manual feed for the occasional job that requires a different paper altogether. And if you engage in a great deal of correspondence, consider an envelope tray.

Bells and Whistles

You may not believe this now, but indicator lights can make or break your laser-printing success. The Hewlett-Packard and its compatibles communicate with you through a collection of colored lights and an LCD display. The Apple LaserWriter uses a set of enigmatic lights.

The most common problem you will encounter is an empty paper tray. Many printers halt, turn on a light, and display the message *PAPER OUT* on the LCD display. Unless you watch the lights or check the message board, you'll probably think the printer has stopped because the print job has completed. If the printer you buy uses an audible signal to alert you to problems (as the Star does), you are more likely to quickly—and correctly—diagnose the problem and continue with your work.

One Last Consideration

If you're considering a laser printer for the home, take a cautious posture. If the LaserJet IIP wows the market, a flood of low-cost, feature-packed home laser printers will likely follow. Already, IBM is expected to announce a 512K printer with 13 fonts that will generate six pages per minute. Best of all, it will cost less than the current list price of the Hewlett-Packard IIP. IBM is also planning a midrange printer priced around \$2,000 and a PostScript printer for around \$3,000.

This competition from industry-leader IBM could revolutionize the price structures of laser-printer manufacturers in the next few months, making personal laser printing more feasible than ever. □

Robert Bixby is an editor and award-winning writer. His latest book is *Quick and Easy Guide to Ventura Publisher*, from COMPUTE! Books.



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PC PRIMER

HINTS AND TIPS FROM OUR READERS

Tired of typing the same commands over and over again? How would you like to never type `CD C:\SCALC5\WSHEETS\1989\NOV\PERSONAL` again? You have the tools to create your own macro keys right on your DOS disk.

The first thing that you'll need to do is make sure your system loads the ANSI driver. From the root directory, type `TYPE CONFIG.SYS` and then press the Enter key. If you see a line that says `DEVICE=ANSI.SYS`, it means the ANSI driver loads upon power-up. If not, type `COPY CONFIG.SYS + CON` and press Enter, type `DEVICE=ANSI.SYS` and press Enter, and then press Ctrl-Z and Enter. Make sure that the file `ANSI.SYS` is in the root directory. Finally, reboot your system to load the ANSI driver.

I've used the Edlin editor for this explanation since it comes with MS-DOS and because it allows you to enter the necessary escape codes. Refer to your MS-DOS manual for complete instructions on using Edlin.

You'll need to create a batch file to store your new key definitions. To create the file, type `EDLIN filename.BAT`.

Let's start by programming the F10 key to produce a directory. At the Edlin * prompt, type `!!` and hit Enter. You should now see `!*`. First type `ECHO`, press the space bar, and then press Control-V followed by two `[` (open bracket) characters. The next time that you list this line, the `V` will not be visible, and instead of `^V[[`, you will see `[[`. Continuing on the same line, type `0:68;"DIR";13p` indicating that the F10 key (0:68) will be defined as DIR. The 13 represents a carriage return, the same as hitting Enter. The last character, a lowercase `p`, denotes the end of the message. The function keys are defined as 0:59 through 0:68 for F1 through F10, respectively. Press Enter and then Control-C. You should be back at the *

prompt. Type E and then press Enter to exit Edlin and write the file to disk.

Back at the DOS prompt, type the filename without the BAT extension. Now press F10. If your editing was accurate, the current directory should be displayed.

Be careful, though. If you usually use the F7 key to exit your word processor and you've redefined F7 to print your cat's name, you won't be able to get out. You'll want to create a batch file that restores any of your redefinitions so that programs which use the altered keys can function normally. For instance, to restore F7 to its normal state, you'd type `ECHO (Ctrl-V)[[0:65;0:65p` in the batch file. The 0 in place of the key definition sets the key back to its original state.

FUN WITH FUNCTION KEYS AND FINDING LOST CLUSTERS

Programs you use often can be run with a single keystroke with this technique. If you run *Wordstar* from a directory named `WS`, you can program the F9 key to run the program from any drive or directory by adding this line to your batch file: `ECHO (Ctrl-V)[[0:67;"C:";13;"CD C:\WS";13;"WS";13p`.

Try to keep your definitions fairly short. If your definitions exceed 200 characters, they will begin to overlay `COMMAND.COM` creating undesirable and unpredictable results.

*Richard C. Leinecker
Winston-Salem, NC*

CHKDSK Rescues Lost Clusters

It's not uncommon to receive this message from DOS:

**3 lost clusters found in 1 chains.
Convert lost chains to file? (Y/N)**

Relax—though confusing, this message doesn't spell disaster.

On a PC or compatible, a cluster consists of two disk sectors. Two sectors are grouped to form a cluster, which is the minimum amount of disk space that the PC uses to store data. Ordinarily, the storage for a file consists of a chain of clusters. In normal usage, files grow and shrink and the clusters become more scattered. DOS keeps track of where these clusters are located so the files are still usable. If you enter the command `CHKDSK *`, DOS prints a list of all the files with clusters found in separate places on the disk. If the file is fragmented, the drive heads will have to travel a lot to read the file.

The easiest way to consolidate a fragmented file is to copy it to another disk.

Occasionally, DOS gets confused and loses track of a cluster. This is the case with the lost clusters reported by `CHKDSK`. However you respond to the computer's question, you will still receive the same message the next time you run `CHKDSK`.

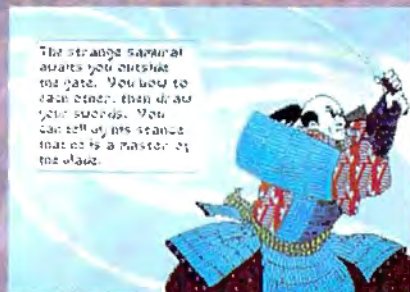
However, if you type `CHKDSK /F` (for Fix) and answer *No* to the same question, the lost clusters will be written over and the information they contained will be gone. If you answer *Yes*, the clusters will be made into files named `FILEnnnn.CHK`. You can examine these files to see if they contain anything you want to keep.

*Tony Roberts
Greensboro, NC*



Sam's trying to keep his head. Literally. But in *Sword of the Samurai*, he's up to his neck in trouble.

As an ambitious young Samurai, you struggle to move up the military and social ladder in 16th Century Japan. Defending your honor is crucial



to achieving your ultimate goal: to become Shogun, ruler of the realm! But every step of the way, you'll be opposed by ambitious enemy Samurai, each of whom employs a different scheme to deceive and destroy you.

To survive, you'll need your wits as well as your weapons. You must outsmart clever political rivals who smile to your face, then work behind your back to blacken your reputation, kidnap your family or raise armies against you.

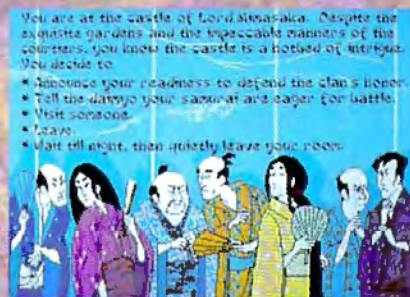
After class, Sam Bushnell will duel with a Ninja, defend his honor, become Shogun and rule feudal Japan.

Just for fun.



The action is fast and furious as you take on multiple warriors in darkened castles and remote villages. You'll also defend your honor one-on-one, using authentic Samurai swordplay against skilled opponents.

Sword of the Samurai has starting options for new players and four skill levels. A unique



system of menus and text windows will guide you in travel and bring each adventure to life. There's even a detailed political map to show you different provinces, each ruled by its own warlord.

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Just for fun.



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ENTERTAINMENT



PRIVATE EYES LIVE TOUGH IN THE TWENTY-FIRST CENTURY

The air was so thick with suspense, you could have spread it on a slice of Wonder Bread. Scisco called me into his office. "Got an assignment for you," he said, tossing a dark package across the room.

"*Mean Streets*," he explained. "New one from the guys at Access. Make a lot of big claims. Could be a COMPUTE! Choice if they're on the straight and narrow. Check it out and give me a report."

I headed back to my office, box in hand. "An interactive detective movie," the cover claimed. Well, there had to be something to *Mean Streets*, because the package weighed me down like sandbags on a hot air balloon. I sat down at my desk, shoved aside the falcon statue Sam Spade gave me, and spread out the package contents.

Something was definitely out of the ordinary. The box had the usual manual, quick-reference card, map, and information sheets. But it also had a pamphlet explaining something called RealSound and six disks.

They say a good detective always starts at the beginning, so I installed the program on my VGA PC's hard drive. As the computer gronked away, copying six 5¼-inch floppies, I wondered why, if bad detectives start at the end, they don't finish the job sooner.

I figured I should get some background on this case, so I checked out

the manual. Seems I was supposed to be Tex Murphy, a twenty-first-century private detective on a murder case. Seems the whole mess started with a visit from Sylvia Linsky, the beautiful daughter of Professor Carl Linsky. She had the face of a doll and eyes bluer than CGA cyan—if this was any indication of how this game was going to go, I thought, this could be fun.

Old man Linsky had jumped from the Golden Gate Bridge, but Sylvia didn't think it was suicide. Her story didn't convince me that it was a murder, but the tears running from her shiny, almost glassy eyes persuaded me to look into the matter. The 10 Gs she waved in my face might have had something to do with my decision, too.

Armed with the info Sylvia gave me, five clues, a list of possible questions from the manual, and my trusty .38 Special, I booted the game. Apparently the guys at Access wanted to make sure I was really Murphy—I had to type in a word from the manual before I could get into the program.

When the opening screen came up, I was as pleased as a cop with a jelly doughnut. It wasn't the blood-red VGA sky that threw me for a loop, it was the sound. Having been up and down PC Boulevard many times, I expected beeps and bleeps. Instead, I heard a digitized rock tune. It was nothing to make Tommy Dorsey nervous, but it was worlds ahead of what I was used to hearing on DOS machines.

The story opened in the driver's seat of my Lotus Speeder. This baby was nothing like the old Packards that 1930s detectives drove. The autopilot and altimeter were dead giveaways that driving this set of wheels would be a lot like flying a DC-3.

I needed some help getting the speeder off the ground. Hitting H on the control panel brought up a screen that explained the controls. Since I

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MEAN



had the list of five Nav Codes from the manual, I called up the Navigation Computer. It displayed a map of California, highlighting my current position. I punched in the Nav Code for Sylvia Linsky, figuring I'd ask her a few questions about her father. A crosshairs pointer highlighted her location and then the computer returned to the cockpit view.

I could have used autopilot to fly to my destination automatically, but I wanted to see how this baby handled.



The mutants' hideout is just one of the many colorful settings you'll encounter.

So, I took off on manual.

The speeder was surprisingly easy to fly, and I had a fantastic view through the windows. Looking down over San Francisco, I noted that the solid-fill, 3-D flight-simulator graphics in *Mean Streets* were as good as in most dedicated flight simulators. If the rest of the game was this good, it might just be COMPUTE! Choice material. Not only was this machine easy to fly, it was also faster than a jack rabbit at the dog track. I made it from San Francisco to Los Angeles in just over a minute.

I brought the speeder down on the landing pad outside Sylvia's place. I hit kind of hard, but this thing was crashproof. Good thing, too. I was glad I wouldn't need flying lessons to drive this beauty.

Once I got out of the speeder I really fell into my role as Murphy. The graphics in the speeder cockpit were great, but when I saw the digitized picture of Sylvia's apartment, I couldn't believe I was playing a computer game. Then Sylvia popped up

onscreen. She was 256 colors of animated beauty. As she winked at me and moistened her lips, I was astonished. I'd never seen digitized graphics that good.

But back to business. I was there to ask questions, to get leads. According to the *Mean Streets* manual, I could ask people about any names I had run across and about eight mysterious terms: *MTC Corporation*, *Gideon Enterprises*, *Overlord*, *passcard*, *password*, *NEXUS*, *Law and Order*, and *insurance*. While that seemed kind of limiting—Philip Marlowe made up his own questions—it did make the questioning process much smoother.

Watching Sylvia's responses to my questions, I developed a healthy respect for the guys who put *Mean Streets* together. When I asked Sylvia about her old man's insurance, she got real defensive. She had a big frown on her face. I asked about a happier subject, and she smiled. All the while she blinked her baby blues. These guys had paid attention to detail.

I thanked Sylvia for her time and hopped back into the speeder. After

questioning a few other people, I went over my notes. So far, *Mean Streets* had lived up to its hype. Everywhere I went, there was a fantastic digitized background. Each character was as realistically animated as Sylvia. However, each had a distinct personality and reacted differently to my questions. Some of them volunteered information freely, some had to be bribed, and a few had to be threatened into spilling their guts. I learned early on, though, not to threaten the wrong people. Delores Lightbody, the professor's ex, didn't take kindly to my pushy behavior; the digitized picture of her kicking Murphy was enough to make me flinch in real life.

As I cruised over to Professor Linsky's place on automatic pilot, I reconsidered my initial enthusiasm for the speeder. While it was an impressive mode of transportation, this case required a lot of travel. Sitting in the speeder for more than a minute, waiting to get to your next destination, was about as exciting as staking out a mortuary. On the other hand, I could catch up on *True Detective Monthly* while the speeder flew itself.

When I got to the professor's place and stepped out of the speeder, I wasn't greeted by the usual digitized



You'll have to explore this subterranean laboratory carefully to find vital clues.

picture. Instead, I found myself in a dark alleyway. I started to make my way across the screen when two trench-coated creeps jumped out and sprayed me with Tommy guns. Luckily, I could duck and get off a few rounds of my own that literally shattered the bad guys. Before I could move more than a few feet forward, two more thugs popped out. It wasn't going to be easy to get into this place. Two screens and about 50 rounds of ammo later, my way was clear. If I had many more encounters like this, I would need more ammunition.

In the apartment, I found another surprise. Unlike the other places I had visited, there was nobody here to question. Instead, I was in a 3-D

graphics adventure scene. I moved my animated figure around the room using the cursor keys. Whenever I got near an object, a text description of it appeared at the bottom of the screen, along with a choice of actions, such as Open or Get.

The first time I explored the room, I found a lot of locked doors and cabinets, but no keys. I had to be a better sleuth if I was going to uncover any clues, so I tried moving some objects and looking under them. It's amazing where some people will drop keys, and you find the most unexpected things under fax machines.

While checking out the professor's belongings, I accidentally set off an alarm. I had ten minutes to find the switch to shut it off or I'd be arrested for breaking and entering. Unfortunately, I didn't find it the first time around. But, fortunately, I had saved the game before entering the room. The second time around, I found the switch. I figured that there couldn't be obstacles like this in every room. I figured wrong.

I found a lot of stuff in Linsky's apartment. When I got back to my speeder and looked at my inventory, I discovered I could pawn the objects I had picked up. Since the bribes had eaten up a big chunk of my 10-G advance, I decided this would be a good idea. The problem was how to tell if an object was an important clue or if it should be pawned. Trial and error showed me that it was usually safe to sell the stuff that was worth big bucks, but that I'd better hang on to the rest.

At this point, I had a lot of names without addresses. I called up my trusty assistant, Vanessa, on the vidophone. She popped up onscreen, blew me a kiss, and said, "Hello, Tex." Coming from my HeadStart III's speaker, her voice was about as lilting as Dr. Ruth's through a cheap transistor radio. I made a note to buy Access's \$9 cable that would connect my PC to a stereo before I played any more games with RealSound. My PC's speaker just wasn't good enough to get the full effect. Vanessa faxed me a few of the addresses I needed, and I bought the rest at ridiculous prices from Lee Chin, my informant.

The investigation became comfortably routine. Whenever I talked to a new person, I asked about all of the names I had gathered, plus the terms from the manual. As I collected more and more information, it became obvious that this wasn't just a routine murder investigation. Several other prominent scientists had died mysteriously.

Two major corporations, the Law and Order political party, and several people in low places were tied in, too. I was hot on the trail.

After interrogating about 40 people, surviving a number of gunfights, and exploring several locations,



Climb in your Lotus speeder and fly over the Golden Gate Bridge at high altitudes.

I could put everything together, solve the case, and save the world. But not before I made a lot of mistakes. I was glad I had saved my position on disk frequently—I've never died so many times in my life.

With the case behind me, it was time to write out my report for Scisco. *Mean Streets* was definitely COMPUTE! Choice material. The digitized graphics, animation, and sound broke new ground for PC games. It had all kinds of action, with elements of text-based and animated graphics adventures, plus arcade sequences. And while it took a lot of time and thought, the case was solvable.

The program had few bad points. Because it came on six 5¼-inch or three 3½-inch disks, I would have been in for some fancy floppy swapping if I hadn't been using a hard disk. The game was fairly slow on XT-class machines, and while the game was breathtaking on a VGA screen, the Hercules, CGA, EGA, and Tandy graphics were only a little above average.

Satisfied, I walked into Scisco's office and tossed the report onto his desk. "Guilty. It's a COMPUTE! Choice, all right."

"Good job, Atkin," he grumbled. "Oh, by the way, somebody stole that Maltese bird off your desk."

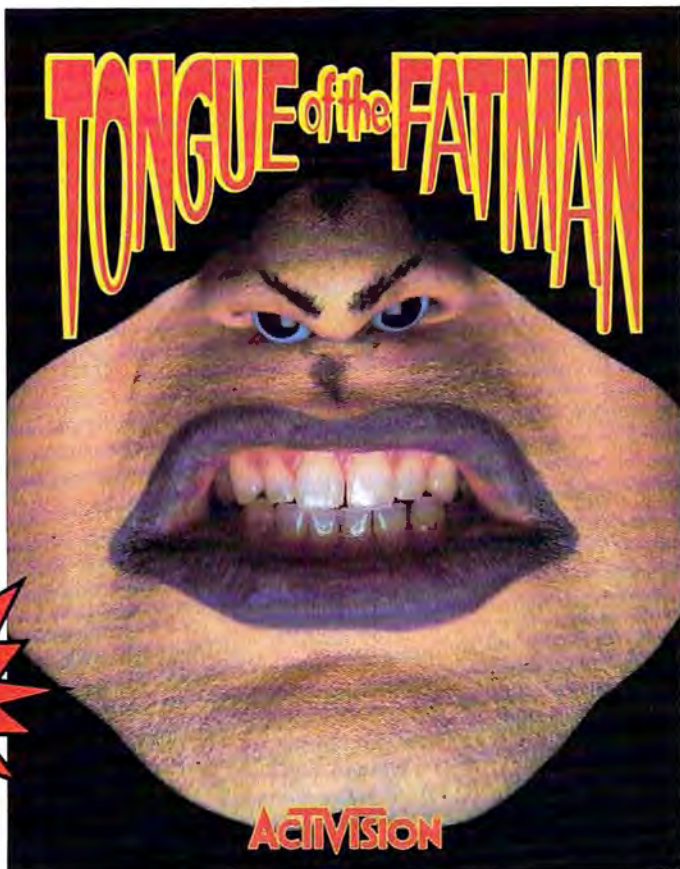
Sigh. A detective's work is never done.

Mean Streets

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GAMEPLAY

ORSON SCOTT CARD

Once, when I was three years old, my big brother (at the ripe old age of 7) joined in a game that my friends and I were playing. Within moments, *our* game had become *his* game. We were nothing but helpless pawns, playing out the roles he assigned to us. Maybe his game would have been more fun than ours, but that wasn't the point. We wanted to be in charge of our own game.

So we raised our passionate three-year-old voices in revolt. "You're not the boss of the game!" we complained, until he gave up and left.

A few years have passed, and I am no longer 3 (most of the time). Now and then, however, computer game designers make me want to raise my voice in that same plaintive cry. "You're not the boss of the game!"

Take a great puzzle game like Brøderbund's *Lode Runner*. As you move around the screen, you dodge bad guys. All the while you're digging holes, climbing ladders, and jumping off cliffs in pursuit of hard-to-reach treasures. The puzzles are diabolical, and I wouldn't change a thing about the rules of the game.

What's more, the game designers thoughtfully let you practice getting through troublesome screens. You can start at any level, and you can give yourself as many lives as you want until you learn how to solve a particular puzzle. But the program won't record your score on the vanity board unless you started from the beginning and never added extra lives.

Wait a minute, though. The game designer carelessly left out the feature that saves a game in progress, so I have to start at the beginning and play straight through to finish *all* the screens and record the score on the vanity board. That's 150 screens, and it takes me eight or nine hours.

That's annoying enough, but what's *really* frustrating is that kids play the game, too. Why can't young

children put their names on the vanity board? Is it just because they can't get through a game without opting for extra lives? Why not design a vanity board that includes the number of extra lives used to achieve the score? Simple pride will motivate players to reduce that number until it reaches 0, but in the meantime they'll get the payoff of competing with the high scores of their parents and older siblings. In golf it's called handicapping.

Another example from another great game: *Pipe Dream* from Lucasfilm. This is the old Water Works game brought to life. The game deals you a series of pipe pieces—vertical, horizontal, crossover, and four different angles. You must connect them onscreen. After a while, water flows through the pipe work you've built, and, when it reaches a break in the

However, it takes practice to learn how to see the relationships among pipe pieces so you can anticipate future structures. Often you have to lay down pieces for curves and crossovers that are 30 or 40 moves ahead, and most of us aren't born thinking that way. So, the game designers have kindly included a training mode that gives you plenty of time to practice at gentle speeds.

But you don't score any points in training mode. You can't get on the vanity board.

Why not? The vanity board is an important part of the reward structure of a game. And no one needs that reward more than children and beginners. Yet they are the very ones who are barred from that reward at the time they need it most. Why? Because bossy game designers have decided you don't get to use the vanity board until you're good enough.

Fine. I'm good enough—140,000 points on *Pipe Dream* and a complete passage through *Lode Runner*. I love these games. Furthermore, these games are exceptionally *friendly* by allowing more player options, more opportunities for death-free practice than practically any other games on the market. I chose them because they come *closest* to the ideal. But why couldn't they set up multiple vanity boards? Or allow players to determine vanity-board options just as they do playtime options? Alas, even the most freedom-loving game designers can succumb to arbitrary and unnecessary bossiness; and that's a shame, especially when it makes children feel second-rate while playing what is otherwise a great children's game.

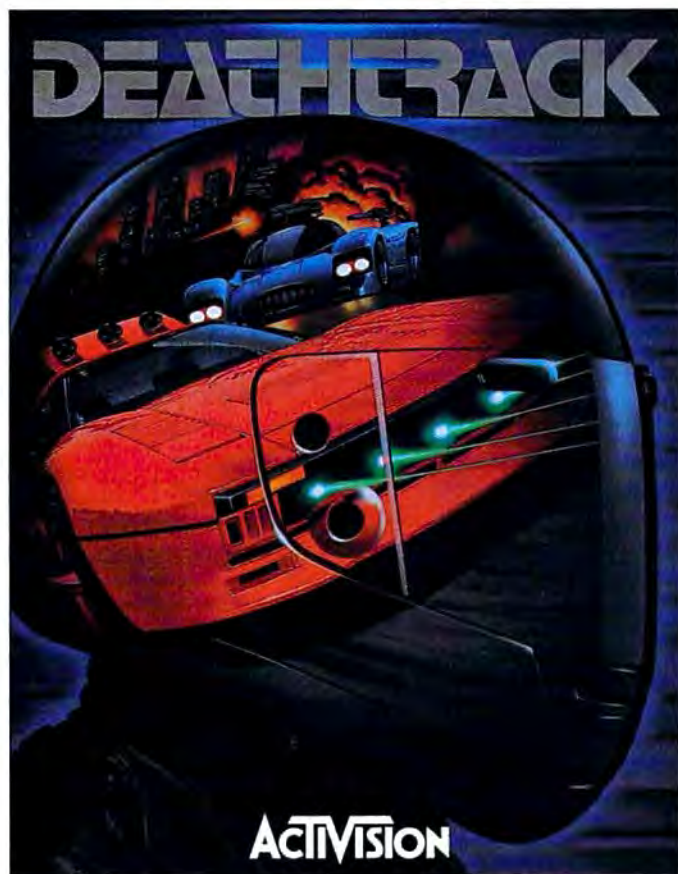
While you make these decisions, game designers, imagine a bunch of little kids standing around your computer desk, chanting: "You're not the boss of the game!" Maybe that will help you remember that you're not just designing games for the 14-year-old wizard with the reflexes of a hyperactive cricket. You're designing games that even klutzes and little children might enjoy—if you'll let us. □

**YOU'RE
NOT THE
BOSS
OF THIS GAME!**

pipe or the edge of the screen, that round ends. If your pipe is long enough, you go on to the next screen; if it's too short, the game is over.

The game is as obsessive as *Tetris* because it's simple in its basic structure while it allows almost infinite possibilities. The game may throw the pieces at you, but you're the one who decides where they fall. In that way, *you* create the playing field, and no two games are ever alike.

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Hurting through the turn, you lock-on to the lead car and fire. In less than a second, your Falcon missile slams into the target and explodes in a ball of fire. You smile to yourself—he was a good assassin, but a lousy driver. Instantly, your radar detects a Terminator bearing down on your exhaust. You swerve, but it's too late. A small mistake ends another brief career on the *DEATHTRACK*—yours.



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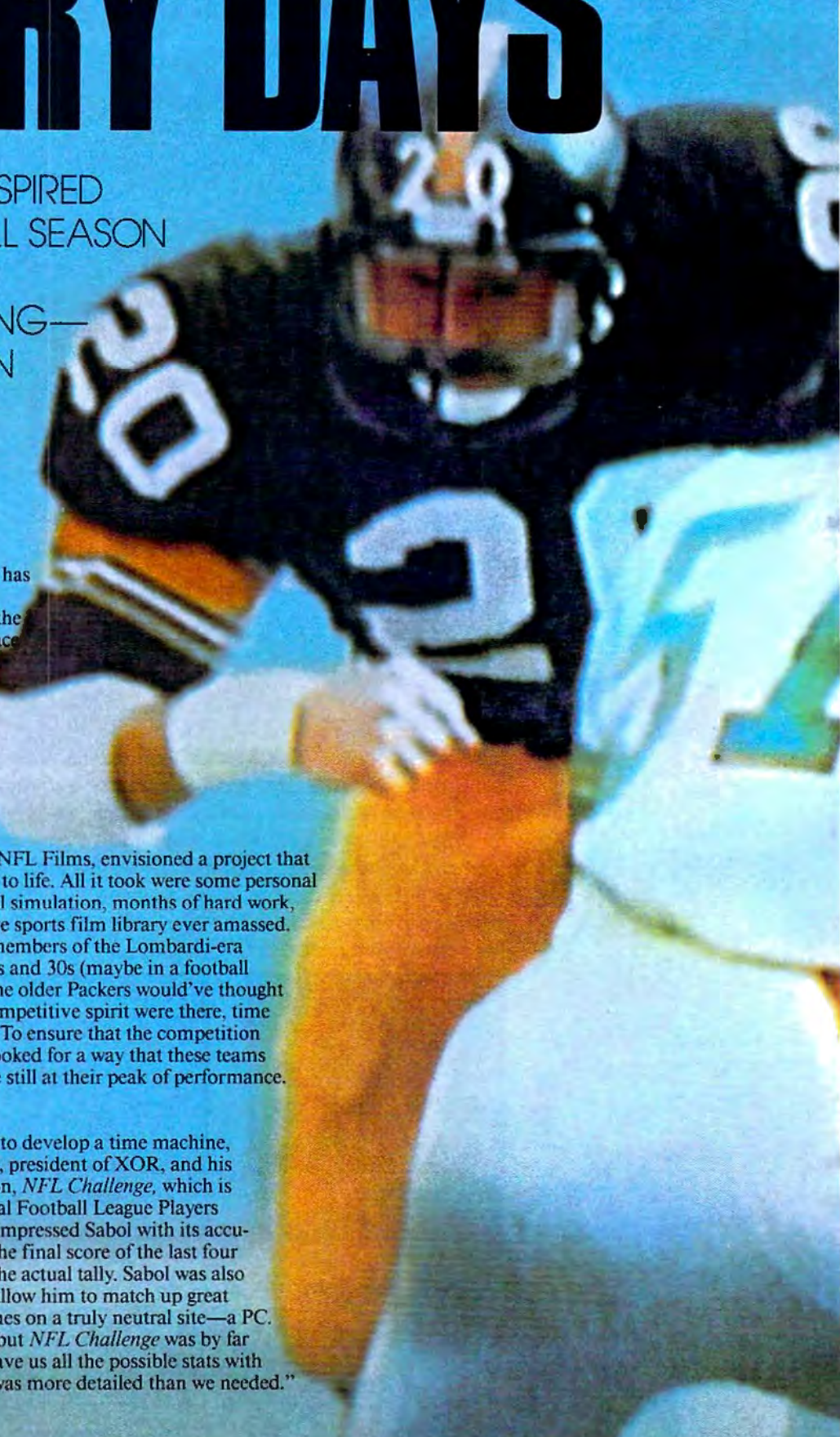
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Circle Reader Service Number 106

GLORY DAYS



THE COMPUTER-INSPIRED
FANTASY FOOTBALL SEASON
THAT PROVED
YOGI BERRA WRONG—
IT AIN'T OVER EVEN
AFTER IT'S OVER

MICKEY McLEAN

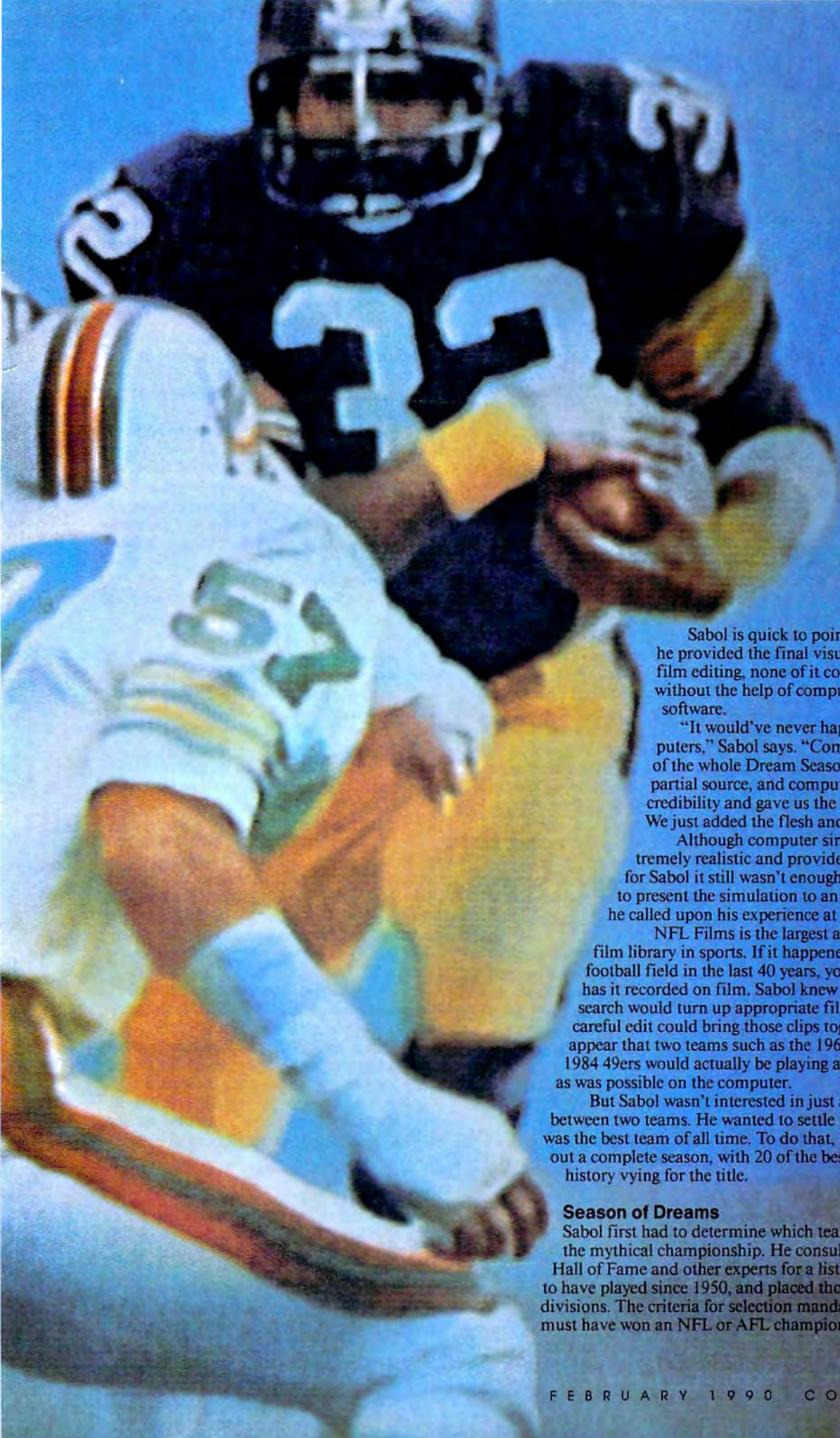
Almost every football fan has argued with family and friends over which was the greatest team to ever grace the gridirons of the National Football League. Maybe you're in your 40s and remember how Green Bay dominated the league in the 1960s, but your teenager insists that the Pack couldn't touch the 49ers from the 1980s. Steve Sabol, president of NFL Films, envisioned a project that would bring those dream match-ups to life. All it took were some personal computers, a comprehensive football simulation, months of hard work, and the vaults of the most impressive sports film library ever amassed.

If Sabol had tried to round up members of the Lombardi-era Packers to play 49ers still in their 20s and 30s (maybe in a football stadium built in a rural cornfield), the older Packers would've thought him insane. Even if the pride and competitive spirit were there, time had blurred the agility and strength. To ensure that the competition would be fair and impartial, Sabol looked for a way that these teams could play against one another while still at their peak of performance.

Time Travel

Instead of calling on a mad scientist to develop a time machine, Sabol enlisted the help of Bob Krutz, president of XOR, and his popular computer football simulation, *NFL Challenge*, which is licensed by the NFL and the National Football League Players Association. The software program impressed Sabol with its accuracy. He notes that it has predicted the final score of the last four Super Bowls within a few points of the actual tally. Sabol was also pleased that *NFL Challenge* would allow him to match up great teams, in their prime, in fantasy games on a truly neutral site—a PC.

"I looked at other simulations, but *NFL Challenge* was by far the most detailed," Sabol says. "It gave us all the possible stats with the game printouts and sometimes was more detailed than we needed."



Sabol is quick to point out that, although he provided the final visual product through film editing, none of it could've been possible without the help of computers and XOR's software.

"It would've never happened without computers," Sabol says. "Computers were the basis of the whole Dream Season. We needed an impartial source, and computers provided us with credibility and gave us the high-tech element. We just added the flesh and personality."

Although computer simulations can be extremely realistic and provide fascinating results, for Sabol it still wasn't enough. He needed a way to present the simulation to an audience. For that, he called upon his experience at NFL Films.

NFL Films is the largest and most exhaustive film library in sports. If it happened on a professional football field in the last 40 years, you can bet NFL Films has it recorded on film. Sabol knew that an exhaustive search would turn up appropriate film clips, and that a careful edit could bring those clips together to make it appear that two teams such as the 1966 Packers and the 1984 49ers would actually be playing against each other, just as was possible on the computer.

But Sabol wasn't interested in just a one-time match-up between two teams. He wanted to settle the question of what was the best team of all time. To do that, he would need to play out a complete season, with 20 of the best teams in NFL history vying for the title.

Season of Dreams

Sabol first had to determine which teams would vie for the mythical championship. He consulted the Pro Football Hall of Fame and other experts for a list of the 20 best teams to have played since 1950, and placed those teams into four divisions. The criteria for selection mandated that each team must have won an NFL or AFL championship. After the

GLORY DAYS



Only in a Dream Season would Cleveland's Jim Brown (32) face Lawrence Taylor of the New York Giants. (© NFL Films, Inc.)

teams were chosen, six games were scheduled for each team; the Dream Season became reality.

At that point, Bob Krutz at XOR took the ball. It was up to him to gather the statistical data necessary for use with *NFL Challenge*. XOR constantly updates data on current NFL stars for its season disks; therefore, Krutz had no problem compiling information for teams from the recent past. For teams that played prior to the release of *NFL Challenge*, Krutz used data from XOR's All-Star and Greatest Teams disks. The Greatest Teams disks feature the best players from each franchise. But even with that extensive amount of team and player information, there were still some holes. To help fill them in, Krutz enlisted the aid of local NFL experts (XOR's offices are located in Minneapolis) to research the remaining player ratings. The final product was not only used for the Dream Season but also became available for use by *NFL Challenge* players as *The Dream Teams Disk*.

Krutz played every game on each week's schedule 100 times. Whichever team won the most games was deemed the winner. Krutz then browsed through the results and selected one game that was representative of the score and statistics found in the majority of the games played. He then sent a play-by-play printout of the representative game (45-50 pages long) to Sabol at NFL Films' New Jersey offices.

If You Build It, They Will Watch

Each week, Sabol and his crew at NFL Films picked one game as a feature game. They then gleaned from their archives the appropriate footage to create a fantasy game that fans could watch on ESPN.

"We would feed NFL Films a book of statistical results for each week of the season," Krutz says. "They would go through the stats and build it out of that. And they did a remarkable job putting it together."

Sabol and crew pulled over 150 miles of film footage out of the NFL Films vaults. The footage

included from 15 to 20 games between each week's two feature teams and took over two months to edit, translating into almost 16 months of work to complete the entire season.

"It was like putting together a jigsaw puzzle," Sabol says. "To be accurate, we had to take into account weather, stadiums, playing surfaces, and uniforms."

It wasn't always possible to make a 100-percent-perfect duplication of the computer game, but Sabol came remarkably close. First, he searched through film of all the games the two clubs actually played against each other, and then he went through all the film from the year each team played, plus the year before and the year after.

"We tried to find a play similar to what the simulation called for, or we would find an appropriate beginning and end to the play," Sabol says.

Krutz says that Sabol remembered some plays from experience. "He is a walking encyclopedia of NFL Football," Krutz says. "He seems to remember almost every big play ever made."

Overcoming Obstacles

One problem Sabol encountered while working on the project involved the 1972 Dolphins, which featured Bob Griese at quarterback.

"Bob Griese, later in his career, began to wear glasses," Sabol says. "We thought about having him have a bad first half, then go in at halftime, put on his glasses, and have a great second half. But we didn't want to make a joke out of these games."

Helmets, which covered players' identities, and the air-brushing of uniform numbers solved many of Sabol's problems, but one feature game provided some unique obstacles.

"The most difficult game we did was the '66 Packers against the '84 San Francisco team," Sabol said. "None of the players ever played against each other. The stadiums, uniforms, and the film stock we used were different. That one game took over two and a half months to complete. But it was magic seeing Walsh versus Lombardi."

That game also featured several special touches that Sabol and crew added to the telecasts to provide further realism.

"That is really Vince Lombardi's voice you hear during the game," Sabol says. "It's also actually Bart Starr's voice calling the signals."

Sabol believed that what made the games seem even more realistic were the sideline close-up shots that revealed the reactions of players and coaches.

Play It Again, Steve

Many of those reactions didn't come from the past, however. A lot of ex-players and coaches were very vocal about their "computerized" performances.

"Some players and coaches were upset when their teams lost," Sabol says. "We set out to make it realistic, but maybe we did too good a job."

"Hank Stram [coach of the 1969 Kansas

City Chiefs] has been a friend of mine for 20 years, and when he saw his team get beat by the '76 Oakland Raiders, he asked me, 'What kind of trash are you putting into that computer?'"

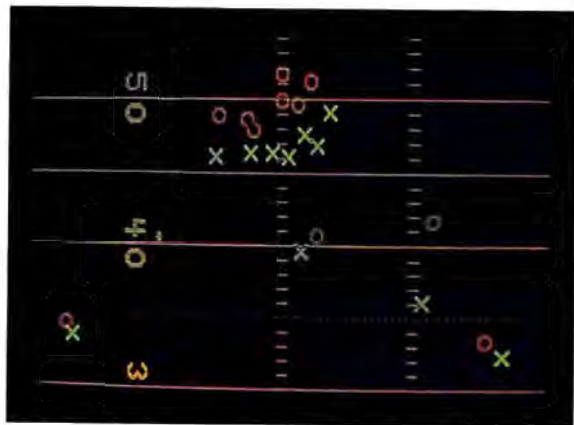
Several players also disapproved of the game results and botched plays. "These guys were feeling a sense of frustration," Sabol says. "They were watching themselves in action and couldn't do anything about it."

Despite the grumbling, coaches and players from these championship teams went on camera and pretended that the game was for real, providing insight into their game plans and revealing how they might handle an opponent who was from another era.

The schedule maker provided some interesting match-ups and created some bizarre conflicts of interest. For example, when the 1959 Baltimore Colts faced the 1969 New York Jets, Weeb Ewbank stood on opposite sidelines, coaching both teams. Chuck Noll found himself playing for the 1955 Cleveland Browns while coaching the 1978 Pittsburgh Steelers. Norm Van Brocklin played quarterback for both the 1951 Los Angeles Rams and the 1960 Philadelphia Eagles, while Paul Warfield lined up at wide receiver for both the 1964 Browns and the 1972 Dolphins.

Network Coverage

The final product of all the computer games and diligent film work ran on six consecutive Sunday nights on ESPN last September and October, then culminated in the Dream Bowl on October

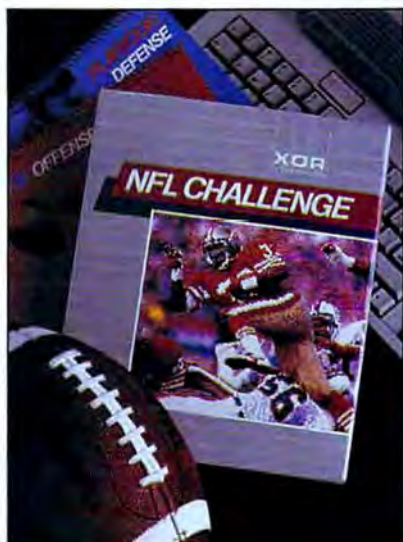


Before they were augmented by film, the fantasy football games were played out using XOR's *NFL Challenge*.

29. During the season, real-life Philadelphia Eagles announcer Merrill Reese provided the play-by-play, while Sabol offered his on-the-air analysis. At halftime, ESPN's Chris Berman relayed scores and highlights of other dream games from around the league, explaining that black-and-white footage was the result of some technical difficulties.

"ESPN provided us with great publicity," Sabol says. "They showed a great sense of adventure by airing it, and it worked."

When the regular season came to a close, the 1978 Pittsburgh Steelers had captured the East division; the 1984 San Francisco 49ers, the West;



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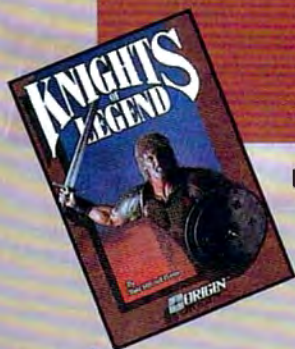
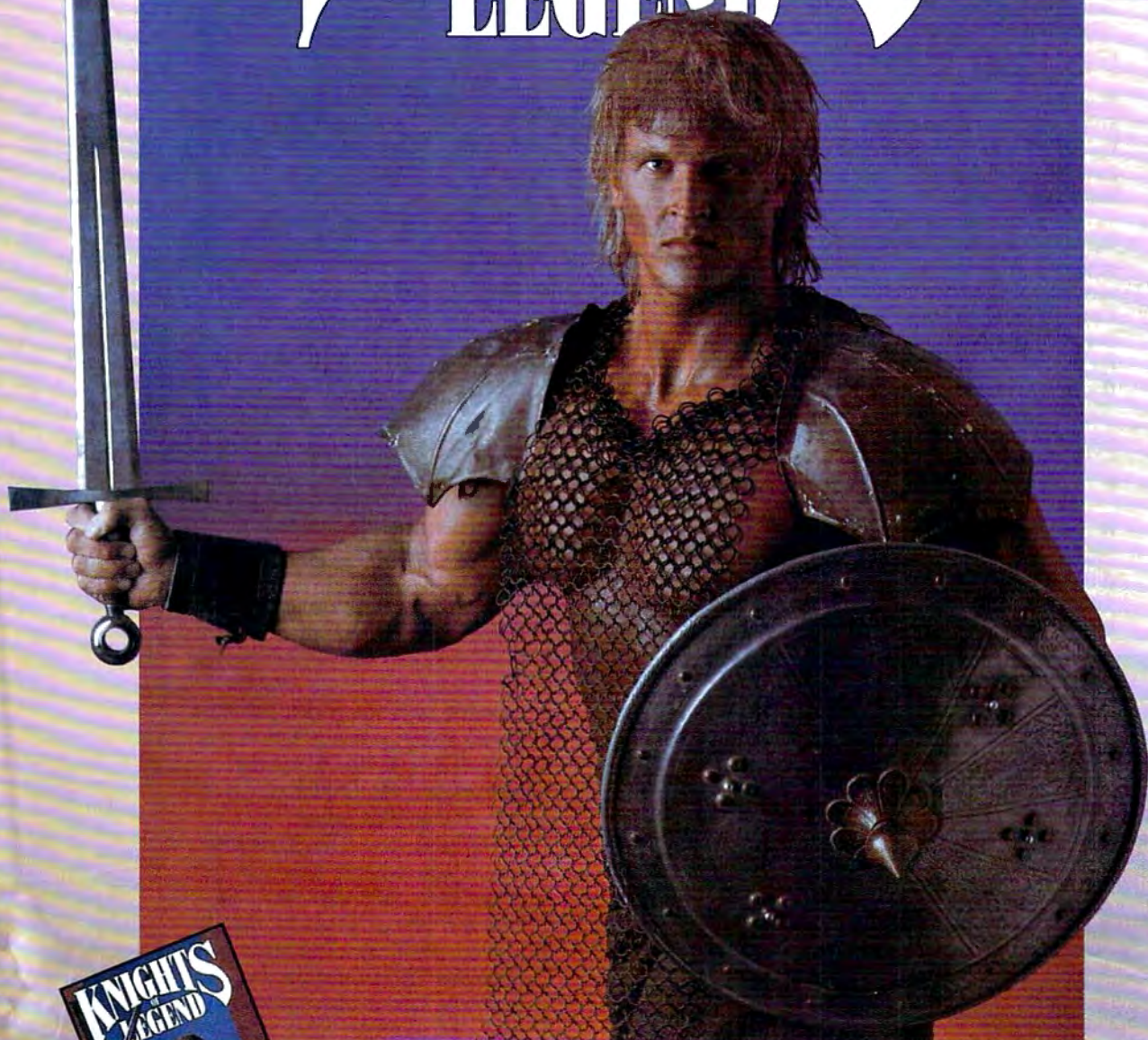


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GLORY DAYS

the 1976 Oakland Raiders, the North; and the 1972 Miami Dolphins, the South. In the Fantastic Four playoffs, the Steelers defeated the 49ers, while the Dolphins downed the Raiders. Then it was on to the Dream Bowl.

Don't Step on My Blue Suede Cleats

Most Super Bowls have been super yawns, but the Dream Bowl poured on the excitement from beginning to end. Before the game, Dream Bowl organizers brought Elvis back from the dead to toss the coin. And to top off that rousing beginning, Pittsburgh running back Franco Harris plunged over the goal line from three yards out on the last play from scrimmage to give the Steelers a 21-20 Dream Bowl victory over the Dolphins. (The 1972 Miami team didn't lose a single game in reality. It's the only team in NFL history to have finished a season with a perfect record.)

Although the game appeared to have been won at Pittsburgh's Three Rivers Stadium, in actuality it was played out in Minnesota on Bob Krutz's PC, where the computerized Steelers prevailed in 52 of 100 simulated games.

Son of Dream Season?

Sabol and Krutz are still recovering from the tedious Dream Season project and have no plans to repeat the experience. "There will be no sequel," Sabol says. "We'll wait at least ten years before we try anything on this scale again."

At the Snap

For more information on products mentioned in this article, contact XOR, 7607 Bush Lake Road, Minneapolis, Minnesota 55435; (800) 635-2425.

NFL Challenge (version 2.01)
IBM PC and compatibles—\$99.95

NFL Challenge (version 1.03)
Macintosh with one megabyte of RAM—\$99.95

The Dream Teams Disk
IBM PC and compatibles—\$19.95

There is a possibility, however, that we'll see some special projects, including one-time matchups between teams such as this year's Super Bowl champion against the Dream Bowl winner.

So, while we watch another decade of great players, super games, and dramatic comebacks, we can hope for another glimpse into the world of computerized fantasy football. And by the way, if you missed the telecast of the Packers and the 49ers during week 2, the old-timers did well for themselves, defeating the 1984 Super Bowl champions 28-21. □

Mickey McLean is an editorial assistant at COMPUTE! Publications. He holds the sports trivia title in our office.

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

As in *Tetris*, the key to most cube-based games is to know what to do with pieces before they fall. In your head, you should be saying, "If I get a three-pronged corner piece, it can go here or there. If I get an L-shaped piece, I'll need to flip it horizontally to fit it there." All the time, you should prepare for contingencies.

In California Dreams' *Blockout*, there are three groups of shapes, and they correspond to the difficulty of the game. I'm still trying to master the second level, which uses the Basic set of shapes. In this set, you'll find two shapes that cannot lie flat. No matter which way you flip them, they take up at least two rows. Both shapes have an analogous flat shape, though: the three-piece corner shape. Whenever one of these two-level corner pieces comes up, just think of it as a flat corner piece and find a place for it without worrying about the extra level.

On the other hand, there is a way to use the two-level corner shapes to your advantage. For either shape, look for a space with a two-cube hole on one level and an adjacent one-cube hole one level down.

When you get the three-pronged shape, for example, flip it once and it will fit neatly into a space with a one-cube hole that's one level down from two cube holes that meet diagonally. The new piece turns that area into a tidy rectangular box.

I still can't master the hardest group of cubes. They take up more than two levels, and it's so easy to block off several rows at a time. Anyone out there have any ideas?

Heidi E. H. Aycock
Chapel Hill, NC

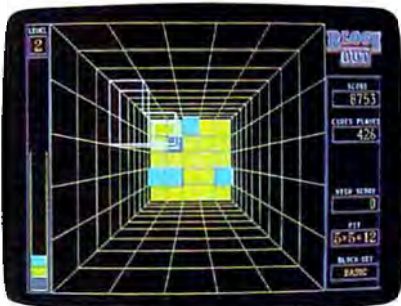
Art of War

In Brøderbund's *The Ancient Art of War*, armies are composed of three different types of soldiers: archers, barbarians, and knights. The most important lesson is to learn what each type of soldier is good for. Archers are

good at picking off slow-moving knights. A knight's armor and sword makes him effective against barbarians, while the swift-moving barbarians are the best choice for eliminating enemy archers.

If you find an enemy army composed of a single type of soldier, try forming an army composed of the best type of soldiers to fight against that type. For example, if you spot an enemy army composed entirely of knights, split off archers from your armies and form them into a separate army; then send it against the enemy knights.

The formation of an army is important to its combat effectiveness. Be careful of the terrain as well—troops



You can fill a hole and clear a level if you rotate your block before you drop it.

fighting uphill are at a serious disadvantage.

Fighting with mixed units requires careful planning. If your army of knights and archers is opposed by an enemy army of knights and barbarians, don't just rush to the attack. Instead, order only your archers to attack. This will eliminate many of the enemy knights. When the enemy barbarians approach, order your archers to back off and then let your knights attack.

Keep a close eye on the condition of your troops. Fatigue has a drastic effect on an army's performance, and if your troops are too tired, they may choose to surrender rather than fight. A good food supply is an absolute must. Capturing a town supplies your

men with food, while denying it to the enemy.

Brandon Alexander
La Crosse, WI

Mansion Maniacs

Here are some tips on how to get out alive when playing Lucasfilms' *Maniac Mansion*. You'll have to lift weights before you can open the garage and the grass-covered grating near the steps at the front door.

To get the radio out of the swimming pool, you have to turn on the water valve at the end of the hallway of pipes, which is located below the grating. But be careful—if you leave the water valve on too long, the mansion will blow up. If you push the red button on the wall of the pool, it will blow up, too!

Diane Sides
Kernersville, NC

On a Quest

Here are some clues to get you through the tougher spots in Sierra's *King's Quest III*.

If you can, avoid the Wizard. But if he tells you to do a chore, do it. Explore the countryside while the Wizard takes a journey, but be careful, as he will soon return. Watch your back while exploring here.

Go into the Wizard's office, move a book, and pull the lever. A trap door will open. Kick the cat out of the way, search the shelves, and take everything.

The porridge will come in handy when you're trying to get rid of the Wizard.

Dragons are easier to kill when they can't see you. And you'll need to brew up a storm to save the princess.

Chad Stone
Winston-Salem, NC

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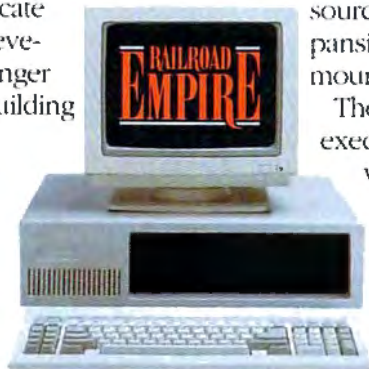
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LEARNIN

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RICHARD C. LEINECKER



Grade-school programming students usually begin with Logo, then after a few years discard it for "higher-level languages" and spend their remaining years of study showing disdain for the language. But now, Logo Computer Systems Incorporated (LCSI) may have shattered that perception with *Logo Writer*, a revamped version of the age-old classic.

What are the benefits of programming in Logo? First, Logo's commands are easy to use, easy to understand, and easy to master, even for kids and nonprogrammers. Also, Logo is a structured language. You

can easily develop simple, complex, and even recursive procedures to perform almost any task. That may sound like a dichotomy, but it's not. A set of simple building blocks (the commands) can be assembled into larger parts (the procedures) to create a complete structure (the program). It's like building a mansion out of single bricks or writing a novel using single letters and words.

Logo Writer combines the strengths of Logo with several substantial enhancements. These include a powerful program editor, new commands, extended graphics, and a page-and-scrapbook metaphor that simplifies the disk storage concept for young users.

The text editor found in earlier Logo implementations has been replaced by a word processor-like environment. Cut, copy, and paste functions simpli-

fy writing and editing programs. Also, you're no longer forced to switch back and forth between the editor and the output display—they are now integrated on a single screen. Commands typed on the main screen are executed immediately. You create programs and subroutines on an alternate screen called the Flip Side. These routines can then be accessed from the main command screen or other subroutines. There's nothing like immediate feedback and reinforcement while learning.

Logo Writer has powerful search capabilities. You can search for a text string and replace it, delete it, or insert text before it. Not many versions of Logo allow that.

Single-keystroke commands help

G



further tame the user interface. Get a directory, see onscreen help, and view the previous or next screen with the touch of a key. You can select a page to load with the cursor keys. The keyboard layout posters, adhesive templates, and conveniently sized reference cards that come with the program make it easy to learn the various keystrokes.

Commands added to the standard Logo repertoire increase *LogoWriter's* power. They also make programming easier by streamlining some previously awkward tasks. LCSI didn't add incompatibilities by changing the standard set of instructions; it simply added extras that can be used once you master the fundamentals.

LogoWriter lets you parse a string of characters, converting them into a list. A clumsy set of instructions in many other languages, parsing is automatic in *LogoWriter*. This parsed list can then be used to make a complex set of decisions. This is a first step when developing artificial-intelligence programs.

Most programs easily accept key-press inputs. *LogoWriter* programs are no exception, but the language adds direct support for hot keys, something I've never seen in any other language. Plenty of programs, especially terminate-and-stay-resident programs, are activated with hot keys. But implementing hot keys is usually very difficult. In *LogoWriter*, though, it's as easy as typing WHEN "Z [PR HELLO WORLD]. Every time you press the control-Z key combination, HELLO WORLD will be printed on the screen. When you want to deactivate the control-Z hot key, simply type CLEAREVENTS. The entire process is quick, easy, and extremely effective in programs.

I've only mentioned a small portion of the command additions. Flash and glitter play as important a role in

keeping kids interested as do fancy programming techniques—and *LogoWriter's* beefed-up graphics support gives you plenty.

Turtle graphics are a big part of what makes Logo so popular for programming instruction. Kids give an onscreen turtle commands such as TURN, FORWARD, PEN UP, and PEN DOWN. With the pen down, the turtle draws a graphic trail behind it as it moves across the screen. Students learn programming fundamentals as they learn to draw pictures by moving the turtle around the screen.

LogoWriter has four turtles that move smoothly across the screen, either independently or in synchronization. Actually, the turtles no longer have to be turtles. You can set them to any shape within a 16 × 16 pixel size limit using the shape editor. Modify any of several dozen shapes provided with the package, or add to the collection by filling in blank shape tables. As you edit a shape, you see both a magnified version and an actual-size version. Move the cursor around in the edit box and hit the space bar to toggle bits on and off. The actual-size shape changes, too, so that you can see exactly what it will look like in your program.

If you have an EGA or a VGA monitor, get ready to splash your programs with vivid color. The appearance of 16-color EGA Logo programs can rival most commercial programs. Taking full advantage of the 256 VGA-color spectrum could produce a program competitive with the most graphically intensive packages. The execution speed isn't up to the snuff of commercial games, though. As with any interpreted language, Logo has operational overhead that slows it down. But if you want graphics, and

speed isn't high on your list of priorities, *LogoWriter* fills the bill.

Within several hours of first installing the program, I had made complex patterns and shapes come alive on the screen. I was able to make triangles rotate, change colors, shrink, and grow in different sequences. Where was this package when I was teaching rotations, symmetry, and similar figures in geometry classes several years ago?

One of the more substantial benefits of Logo is its crossover to other subject areas. To its credit, LCSI has exploited this ability.

Math concepts are the first to come to mind. Make the turtle go forward 50 pixels, turn right 90 degrees and go another 50 pixels, and you've covered distance, spatial relationships, right angles, and event sequencing. Create some random numbers, use them to make decisions, and the field of statistics has been addressed. But why is this package any better at fostering these cognitive processes than other languages and educational tools? It's the examples that are provided. The home version takes you through them step by step, while the school packages provide several activities and reinforcements. Example pages on the disk will also put you through the paces.

The comprehensive working environment *LogoWriter* provides is also an excellent tool for other classes. Consider a biology project on the development of houseflies. You can easily integrate text and graphics to

present information and graphically depict different growth stages. Demonstrate how wings and other parts work by defining the four turtles as shapes that work together. Draw a map and show migrations and population tendencies. Soon you have a full-fledged, audio-visual report—the type that gets superior awards at science fairs.

Now for an exercise in creative writing. Interactive stories are gaining popularity in educational software, and *LogoWriter* gives you the chance to create your own. Suppose that you're writing an adventure story that takes place in Civil War America as part of an American history lesson. The story begins with a text description that sets up the scenario, and then it displays graphics representing the fragmented country. Mixing graphics and text is easy, and you can prepare and save screens in advance. Saving and loading screens is as simple as typing `SAVEPAGE` and `LOADPAGE`. Pressing a key takes you to the next scene (or page in *LogoWriter* lingo), where the student can choose between learning about the Battle of Gettysburg, the Battle of Vicksburg, the surrender of Lee's forces at Appomattox, or Sherman's burning of Atlanta. A single command in your program gets the student's keypress.

The choice branches off and calls a sequence of pages that represent the topic. You can easily create maps and charts with the multitude of graphics commands. Turtles provide animation to illustrate events, and musical tones add a convincing final touch. You can have all the stuff of a Hollywood presentation with the impact of multimedia.

One of the benefits of creating presentations with Logo is that not only do the viewers learn, but so do the creators. Organizing thoughts and information in such a way as to convincingly present them helps solidify understanding and knowledge. Fuzzy concepts become concrete and real after you've assembled them into a program. And the fact that *LogoWriter* is packed with so many easy-to-use features makes it an ideal facilitator.

The scrapbook metaphor is very effective at representing disk files. When you first run *LogoWriter*, the program displays a directory of pages to select from. Included on the pages are the scrapbook, the set of programs, routines, tools, screen images, and projects. You can link these into larger parts or leave them as stand-

alone creations. One nice touch is a startup routine that will automatically execute a page when it's selected.

LogoWriter dedicates a section of memory to user-defined tools. The tools are subroutines that you write to simplify repetitive program routines. These can then be saved as a page and used by any other page. Just type `GETTOOLS` and they're in memory, completely transparent to users. For example, you could create a routine called `MAKEDSIGN` and save it as a tool. When the user types `MAKEDSIGN 50 45`, a preprogrammed function will cause a complex design to form at screen location (50,45). The tools are there in memory for the student to use at any time.



Your geography presentations can include informational text and graphics.

Educators will be especially happy to hear what's in the school packages. First, there's a complete guide to *LogoWriter*, with examples and full detail on implementation. It's more than a list of the commands and the arguments; it's a definitive book that will answer almost every question you have about the language. The included teachers' guides contain the major lesson-plan components. Objectives, procedures, evaluation techniques, and enrichment activities are all in the package—just plug them into the weekly plan book and you're in business.

The activity cards provide the curricular structure for teaching Logo. They systematically follow through the language in bite-sized portions. The activities initially introduce simple ideas and then elaborate on those. It's just enough to get the creative juices flowing. With the right instructional nurturing, the students' discovery process should flourish. This is what education is all about, and LCSI should be applauded for its efforts toward this end.

In spite of the positive contributions of this package, I have some criticisms. I've always been frustrated when dealing with Logo variables. There's nothing that you can't do with

them, but in a language that boasts simplicity as a major feature, it should be easier to use them. I realize that *LogoWriter* needs to retain compatibility with other versions of the language, but something could have been done to make using variables more intuitive. As I was trying to push subroutines to the limit of the language, I found myself dealing mostly with awkward and clumsy variable manipulations.

A compiler is another important feature missing from *LogoWriter*. What we need is the ability to create stand-alone programs that can be distributed. A compiler would let students give copies of their Logo programs to friends or show them at events such as science fairs without needing a copy of *LogoWriter*. It would also give programmers the chance to write commercial software with Logo.

There's another omission, an especially serious one for what should be the ultimate structured language: Logo doesn't have a set of structured control devices. `WHILE`, `DO`, and `UNTIL` constructs and loops aren't possible. There's a way to fake it with clever error-trapping, but that's a convoluted process compared with using the types of controls found in most structured languages.

In spite of a few omissions, *LogoWriter* deserves a place along with the very best educational tools. In an age of increased pressure on schools, this comprehensive package should find its way into every curriculum. Across-the-board benefits justify its cost, and parents interested in home learning will find it invaluable. So, get your copy for home and lobby for your school district to adopt it. We'll be reaping the benefits for years to come.

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DISCOVERIES

DAVID STANTON

Recently, I was surprised to find a well-known computer columnist writing disparagingly about the value of multimedia in education. Comparing it to the failed and forgotten teaching machines of years past, he pointed out its shortcomings as a total education solution. He accused Apple of overselling the concept. He argued that computers and the current interest in multimedia applications would soon fall by the wayside. Computers, after all, cannot teach, and he seemed to think it was time we accepted that fact.

As an educator, I found myself applauding his high regard for teachers. Anyone who thinks that technology alone can maintain discipline in a roomful of sophomores has never taught a high school class. Anyone who imagines that a CPU, a monitor, and a mouse can magically turn apathy into enthusiasm has never attempted to instruct the unmotivated. Anyone who expects a PC, a VCR, a laser disc, and a spider's web of cables to transform mediocrity into excellence doesn't understand the complicated processes of learning. Effective teaching has always required a human touch, and it will continue to do so until technology develops far beyond its current limitations.

Computers, isolated and unassisted, cannot teach. Nor can films or filmstrips, educational TV, or slide shows with synchronized sound and music. Likewise, buildings don't teach, whether they're libraries or museums or universities. Textbooks and overhead projectors don't teach, either. Like multimedia, these tools become effective only when employed by skilled teachers who know what to teach and how to teach it.

However, admitting that tools have limitations doesn't mean discarding them as valueless. Computers haven't turned every child into a genius, but they have permitted schools to prepare teens for work in a modern

world. It's safe to say that multimedia applications will not solve all educational problems, either.

Nevertheless, if we expect schools to remain effective, then society must continue to provide educators with the professional tools necessary for doing their job. Increasingly, those professional tools include computers, scanners, laser printers, CD-ROM players, videodisc players, sound digitizers, and the software they require.

Once provided with proper equipment, teachers can begin experimenting with multimedia approaches to see what works and what doesn't. Traditionally, educators have been open to new technologies while maintaining a healthy skepticism. That mix of openness balanced by a "show me" attitude explains why desktop publishing is only now gaining strong support after years of proving itself in business. Considering the large investment required, educators should have

children with different backgrounds and interests. Second, investments in hardware provide a double benefit because students and teachers can use the same equipment to run packaged products and to produce their own presentations. Judging from current literature and experience, multimedia may prove most effective in situations where students design, research, write, and produce, rather than ones where they merely work with the products of others.

That brings us back to the relationship between teacher, learner, and learning tools, whether those tools be books, filmstrips, or multimedia worlds. Ultimately, even teachers may not really teach as much as they provide opportunities and environments in which students can and will learn.

Don't misunderstand—I'm not arguing against healthy skepticism about multimedia solutions, or any other untested educational approach, for that matter. We've all seen schools jump on and off too many bandwagons to accept every new trend with open arms. But skepticism should not mean blind rejection.

When computers first started trickling into schools, I was very skeptical. No one knows better than teachers the depressing lows that inevitably follow each unwarranted high engendered by those who promise too much and know too little. It took time, but teachers found a proper role for computers. Keyboarding classes replaced typing courses as educators and policy makers discovered the benefits of word processing. Elementary teachers found that students who couldn't sit still to do math work sheets could spend an entire period practicing those same skills while playing computer bowling. English teachers realized that spelling checkers could provide extra help for poor spellers.

So what about multimedia? Can it find a place in tomorrow's classrooms? Maybe so. Maybe not. But anything that offers hope for helping teachers teach and learners learn deserves a fair chance. □

MAKING THE CASE FOR MULTIMEDIA

ample time to evaluate the technology before schools waste significant tax dollars on unnecessary equipment.

In any case, the multimedia movement has at least two major things going for it. First, today's educators and developers recognize that teaching and learning are complex, interrelated processes that require a multiplicity of approaches to reach

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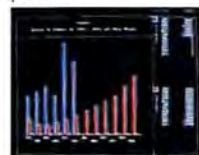
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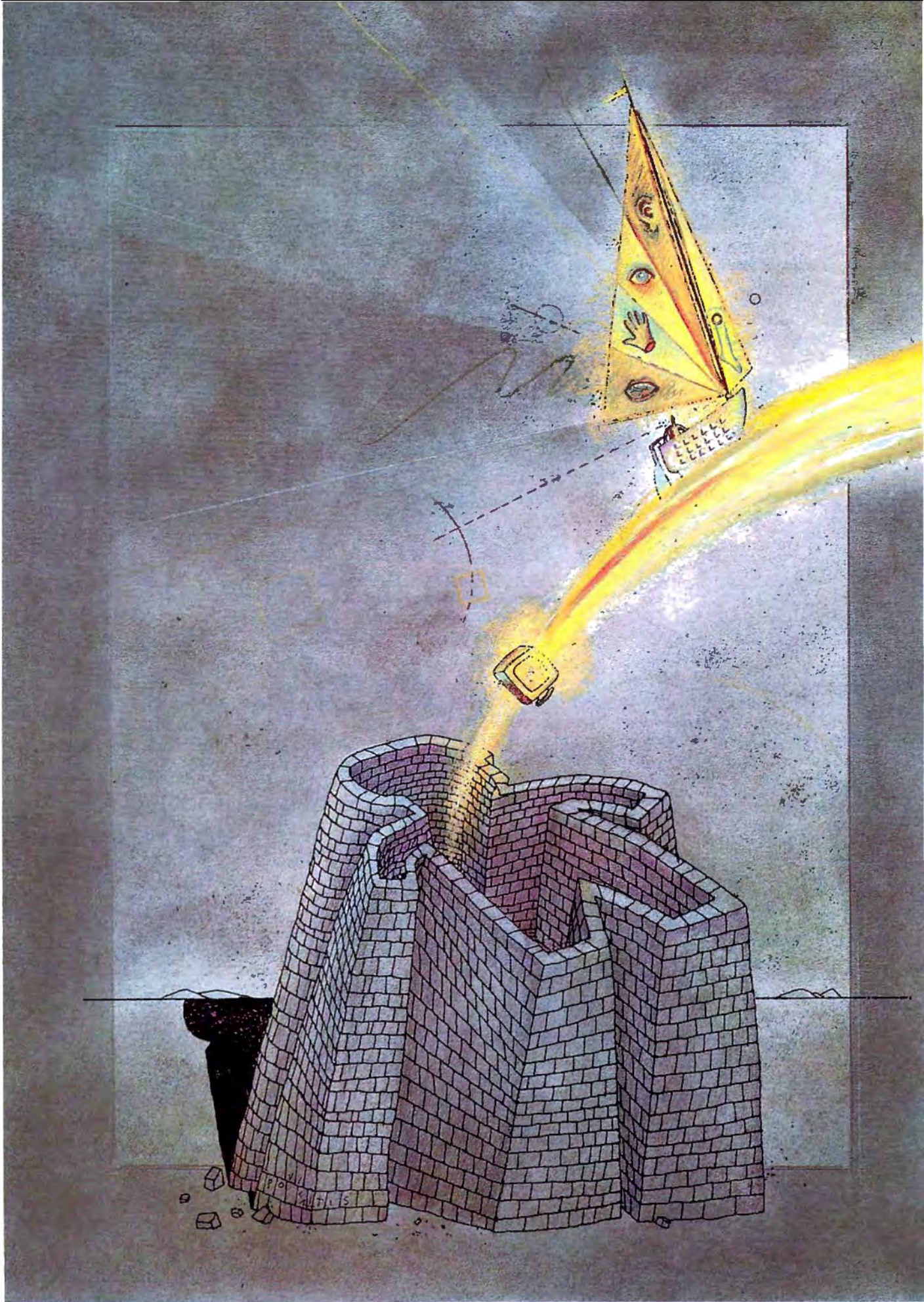


Illustration by David Povilaitis

BUILDING BRIDGES

HOWARD MILLMAN

As recently as six years ago, the technology that expanded the world of disabled people was no more advanced than it was in medieval times. Today, breakthroughs in computer technology enhance the quality of life for many handicapped people. Computers also throw open doors to new educational and employment opportunities.

"Since the beginning of time, people who had severe disabilities were measured by what they couldn't do. Now we look at what a person can do, no matter how minimal, and bring technology to augment their diminished abilities," says Bud Rizer, director of the Technology Resource Office in the Maryland Rehabilitation Center. Without technology, the disabled would still be relegated to pointing at picture boards or suffering the frustration of communicating through incoherent gestures.

In the past six years, we've seen an explosion in the amount and sophistication of technology crafted to help the disabled people in our society. Most of the recent advances are in two product categories: assistive devices that compensate for decreased mobility and adaptive devices which are designed to advance communication skills.

These devices increase the self-confidence of disabled people and amplify their sense of control over their environment. "With speech synthesis and text-to-speech converters, we are seeing handicapped children come alive," says Sidney Schneider, a language pathologist at the Everhart School for exceptional children in Tallahassee, Florida. "Self-esteem is a wonderful word to describe the kids' reactions. Their facial expressions say 'Hey, I'm not locked in this unresponsive body—I do have control over my environment.'"

Goal Seeking and Game Playing

Technology's implied goal is to increase the amount and quality of time that disabled people spend interacting with others. Schneider uses computer games to decrease the unrewarding hours kids spend alone and to provide them with a measure of achievement. "Game playing produces a cause-and-effect relationship. The kids say to themselves, 'If I push this button, I will see the results of my action on that screen.'"

For handicapped children, game playing serves as a bridge to other kids, an entertaining expedient to communicating and finding companionship. The computer functions as a translator, shrinking the differences between mainstream and handicapped kids.

Molly Shannon, a teacher in the Hurst-Euless, Bedford School District in Texas, attaches even greater significance to game playing. "For the physically handicapped child, there are not many opportunities to play. Playing is an important part of a child's day," Shannon says. "If you can't play, you cannot learn how your body works. And there are many other things they miss, things like social interaction."

Shannon and Schneider see technology as a tool, a means of delivering needed services to the disabled. And, just as a key unlocks a door, technology unlocks potential.

"Whether it's computers or computer games, the goal is to allow teachers, therapists, and clinicians to exploit technology's capacity in returning and integrating the disabled back into society," explains Dr. Michael Behrmann, director of the Center for Human Disabilities at George Mason University in Fairfax, Virginia. "This includes the recreational, living, and work environments. With remote-control devices, the disabled can control lighting, TVs, heating, and air conditioning; open doors; or perform a multitude of everyday tasks." ▸

TECHNOLOGY LINKS DISABLED PEOPLE TO THE WORLD

Technology's Solutions and Shortcomings

The wizardry of technology provides help for children and adults who suffer from speech, motor control, visual/aural, emotional, or learning problems. Within each of these groups, educators employ computers in a distinct way.

To compensate for inadequate motor control, solutions range from oversized keyboards (with one-inch square keys); mouth-, foot-, and head-activated switches; and breath-operated switches. Disabled children can even control Nintendo games with an adaptive device that combines a puff switch with a chin-operated joystick. By using head- or limb-activated switches, infants as young as ten months old can use technology to ask for attention or operate toys.

Voice commands augmented by speech-recognition devices assist speech-impaired kids. The sounds need not be recognizable as words; all the computer needs are uniform, repeatable sounds.

If users aren't visually impaired, they can use speech recognition to perform gainful work in offices (interacting with computerized data) and in industry (especially in quality-control tasks). These devices also allow handicapped people to participate in conversations with others.

Given the results that can be achieved with technology, why isn't it more widely employed? The answer has two components: inadequate training and inadequate funding.

In competition with many other academic programs for scant budget dollars, programs for handicapped kids suffer because of a flawed image. One speech-language therapist in a Westchester County, New York, school district, believes much of the funding problem stems from a lack of "glamor." In an unusually candid observation, she says, "Daily, we face the reality that funding for programs to aid the handicapped is not popular. What's worse, if by some miracle we do achieve a superior program, parents, desperately seeking the best opportunities for their children, move into the school district and overtax the program's resources. School boards frown on such 'success.'"

Maryann McCandless, special education technology assistant for the City of Hartford, Connecticut, strives to make the best of her limited equipment and funding. Her school district has 30 computers allocated to special education students spread among the district's 30 schools. Yet McCandless remains optimistic; she feels that the administration is sympathetic, and she has achieved modest success raising funds from private and government sources. "Realistically, I

don't expect to ever acquire the topnotch level of technology I'd like to achieve, but I will nevertheless continue to seek outside funding sources," she says.

One source of funding is the federally financed Technology-Related Assistance Bill. Administered by the National Institute of Disabilities and Rehabilitation Research (NIDRR), the Tech Act provides funding for states to develop a coherent technology-information and -dissemination resource program. To date, nine states have received \$500,000 grants. During the life of the act, all 49 states that applied initially will receive similar funding.

Many people interviewed spend some portion of their time fund-raising. While no accurate statistics exist, these people said that they spend 10 to 20 percent of their time influencing budget committees or writing grant proposals. Sometimes it's on behalf of an entire program; other times the efforts are for several especially deserving children. McCandless says, "I deal with some kids who are very impaired. Kids who live in the inner city and endure not only their handicap but poverty and family troubles as well." McCandless champions the cause of these kids as she tries to find outside funding sources. Only sometimes is she successful.

More hardware and software constitutes only one part of the solution. To exploit technology's potential, the profession admittedly needs more trained personnel. "The present level of training is not adequate," says Behrmann, of the Center for Human Disabilities in Virginia. "There is a crying need for trained personnel so we can infuse technology, where appropriate, into new and existing programs." As is often the case, technology has progressed faster than people can be trained to use it.

As a partial solution, Behrmann suggests using expert systems, a branch of artificial intelligence, to reduce the demands upon the limited pool of trained teachers and clinicians. In expert systems, the expert transfers his or her knowledge into a computer program. Then, guided by this recorded knowledge, less-trained people determine the subject's abilities and implement specific goals. Theoretically, the program delivers the same recommendations as the expert would if the expert were available.

Expert systems, while far from foolproof, do work. And, once debugged through constant honing, they can significantly broaden the distribution of professional services. ▸



BUILDING BRIDGES

Perhaps the most promising embryonic technology is neural networking. Unlike regular computer programs, which dutifully execute instructions, neural networks imitate the human brain. They can, for instance, learn from past errors, execute midcourse corrections, and recognize patterns.

Complicated, and far from perfected, neural networks hold the greatest promise for the quality of life of handicapped people. In addition to providing tangible assistance, computers benefit the disabled indirectly by allowing teachers to be more effective. Using neural networks, the computer temporarily becomes the child's instructor and allows the teacher more time to deal with other children. Likewise, computers also simplify teaching children with varied intellectual skills or children of mixed physical abilities. And since computers are nonjudgmental, children do not feel rejection when a machine, with a bell or a beep, reveals their errors.

Hardware, too, continues to advance. Intensified research efforts result in unprecedented new developments, such as those listed below.

- L. C. Technology's acclaimed EyeGaze System lets a computer accept input based on eye movement. While a person focuses on a particular character, word, or icon on a monitor, low-power infrared waves read the eyes' position. At the same time, special software correlates the line of sight with the targeted reference point on the monitor and displays the related information. The system enters words on a monitor and activates appliances in accordance with these EyeGaze commands.
- Scanning instruments read text directly from a printed page, enlarge the characters, and display the text on a monitor.
- Prab/Heath/Zenith's robotic arm activates switches and appliances as well as grasps objects, answers the telephone, and even feeds severely disabled people. The device is controlled by voice commands.
- Text-to-speech converters, such as IBM's Screen Reader, "speak" the words displayed on the monitor screen.

McCandless describes the awe some of these devices inspire. "We find students talking to the machines. In one case, a little girl was directed by a speech synthesizer to touch a circle. She complied, then leaned into the speaker and said 'I did. What do you think?'"

Behrmann relates a story about a 35-year-old retarded man who was physically unable to communicate. "We suspected he knew how to read and write, but, since he was unable to express himself, we never knew it. When provided access to a computer and adaptive devices, the man surprised us by writing an article for the training center's newsletter."

By allowing the disabled to communicate, computers impart a sense of accomplishment. Properly applied (and that denotes using skilled instructors along with the proper equipment), technology decreases drudgery and increases motivation.

Product-Information Sources

The following organizations offer information about computer options for people with special needs.

■ The Council for Exceptional Children, Division of Special Education Technology in Reston, Virginia (800-873-8255), distributes technical information on adaptive and assistive devices as well as on locating services and resources.

■ TRACE Center, in Madison, Wisconsin (608-262-6966), is a branch of the University of Wisconsin. This organization publishes the 800-page TRACE Resource directory (\$49), a comprehensive compilation of assistive/adaptive devices as well as service agencies. It also provides free information on finding local assistance throughout the United States.

■ IBM's National Support Center for Persons with Disabilities in Atlanta, Georgia (800-IBM-2133 or 404-988-2733), provides information about a broad assortment of hardware, adaptive/assistive equipment, and agencies. IBM Special Needs Exchange also has an electronic bulletin board which you can contact at (614) 433-0851.

■ Edlinc's Bulletin Board System and trained researchers offer advice on the availability and applicability of educational software for mainstream and special-education students. Edlinc's expanding databases presently hold detailed information on 1000 programs supplied by more than 100 software publishers. The voice number is (800) 736-1405. Schools and other accredited institutions can tap into Edlinc's BBS to perform their own searches and read topical online reports. Call to apply for access instructions and a password.

■ The U.S. Department of Commerce and Office of Personnel Management, Washington, D.C. (202-377-5691, contact: Mark Sakaley), hosts an annual exhibition and conference on computers and other technologies designed to aid the handicapped. About 50 vendors and organizations participate. The exhibition is held in Washington on the first Thursday in October.

■ Contact Prab/Heath/Zenith at P.O. Box 377, St. Joseph, Michigan 49085; (616) 982-3341.

■ Contact L. C. Technologies at 4415 Glenn Rose Street, Fairfax, Virginia 22032; (703) 425-7509.

With the right mix of hardware, software, and expertise, kids and adults with disabilities can participate in the same kinds of activities as their peers do. They achieve the ability to reach beyond their own physical limitations and enter worlds long closed to them.

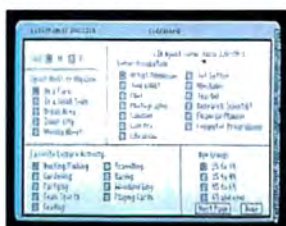
McCandless poignantly describes the future: "Handicapped children will always be special, but it need no longer be because they are less a person than any other child." □

Howard Millman works for Columbia University in New York and frequently contributes to several national computer magazines.

Blood, Swe

Enter the present. Tense.

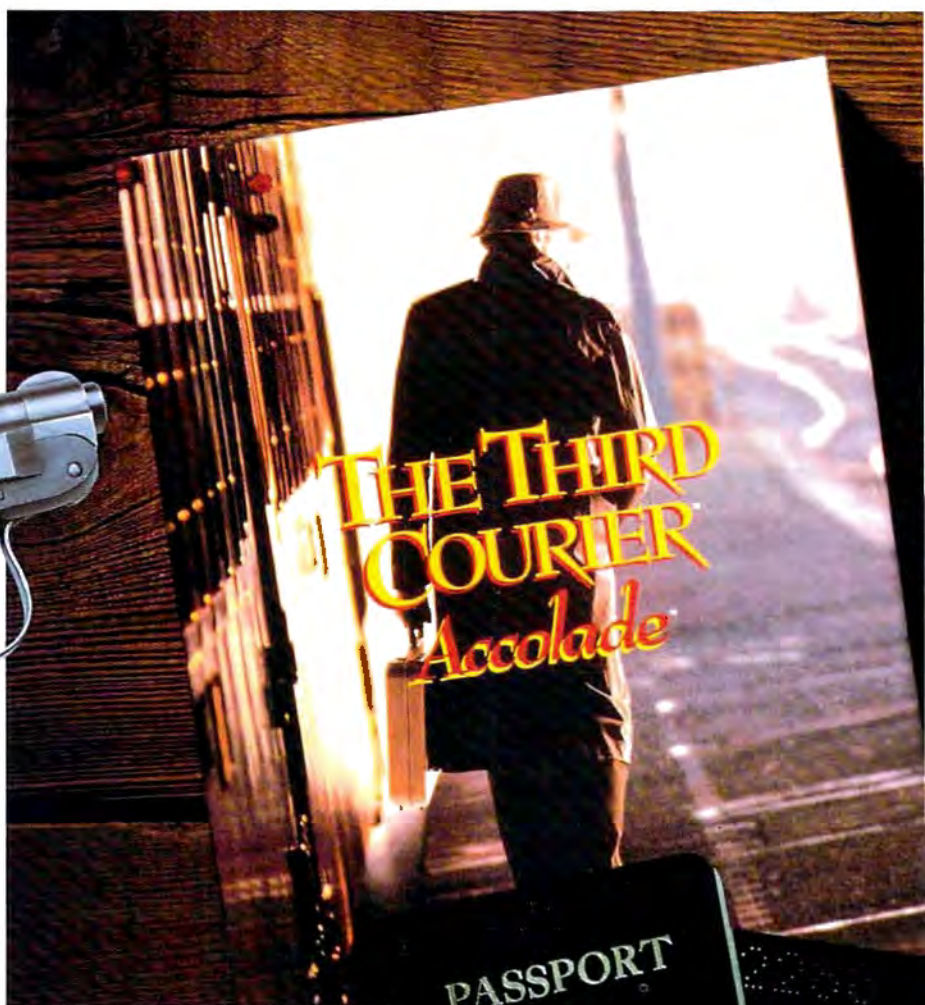
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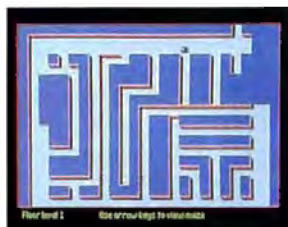


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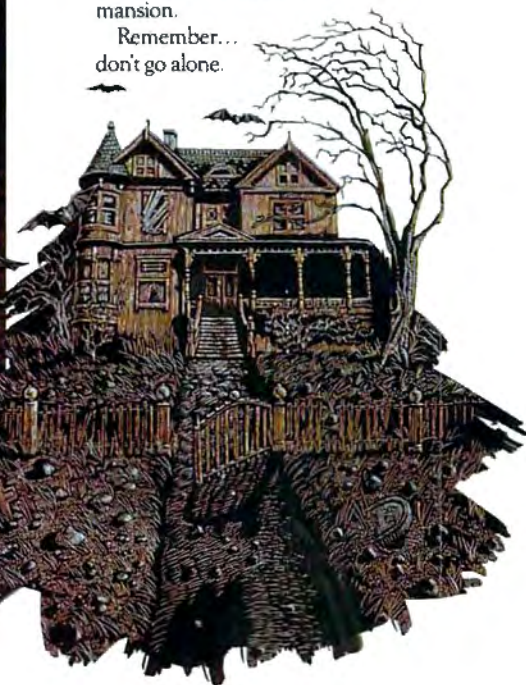


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HOMEWORK

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

Jean Piaget, a developmental psychologist, felt that one of the most important factors in a child's development was establishing a relationship between causes and effects. You can give your kids an edge with several simple computer-based exercises geared toward helping them understand this relationship.

To start, run a paint program and set it to a simple drawing mode. Place your child's hand on the mouse. Use a gentle touch to guide your child's hand, moving the mouse pointer smoothly from side to side. With ever-diminishing help, ask your child to position the pointer in different portions of the screen. Make sure you explain the difference between the canvas section, where you do the actual drawing, and the drawing-tool icons.

With basic coordination under control, instruct your child to position the pointer at the left side of the drawing area and to hold the button down and move to the opposite side. You may want to guide your child through exploring various drawing directions and lengths, or you might prefer just standing by and watching as your child explores and tries things alone. Both are valuable approaches, and I suggest trying each.

Of the remaining tools available, lines, boxes, and circles will be the easiest things to master. Your child should gain control sooner if you coach a little. Show the difference between making small squares or large circles. Specific tasks provide better training than random doodling.

Getting the kids to choose the drawing color increases the fun (and subsequent learning) tenfold. Soon abstract lines become recognizable pictures, and minutes spent with the program become hours.

The link between the mouse on the desk (cause) and the art on the screen (effect) should become firmly entrenched as time goes by. With a lit-

tle help and explanation from you, your child should have a good understanding of this basic, but important, concept.

A Family Painting

Once the kids are comfortable with mousing around the screen, you might want to involve them in a fun learning activity that your entire family can enjoy. Each person participating will take turns adding pieces to a developing picture. The learning comes from nurturing the creativity and adaptation necessary to introduce a new element into an existing scenario. The

program allows you to do this.

Having rules for each turn adds an element of structure, but a lack of restriction may enhance creativity. Here are some suggested guidelines, should you want some rules. Try basing each addition on a shape. Write various shapes on slips of paper and pull one out of a hat each turn. You could also incorporate colors—the slips of paper could read RED TRIANGLE or BLUE CIRCLE. You could even base drawings on a set of clip art. Randomly select from several pieces of clip art; then touch them up once they're in the big picture.

To enhance the educational value of this exercise, you might want to stress beforehand that the artwork shouldn't be purely random. It's important to make sure that the participants recognize the ideas and themes that others have introduced to the artwork. Adhering to these or elaborating on them will make for a more unified final picture.

When is the painting finished? It might be a good idea to have a specific number of turns, or the process might drag on forever. Saving the picture between turns is a good idea. If someone makes a major mistake, you can reload the previous version.

What should you do with your masterpiece? You can upload the file to bulletin boards or online services. Make printouts and send them to family friends and relatives. Keep a collection so you can see how things develop over time. Put the collection on disk and send it to people who have computers and compatible art programs. See if you can get other groups to do the same thing—some healthy competition could be fun.

*Richard C. Leinecker
Winston-Salem, NC*

Do you have advice that makes a better teacher out of your PC? If so, we'd like to hear from you. Send your tip, no matter how brief, to COMPUTE! Feedback, P.O. Box 5406, Greensboro, North Carolina 27403. If we publish your suggestion, we'll send you a gift. ☐

RECOGNIZING RELATIONSHIPS AND FAMILY ART FUN

fun results from a unique creation that's a result of a group effort, and the inevitable interaction among the artists.

Begin by running your art program. You can either decide on a theme beforehand or let it develop as you go. If you want to choose the topic in advance, take turns picking, or put a bunch of ideas in a hat and do a random drawing. Decide who goes first and the order in which turns will be taken. You can even take turns setting the palette colors, if your paint



REVIEWS

WRITE WELL, PLAY GAMES, FIGHT MONDU, ADVENTURE WITH INDY, TAKE COVER, MANAGE MONEY, BATTLE DOH, PREVIEW PAGES, SAVE SAN FRANCISCO, AND MORE.

QUITWRITE 2.0

Parsons Technology's *QuiteWrite* is a basic word processor with some nifty features for the money. Unfortunately, while the program has a lot of positive aspects, those features are hampered by some limitations.

QuiteWrite has the basic features you'd expect in any word processor. The program also features a 100,000-word spelling checker, mail-merge capability, and automatic document save and backup.

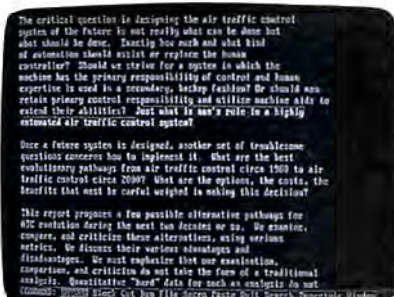
The unique repeat feature makes repetitive operations easy. In most word processors, you must define a block of text before you can copy, move, or manipulate it in any way. You can do that in *QuiteWrite*, but if you know in advance how many lines you're changing, use the repeat feature. Enter the number of lines you want the command to act on; then choose the command. While this isn't practical in all cases, I found it to be a real timesaver.

QuiteWrite is a menu-driven program. However, you can set the time interval between pressing the ESC key and the menu's appearance. If you know the first letter of a command and press it before the menu appears, you can continue choosing commands this way without having to go through several menu levels on the screen. For example, after you've used the program for a while, you know you can change your document's line spacing to double by pressing, in order, ESC, A, S, and then D.

Rather than a plain, monochrome screen, *QuiteWrite* shows

physical page breaks on the screen, and you can use the Setup feature to choose background and foreground screen colors, and colors to represent underlined, bold, and italic text.

The Display command brings up a screen that gives you all the information you'd want to know about your file—even the first line of text currently stored in the paste buffer. From this screen you can activate a timed automatic-save feature and



You can easily choose commands and modify your text with *QuiteWrite*.

choose whether you want a backup copy of your document created when saving.

A date-insert feature lets you place the current date anywhere in your file. The date is automatically updated whenever you print the document.

You can exit to DOS, execute a command, and then return to *QuiteWrite* with a single keystroke. You'll never appreciate this feature more than when your document disk is too full for your current file and you need to format a new disk to save your work.

Finally, *QuiteWrite* has a nice way of letting you insert special ASCII characters into your text: You use the cursor keys to select the one you want from a pop-up box that appears and

then press Enter.

Unfortunately, some of *QuiteWrite*'s features are limited. You can create macros, for example, but you can have only ten macros per file, and these can contain a total of only 256 keystrokes.

Instead of moving or copying text in one step, *QuiteWrite* makes you select and cut a text block, then use the paste command to insert it into another location. And, though your document can contain headers and footers, they're limited to one line in length. A split-window feature that lets you open two files at once is a nice feature, but it takes several keystrokes to move between the files (unless you assign the commands to two of your valuable macros).

The worst offender is the manual. It's missing the simplest things (a keystroke-reference chart) and the most necessary (step-by-step examples explaining how use the commands). Also, much of the information it does provide is downright confusing, or in some cases, inaccurate. While some of this information is available in an on-line help file, being able to access reference material without having to leave your file seems a better arrangement.

Although this is a passable beginner's word processor with some neat features to recommend it, its manual is woefully inadequate. But if you're willing to jump in and do a lot of experimenting, the price is right.

LYNNE FREY

IBM PC and compatibles—\$49 plus \$5 shipping

PARSONS TECHNOLOGY
372 Collins Rd. NE
Cedar Rapids, IA 52402
(319) 395-9626

THE PLAYROOM

Your imaginative six-year-old is sick of his toys. Your four-year-old refuses to learn to count past 3. Your precocious two-year-old wants to learn to spell. What's a parent to do?

Buy *The Playroom* from Broderbund, and watch the toys come to life to teach and entertain your preschoolers. With a little help from Mom or Dad, a six-year-old shouldn't have trouble with any of the game elements in this package. A four-year-old might need to sit on your lap and play it with you. My two-year-old couldn't do it himself, but he enjoyed telling me what he wanted to do.

The fun begins with the opening screen. There are toys in the toy box, books on the shelves, a computer on the child-size table, a bed, a clock, a radio, and a few things never seen in any ordinary, real-life kid's room. Move your pointer around the room and interesting things begin to happen. Some of the playroom surprises are accompanied by digitized sounds, an added plus that doesn't require any special hardware. Six game options—the ABC Book, the Mixed-Up Toy, the Spinner Toy, the Mousehole, the Cuckoo Clock, and the Computer—await children exploring this playroom paradise.

The ABC Book was far and away my favorite game option. You are presented with a choice of two scenes, either a medieval castle or a modern street. Select a letter, and a picture beginning with that letter appears. By clicking on the picture, your child can place it in the scene. Removing a picture is as simple as selecting it and moving it to the trash can; remove all the pictures by selecting the garbage truck. You can print out completed pictures, too.

Another creative game option is the Mixed-Up Toy. You're presented with a toy that's divided into three parts: head, body, and legs. Select the head, and every time you strike the Enter key, a new head appears. The same thing happens with the body and legs. There's also an option you can choose that will mix up the toy for you. I can see two small boys getting together with this option and having a laugh riot over the crazy combinations they come up with.

The Spinner Toy is a simple counting game with four difficulty levels that are based on how high your

child can count. Pepper the Mouse sleeps in the lower left corner until you wake him up. Then he begins to play with you; for example, he may display three ducks and ask, "How many?" If your child selects the correct number from the spinner, the ducks will stand on their heads and make noises.

The Mousehole is a more complicated counting game that requires some ability to add and subtract, as



The Playroom is a child's paradise chock-full of toys and activities.

well as to think strategically. This game offers three skill levels based on how high your child can count. I played the lowest level against the computer and was pleased to notice that the computer got consistently awful rolls, allowing me to win easily. This gives young, inexperienced players a necessary edge while they learn to play the game.

The Cuckoo Clock game is supposed to teach kids how to tell time, but, unfortunately, it isn't very interesting to play. The clock displays analog time, digital time, and the time in words; and it contains a graphic showing what Pepper the Mouse does at that time. The game is played by selecting different times on the analog clock.

The Computer is a spelling game and is also supposed to familiarize your child with the keyboard. But you don't directly use the keyboard when playing. It seems to me that a hands-on approach would have been the best way to get comfortable with the keyboard. Instead, you get a graphic representation of a keyboard and access it with a pointer, which is a slow and frustrating process.

The documentation that accompanies this package is simple, but all you really need to know is how to load the program. Once your child starts experimenting, directions won't be necessary. Also noteworthy are the creative suggestions on how to do more with the games away from your computer.

Great graphics, effective sounds,

and creative interaction combine to make *The Playroom* a great teaching tool that's also great fun.

BETH ANN MURRAY

Apple II—\$39.95
IBM PC and compatibles—\$44.95
Macintosh—\$49.95

BRODERBUND
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San Rafael, CA 94903-2101
(415) 492-3200

TONGUE OF THE FATMAN

FAST LOOKS

People who liked Jabba the Hutt are going to love Mondu-the-Fat. He's the porcine proprietor of the Fight Palace in Activision's *Tongue of the Fatman*. Mondu-the-Fat is just waiting for you to step into the pit and challenge one of his interplanetary brawlers to a fight to the death. Too bad, as the death is usually yours instead of theirs.

Be prepared for taunts and jibes from the Fatman, and be warned that this calorie-cruncher's bite is worse than his bark. "Humanoids," he says, "they come apart so easily in the fight pits. Especially when you pull their arms." There's no such thing as a fair fight at Mondu's.

Your early opponents aren't top contenders, but they are nasty enough to jump on your face and laugh about it. The Fat Man waits at the end. If you get a shot at him, watch out for his Tongue Lash—it's a wicked weapon.

This game also has a wicked sense of humor that's reflected in the manual, and the explanatory comments by Sworat, the Bingusian swamp rat, are a pure delight. Unfortunately, I can't say the same for the game's background music. You can shut off the fight's sounds, but there's no relief from the game's incessant chirping tones as you move through the preliminary screens.

Via joystick or keyboard, your fighter has 16 different moves—jumps, flips, punches, and kicks—almost too many. I was mangled and mauled dozens of times before I could remember which combination of keys produced an effective punch. Many players may grow discouraged and quit before they learn how to fight and use their weapons. But this is no game

for wimps; as the manual says, "Confused? Hey, that's just a polite word for stupid."

TOM NETSEL

IBM PC and compatibles with 512K and color monitor—\$39.95

ACTIVISION
3885 Bohannon Ave.
Menlo Park, CA 94025
(415) 329-0800

INDIANA JONES AND THE LAST CRUSADE

The legend of the Holy Grail has been resurrected by LucasFilm with the release of the movie *Indiana Jones and the Last Crusade*. In this film, Indiana Jones travels to Italy, Austria, Germany, and the Middle East, racing the Nazis to find the lost chalice of the Last Supper.

In the computer version of this adventure, you must find the Grail by thinking and acting like Indy. In fact, every time you act like Indy, you earn I.Q. (Indy Quotient) points. Don't think that you can locate the Grail easily just because you've seen the movie; this game is sophisticated, and there's more than one trail to the Grail. At times, you can follow the same route that Indy did. At other times, you'll be in unfamiliar places and have to make decisions about things that you didn't see in the movie.

There are three accessories necessary for finding the Grail. One is Henry Jones' diary. Henry, Indy's father, spent most of his life hunting for the Grail, and his diary is packed with clues to guide you on your journey. However, you must find it before you can use it.

There are critical moments when you must correctly translate inscriptions to continue the game. You are given a four-page translation table to help. Also, to help you get the game started painlessly, you're given a 16-page, easy-to-understand instruction manual that contains numerous hints for helping you in your quest.

LucasFilm did a great job putting this game together. The graphics are superb even on a CGA monitor, and the sound is good even when coming out of a 49-cent speaker. You hear Indy's wet shoes squishing, doors slamming, and water gushing from a fountain when he stops for a drink.

One outstanding feature of this game is the inclusion of action elements. For example, when Indy and his father escape Germany in a biplane, you actually fly the plane much like you would in a flight simulation, and whenever Indy gets into a fight with an enemy, you control his punches.

Great attention is given to detail. When I "looked" at a bulletin board in a hallway, I was surprised to read such messages as FOR SALE: 6000 RATS, 500 SNAKES. CALL S. SPIELBERG. And I received a verbal slap in the face when I typed *turn on* too near a member of the opposite sex. There's also wonderful dialogue between the characters and you.

If you're used to adventure games that require a lot of typing, you'll enjoy selecting verbs and nouns with your keyboard, joystick, or mouse. The ability to save your game to disk is also crucial because you won't get through this game in one sitting.

▷

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Circle Reader Service Number 181

Indiana Jones supports EGA, VGA, CGA, MCGA, and Tandy 16-color graphics. The game package contains a \$20 rebate coupon for an Ad Lib Music Synthesizer Card,



Find the chalice before the Nazis do in *Indiana Jones and the Last Crusade*.

which gives you better sound in *Indiana Jones* and other software. Because of frequent disk accesses and occasional swaps, you'll want to run the game on a hard drive.

Indiana Jones and the Last Crusade is the best of the quests, and it would have kept even Don Quixote glued to his computer in La Mancha. Of course, it's hard to run an AT on windmill power.

DAN WEAVER

Amiga—\$49.95
Atari ST—\$49.95
IBM PC and compatibles—\$49.95

LUCASFILM
Distributed by Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
(415) 571-7171

THE THIRD COURIER

From your West Berlin apartment, you make computer contact with Mission Control in Langley and learn that two couriers carrying top-secret NATO defense plans have been eliminated. The third is missing. Rumor has it that the courier has made contact with the East and is willing to sell the NATO plans to the highest bidder. You, Moondancer, the free world's best secret agent, must find and stop him.

Accolade's *The Third Courier* is one of the most clever action/adventure games I've seen. From the moment you open the package, you'll be caught up in the intrigue of espionage.

The creative, well-written documentation—called Mission Overview—accompanies a map of East and West Berlin and a decoder slide rule.

After the easy, menu-driven installation, you select a cover. You can have up to four active agents on file at a time. Not only do you choose aliases for your agents, but you also fill in background information, such as a cover occupation. Agents are rated on physical strength, knowledge, intelligence, intuition, and health from this dossier. Your overall rating determines the points that you receive for collecting information, successfully avoiding a conflict, and fighting in a confrontation.

The screen is arranged into two sides. The right half contains the action, inventory, and place menus. Bar graphs show your current level of strength, intelligence, intuition, knowledge, and health. A compass indicates the directions you may move when on the city streets. An encounter box allows you to fight, chat, threaten, or run.

The left half of the screen displays the scene, whether it's your apartment, the interior of a seedy bar, or the street. Above this scene is a dialog box that displays conversations or indicates whether you've been hurt in a fight. Below the scene is a status box that indicates your location and whether you're armed or not.

The graphics are excellent. The scenes are clear and detailed even on a CGA monitor. And facial expressions of the people you meet on the streets of Berlin actually change slightly if they're displayed for more than a few seconds.

The colors are vivid as long as you remain in West Berlin. Enter East Berlin, and expect to see nothing but gray and black. The buildings and surroundings are drab, frozen in a World War II time warp. Don't forget your papers and don't cause problems at the border or you'll be thrown in jail for questioning. If this happens, expect to spend at least four hours there.

The Third Courier definitely exercises the gray matter. At first I wasn't sure just how to get the information to find the missing courier, but eventually the steps seemed so obvious I wondered how I could have gotten my first agent killed so quickly.

Before long, all of my active agents were able to think quickly on their feet. They had a feel for the city so they weren't assassinated while trying to find their way with a map, and they had enough intuition to know when to fight and when to run.



Keep track of your status as you travel about and search in *The Third Courier*.

If you enjoy mystery and intrigue, if intuitive games with great graphics and challenges appeal to you, give *The Third Courier* a try. This quality thriller is sure to captivate audiences.

LISA WROBLE

IBM PC and compatibles—\$49.95
Apple IIas—\$49.95

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FINANCE MANAGER II

Far too often, users become jaded about computer software that promises to solve all their problems, particularly if they've been stung by packages that have failed to work. *Finance Manager II* has restored my faith in software claims—it's a smoothly competent financial-management program in a well-designed package. Designed for those with little bookkeeping experience, *Finance Manager* easily manages financial resources. You may purchase different modules such as General Ledger, Accounts Receivable, Accounts Payable, Payroll, and Financial Utilities and use them independently or together in any combination. If you want to start with General Ledger, the heart of the program, you can add the other modules later with no hassle.

The installation process is easy. Accurately detailed instructions appear on the screen and in the manual. You can maneuver using a mouse or the keyboard, and all the modules are menu-driven.

General Ledger is easy to use, but

ACTION!

Slick up your joystick it's hot!



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DARK CENTURY



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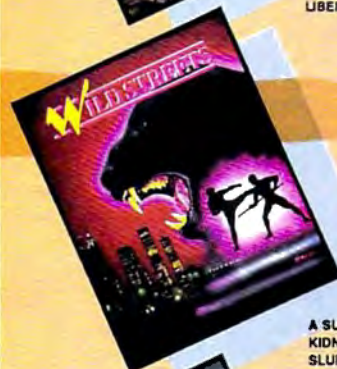


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OFF SHORE WARRIOR

YOU ARE AN OFF SHORE WARRIOR AND YOUR FIRST ARENA, FULL OF FANS, IS WAITING FOR YOU. STRUGGLE AGAINST ROCKS, WAVES AND OPPONENTS IN A DEADLY GAME. ONLY FEW CAN LEAVE ALIVE. DO IT OR DIE!!!



FIRE AND FORGET

FACE THREE LEVELS OF SIX CONFLICTS, FROM SPORADIC WARFARE TO TOTAL WAR. NEVER LOOK BACK! IT COULD BE YOUR LAST MISSION. ONE OR TWO WARRIORS CAN TEAM UP.



CRAZY CARS

YOU ARE RACING FOUR OF THE MOST PRESTIGIOUS CARS IN THE WORLD'S CRAZIEST RACE THROUGHOUT THE UNITED STATES. PREPARE TO START, READY? GO!!!



TITAN

MAKE YOUR WAY THROUGH THIS STRATEGIC PUZZLE OF EIGHTY WORLDS WITH YOUR MAGNETIC CONTROL UNIT. BUT BE CAREFUL, THE ULTRA-FAST SCROLLING HAS ALREADY CAUSED SOME MENTAL BREAKDOWNS.

you must understand double-entry bookkeeping. You have to know which account to debit or credit, the difference between expenses and income, and the differences among assets, liabilities, and equity. The sample demos show you how to set up your accounts and perform transactions.

General Ledger tracks assets, liabilities, net worth, income, and expenses. The program records financial transactions and categorizes them into the various accounts that you set up. It generates nine financial reports including a balance sheet, an income statement, a statement of sources, and uses of funds. A long list of features includes storage of up to 1999 accounts, three subtotal levels, entry of up to 32,000 transactions per year, and sorting by date or input. In addition, all closing entries are performed automatically and fiscal-year dates can be varied.

The Accounts Receivable module tracks the receivables of up to 2000 customers. It generates eight reports, including invoices and a Receivables Aging report. The reports are sent to the screen, the printer, or a disk file. It also prints six-line mailing labels.

Entering customer transactions moves quickly. Each of the 12 cus-

tomers-account data fields defaults to the last data entered in that field. This saves keystrokes when you're entering repetitive data. Versatility is limited because fields can't be altered to fit your individual needs. This module



Finance Manager II's friendly menus guide you through all of the functions.

keeps detailed information on each customer without cluttering up the general ledger including customer names, addresses, credit limits, due dates, and interest rates.

Press F3 and all Accounts Receivable transactions will be posted to the General Ledger module. I was pleased to discover the posting procedure is smart; it only adds transactions not already posted, so you can never double-post.

The Accounts Payable module interacts with General Ledger similarly to Accounts Receivable. It prints seven reports, vendor mailing labels, and checks. Each vendor account consists of 11 fields, which include name, address, discount percent, discount days, and net due days.

I found the Payroll module to work as efficiently as the other modules and to work the same way. Remember, these five modules are intended to be a team. Payroll keeps information such as hire dates, earnings, deductions, vacations, sick leave, overtime, holidays, extra income, and deductions on up to 1000 employees.

Payroll also automatically calculates employee deductions and employer liabilities, and it prints payroll checks and W-2 forms. It can be fully integrated with the General Ledger module. Payroll creates ten reports, including a Quarterly Tax Summary.

I learned to use the Financial Utilities module with minimal effort and time. One of the numerous functions in this module is loan analysis. It computes payments, original loan amounts, interest rates, terms, and amortization schedules.

All five manuals are well written; their organization flows logically.

WHEN REALITY JUST ISN'T ENOUGH...



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- ☐ **Stock Charting** (1612) A complete portfolio system to track, analyze, and chart your stocks.
- ☐ **Small Business Accounting** (1617) A must for all small business owners!
- ☐ **Solve-It!** (1618) Does over 20 vital financial calculations including amortization, PV, FV, and IRR.
- ☐ **PC-Books** (1621) A complete, easy to use bookkeeping system.
- ☐ **PC-Loans** (1628) This package supports all common loan methods.
- ☐ **Easy Project** (1629) A powerful project manager software package.
- ☐ **FormGen** (1630) Design and print any office form, easily!

DATABASE/MAIL LIST

- ☐ **File Express** (1700,1701) A powerful, easy to use database (2 disks).
- ☐ **Doctor Data Labels** (1703,1704) Complete and powerful! A professional mail list manager. (2 disks) **HD**.
- ☐ **PC-File:db** (1705-1707) The most powerful dBASE compatible program available! (3 disks) **HD 512K**.
- ☐ **Label Master** (1715) A great mail list manager and label printing utility.

SPREADSHEETS

- ☐ **PC-Calc+** (1800-1802) The most powerful spreadsheet package. (3 disks) **512K**.
- ☐ **QubeCalc** (1805) Take your spreadsheets 3-D! Highly recommended.
- ☐ **Lotus Macros** (1807) A large collection of Lotus macros and templates.
- ☐ **Lotus Learning System** (1810,1811) —Master Lotus 1-2-3! (2 disks)

WORD PROCESSING

- ☐ **PC-Write 3.03** (1851-1853) The BEST word processor for under \$200! Has spell checking and hundreds of other features (3 disks) **512K**.
- ☐ **PC-Stylet** (1855) Analyzes and helps you to improve your writing skills.
- ☐ **PC-Outline** (1860) An excellent idea organizer and free form database.
- ☐ **WP 5.0 Learning Sys.** (1863,1864) Helps you learn and master Word Perfect 5.0. (If you have WP 4.2, select disks #1861 & #1862.) (2 disks)
- ☐ **WP 5.0 Macros** (1857) Several macros for Word Perfect 5.0. (If you have WP 4.2, select disk #1858.)
- ☐ **PC-Type+** (1870-1872) Complete word processor with 100,000 word dictionary and mail merge. (3 disks)

BIBLE/RELIGION

- ☐ **Bible-Q** (1551) Test your Biblical IQ!
- ☐ **BIBLE Men** (1570) A fun quiz on the people in the BIBLE.
- ☐ **SeedMaster** (1555-1567) The complete King James version of the BIBLE on disk! (13 disks) **HD**.

HOME BUDGETS/FAMILY APPLICATIONS

- ☐ **Fast Bucks** (1100,1101) Keeps track of all your personal finances and prints great financial reports (2 disks).
- ☐ **Home Budget Manager** (1103) Tracks all your household expenses and helps you to set budgets and goals.
- ☐ **Express Check** (1104) Excellent checkbook program with reconciliation and great screen displays. **512K**.
- ☐ **Home Inventory** (1105) Keeps track of all your personal property.
- ☐ **MealMate** (1115) Helps you to plan nutritionally balanced meals.
- ☐ **Edna's Cookbook** (1118,1119) An easy to use computerized cookbook. Comes with several great recipes—add your own favorites. (2 disks)
- ☐ **Brother's Keeper** (1120,1121) A great genealogy program that allows you to trace your family history (2 disks).

EDUCATION

- ☐ **French I & II** (1200,1201) Learn and practice French vocabulary (2 disks).
- ☐ **Spanish I & II** (1205,1206) Test and train with these excellent Spanish vocabulary drills (2 disks).
- ☐ **Geography** (1215) Learning is fun with this great geography trivia game.
- ☐ **PC-Gradebook** (1217) Record and monitor your students' grades.
- ☐ **World** (1221) A computer encyclopedia of global information. **CGA**.
- ☐ **Typing Tutor** (1224) Helps you improve your speed and skill. **CGA**.
- ☐ **PC-Professor** (1229) This program teaches BASIC programming.
- ☐ **Balloon Speller** (1230) An introduction to spelling for children. **CGA**.
- ☐ **Math Lessons** (1233) A great program that teaches algebra. **CGA**.
- ☐ **Facts 50** (1234) A graphic geography lesson of the U.S. **CGA**.
- ☐ **Computer Tutor** (1235) Become a more effective computer user.
- ☐ **Play 'n' Learn** (1236) A set of 6 learning games for preschoolers. **CGA**.

UTILITIES

- ☐ **MasterKeys** (1400) Like Norton Utilities (recover deleted files, disk editing, change file attributes, etc.).
- ☐ **SimCGA** (1404) Allows monochrome PCs to run many CGA programs.
- ☐ **PC-DeskTeam** (1406) Several useful desktop accessories (clock, calendar, calculator, notepad, etc.).
- ☐ **Automenu** (1409) A very professional hard disk menu system. Run any of your programs from a custom menu.
- ☐ **SideWriter** (1410) Prints your spreadsheet print files sideways.
- ☐ **Baker's Dozen** (1411) A set of 13 utilities that everyone needs!
- ☐ **Space Maker** (1412) This utility allows you to fit more data on any disk.
- ☐ **ALT** (1413) It's like Norton Utilities, the Sidekick desktop accessories, and a menu program all in one!
- ☐ **Still River Shell** (1414) A superb file and directory management utility.
- ☐ **HD Backup** (1415) Allows you to backup/restore all the data on your hard drive with floppy disks. **HD**.
- ☐ **NewKey** (1416) Save time and increase efficiency by using this (the BEST) keyboard macro program

GRAPHICS/PRINTING

- ☐ **Express Graph** (1106) Turns raw data into great business graphics.
- ☐ **DiskOver** (1320) Prints informative disk sleeves for all your disks.
- ☐ **Banner Maker** (1502) Prints banners in various sizes, styles, and fonts.
- ☐ **PrintShop Graphics** (1503) A large collection of Printshop clip art.
- ☐ **EDraw** (1508) Design tool for creating flow charts and schematics. **CGA**.
- ☐ **PC-Art** (1509) A color graphics painting/drawing package. **CGA**.
- ☐ **Epson Utilities** (1514,1515) Enhance the print quality of your Epson-compatible printer. (2 disks)
- ☐ **PC-Key Draw** (1520-1523) Powerful CAD design system. Works with mouse or keyboard. (4 disks) **CGA**.
- ☐ **City Desk** (1525) Simple desktop publishing for newsletters.

MISC. APPLICATIONS

- ☐ **Weight Control** (1302) Let this program help you get fit.
- ☐ **Personal Biorhythm** (1310) Will display or print a personal chart.
- ☐ **KwikStat** (1314,1315) A professional statistics package. (2 disks)
- ☐ **Wisdom of the Ages** (1316-1319) Great quotes from the greatest minds of history. Quick access to 6000 quotations in several categories. (4 disks).
- ☐ **Make My Day** (1627) Puts you in control by organizing your time! Keeps track of appointments and deadlines.
- ☐ **Piano Man** (1901) Compose and edit music or play the keyboard.

GAMES

- ☐ **AdventureWare** (1934) Five excellent adventure games.
- ☐ **Armchair Quarterback** (1905) A fun football strategy game.
- ☐ **Baseball** (1916) Great arcade action and baseball strategy. **CGA**.
- ☐ **Trivia! by PAS** (1953) Test your knowledge in several categories.
- ☐ **Checkers** (1954) See if you are good enough to beat the computer. **CGA**.
- ☐ **Crime Lab** (1955) Play this exciting graphic murder mystery game. **CGA**.
- ☐ **Flightmare** (1923) Futuristic fighter pilot arcade game. **CGA**.
- ☐ **Ford Simulator** (1956) A great driving simulation game from Ford. **CGA**.
- ☐ **Hopper** (1902) Frogger clone. **CGA**.
- ☐ **Kid Games** (1938) These games are both fun and educational. **CGA**.
- ☐ **Kingdom of Kroz** (1952) An excellent, award-winning adventure game.
- ☐ **Las Vegas Style Craps** (1914) Play and improve your skill. **CGA**.
- ☐ **PAC-Man & More!** (1930) PAC-Man and Ms. PAC-Man clones. **CGA**.
- ☐ **PC-Gammon** (1907) Play a tough computer opponent, anytime. **CGA**.
- ☐ **PC-Pro Golf II** (1975) Choose your club and swing away at one of the world's most beautiful country clubs (Amherst). Excellent graphics! **CGA**.
- ☐ **Pearl Harbor** (1959) Save your fleet from the invading planes. **CGA**.
- ☐ **Risk** (1946) Play the famous board game on your computer. **CGA**.
- ☐ **Scrabble** (1957) Test your word power with this always fun game. **CGA**.
- ☐ **18-Hole Miniature Golf** (1915) Kids really love this one! **CGA**.

GAMES CONT.

- ☐ **Sleuth** (1903) Play detective in this "Who done it?" adventure.
- ☐ **Solitaire** (1940) The computer makes sure you don't cheat! **CGA**.
- ☐ **Space War** (1958) Battle it out in outer space—ship vs ship. **CGA**.
- ☐ **Sports Games** (1927) Bowling, archery, and pool. **CGA**.
- ☐ **Star Trek** (1948) Two versions for all you TREKies out there.
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- ☐ **Video Poker/Ultima 21** (1945) The BEST poker and blackjack games!
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IMPORTANT

CGA=Requires Color Computer
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512K=Requires 512K RAM
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Most important, no questions are created and then left unanswered. To help the bookkeeping novice, the General Ledger manual has a six-page lesson with examples on double-entry bookkeeping. Samples of all reports are included at the end of each manual. The only drawback is that the print in the report samples is very small and I have to squint to read the text.

Finance Manager II is a well-defined program that reflects a thorough commitment to a solid product.

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ARKANOID II: REVENGE OF DOH



Just when you thought it was safe to get back in your space pod, your evil galactic nemesis appears on the outer limits of the galaxy, primed to dust the intergalactic void with your neurons. It's DoH, that great space face you love to hate, and this time it's personal.

Arkanoid II borrows heavily from its predecessor, enhancing its familiar block-breaking strategies with no less than 13 types of Energy Blocks that surrender their special powers to you once you hit them with an energy ball.

The action in this version is thicker and heavier than in the first, but it's sometimes overshadowed by the less attractive graphics. Your space pod isn't nearly as well defined, for example, and some of the backgrounds are so garish that it's hard to pick up a passing energy ball before it gets by you. If that happens, you're space vapor.

Fortunately, you can overcome a problematic background with the program's Construction Set, which allows you to build your own space walls. Select a more stable background, or design your own Arkanoid levels, complete with reappearing, moving, indestructible, or energizing blocks of different hues.

With its 67 rounds of rousing arcade action, construction kit, and support of several PC sound devices, *Arkanoid II* is a worthy successor to one of the most addictive arcade games ever released.

PETER SCISCO

Amiga version available through Discovery Software (301) 268-9877
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ONCE UPON A TIME... II

Sharing stories with friends makes writing a popular activity. Now with *Once Upon a Time... II*, a one-stop publishing center, students can write stories, draw illustrations, and print "published" books. The package includes a simple text processor. Young writers enter as many as four lines for every picture screen, backspacing to make corrections. They save story pages to disk and call up saved files to make further revisions. Since kids produce neatly written copy with every printout, there's no need to worry about messy handwriting.

Once Upon a Time... II also has graphics capabilities. While these tools are limited when compared to full-powered desktop publishers, they're adequate for the writing assignments of young children. The program includes underwater, forest, and dinosaur picture sets; each with a library of different graphics images. For example, the underwater library offers 24 pictures, including a clump of seaweed, a shark, a manta, a puffer, a clam, and a dolphin. Kids use these pictures to illustrate their stories. Although they can't use graphics from more than one picture set at once, there's an adequate selection within each graphics library.

Children may publish single-page pictures or multiple-page storybooks. Title pages can be up to 30 characters in length and there's even room to enter the author's name. Eight nontoxic colored pencils come in the box and can brighten up all of your black-and-

white printouts.

Students begin by picking a theme and then must decide whether to work on a picture or a book. When they choose the picture option, they start with a blank screen. Four sample pages come with each picture set and can be loaded to get the story started. Graphics on the sample pages may be modified, deleted, or repositioned. Sample text may be erased to leave room for a new script.

The book option enables budding writers to publish stories by linking individual picture pages. They determine the page arrangement by selecting insert or delete from the option menu. They won't be able to edit story pages from the story mode. There's a view option so that children can read their books before printing.

Navigating from section to section is very simple using the space bar and the enter key. As an added educational twist, children can't select a



You can view your finished story in full color with *Once Upon a Time... II*.

graphic by simply running the cursor through a picture list; they must type its name. They can, however, scroll through an alphabetized list to see what's available.

Once Upon a Time... II doesn't offer a choice of fonts, type styles, or type sizes. It supports a variety of printers.

This well-designed program is sure to complement any language arts curriculum or greatly encourage writing at home. Its audience is children in grades 2-4, as older students might find the picture themes a bit limiting. But younger children will enjoy combining text with graphics as they write their very own published stories.

CAROL S. HOLZBERG

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INSTANT PRESENTATIONS AND INSTANT FORMS

Scramble! You're expected to make a presentation in one hour at an unexpected meeting. Sound familiar? The next time this happens, you might be grateful if your computer library includes a copy of *Instant Presentations*, one of two new programs from Qumatic Instant Business Software.

Instant Presentations produces charts for overhead projection or handout purposes. It works quickly and easily, with no worry about formatting or layout details. You simply choose your chart from a menu of formats, pick portrait or landscape orientation, type your message, and send the chart off to your printer.

The format options include a title page, bullet charts, outline charts, and charts with two, three, or four columns for tables or financial data. You're limited to 12 double-spaced lines plus a title, subtitle, and footnote in each chart. The clean, strong, sans-serif font resembles Helvetica and is fixed at 36-point type for titles, 24-point for subtitles, and 18-point for individual lines of the chart. All formats are for text; there aren't any graphics capabilities.

The restrictions on the number of lines and the fixed definitions of point sizes are well chosen. Often presentation charts are so busy or attempt to crowd so much information on a single page that the message is lost. *Instant Presentations* helps you avoid these temptations.

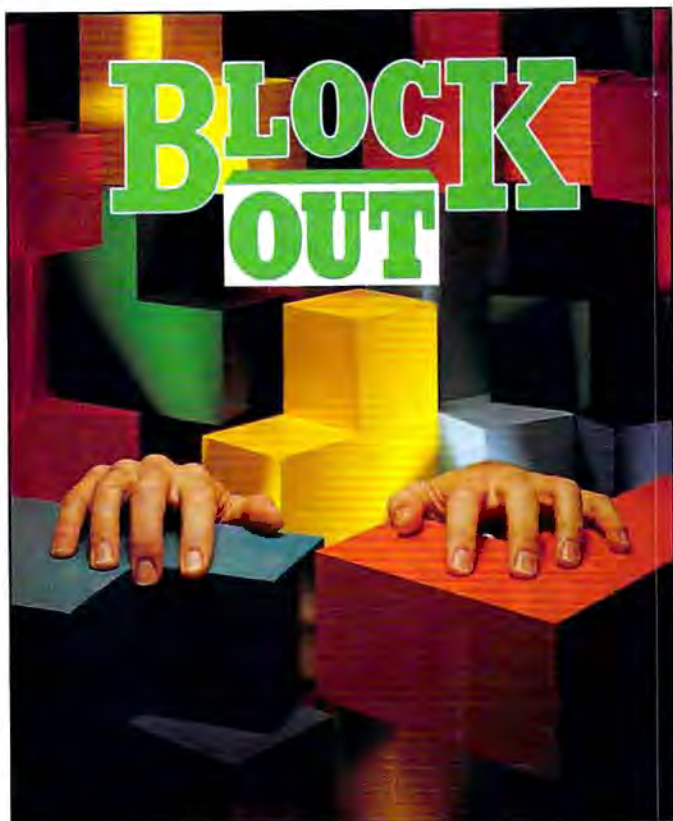
The program is packaged with 5¼- and 3½-inch disks, but you must have a hard disk to run the program. Installation is quick and easy; the program takes up about 500K of disk space. The printer option in the installation procedure provides for many types including Epson and Okidata dot-matrix and Hewlett-Packard and compatible laser printers. The printed documentation only covers installation. After installing the program, you can print the well-written documentation file. The company provides a telephone number for technical support.

I decided to make a bullet chart, a type commonly used in presentations. After choosing to create a presentation from the main menu, I named it, created and named a page, chose the bullet format with portrait orientation, and chose to give the chart a border. With it on the screen, I typed a title and subtitle and the lines of my chart. From the main menu, the options to view and change the text and to reorder the lines let me make some changes to the chart. The online help for all these options removes any need to refer to the manual. Selecting the print option, I received a most presentable chart. The whole process was quick and easy.

Instant Presentations isn't fancy, but as we all know, sometimes there isn't enough time to be fancy. And its price isn't fancy either.

If you've ever needed to create a business form on the fly, you may want to take a look at *Instant Forms*. This program offers a library of standard business forms including credit and debit memos, fax messages, invoices, job estimates, packing lists, proposals, purchase orders, quotations, requests for quotation, sales orders, statements, and letterheads. Your company name and address can be placed at the top of each form.

The program has 5¼- and 3½-inch floppies for hard



WATCH OUT FOR FALLING BLOCKS



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CALIFORNIA™
Dreams

drive installation. The documentation is clear, and the process is quick and easy. After installation, you can print a nine-page manual and a collection of sample forms. The well-written manual may not be needed because the program's online help is so good. Qume offers telephone technical support for the program.

The forms print in a bold, clean, Helvetica-like, sans-serif font, in well-chosen sizes ranging from 8 to 18 points. Your company name is printed in that font, but your entries on the forms are printed in a crisp 12-point Courier font.

To create an invoice, I entered the company name and address, selected the invoice option, and edited the various fields to fit my needs. The program has no mathematical capability, so you must enter totals yourself. The printed form is clean and uncluttered, with a strong, business-like appearance.

To my mind, Qume need not have bothered with the letterhead form. Your header prints in the upper left corner, rather than being centered, and, in typing the letter, you have none of the aids that any good word processor offers. Unless you don't have a word processor, it's unlikely that you'll use the letterhead form.

Aside from that, the program offers an attractive alternative to maintaining stocks of preprinted forms for your business. It doesn't allow for fancy logos or icons, but it quickly and easily prints strong, clean forms.

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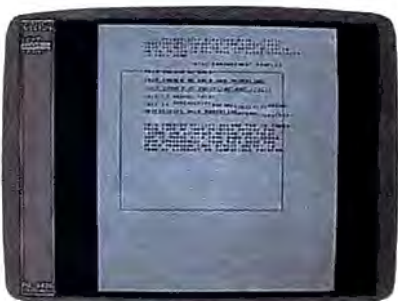
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PRINTVISION

A new look has been given to documents printed with laser printers on PC systems. The ability to see the final page on the screen before printing isn't available in most programs. Without a preview, page layout can be time consuming even with a fast laser printer. Repeated printouts to examine layout changes consume time, paper, and toner.

BLOC Publishing has solved this

problem with *PrintVision*, a memory-resident page-previewing program that allows you to display a page on the screen as it would be printed on an HP LaserJet or DeskJet or on a compatible printer. Now you can see how outputs from spreadsheets, database



PrintVision allows you to preview pages on the screen before they're printed out.

managers, word processors, and other programs will look before they are sent to a LaserJet. *PrintVision* works with any program that produces text-based documents, and graphics files included in the document can also be viewed with the text.

The program is activated by the Alt-Space key combination or by a print command. Other key combinations can be chosen if this one interferes with another program. You won't notice *PrintVision* until you try to print. Then it interrupts your application program to display your document on the screen.

An entire page is displayed at one time. You can move around the document and zoom in on specific areas to check alignment and layout on a smaller scale. The document can then be printed, or you can return to the application program for further editing. Since documents print to the screen much faster than to the printer, repeated printings to make fine adjustments take less time.

PrintVision's previewing power is especially useful when working with word processors. Many of these use font cartridges to print proportionally spaced fonts on a laser printer, yet the screen displays your text in Courier only; the screen displays bold or italic but not specific font families. With *PrintVision*, you now see your typeset documents on the screen with the proper line breaks and font sizes displayed. This preview ability is normally found only in desktop publishing software, but *PrintVision* now makes it available with your word processor.

I did have a problem when I used *PrintVision* to display a two-column document from *Microsoft Word*. *PrintVision* jumped back and forth

between its display and *Word*. It eventually returned control to the word processor, but it never did display the document.

Another drawback is the program's inability to work with soft (downloadable) fonts. Soft fonts are more popular and numerous than cartridges are because of their flexibility and cost. This can be a problem with the ever-growing array of soft fonts and font generators.

PrintVision's limitations are only significant if you use a lot of fonts. For the average user, its capabilities are adequate. Whether you own an HP LaserJet or you just use one for final printouts, *PrintVision* is a useful tool that allows you to get more power from your existing software.

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MANHUNTER 2: SAN FRANCISCO

Putrid red gases spew from Coit Tower, a mysterious mound slowly swallows the Transamerica Pyramid, and everybody begins to disappear. It's San Francisco in the future, and these circumstances pose compelling questions.

The answers, found in Sierra's *Manhunter 2*, are simple. Alien orbs have taken over, and they're spreading horror, tyranny, and death. But the orbs don't do it directly. Instead, they have helpers—robots and you. For you are what is known as a manhunter. Your job: to hunt your own kind. Under the direction of a supervising orb, you track down those who have offended the orbs' delicate sensibilities.

To help, you have a Manhunter Assignment Device (MAD), a sort of portable PC with dedicated manhunting software. It works in conjunction with electronic tracking disks, which the thoughtful orbs have implanted in everybody's neck (including yours). But the tracking system only works when the quarry is above ground.

When the game opens, you're in hot pursuit of a baddie named Phil. He's the nasty killer sort. You're just about to close in when—*wham!*—you

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smash into the side of a building and crash to the street. Unfortunately, you fall atop a fellow manhunter, rendering him essentially two-dimensional. It's not a pretty sight. Phil hovers above you, laughing wildly, then zooms away—and you're on your own.

The object of *Manhunter 2* is, among other things, to explore various places throughout San Francisco. That is done with the help of an on-



A building is swallowed by a mound that appears in *Manhunter 2: San Francisco*.

screen marker that's smoothly controlled using the cursor keys or the joystick.

The marker is interesting and itself becomes an important part of play. It changes shape when positioned over important objects, and the shape it assumes gives useful hints. For example, an open hand indicates that you can take or manipulate the object; a pointing finger tells you that you can press or push something; and a magnifying glass suggests that you can take a close look at something.

Further exploration may turn your marker into a question mark, which indicates that something is displayed in the message bar at the bottom of the screen. Read it, and you may get a useful clue concerning that object.

After exploring a particular screen, it's travel time. Pressing F3 brings up the travel map. Your current position is shown by an X, and orb-approved destinations are indicated by blinking squares. You can move to the next map section by moving your marker to the edge of the screen.

As you track Phil through San Francisco, you'll do more than manipulate markers. From time to time the view will shift to third person and you'll be faced with arcade-style obstacles.

Less experienced adventurers will like the game's interface because it eliminates a lot of frustration. More experienced players, however, may wish for a greater challenge. But players of all levels will appreciate the exceptional graphics, the variety, and

the alternating tension and humor.

The game's command summary card, a quick-reference sheet, and the Official Manhunter's Field Guide are a lot of help to the neophyte adventurer. *Manhunter 2* runs on systems with Hercules, CGA, EGA, MCGA, or VGA monitors.

Admittedly, *Manhunter 2* is probably a bit simplistic for dyed-in-the-wool adventure fans. Even so, it's addictive. If you're a newcomer to the genre or you're just curious about why the Transamerica Pyramid is being buried by that mysterious growing mound, then here's a game you'll enjoy.

STEVE HUDSON

IBM PC and compatibles—\$49.95

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CRIBBAGE KING/GIN KING



For those times when human opponents are scarce, *Cribbage King/Gin King* substitutes admirably. The people at The Software Toolworks have almost completely captured the feel of these two card games. The package is a two-headed deal—both *Gin King* and *Cribbage King* on the same disk.

In *Gin King*, the only drawback is that you can't arrange your own cards. Otherwise, the game is very accurate and entertaining. You can choose between two styles of gin: gin rummy, in which you can knock (end a hand) with ten or fewer points, and Oklahoma gin, in which you turn up a card from a separate deck and must knock with fewer points than that card indicates.

In *Cribbage King*, the only drawback is that you can't peg your own points on the cribbage board. An especially nice feature, however, will count your points for you or let you count your own. The second option awards any miscounted points to your opponent, though, so be careful. As in *Gin King*, the different options in *Cribbage King* really add to the game's appeal.

In both games, you can choose from several opponents of varying skills. If you don't know how to play

cribbage or gin, the Help menu will teach you. Another option lets you play the same hand several times, looking for the best possible way to play the cards.

Graphics are good, with sharp reproductions of the playing cards and a dark green background that looks like a felt tablecloth. The cribbage board is shaded so that the wood looks textured and 3-D.

If you love to play cards, or if you just want to learn some new games, draw *Cribbage King/Gin King* from the stack of computer packages. You'll enjoy your electronic opponents, and maybe you'll learn some tricks for the next time you face a human across the card table.

HEIDI E. HAYCOCK

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HORSE RACING

Sport of kings, that's the way thoroughbred horse racing is described. But that moniker seems less related to regal breeding and high-society cliques than it does to the size of the bankroll you need to enjoy this sport in style. If you're part of the two-dollar-window crowd, SportTime's *Horse Racing* gives you the chance to try your handicapping skills without risking your wallet and



Enjoy a day at the races without affecting your wallet as you play *Horse Racing*.

redefines the phrase *off-track betting*. *Horse Racing* is designed to offer players an expandable game format through use of software modules. With the original package, you receive the Handicapper's Tournament and the Track 1 disks. If, after you've played the game for a while, you want

to discover other aspects of horse racing, you can buy separate disks to add to the original system. So far, SportTime has released two supplementary disks: *Track 2* and *Stable Owners*.

The Handicapper's Tournament is a competition between you and 19 other racetrack rounders. Up to four humans can play; the program generates its own bettors to make up the 20. All players start with the same amount of money, and you can set the skill level to Easy, Normal, or Hard. The game ends after one of three criteria that you define is met: A certain number of races are run, a certain number of race bets are made by each player, or one of the bettors reaches a predefined dollar amount.

Once you've established the ground rules, it's time to head for the track and the game's main menu. To begin play, select Entry Information; you'll move to a screen that resembles the program at many tracks. Here's where you can see the names of the horses and their jockeys, the number of times they've finished in the money, the total number of races each horse has run, the track conditions, the post positions, and the odds.

This information, while helpful, doesn't go too far in picking a winner. For that you need the racing form. This game compiles its own cumulative collection of stats on each horse, which you can see by highlighting the horse's name and pressing the Enter key or by using your joystick. My only complaint about the game concerns its lack of mouse support; if there ever was a game that begged for a mouse, this is it. SportTime should offer a mouse-support upgrade in the future.

Reading the racing form takes practice, but you can pick it up pretty easily with *Horse Racing's* version. In this game you have a Past Performances screen that, if used wisely, can give you a very definite edge over the other bettors.

Back at the main menu, you move to the betting window. This was the most difficult part of the game for me because as a kid I lived near Keeneland, a small and very traditional racetrack in Kentucky where the most exotic bets allowed were the daily double and six-dollar combination. In *Horse Racing*, I could choose not just from the normal win, place, or show bets, but also from such strange breeds as the quinella, exacta double, triple box, and more. Fortunately, the manual explains these exotic wagers pretty well.

If you're stumped on a bet, and you have a least \$100, you can buy a tip from one of the computer handicappers. The cost of the tip relates directly to the handicapper's success at the window, but not always to the bet that the handicapper will place on that race.

Select Run Next Race from the main menu and you're transported to the grandstand. The track and the horses are rendered in CGA graphics, but don't set yourself up for disappointment. To their credit, the game's designers have made good use of the four-color palette. The result is a detailed and attractive view of the racecourse. (SportTime's *Track 2* module sports EGA graphics.) The running horse figures give way to numbers when the horses are in a turn, but you shouldn't find that too distracting.

I couldn't believe how well *Horse Racing* captures the feel of a real day at the track. The entry information is a gold mine for stat nuts, the competition among handicappers is fierce, and the races are exciting and extremely realistic. What's more, by compiling a history of statistics for each horse and rider, the game becomes even more lifelike as you continue your parimutuel betting adventure.

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It's hard to explain the thrill of horse racing to those who have never participated, but this game provides a satisfying glimpse into what the thoroughbred world is all about. The program wins high praise for its meticulous detail, imaginative use of graphics, realistic play, and thoughtful modular structure. It's a sure bet for the winner's circle.

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GET-A-REF

Serious research is tough work, but computers have made things easier. Word processors, encyclopedias on CD-ROM, online databases—these and similar modern-day tools have improved productivity while easing the pain commonly associated with writing research papers. DatAid's *Get-a-Ref* version 4.1 allows researchers to create their own source lists, search them for relevant data, and move that data directly into word processing documents without tedious retyping.

The complete *Get-a-Ref* package consists of six individual program modules: *Get-a-Ref* (a pop-up utility), *GarInst*, *CreForm*, *GarList*, *GarSort*, and *Convert*. All of these work together to simplify the handling of abstracts, reprints, and other source materials that are commonly used by researchers.

The *Convert* utility is a great tool with which to begin a thesis. It reads ASCII files taken from online databases such as MedLine, BIOIS, IRIS (a database for ophthalmologists), Chemical Abstracts, and Excerpta Medica and transforms them into *Get-a-Ref*'s file format. It creates a separate record for each reference and places titles, authors, and other data into predefined fields. The result is a fully functional file filled with scientific abstracts. Those who use networks not already supported can accept DatAid's offer to write additional *Convert* routines upon request.

To continue with the process,

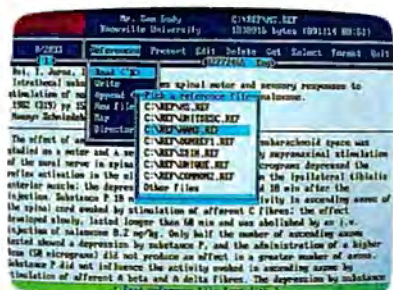
Get-a-Ref, a 106K RAM-resident reference manager, can be loaded.

Among its other features, *Get-a-Ref* allows you to load files, delete unnecessary entries, and modify records as desired. Once you've converted the files you have downloaded, you can combine them with *Get-a-Ref*'s Append command. The familiar menu bar and drop-down menus provide sufficient guidance for most situations. To complete a file, handwritten references have to be manually entered using the program's built-in editor.

In automatic mode, *Select* finds all entries that match a given search string. Alternatively, records can be manually located and selected. Once all relevant entries have been marked, the *Write* command will create a file.

Now the actual writing begins. On a 640K computer, *Get-a-Ref* works in tandem with most popular word processors. Pressing the ALT-R key combination activates the *Get-a-Ref* TSR (Terminate-and-Stay-Resident) module. From here, quotations can be marked and copied to a word processor or automatically documented with a citation in long- or short-form footnotes. Just a few keystrokes will do it all.

Footnote formats can be established with *CreForm*, a utility that lets you design footnote-format files. Set up the format once and *Get-a-Ref* handles everything from then on. Those who use different formats for different professors or journals can



You can easily organize your research for maximum efficiency with *Get-a-Ref*.

design as many format files as necessary and choose from them.

When it's time to write a bibliography, *GarSort* sorts entries by source, author, or year. *GarList* creates an ASCII text file and saves it on disk. From there the list can be printed directly through DOS or appended to a word processing document.

The recently revised manual comes in a loose-leaf binder with extensive screen illustrations. It provides clear and adequate assistance to

ensure success with the program's functions.

Overall, *Get-a-Ref* performs its job well. Keep in mind, however, that this is a highly specialized application designed to fill a specific purpose. But for those with the need, *Get-a-Ref* will simplify the process of researching, writing footnotes, and organizing bibliographies.

DAVID STANTON

IBM PC and compatibles—\$250

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DON'T GO ALONE

A haunted house sets the perfect stage for adventure. Your heart races; your hair pulls away from your skin; you sweat. What a wonderful feeling.

Accolade's first attempt at role-playing games, *Don't Go Alone*, is a journey through a haunted house so large that you'll think you're in a mall. Nasty creatures lurk around every corner, down every hall. Some, you can conquer in one battle. Others keep coming back for more.

Patience is the key. You can't finish this game in one sitting; the action isn't very fast-paced, and the interface is sluggish. The story line has great potential, but it unfolds too slowly.

The premise of the game is fertile ground for a good suspense tale. Your grandfather tried to prove that this large house is haunted. In the process, he disappeared into the depths of the old building. On the bottom floor, ten levels away, you'll meet up with the Demon of All Demons. Beat him in battle and your grandfather will go free.

As ghost stories go, this game isn't strong on plot. You move from room to room and, most of the time, at least one monster attacks you. Special weapons and magical chemical concoctions are your only defense. As the levels get deeper, so does the trouble. Besides monsters, you'll encounter other dangers, such as darkness squares and fear squares.

You see the adventure through four characters: a technician, a chemist, a psychic, and a fighter. They start out as beginners, but, as they gain experience, they advance in rank and become more powerful. If you could

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(These comments are from the correspondence from real SimCity users. *Honest!*)



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play an active role in the party, this four-person group would be very interesting. Except for guiding the characters through the maze-like house, however, you aren't directly involved.

You can use a mouse or the keyboard to activate directional icons. This makes it easy to get around the



In *Don't Go Alone*, you'll have to deal with a wide variety of surprises.

house (it's better than typing text directions). But when it comes to battle, the game's interface isn't very good.

Battle is dull. You fight by hitting the left-arrow key, or you build a formula by hitting the right-arrow key. There's no skill involved; the game decides if you hit the monster, if you incurred any damage, if you were scared by the monster, and so on.

During fights, the interface is anything but responsive. Offensive actions take several keypresses. In the meantime, the monster is terrifying your other characters, driving them crazy with fear.

If you don't want your characters to go insane with fear, you must spend a lot of time waiting for their fear levels to decrease. To calm them down, you can either brew up some antifear potions or sit and wait until the yellow fear bar sinks to 0, which slows down the game even more.

All in all, *Don't Go Alone* lacks the element of surprise. Even when I ran into new puzzles and new frights, I didn't have that fearful thrill that leaps from a good ghost story.

But what it lacks in thrills, *Don't Go Alone* makes up for in intricacy and depth. You can explore for hours and hours. You make progress, so—once you realize that success isn't represented by dramatic victories—you don't get frustrated. The maze is quite involved, with one-way doors and camouflaged secret passages. As your characters build strength, you'll see them improve as monster killers.

People who enjoy role-playing games a lot will welcome Accolade to the flock of software companies that produce role-playing adventures. Newcomers to the role-playing arena will enjoy the game because the graph-

ics presentation isn't as intimidating as the text adventures of the old days.

Don't Go Alone suffers from a slow-moving plot, but if you're content with just exploring the house, the adventure will come to you.

HEIDI E. H. AYCOCK

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LAKERS VERSUS CELTICS AND THE NBA PLAYOFFS

Think of the NBA Playoffs, and the Los Angeles Lakers and Boston Celtics usually come to mind. That's why Electronic Arts chose to highlight these two teams in its new computer basketball game, *Lakers versus Celtics and the NBA Playoffs*.

In addition to the 1988-89 Lakers and Celtics clubs, you can choose from 6 of the remaining 14 teams that participated in last spring's NBA Playoffs or from last year's two All-Star squads. Match up any of these teams in a head-to-head arcade clash and try to make your way through the NBA Playoff bracket and become World Champion.

This five-on-five game features outstanding graphics, and players on every team, including substitutes, are displayed in detail and dressed in official team colors with the appropriate uniform number. Unlike other basketball games, where all the players look alike, *Lakers vs. Celtics* features seven-footers that tower over shorter guards, and distinguishing characteristics such as Kareem Abdul-Jabbar's and James Worthy's goggles.

The animation also gets high marks. Kareem actually performs sky hooks, Isiah Thomas finger-rolls the ball into the hoop, while Michael Jordan does a three-sixty slam down the lane.

Although the game looks good, the sound is less spectacular. Even though the game supports three sound boards, there's no crowd noise, and the sound of the ball bouncing around the basket sounds unnatural. The only realistic sound effect is the horn end-

ing each period. That's not much support.

The game follows official rules, including a 24-second shot clock, 10-second backcourt violations, 5-second inbound violations, overtime, traveling calls, backcourt violations, offensive and defensive fouls, and out-of-bounds rulings.

Game-control options are simple. There are no plays to call. On offense, you can dribble in any direction, pass to a teammate, pump-fake a shot, and shoot. Defensively, you can steal, block a shot, and switch to the defender closest to the ball. A joystick is recommended because, when you're using the keyboard, you can't direct your passes to a particular teammate.

With single games, you can compete in either the arcade or the simulation mode. Tournament games are always in simulation mode, and players can get tired in this mode. You must wisely substitute for fatigued players or your team's performance will suffer. Substitutions can be made only during timeouts or between periods.

The team roster screen shows facts such as each player's name, number, and statistics from the 1988-89 season. These stats are used to determine how well each player performs in the game, but there are no current stats resulting from your gameplay. There's no way for you to



Watch the five-on-five battle in *Lakers Versus Celtics and the NBA Playoffs*.

know how many points Larry Bird scored or how many rebounds Jabbar pulled down unless you keep the stats yourself.

Some other minor quirks include the facts that the teams never change baskets and players don't foul out. But if you remember that this is an arcade game rather than a simulation, these facts won't affect your enjoyment.

One last word on realism, since these teams are modeled after real teams. The 1988-89 Lakers did have the best record last season, but they lost the title to Detroit. Last year's Boston club barely qualified for post-

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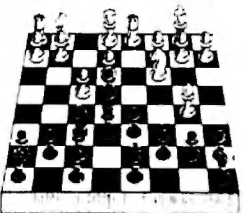
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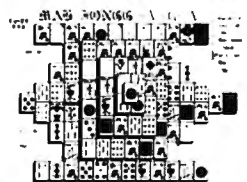


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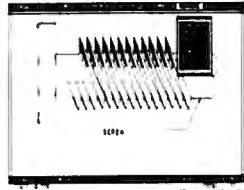
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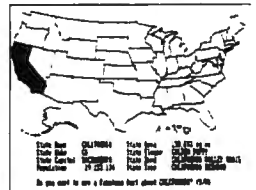
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season play. If EA wants to play up the rivalry between the two teams, it should release some disks with great teams of the past. Watching Bill Russell and John Havlicek do battle with Wilt Chamberlain and Jerry West would really appeal to computer roundball fans and make a rousing, in-your-face dunk of a sequel.

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IBM PC and compatibles—\$49.95

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DAVID WOLF: SECRET AGENT

Game players get a peek into the future of computer games with *David Wolf: Secret Agent*. Billed as an interactive movie, this spy adventure has the look and feel of a James Bond film, from opening titles to closing credits. In fact, it lacks only the Bond music to complete the mood.

The plot is developed by a series of still-frame digitized images rather than by computer-drawn cartoon-style characters. Real actors, costumes, and sets were used to create the images, and cinematic techniques such as cuts and fades help bring them to life. The EGA graphics offer rich detail and texture.

The story opens on the cliffs of Dover as David Wolf, agent for Peregrine, an international crime-fighting organization, tests an armed hang glider. He's immediately pounced on by hang-gliding Viper bad guys, and the fight is on. Once the action starts, you're in control of the hang glider, and it's up to you to win the sky battle.

This is the first of six mini simulation games that pop up from time to time. All done in polygon-filled graphics, the games are easy to learn but a little jerky at 10 MHz. And although the graphics are good vector graphics, they look primitive between the digitized photos.

If Wolf survives the glider scene, he'll be assigned to recover a top-secret stealth aircraft, which a defecting pilot has delivered to Viper. In any spy adventure, there has to be a beautiful girl. Missing along with the

plane is the brilliant and gorgeous Dr. Kelly O'Neal, chief engineer for the S-2 project.

Wolf's pursuit of the S-2 (and Dr. O'Neal) takes him through a couple of car chases near Monte Carlo, where, again, you're given control of the vehicle. This is followed by a well-done free fall-and-parachute sequence and finally by the big stealth-fighter dogfight at the end.

Dynamix has gone out of its way to make things easy for the player. Its Smart Start system automatically sets the game to match your computer at the beginning so you don't have to answer a long list of questions about your graphics, sound cards, joysticks, and disk drives. And the VCR-style interface lets you fast-forward through parts of the game or skip parts you've already completed. It also lets you adjust the level of difficulty at any time during play.

The game has a lot going for it, but it has some problems that can't be ignored. First, its movie-like quality works against it: Most of the time you just sit there watching pretty screens and dialogue go by. Except during the simulation scenes, there's no interaction with the game. Because of this passive stance, you never get that "reality shift"; you never feel like you *are* David Wolf.

Second, it doesn't last long enough. I played the entire game, including some of the simulation sequences several times, in a just over two hours. I applaud Activision for



Pilot your hang glider and shoot down the Vipers in *David Wolf: Secret Agent*.

not punishing the user by killing off the character every five minutes and requiring you to put in 50 hours of game time. But 2-3 hours is just too short, especially considering the \$49.95 price tag.

Dynamix certainly is on the right track, but this look at the future is just that—a hint of things to come. Game players are looking for more substance behind the flashy graphics. But if future Dynamix releases offer more con-

trol over the character and have a more entertaining plot, I'll be first in line to buy them.

RICHARD SHEFFIELD

IBM PC and compatibles—\$49.95

DYNAMIX
Distributed by Activision
3885 Bohannon Dr.
Menlo Park, CA 94025
(415) 329-0800

GRAVE YARDAGE

Activision's *Grave Yardage* represents what would have happened if Boris Karloff had been named commissioner of the NFL. Instead of brawny linemen, fleet-footed receivers, and crafty quarterbacks in the National Football League, you'll command a lineup of ghouls, ogres, zombies, gargoyles, and goblins in the Monster Football League.

The MFL plays on fields that are more hazardous than Astroturf. In addition to mud and weeds, land mines plague your players. If one of your grim grid warriors triggers an explosion, the demonic ref slaps your team with a penalty for littering the field with body parts.

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Grave Yardage is an excellent arcade game, but features such as play calling and substitutions tend to slow down the pace. Other unnecessary parts of the game include the team construction, playbook design, and field design options. But, if you're bored with sports simulations that imitate the pros on television and you enjoy carnage more than a good clean hit, then *Grave Yardage* is the football game for you.

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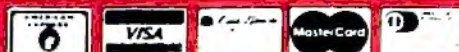
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LICENCE TO KILL

Bond movies beg for translation into computer games. James Bond's name conjures up visions of fantastic car chases, totally impossible escapes, great-looking women, and dry martinis. Brøderbund software has come out with a game that attempts to flesh out the vision.

Based on, and named after, Bond's most recent film, *Licence to Kill*, the game takes six scenes from the movie and puts you in the position of our hero in this arcade-style offering. Your mission is to catch Sanchez.

The first scene has Bond and his CIA counterpart, Felix Leiter, chasing the evil Sanchez in a helicopter. With Sanchez racing off in a jeep, you must maneuver past varying tall obstacles, dodge gun emplacements and try to prevent Sanchez's escape. To help you do this, there are control panels describing the amount of damage your chopper has taken and your current altitude. The joystick controls your direction, altitude, and speed; and it fires your gun.

Next, Bond is chasing after our villain on foot. You're given a finite number of bullets (although you can get more), and you must dodge explosions and ambushes. Graphically and strategically the most interesting of all the scenes provided, this situation demands thought and inventiveness.

Scene 3 sends us back into the air as Bond tries to jump from his plane to Sanchez's. This setting becomes a mere exercise of coordination, as you must time your jump perfectly before time expires and Sanchez leaves U.S. territory.

Scene 4 features our intrepid hero swimming underwater and attempting to interrupt a drop by drug smugglers. You're given only a limited amount of oxygen, and staying under is the only way to avoid being shot. A tough one.

In scene 5, Bond shows off his water-skiing skills and you show off your reflex skills as you race through all kinds of obstacles, trying to catch you-know-who. If you have played any of the popular race games, this scene will hold few surprises.

The final scene requires completion of two separate actions. The first is to successfully drop from a plane to a truck. The second is to drive the truck, destroying tankers as you go, until you finally stop Sanchez in the lead tanker.

The hardware requirements nec-

essary to play *Licence to Kill* are EGA, CGA, or Hercules capability and 512K of memory. This allows practically anybody to play the game, but the question is *would anyone want to?*

There are several problems that make this game ultimately unsatisfying. One is the lack of documentation. There are literally more words in this review than there are in the manual. The game's instructions tell you only what the joystick does and what the situation is, and then it lets you go at it. It doesn't explain the symbols on the control-panel menu, how to win or lose, or what the symbols on the map mean. At the least, I would expect a demo game. I might have been able to figure the mechanics while watching the computer play. Starting with such limited knowledge decreases the game's pleasure and playability.

Another major fault is the matter of subject interest. Essentially, this game is six different arcade games in one package. But the differentiation between one scene and another is so slight as to suggest not six different games but one game six times.

On the plus side, the graphics are truly terrific, especially in EGA. Unfortunately, that's too little to earn a recommendation. I expect a lot more from a game that carries the name of James Bond. This is one package I wish I had a license to stop.

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BAR GAMES

Recommended for mature audiences. That warning on the *Bar Games* box should ensure plenty of sales for Accolade, but this collection of five classic bar games should sell on its own merit. It's fun, varied, and has a sense of humor.

Liar's Dice pits you one-on-one with a beautiful barmaid. Guess the best hand that combines your dice with hers, and then try to bluff her into thinking your hand is better than it is. I never understood this game in real life, and it's just as confusing here.

In Air Hockey my paddle seemed a little sluggish, but the first opponent was a pushover. Win two out of three games and advance to a tougher opponent. Graphics in this game are great, and so are the women opponents. Male opponents may be handsome, but I never noticed.

As the bartender in Last Call, you slide frosty mugs of beer down the bar to thirsty customers. Use a power gauge to determine how much force to put behind each slide.

Wet 'N Wild is a wet T-shirt contest. The wetter the shirt, the more it reveals. Contestants wander across a stage, and you try to douse them with buckets of water from a catwalk above. It gets tougher and zanier as the contest progresses. Did I mention there are male contestants, too?

Brush off your opening lines in Pick-Up Artist. You have to determine which line works best on three beautiful women, and one has her eye on you. Use the wrong line on the wrong girl and she'll melt you faster than a snowball melts in San Diego.

Plenty of varied action in this one. Play for five minutes or five hours, *Bar Games* is different each time.

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THE PUZZLE STORYBOOK

Lug, that lovable, huggable monster, is back in First Byte's *The Puzzle Storybook*. This time, he's here to teach kids about shapes, encourage them to write stories, and tempt them to do puzzles.

The Puzzle Storybook is designed to appeal to children between ages 3 and 8. The graphics are bold, the colors are bright, and the menus use a combination of words and pictures to make it easy for even nonreaders to understand how to get around the program.

Kids can choose from three activities: Picture, Puzzle, and Story. The Picture option lets children create a series of storybook pictures. They can

FAST LOOKS

add a background, a person, a moving object, and a building to each scene. They can print the picture or use the Keep option to save the picture in the library on the program disk.

The Puzzle Game is actually two different games, Shapes and Tiles. The Shapes Puzzle asks you to identify six basic shapes: oval, circle, triangle, parallelogram, rectangle, and square. The Tiles Puzzle divides the picture into large blocks which are shuffled onscreen. The goal is to unscramble the image one piece at a time, trying not to make any mistakes.

My favorite part of *Puzzle Storybook* is the Story activity. Start by creating a new picture or choosing one from the library. The right side of the screen then changes into a talking word processor. Depending on the settings selected in the Helper Control Panel, the computer reads back your youngster's work either letter by letter, word by word, or sentence by sentence. By selecting the Radio icon, you can hear the whole story read repeatedly, either for enjoyment or to make corrections with the phonic clues provided.

When you finish a story, you can add it to the library, print it out for bedtime enjoyment, or have the computer read it out loud just for the fun

of hearing it talk.

The speech quality in the *Puzzle Storybook* is excellent. In addition to the speech generator, there is a phonic dictionary of frequently used words and an editor to make manual corrections to special words, such as the names of friends and pets. Attentive youngsters will quickly learn how to correct their work independently, just by listening for words that don't sound quite right.



Kids can create a series of storybook pictures with *The Puzzle Storybook*.

The program does have some frustrating features. Even with all the images supplied with the program, the pictures you create quickly begin to look very similar. To add to the irritation, pieces can only be put in preset locations, which severely limits story-

creation possibilities. Printing routines are similarly limited: pictures and stories can be printed in only one size, and it's impossible to predict how the page layout will come out.

While all the youngsters I let work with the program loved creating pictures and writing stories, the Puzzle section was less well received. Neither the Tiles game nor the Shapes game keeps records, and Zug's reaction is independent of the effort required in both games. Additional challenge in this section would have definitely improved the program.

Overall, *The Puzzle Storybook* succeeds with children because it appeals to their sense of fun, and it works well because the choices make sense to them.

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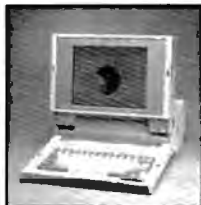
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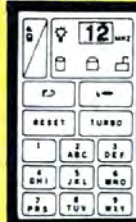
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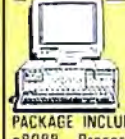


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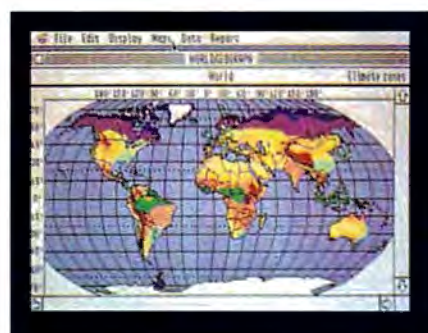
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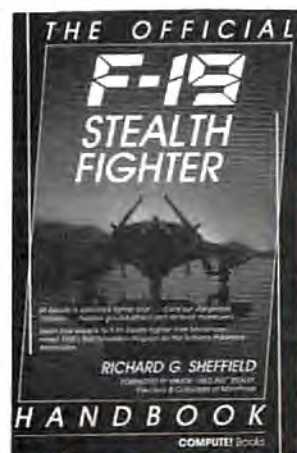
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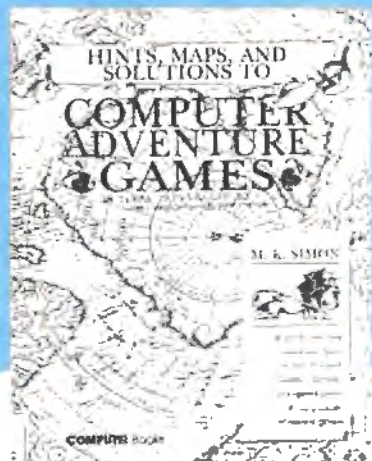
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CONVERSATIONS

THE VIEW FROM EUROPE

KEITH FERRELL

Some of your favorite games may be European. If not now, then tomorrow. Entertainment software is an increasingly global business. That's nowhere more evident than in Europe, where dynamic continental and United Kingdom markets are spawning games for both domestic consumption and export.

Simon Treasure, general secretary of the European Leisure Software Publishers Association, sees the growth of European software as inevitable.

"I don't think manufacturers are any longer concerned about domestic penetration of any one country," Treasure says. "They regard Europe as a whole. Obviously, with the arrival of a more integrated European market in 1992, this becomes even more essential."

There are economic factors as well. "The cost of developing a major product today is so large that it cannot possibly be recouped in a single country. The game has to sell across Europe at the least, and, if possible, be licensed into America, just as American companies such as MicroProse, Electronic Arts, and Activision have large European operations."

Powering the expansion is the current generation of 16-bit computers, led by the Amiga, the Atari ST, and upper-end PCs. This is new, especially in the United Kingdom, which early on embraced 8-bit, cassette-driven computers such as the Commodore 64 and gave little sign of being willing to give up the machines.

The European 8-bit market was a frenetic environment. With games priced at just a few pounds—less than \$5, U.S.—new games had to sell tens of thousands of copies to turn a profit. Shelf life for a game could be as brief as a couple of weeks, after which new products were tossed into the fray.

The shift to 16-bit products has come rapidly, but the leading European companies have prepared for it.

"Companies like Psygnosis, Mirrorsoft, and others made decisions to invest heavily in the 16-bit market. And it's starting to pay off handsomely." Among the other advantages of 16-bit products is the higher price point the games bear—£15 or so, or \$25 and up, in line with American prices—and a longer shelf life.

Which machines are leading the 16-bit revolution? "The Atari ST obviously has much greater potential in Europe than in the States. The Amiga has been equally successful. On the software side, Amiga and ST software are of great importance to all U.K. and European publishers." The past year, Treasure points out, has seen a surge in the popularity of 16-bit MS-DOS machines, led by Amstrad.

As in North America, the transition to 16-bit machines has brought with it a new, more sophisticated type of game. "Arcades were by far the most popular 8-bit games," Treasure says. "Sixteen-bit is a lot more pure, as far as game design goes. Simulations, flight simulations, and role-playing games are all finding great success."

The new machines are bringing in a new audience as well. "Historical-

ly, the 8-bit gaming audience was composed of boys from 10 to about 16. They played computer games until they outgrew them and moved on to other interests. We're finding a more mature audience for 16-bit games."

One thing from which European developers have been largely spared is the Nintendo boom, which has wreaked more than a little havoc on American software publishers. "Essentially, volume sales, in the United Kingdom at least, have been based on 8-bit software that costs from \$3 to \$15. At that price point, Nintendo can't compete. It's led them to hold back from this market."

Having anticipated the 16-bit market, what lies ahead for European software publishers? Treasure sees both opportunity and risk. As computer entertainment becomes more widespread, he feels, the industry will attract the attention of mainstream entertainment producers. This trend will be hastened by the arrival of new technologies such as CD-ROM, which will permit both the development of even more complex entertainments and the extension of the entertainment-software audience to a broader consumer base.

"Already we're seeing major developers and publishers investing in research into new technologies," Treasure says. "As companies like Sony and Philips arrive at standards for the new technologies, you'll see a real explosion of growth among the software developers who have come up from the 8-bit world. It's the beginning of the future, really."

That future will, perhaps inevitably, include the major entertainment producers. "I think you'll see companies like Time-Warner, Columbia, and others investing in our industry, acquiring software houses the way they've acquired movie studios, record companies, and book publishers."

Will that signal the end of the independent software industry? Not at all. "There will always be room for people who are faster and fleet of foot," Simon Treasure observes. □



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Word for Windows features a WYSIWYG graphical user interface.

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Super Solvers Midnight Rescue! supports EGA, Tandy 16-color, CGA, and Hercules graphics cards and requires 512K of memory for IBM PCs and 640K for Tandy PCs. The suggested retail price is \$49.95.

The Learning Company, 6493 Kaiser Dr., Fremont, CA 94555

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You can't change history though, as Joan is eventually captured by the British and burned at the stake in 1432. However, the game continues until 1456, as Charles VII carries on his fight to drive out the English and unite France.

As Charles, you can choose from 20 options on any given turn including raising armies, collecting taxes, negotiating for towns, ransoming prisoners, dispatching spies, and dispensing royal justice.

You'll visit 73 authentic locales and encounter 31 characters who have different weaknesses and strengths. The game features five action sequences including large-scale battles in open countryside, hand-to-hand struggles with individual English soldiers, and assaults on fortress walls with boulders and scalding oil raining down.

Joan of Arc has a retail price of \$44.95 and is available for the IBM PC and compatibles, Amiga, and Atari ST. The PC version supports Hercules monochrome, CGA, EGA, and Tandy 16-color graphics.

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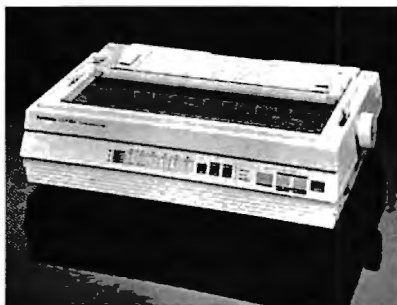
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Data East USA, 1850 Little Orchard St., San Jose, CA 95125

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The basic system includes a 5¼-inch, 1.2MB floppy drive.

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Hyundai Electronics America, 166 Baypointe Pkwy., San Jose, CA 95134

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Bookkeeping by Design requires 640K, a hard disk, a graphics card,

and a mouse. It comes bundled with a runtime version of *Microsoft Windows* and retails for \$695.

Accounting by Design, 2140 Shattuck Ave., Suite 501, Berkeley, CA 94704

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Toshiba America has released the T3100SX, its first battery-powered portable 386SX computer. Equipped with an Intel 80386SX microprocessor, the unit runs at 16 megahertz and is powered by two internal removable and rechargeable batteries that last up to three hours. It also runs on AC power.



The T3100SX is Toshiba's first battery-operated 386SX portable.

Weighing in at 14.9 pounds, the T3100SX offers VGA screen resolution using an advanced, high-contrast, low-power gas-plasma display. The unit also supports simultaneous internal and external monitors.

The system comes equipped with 1MB of RAM and is expandable to 7MB using 2MB memory modules or to 13MB using 4MB memory modules. It also features a 40MB hard disk drive with a 25-millisecond access time and a 1.44MB, 3½-inch disk drive.

It's equipped with five Toshiba slots including a dedicated modem slot.

The T3100SX retails for \$5,999.

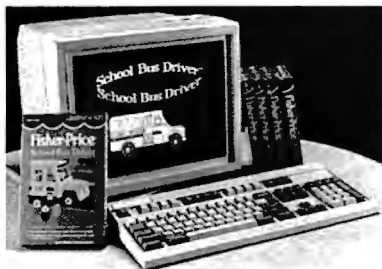
Toshiba America Information Systems, Computer Systems Division, 9740 Irvine Blvd., Irvine, CA 92718

Circle Reader Service Number 208.

Computer Toys

Fisher-Price has joined forces with software publisher GameTek to produce six educational computer games for children ages 3-8. Each game is based on a popular Fisher-Price toy.

My Grand Piano, a music pro-



GameTek has teamed up with Fisher-Price to produce educational software.

gram, teaches basic piano theory and musical notes while entertaining children with 30 songs such as "Mary Had a Little Lamb" and "London Bridge." In *Bowling Alley*, children learn basic math, coordination, and spatial relationships in a bowling game featuring curve balls, computer scoring, and sound effects. The role-playing game, *School Bus Driver*, teaches navigation and memory skills as children pick up Fisher-Price Little People at bus stops and drive them to school. Children can develop number-recognition and visual-recall skills with *I Can Remember*. In *Firehouse Rescue*, children assume the role of firefighter, driving a fire truck and rescuing Little People and their cat while learning coordination and decision-

making skills. Children can develop skills in picture and shape recognition with *Perfect Fit*. This match-and-fit game features sound effects and puzzles involving Fisher-Price toys and has three levels of difficulty.

Fisher-Price computer games by GameTek are available for the IBM PC and compatibles, Commodore 64/128, and Apple II. A color monitor is recommended. Each game retails for \$14.95.

GameTek, 2999 NE 191st St., Suite 800, N. Miami Beach, FL 33180

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Foreign Affairs

Two language-teaching software programs from International Software can perform direct translations from English into either German or Spanish. With *Learn German* and *Learn Spanish*, you can type in a simple sentence on your IBM PC or compatible and the program will act as interpreter and display or print the translation.

The programs employ artificial-intelligence parsing to ensure that grammar, gender, conjugation, and composition of words within the translated sentences are correct. After examining the translation, you can save each sentence in an ASCII file.

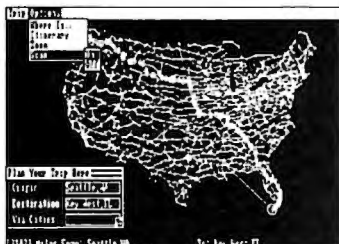
The accumulated text can then be edited with any word processor.

Both *Learn German* and *Learn Spanish* contain a large resident vocabulary and a dictionary; separate displays for numbers, verb conjugation, and noun declension; and word exercises that test your knowledge of the language. Each program retails for \$99.95.

International Software, 1954 Nob Hill, Box 747, Running Springs, CA 92382

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D A N G O O K I N

Gone are the days of the hobbyist, the hacker, the guru, the nerd. Before us lie the nineties, a new decade of issues, buzzwords, and computer happenings. What sounds odd today will be old stuff in a few years. When the twenty-first century dawns, we'll look back on the nineties with wonder and tell tales of that decade's glamour biz. We'll remember:

Exciting philosophical issues, like how Commodore/Atari zealots gained legal status as a religious cult and, therefore, were protected by law from DOS/Mac/NeXT deprogramming methods known as *real world training*.

Or when **eyeglass monitors** came equipped with an LED so that the boss could tell whether subordinates were working or sleeping.

And how the trend toward **portability** died when Ashton-Tate put a Handy Tote handle on its 47-pound *dBase VIII* package and Egghead installed customer forklifts.

Not to mention how the **personal computer craze** nearly crashed when a philosophical tome written by the most advanced computer neural network system of 1999 was published under the title *The Ultimate Peripheral: Your Head*.

And don't forget the **ground-breaking legal issues**, like the major defect in hard drive auto-spring-loaded-eject systems (standard in most 1998 PCs) that brought a rash of suits from users suffering severe chest bruises.

Or the **Columbian government's** suit against the manufacturer of the coffeeproof keyboard.

And the **suit brought by Denny's** against Apple Computer for borrowing its menu-with-pictures metaphor.

Or the **Apple suit against the state of Washington** for unrestricted use of its own state fruit.

And, last but not least, the Supreme Court's landmark decision that **IBM owns the English alphabet** but Lotus retains the rights to all the spell-

ing in perpetuity.

We'll look back on the **common complaints from the year 1996**: "I just can't live with this 256-character-filename limit!"

"This Portable Mac IIxvcr must have been designed by a weight-lifter! At two pounds, it's killing my kneecaps!"

"Eighty bucks for a gigabyte of RAM! These people must think I'm crazy to ask that!"

"This word processing software is a joke! Not only does it lack its own UNIX-like programming language, it doesn't even have a hard disk unformatting feature."

**GLAMOUR,
GLITZ,
AND
GLORY
—COMPUTERS
GIVE US THE BIZ**

"It just goes to show you: I spent six years learning the C language and they come out with D."

"This program requires six megs just to load! I remember when you could write a decent program in only 1.5 megs of RAM."

"I need a new graphics board. This SPQRVGA card only has a 5 X 5 meg pixel grid and a paltry 4 trillion

colors. It doesn't even do holography."

"This software would be easier to use if it didn't rely so much on the Alt-Shift-F91 key combination."

"We need to find a better way to interface humans and computers. This stupid bioconnector keeps slipping out of my ear."

"It just goes to show you: I spent four years learning the D language and they come out with E."

"The batteries in this laptop are useless! How can I get any work done on the moon shuttle with only 29 hours of power?"

"It just goes to show you: I spent six months learning the E language and they come out with F."

We'll hear the echoes of the **buzzwords and phrases from around the house in the year 1998**. "Look, dear! I found your laptop here behind the sofa cushion."

"Honey, did you see the keys to my i986?"

"Mom! The toaster won't boot."

"I didn't buy a \$9,000 HDTV for you to hook up your Tandy Color Computer 8 to it."

"Billy's been using the laser printer all morning—tell him to get off."

"Honey, I can't find the Honda's boot disk."

Hardly a day will pass when we don't look back on **all the other happenings that made the nineties so exciting**. Like in 1991, when PC computers stopped snorting and beeping and began to warble and yawn instead.

And the **computer-store headache pill**, perfected in 1992, became available in three strengths: beta, 1.0, and mail order.

And how **bright, snappily-dressed, attractive women** finally constituted, in 1997, a majority in the personal computer world.

Or when the **last WordStar hold-out converted to WordPerfect** in 1998 but continued to lament the loss of his beloved cursor-key diamond.

And **who can forget** when the "real world" was discovered in 1999, but wanted nothing to do with us? □



HOTWARE

SOFTWARE BESTSELLERS FROM AROUND THE COUNTRY

HOME PRODUCTIVITY

- 1. Quicken**
Manage your finances.
Intuit
IBM, Macintosh
- 2. The Print Shop**
Make banners and more.
Broderbund
Apple II, Apple IIGS, Commodore 64/128, IBM, Macintosh
- 3. PC USA**
Explore the United States.
PC Globe
IBM
- 4. BannerMania**
Print banners, pennants, and more.
Broderbund
IBM
- 5. Managing Your Money**
Allocate your income.
MECA
Apple II, IBM, Macintosh
- 6. Calendar Creator Plus**
Create many different calendars.
Power Up
IBM, Macintosh
- 7. WillMaker**
Get help in writing a will.
Nolo Press
Apple II, IBM, Macintosh
- 8. Print Shop Graphics Library**
Add variety to your *Print Shop* creations.
Broderbund
Apple II, Apple IIGS, Commodore 64/128, IBM
- 9. PC Globe 3.0**
Explore world demographics.
PC Globe
IBM
- 10. Adobe Type Manager**
Better fonts for your Mac.
Adobe
Macintosh

HOME ENTERTAINMENT

- 1. Flight Simulator**
Head for the wild blue yonder.
Microsoft
IBM, Macintosh
- 2. SimCity**
Run the world's first simulated city.
Maxis
Amiga, Commodore 64/128, IBM, Macintosh
- 3. Their Finest Hour: The Battle of Britain**
Turn the tide in the WWII air war.
Lucasfilm Games
IBM
- 4. M1 Tank Platoon**
Thrilling tank action.
MicroProse
IBM
- 5. John Madden Football**
Take to the field with the pros.
Electronic Arts
Apple II, Commodore 64/128, IBM
- 6. Tetris**
Deceptively addicting falling-block game.
Spectrum HoloByte
Amiga, Apple IIGS, Commodore 64/128, Macintosh
- 7. Mean Streets**
Become a digitized detective.
Access
Commodore 64/128, IBM
- 8. Hero's Quest**
Your chance to become a hero.
Sierra
IBM
- 9. The Duel: Test Drive II**
Fast-paced car racing.
Accolade
Amiga, Apple IIGS, Commodore 64/128, IBM, Macintosh
- 10. Battlechess**
Animated action on the chessboard.
Mediagenic
Amiga, Apple IIGS, Commodore 64/128, IBM

HOME LEARNING

- 1. Where in Time Is Carmen Sandiego?**
Can you find Carmen in time?
Broderbund
IBM
- 2. Math Blaster Plus!**
Teaches basic math concepts.
Davidson & Associates
Apple II, Apple IIGS, IBM
- 3. Where in the World Is Carmen Sandiego?**
Chase Carmen around the world.
Broderbund
Amiga, Apple II, Commodore 64/128, IBM, Macintosh
- 4. Where in the USA Is Carmen Sandiego?**
The chase moves to the USA.
Broderbund
Amiga, Apple II, Commodore 64/128, IBM, Macintosh
- 5. The Children's Writing & Publishing Center**
A desktop publisher for kids.
The Learning Company
Apple II, Apple IIGS, IBM
- 6. Reader Rabbit**
Helps children learn to read.
The Learning Company
Apple II, Commodore 64/128, IBM, Macintosh
- 7. Mavis Beacon Teaches Typing**
Learn to touch-type.
Electronic Arts
Apple II, Apple IIGS, Commodore 64/128, IBM, Macintosh
- 8. Learning DOS**
Learn the ins and outs of DOS.
Microsoft
IBM
- 9. Think Quick**
Children learn problem solving.
The Learning Company
Apple II, Apple IIGS, IBM
- 10. Math Rabbit**
Build early math skills.
The Learning Company
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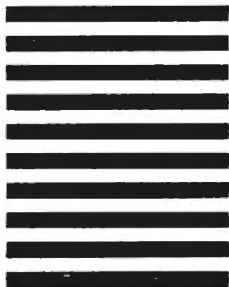
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☐ Macintosh ☐ Apple II ☐ Commodore 64/128

2. How long have you owned your computer? _____ years _____ months

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☐ school work/learning?

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☐ Personal Computing ☐ Other

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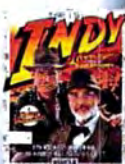
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Revenge of DOH



Activision's
Ghostbusters II



Sierra's
Hero's Quest



Lucasfilm's Indiana Jones
and the Last Crusade

System requirements: IBM PC, XT, AT, or compatible with 256K RAM, DOS 2.0 or higher, CGA, EGA, or monochrome graphics adaptor, and headset or external speaker.

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"Just got HQ yesterday and am very pleased...some of the humor is priceless."

"...this one has more humor than most CRPG's I've played!"

"The fairies were a riot! Great characterizations in this game, better even than Space Quest III, and that's going some."

"...much of the humor is a great deal more subtle...the sub thing brought me right out of my chair."

"I like that ending a lot!!! I want to go back and replay...SOON!"

"...one of the best of all of Sierra Games...I play the game every chance I get. I highly recommend it to anyone who likes games by Sierra."

"We can't wait to play HQ II!!! Sierra is getting too good at this stuff. It's getting to the darn point where no other computer games are worth buying. Keep it up...just make MORE games."

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