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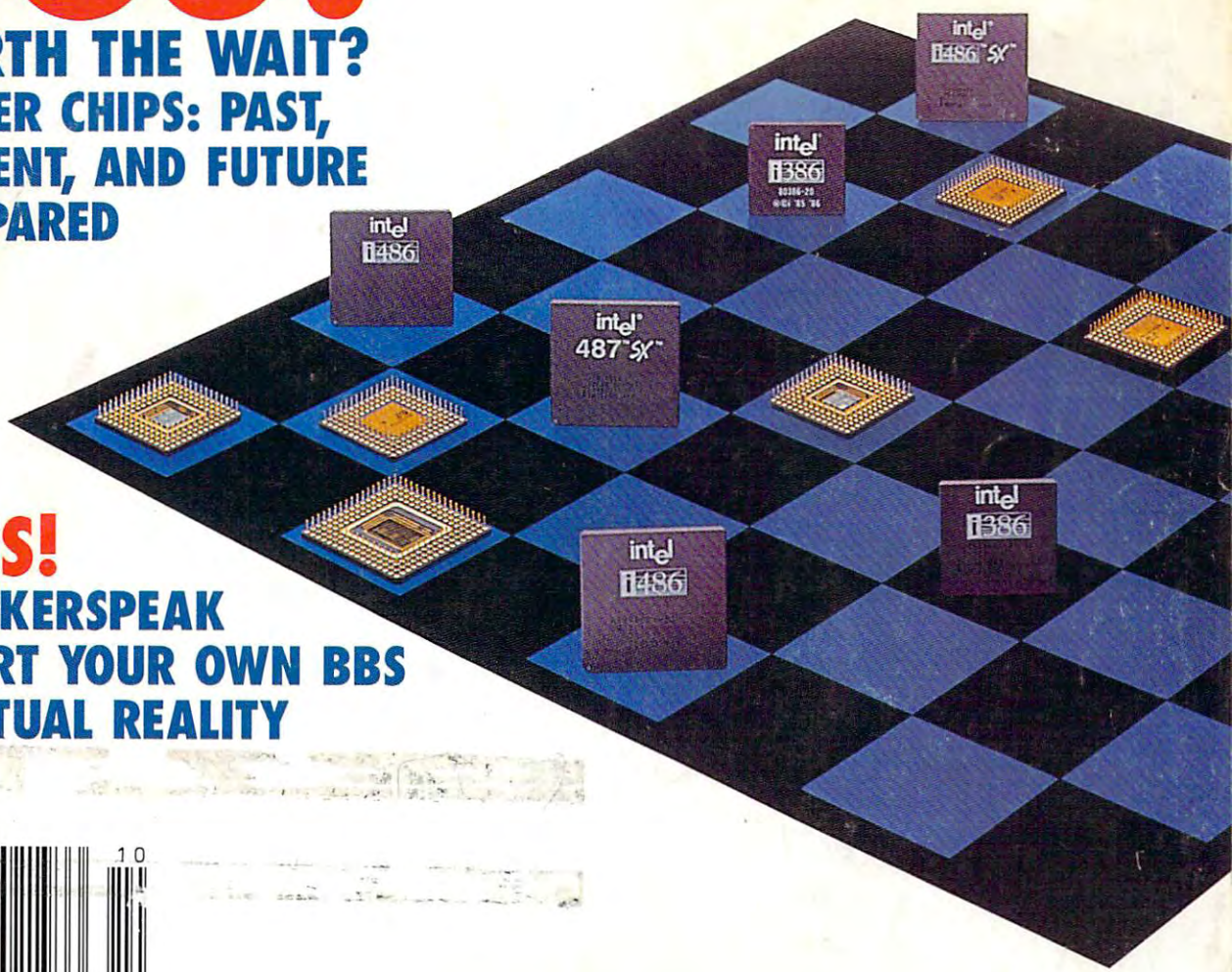

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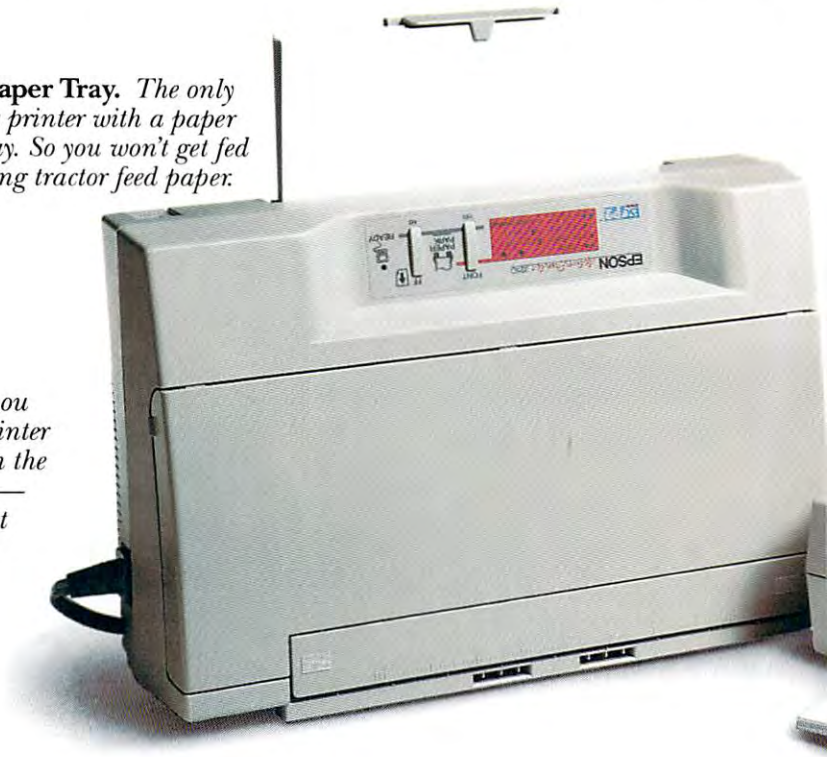

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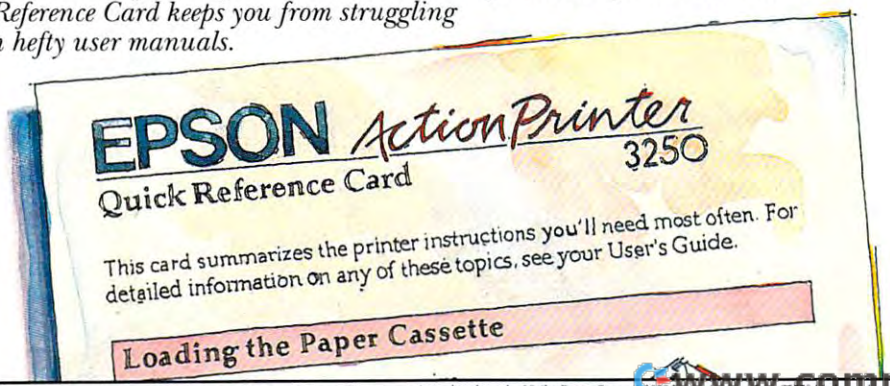

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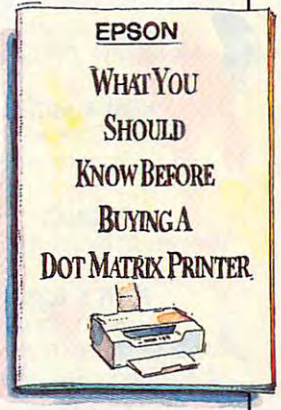

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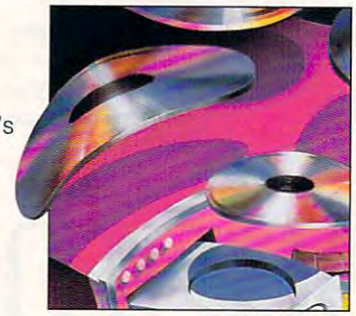

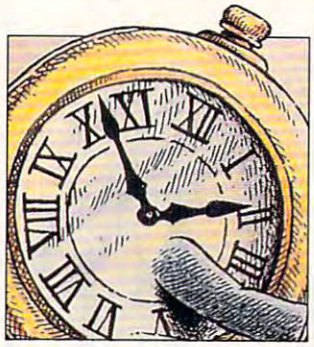

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REVIEWS

COMPUTE (ISSN 0194-357X) is published monthly in the United States and Canada by COMPUTE Publications International Ltd., 1965 Broadway, New York, NY 10023-5965. Volume 14, Number 9, Issue 145.

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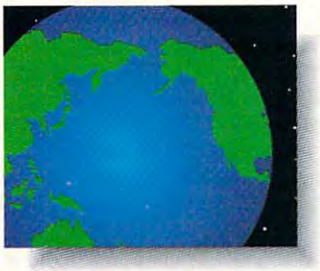

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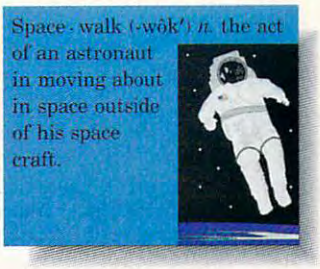

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Two new books give us a two-dimensional picture of Microsoft's Bill Gates.

Just who is Bill Gates, cofounder of Microsoft and its chairman? Despite the fact that he's arguably the most important and influential person in the software industry, Gates has remained a shadowy figure cloaked in mystery and surrounded by gossip. Two new books cast *some* light on Gates, but not enough.

Hard Drive by James Wallace and Jim Erickson, published by Wiley, is a biography of Gates by two Seattle-area reporters. *Accidental Empires* by Robert X. Cringely, published by Addison-Wesley, explores the microcomputer's entire history, not just Microsoft's, but as you can imagine, a large part of the book focuses on Gates.

In terms of style, these books couldn't be more different. *Hard Drive* takes a reportorial approach that balances careful research with somewhat dry prose. *Accidental Empires'* author, Cringely (the name is a pseudonym, by the way), is InfoWorld's gossip columnist, and his brilliant writing is as entertaining as a food fight at the White House.

After reading *Hard Drive,* you realize that the title *Accidental Empires* is a misnomer, at least as far as Gates is concerned. Gates planned his success; it was no accident. As *Hard Drive* makes clear, from the time he was in junior high school, Gates wanted to be a captain of industry. He read biographies of successful people, and he immersed himself in business books. And, most important of all, he became a computer wizard of the first rank.

Hard Drive also clarifies some facts about Gates that haven't been adequately documented until now. For example, he's a certifiable genius, and he has a photographic memory. The book recounts several exploits where both his genius and photographic memory are demonstrated.

What I found most interesting, however, were *Hard Drive's* sections dealing with the start of Microsoft, when Gates and Paul Allen created the first microcomputer BASIC, and the chapters that discuss how Microsoft got the IBM DOS contract. The IBM-DOS business has been so misunderstood for so long, and *Hard Drive* gives such a thorough account of the whole affair, that this alone is worth the price of the book.

Accidental Empires' droll subtitle, *How the Boys of Silicon Valley Make Their Millions, Battle Foreign Competition, and Still Can't Get a Date,* makes it clear that this is not a dull scholarly treatment of the subject. Cringely starts the book out with Gates and returns to him several times, always making the same points: Gates is driven to prove himself, and he's not a nice person. Interestingly, Cringely gives a much different spin to Gates's motives in the IBM-DOS story than *Hard Drive's* authors.

In *Hard Drive* we see Gates poised to make a bundle selling programming languages to IBM for its new under-development PC, codenamed Project Chess. But there's a problem. IBM won't do business with Digital Research, the company originally slated to develop the operating system. In order to gets IBM's language business, Gates, knowing that IBM must find an operating system for the PC—and fast, finds one himself and licenses it to IBM. His sole motivation in doing so is to be able to sell his language products to IBM.

Cringely sees it differently. Gates immediately realizes the power he'll have if he controls the operating system software, so he makes some shrewd behind-the-scenes moves and manipulates events to his own advantage. He comes up with the operating system and seals the deal.

The books seem to agree on two things, though: that Gates is a genius and that he's a jerk. This two-dimensional treatment is unsatisfying. It's impossible to imagine that there isn't more to Gates than the boy wonder, who performs nearly impossible feats, and the childish bully, who mistreats friends and employees.

These two books are well worth reading, but neither gives us a complete enough picture of Gates. I'm sure there's truth to the two dimensions both books present, but there's also lots of evidence that this is an oversimplistic view and that there's much more to Gates. For example, we find indications in these volumes that Gates is devoted to his family, that his employees idolize him, and that he's a philanthropist, but none of these areas are explored. I find myself wanting a more in-depth treatment, and I think Gates deserves one. ❐

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HOW TO START A BBS

Want to start a personal or business BBS? There's no time like the present to get started

If you use commercial online systems or local BBS services, chances are good you've considered starting a BBS yourself. Why not? It's a rewarding and exciting way to get even more involved in computing, and it lets you participate in a personal way in the growing telecommunications field.

According to current estimates, there are over 20,000 BBSs operating in the United States. Just about every community of any size has at least one, and there's always room for more. If you'd like to be the next person to offer online services, here's a guide to hardware and software, as well as what you can expect to encounter when you run your own system.

A Potpourri of Services

There are really only three basic kinds of BBSs: personal systems, group support systems, and business systems. Personal systems are usually operated as a hobby by an individual, running right out of a home. These hobby systems make up the bulk of the BBS community. Their sysops offer everything from general message and file transfer services to special interest systems dedicated to any hobby or avocation you can imagine. Typically, these systems charge no fee for access and operate on a freewheeling basis, with each system reflecting the interests and personality of the sysop.

Group support systems offer online services to members of clubs and organizations. Most PC user groups have BBSs dedicated to supporting their members, and other organizations are also beginning to offer BBS services to their computer-using members. These systems serve as message centers and are places where members can get help and download files relating to the organization's goals. Usually, access to these systems is limited to members of the sponsoring group.

Finally, more and more businesses, large and small, are going online with BBS services. Just about every software publisher now has a customer support BBS, and local computer stores also find that running a BBS makes good economic sense. Mail-order firms use BBSs to take orders and provide support for their customers. Computer-related businesses are still the most frequent operators of these systems, but the trend is starting to spread as more and more people get online. A typical non-computer-oriented system might offer support, for a fee, to a city's real-estate agents. The possibilities are almost endless.

What You Need to Get Started

If you've decided that it's time for you to go online with your own system, planning should be your first consideration. Start by assessing what you need to get going. It's not a long list, but you'll definitely need every item.

First of all, you need a genuine desire to be a sysop. After that, you need enough knowledge about telecommunications and modems to feel comfortable with terms like *initialization string* and *AT commands.* If you're still struggling with online systems as a user, you'll want to wait a bit until you get more familiar with the online environment.

The next requirement is

BY GEORGE CAMPBELL

hardware. If you're going to run a simple BBS with just one phone line, that old XT you've pushed aside will do the job. You'll need at least a 40MB hard disk, but any monitor will do, and you won't need tons of memory. On the other hand, if you want to run a multiline system that offers access to multiple callers simultaneously, plan on using at least a 386 machine with a 200MB hard disk and several megabytes of memory.

Naturally, you'll need a modem. A 2400-bps modem is the bare minimum these days, and a 9600-bps modem is even better. It's a matter of cost; a good generic 2400-bps unit should cost less than $75, while the faster modem will set you back over $300. Whichever speed you choose, make certain that your modem is completely compatible with the Hayes standard, or you'll run into trouble. Most 9600-bps BBSs use modems from U.S. Robotics; they've become the standard in the BBS community.

Next, you'll need a phone line dedicated to the BBS. You could try to share your regular voice phone line with a BBS, but it seldom works out. Fortunately, the cost for installing an additional phone line is usually less than $50 for a hobby system, and you won't have to pay any special rates to the phone company. However, if you charge your users a fee for access to your system or use the BBS in a business setting, the phone company will insist that you use a business line, costing an average of $50 per month.

One need often ignored by would-be sysops is time. Running a busy BBS takes a minimum of one hour each day just to answer E-mail and to keep the BBS running smoothly. Once a week or so, a typical hobby BBS sysop spends additional time backing up the system's hard disk, either to floppy disks or to a tape backup system. If your BBS will offer public domain software and shareware, you can count on spending an additional few hours per week adding and updating files. Finally, you'll spend an occasional day installing a new version of the BBS software or dealing with the inevitable hardware crash.

The final need, and possibly the most important, is a BBS program. Your choice here will determine a lot of things, including the time needed to set up the system the first time, the way users interact with your system, and the time you spend maintaining your BBS.

The Best BBS Software

A mark of the popularity of BBSs is the bewildering number of BBS programs available. There are literally scores of programs to tempt you, with a fantastic range of prices and capabilities. Your choice here will be critical, since switching from one program to another is usually just like starting from scratch. You'll need to spend time investigating the programs before making a choice.

The range is wide, both in price and capabilities. You'll find everything from free but powerful software like RBBS to software like TinyHost, which is limited to just a few users, to expensive multiline systems costing hundreds of dollars. The most popular programs are offered as shareware, so you can try out the software before laying out your cash. Our shopper's guide lists some of the most popular BBS programs, but there are many others available for downloading on commercial online systems. On CompuServe, BBS software is in the IBMBBS forum. If you use GEnie or America Online, the keyword is *BBS*.

A BBS without callers is next to useless. To compete for users with the systems already available in most areas, you have to make your system easy, useful, and exciting, or your potential users will call another BBS. Your first priority should be to check out prospective programs by calling systems that use those programs. Fortunately, just about every BBS software publisher operates a demonstration BBS. Look for numbers for the most popular programs in the shopper's guide. Before making a decision, give potential programs a thorough test as a user.

The software you choose also needs to be easy for the sysop. Assessing that ease of use can be a bit more difficult, but there is a way. When you check out the demonstration BBSs and trim your list to a few possibilities, look for a list on the demonstration system of BBSs that use that software. Call a BBS near you that uses the software, and ask the sysop what it's like to use it. Most sysops like the software they're running, but you can ask leading questions to get a pretty clear picture of what the system is like from the sysop's perspective.

After following these steps, you'll have cut the list down to one or two

BBS-SPEAK: A BRIEF GLOSSARY

activity log. A file created by your BBS software that records who calls and what callers do while online. You need this data to track down problems and to satisfy legal responsibilities.

ANSI graphics. By using special characters and commands in menus and other display files, a BBS using ANSI graphics can display colors and even animation. This feature can be switched off by the individual users.

door. An external program that your users can run while on your BBS. Typically, these are games, but many users set up doors to run databases or other productivity programs. There are hundreds of shareware programs designed for use as BBS doors.

fossil driver. Some BBS software requires special drivers to handle the actual data communications between the computer and the modem. Where the name *fossil* originated is unknown.

net mail. Using a networking system such as FIDONET, you can link your BBS to others on the network, allowing your users to send and receive mail from any BBS on the network. You'll need special software to make the link, plus a fee to join the network.

node. One unit of a multiline BBS. Many multiline BBSs allow users to send messages between nodes.

security level. All BBS software allows the sysop to set up a number of different security levels, each with access to a specific set of BBS functions. New users are given the lowest security level, while no caller has as high a security level as the sysop.

sysop. The system operator of a BBS. Normally, it's the owner of the system, but some BBSs have multiple sysops, each with responsibility for his or her own section.

verification. Most BBS sysops, to protect themselves against bogus callers, require users to list a voice telephone number when they join the BBS. The sysop calls the user and verifies his or her identity before allowing full access to the BBS.

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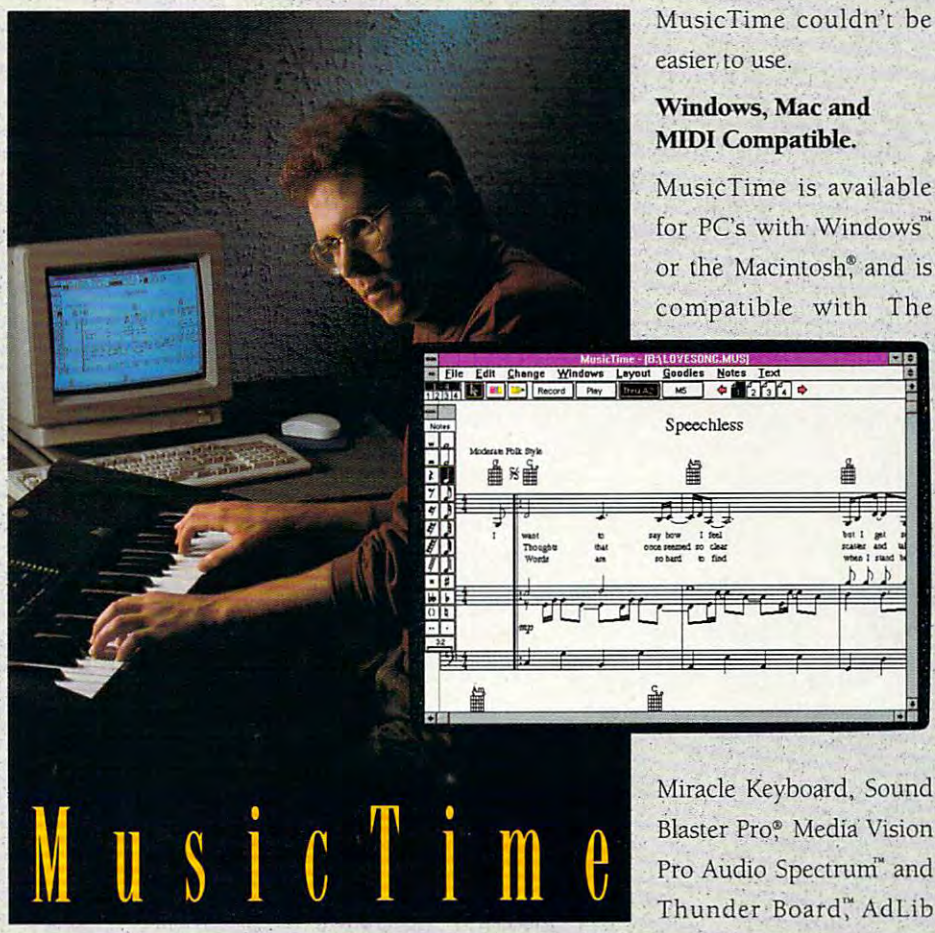

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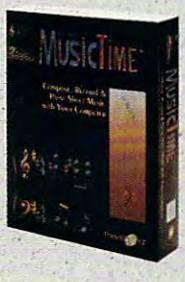

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programs. The next step is to obtain either a shareware version of each program or the demonstration version offered by the publisher. Then it's time to test each one by installing it and running a limited version of your BBS for a short time. You'll finally settle on a single program, but whatever you do, don't be tempted to use an unregistered or pirated copy of the software; at some point, you're going to need support from the publisher.

Preparing for the First Call

With the software selected, it's almost time for your first caller. First, though, you need to set up your system. The more time you spend on system design, the better your BBS will run. It's often difficult to make major changes once you get started, so take time now to get it right. A few hours spent in the planning stage will save you countless hours later.

Start by working out what your system is going to offer its callers. Will you have files available? Messaging? E-mail? How about informational bulletins and online newsletters? Will all your users have access to every part of the BBS, or will you need several security levels to control what different users can do? If it's a business system, will you be taking customer orders on the BBS? Most BBS software can allow users to page you while they're online. Decide whether you want to be interrupted and, if so, during what hours. It's best to answer all these questions on paper before you start configuring the software.

Mail, Public and Private

Every BBS offers messaging services. Since most programs allow you to break down messages into categories, you'll want to consider what subject each message area will handle. Be sure to set aside one area for you alone. Messages that go into that area should be private, readable only by the sysop.

E-mail services are popular, allowing your users to send private messages back and forth. In most BBS software, however, the sysop can read all messages, even those that are marked as private.

File Transfers

A BBS without file transfer capabilities is almost sure to fail. Every user wants to dig around, looking for programs and other files, even on business systems. As with messaging, you'll want to break down your files into carefully chosen categories to make it easier for users to locate files.

Downloading files from your BBS is one thing; uploading files is another. Whatever you do, don't allow users to upload files into areas where they can be immediately downloaded by other users. All files uploaded to your BBS should go into a private directory so

SHOPPING GUIDE

Here are some of the most popular BBS programs. Many others are available as shareware on most online services.

Spitfire 3.0
Buffalo Creek Software
913 39th St. W
Des Moines, IA 50256
(515) 225-8496 (demo BBS)
Price: $70 shareware registration
Shareware/demo version available

RBBS-PC 17.3
Capital PC User Group Software Library
P.O. Box 1785
W. Bethesda, MD 20827-1785
(301) 762-6775
(301) 949-8848 (demo BBS)
Price: free ($16 for a set of disks)
CD-ROM version available

PCBoard 14.5
Clark Development
3950 S. 700 E, Ste. 303
Murray, UT 84107-2173
(800) 356-1686
(801) 261-8976
Price: $170 for one line, $240 for three lines, higher for more lines
Shareware/demo version available

TBBS 2.5
eSoft
15200 E. Girard Ave., Ste. 2550
Aurora, CO 80014
(303) 699-6565
(303) 699-8222 (demo BBS)
Price: $299.95 for 1 line, $895 for 16 lines, higher for more lines

The Major BBS 5.31
Galacticomm
4101 SW 47th Ave., Ste. 101
Fort Lauderdale, FL 33314
(305) 583-5990
(305) 583-7808 (demo BBS)
Price: $59 for two lines, $359 for eight lines, higher for more lines

Falken 6.3
INFO*SHARE
P.O. Box 1501
Woodbridge, VA 22193
(703) 491-5823
(703) 803-8000 (demo BBS)
Price: $99 for two lines, $199 for four lines, higher for more lines
Shareware/demo version available

TinyHost 3.0
Bruce A. Krobusek
5950 King Hill Dr.
Farmington, NY 14425
(716) 594-1804 (support BBS)
Price: $25
Shareware/demo version available

Wildcat 3.0
Mustang Software
P.O. Box 2264
Bakersfield, CA 93303
(800) 999-9619
(805) 395-0233
(805) 395-0650 (demo BBS)
Price: $129 for 1 line, $249 for 1–10 lines, $499 for 1–250 lines
Shareware/demo version available

Sapphire 4.0
Pinnacle Software
Box 714 Airport Rd.
Swanton, VT 05488
(514) 345-9578
(514) 345-8654 (demo BBS)
Price: $51
Shareware/demo version available

Searchlight 2.25
Searchlight Software
P.O. Box 640
Stony Brook, NY 11790
(516) 751-2966
(516) 689-2566 (demo BBS)
Price: $49 shareware registration (one line); $89 for commercial version (one line), $119 (multiline)
Shareware/demo version available

Oracomm-Plus 7
Surf Computer Services
71540 Gardess Rd.
Rancho Mirage, CA 92270
(609) 346-9430
(609) 346-1608 (demo BBS)
Price: $290 for two lines, $540 for nine lines, higher for more lines

Personal Oracomm 5.M.6P
Surf Computer Services
71540 Gardess Rd.
Rancho Mirage, CA 92270
(619) 346-9430
(619) 346-1608 (demo BBS)
Price: $59 shareware registration
Shareware/demo version available

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City _____ **State** _____ **Zip** _____

Apprentice Registration Number _____

(Please include sales slip from your local retailer.)

Circle Reader Service Number 210

you can check them before making them available. You'll need to delete commercial programs and check for virus infections on every file you receive.

Bulletins and Other Messages

Before going online, you'll also need to create the bulletins, help screens, and other display screens needed by your new users. Nothing can kill a BBS faster than a lack of information. Users who call but can't figure out how to use the system simply won't call back. Take as much time as you need to write brief but complete bulletins that explain your system; then make them readily available to users. Unless you're a writing wizard, be sure to run a spelling checker on these information screens and proofread them carefully.

Maintaining Security

You can create as many access levels for your users as you like (within the limits of your software), but there are some basic things to consider. First, never allow anyone but yourself complete access to the BBS. Users should be kept away from sysop functions and should never be allowed to view user data that contains passwords or other private information. If your BBS offers a way for a remote user to drop from the BBS to the DOS prompt, make sure you're the only one who can do this, or you risk intentional or accidental file deletions or even a complete formatting of your hard disk. Finally, never use the same password on your own BBS that you use on other systems, or you risk disaster from a malicious user.

You'll also need a special security level for first-time callers. Legally, you need to confirm that all callers have provided their real names and addresses or telephone numbers. Typically, sysops restrict new users to a very limited subset of services until they're confirmed with a phone call. Once those two basic security levels are established, you can add as many other access levels as you need, assigning a caller to the one which is most appropriate after his or her first call.

Salting the Mine

You don't want your first-time callers to find an empty system, so you'll want to seed the system before going online. Create an introductory message for each message area, explaining that area, and add a few files to each file area. This will make your BBS more attractive to new callers, and it will help to ensure that they call back.

Those are the basic setup tasks you need to perform before your first call comes in. Remember, though, that you'll probably want to modify your BBS once you're up and running, adding features or streamlining your setup. Because of this, you should set up blank message areas, file directories, and security access levels, keep-

ON THE LEGAL SIDE

What could be simpler? You load up your BBS software and hook up the phone line, and you're off, right? That's the way it was a few years ago, but there are now some important legal considerations you need to think about before going online. If you're tempted to ignore these details, think again. In a few cases, federal and state authorities have confiscated all the computer equipment in a sysop's possession when illegal activity was suspected. Once they have it, it's almost impossible to get it back, so forewarned is forearmed.

Privacy

In 1986, the federal government passed a very complicated law called the Electronic and Communications Privacy Act. Reading and understanding it is a chore even for an experienced attorney. Essentially, though, the act defines what is meant by a private communication, whether on the telephone or on your BBS. Since all BBS software allows the sysop to read even private mail, you'll need to include a disclaimer to be seen on each call. Here's a typical notice:

Pursuant to the Electronic and Communications Privacy Act of 1986, Title 18, United States Code, Sections 2510 and following, notice is hereby given that there are no facilities provided by this system for sending or receiving confidential messages. The system operator and assigns may read all messages left by any user.

The notice is awkwardly phrased in typical legalese, but court cases have shown that this message is necessary to protect yourself.

Software Piracy

You need to guard your system religiously against users who might upload copies of commercial software. Most often, this happens by accident, but you could still be held liable and could even have all your computer equipment confiscated! To protect yourself, you'll need to examine each file uploaded to your BBS carefully to make sure it's truly a shareware or public domain program.

Virus Problems

It's possible, if unlikely, that a user will upload a file that's infected with one of the hundreds of viruses currently causing problems all over the world. Although it hasn't happened yet, it's conceivable that a sysop could be sued by a user who downloads an infected file. It's critical that you check every file uploaded to your system before making it available. Use a good virus-detecting program like McAfee's VirusScan. Many BBS programs, like Wildcat!, include automatic virus checking on each file after it's uploaded.

Identifying and Verifying Users

Many BBS sysops allow their users to sign on with aliases or handles. The anonymity is part of the fun on some systems. However, court cases in several states have shown that you need to know who's calling at all times. So even if real names are never used on your BBS, you need to require new users to supply their real names and addresses or telephone numbers when they first log on. You also need to follow up by checking on each user with a phone call. If you skip this and a user leaves threatening or libelous messages to another user or breaks other laws, you could be held legally responsible.

Keeping Logs

Federal and state laws can require you, under a court order, to turn over records from your BBS. This rarely happens unless your BBS is used for an illegal activity by your users. To satisfy the law, you need to maintain careful logs of all BBS activity. All BBS programs keep some kind of log. Print and store hardcopies of the log on a regular schedule to keep the log file from growing too large.

Get the best of Windows and OS/2 without learning all this.

Sure, you want to get your PC flying. With features like multiple open applications and background printing. Maybe even the ability to maintain your host connection while you work on something else.

But for that you need Windows or OS/2. Which means you also need to learn enough to get a pilot's license. And spend enough on hardware and software for a down payment on a jet.

PC MAGAZINE EDITORS' CHOICE October 30, 1990 Software Carousel, Version 4.0

But with new Software Carousel, you can get the biggest benefits of Windows and OS/2 by doing almost nothing.

It's #1 in task switching software.

Software Carousel got to be a best-seller because it works. Simply and reliably. Day in and day out.

And because it gives you the single most practical and powerful function of OS/2 and Windows—the ability to quickly switch from one application to another.

Simply load your programs as usual in individual Software Carousel work areas (it handles up to 12). Then switch instantly from one to another with just a keystroke. Each program gets as much RAM as it needs. And all your programs look and act just like they always did.

Best of all, nearly any program that now runs on your PC will work with Software Carousel. Even RAM resident utilities, graphics programs and network software. And Software Carousel works on all types of PCs. So you can have the kind of multi-application capability you want, without buying anything new.

Now with Print'N'Run.

Thanks to Print'N'Run, new Software Carousel is also an advanced print handler. One that quickly takes over your printing jobs by accepting all the output bound for the printer, then sending it to the printer as fast as it can take it.

While your printer keeps running, you can keep working in the same application. Or switch to another Software Carousel work area running a different application.

No more wasted time waiting for your printer. No more lost productivity.

OLÉ. A network idea whose time has come.

OLÉ is the optional Open Link Extender* for Software Carousel. And it could be the best thing to happen to networks since OS/2 itself.

With OLÉ and Software Carousel, you can connect to any host or service over a network—whether it's a mainframe, a mini, etc.—then "switch away" to work on another application, and not lose your connection.

OLÉ even makes sure that incoming data is received, even though your PC may be occupied with another application.†

And OLÉ works with all kinds of connection software. Including IBM, Attachmate, and others. Without changes to your hardware or software.

Even the experts agree.

Garry Ray, writing for PC Week, said, "Of these alternative operating environments (OS/2, DesqView and Software Carousel), Carousel may be the best choice of the day."

Barry Simon of PC Magazine concurred with, "...I find it difficult to imagine using my computer without Carousel. This package has become an essential tool and one that I strongly recommend."

So if you really want the major benefits of Windows and OS/2, don't get grounded with high cost and mind-bending complexity. Take off today with Software Carousel. It's easy. And it's just $89.95.

Software Carousel $89.95

SoftLogic Solutions, Inc.
One Perimeter Road, Manchester, NH 03103

Available at software dealers everywhere.
Or, order direct by calling toll-free.

Call 800-272-9900
(603-627-9900 in NH)

SOFTLOGIC SOLUTIONS

*Open Link Extender is sold separately. †Requires NetBIOS connection.

Circle Reader Service Number 182

ing them hidden from users and in reserve for later use. It's always easier to do this before going online.

Online for the First Time

Once you have your system configured for startup as described above, it's time to fire it up. Still, there's one more thing to do before you go public: You need to test your completed system thoroughly yourself. Get your BBS running; then call it from another computer, pretending to be a new user. Make sure everything works as you planned and make any necessary changes.

Next, if you have multiple security levels, create dummy users for each level and then call the BBS, signing on as each of those users. Again, test everything thoroughly to make sure the system runs smoothly. Once you're done, be sure to delete these dummy users to avoid confusion.

Check every part of the BBS, from leaving E-mail and public messages to uploading and downloading files. Try every help screen and bulletin. All this takes time, but it's almost certain that you'll catch plenty of errors during this process. It's better to fix them before your first caller is online.

Fishing for Users

Finally! You've done all the testing, you've finished your setup, and you're ready for callers. But how will people know your BBS exists? Depending on the function of your system, there are several ways to attract callers. If it's a public hobby system, one of the best techniques is to place messages on other BBSs in your area, announcing your new system. That method will get you started. You can also ask other sysops to include your BBS in their online BBS listings.

If your BBS supports a club or user group, publish the phone number in the group's newsletter and make announcements at meetings. One note here: It's a good idea to include basic instructions for getting online in your announcements.

If you're starting a business BBS, your best bet is to notify your customers in as many ways as you can. Include the number in your ads, send out flyers or postcards to regular customers, and offer simple instructional information to all customers who ask for it. Remember that your customers may not be familiar with online services.

Don't be concerned if things start off slowly. In fact, a slow start allows you to fix any problems that show up before you have hundreds of callers.

Keeping Your BBS Alive

Once you're online and have a growing list of callers, your work is really just beginning. The long-term success of your system depends on how hard you work at keeping calls coming in. Here are a few basic tips:

1. Don't let your BBS get stale. Add new files for downloading and keep updating versions of the public domain software and shareware available on your system. Keep the message areas up-to-date by deleting old messages.
2. Answer your mail. You'll get a lot of messages from your users. If you fail to reply, they'll stop calling, so try to respond to every message within 24 hours.
3. Introduce new features. By offering your callers new and interesting things to do on your system, you'll keep them calling back.
4. Be responsive. If your users have complaints or request changes in your system, give these suggestions careful consideration.
5. Practice safe BBSing. Be on the lookout for users who cause trouble on your system, and advise them to stop unpleasant activities. If they persist, you'll need to delete their accounts. It only takes one or two troublemakers to drive away your users.

Advanced BBS Features

While most BBSs succeed nicely with just the basic services, there are three popular additions you can make to your BBS once it's running smoothly.

Door programs. There are hundreds of special programs you can add to your system. Door programs run alongside your BBS, giving your callers modem access to games, information databases, and more. You'll find many of these programs in the BBS forums of CompuServe and other online services.

Net mail. Several networks exist to link up BBSs all over the country. These systems let your users exchange messages with any other users on the network. Your system will call the network automatically once a day to send and receive messages. The most popular of these systems is FIDONET. You can get information on joining a network by calling any BBS on the network.

Multiple lines. If running a BBS becomes more than just a hobby for you or if your system just gets too busy, you may want to consider adding additional phone lines. Most contemporary BBS software allows this. You'll need more equipment, additional phone lines, and more time, but your users will appreciate fewer busy signals and the ability to chat with each other online.

Logging Off

Running a BBS isn't for everyone. It takes a lot of work, but the experience of being a sysop on a busy BBS offers a kind of satisfaction that's hard to find in any other field. If you enjoy communicating with others and are willing to give up a little time each day, running your own BBS could easily become a very important part of your life. ❑

RBBS IN A BOX: THE CD-ROM SOLUTION

If your BBS budget can handle the cost of a CD-ROM drive, you may have a one-stop solution for getting your BBS up and running, complete with thousands of public domain and shareware programs. The key is a CD-ROM version of the popular, free RBBS software. On the same disc are almost 9000 public domain and shareware programs, all archived and ready for downloading.

You just install the preconfigured copy of RBBS on your hard disk and make the necessary modifications needed to personalize your system, and you're on your way. With all that software available, your BBS is sure to be one of the favorite systems in any community. It would take months and months of downloading, plus a monstrous hard disk, to accumulate anthing near that many files, so it's a quick way to establish a full-fledged system almost overnight.

You can buy a copy of RBBS in a Box from most CD-ROM distributors for $175. One good source is the following:

Bureau of Electronic Publishing
141 New Rd. Parsippany, NJ 07054
(800) 828-4766

Other CD-ROM libraries of shareware and public domain software are available, but you'll have to set up your BBS to handle them. Fortunately, most full-scale BBS programs offer support for CD-ROMs. Some CD-ROM shareware collections, however, require you to pay extra for a license to use the disc on your BBS. Check with the publisher before using any CD-ROM collection online.

SMART. AFFORDABLE LASER PRINTING FROM PANASONIC.

You may have noticed most personal laser printers are pretty much the same.

So although you'd like a personal laser to adapt to your way of working, it's mostly the other way around.

So, besides lots of fonts, speed, and paper capacity, we gave our KX-P4410 personal laser printer two features you'll find intelligent indeed. One lets you proof the first copy of a multiple printout, before outputting the remainder. The other is automatic shutdown, for those of you who use delayed printing. Together, they help you print intelligently. And complement the PCL 4-compatible 4410's full range of features that give you the look you want.

Like 28 internal fonts, side-loading font card. 512K standard memory, expandable to 4.5 megabytes. And flexible paper handling, with a 200-sheet multi-purpose cassette, accommodating letter and legal sized sheets plus envelopes—without changing cassettes. All this and a true 5 pages-per-minute print speed!

You'll find these same features on our PCL 5-compatible KX-P4430...and more! For example, 8 outline and 28 bit-mapped fonts; 1 MB RAM expandable to 5 MB; and our SatinPrint™ resolution enhancement.

Panasonic® personal laser printers. Performance by design. For the Panasonic dealer nearest you, call us toll-free at **1-800-742-8086.**

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Circle Reader Service Number 104

TEST LAB

Edited by Mike Hudnall
Reviews by Tom Benford

Quick and quiet, today's laser printers deliver. They've taken us far beyond the limits of yesterday's 9-pin printers and cumbersome daisywheel printers. Laser printers have always been the leaders when it came to sharp, clear output—whether for text or graphics. And now laser printers offer you more for your money than ever before. Technological advances and good old-fashioned competition have driven prices down and upped the ante in the field of powerful and convenient features.

This month's Test Lab focuses on ten low-cost laser printers from nine manufacturers. These are printers that you should be able to find for a street price of less than $1,500—some for much less.

As you read this month's reviews and ponder the benchmark results, you'll find plenty of features and options to influence your buying decision. And as always, COMPUTE's Test Lab will help you ask the right questions and focus on issues relevant to your needs.

Do you need to print text only, or are you looking for desktop publishing capabilities? How fast does the printer have to be? The reviews list the pages per minute (ppm), and our benchmark tests time this month's evaluation units performing typical kinds of printing jobs. That way you have a more realistic picture of performance with the kind of applications you might use on a daily basis.

Does the printer offer PostScript capabilities? Is PostScript standard or an option? What are the available printer emulations? What kind of print enhancement technology does a particular printer offer? What kinds of paper does it handle, and how many sheets can you load in the document tray? What kinds of input and output trays can you use?

How much memory comes standard? How much can you add and at what cost? What fonts are available, and how many of them are standard? Does the printer take font cartridges?

Is the printer light enough to allow you to move it around easily? Is its footprint small enough to fit comfortably in your work area? Does the printer offer easy-to-use controls? Does the documentation cover all the bases clearly enough?

This month's Test Lab will help you look at your needs more critically and answer many of these questions. When you're through, you'll have a much better idea which low-cost laser printer is right for you. Read on!

MIKE HUDNALL

C-TECH C. ITOH CI-4

C-TECH ELECTRONICS
2515 McCabe Way
Irvine, CA 92714
(714) 833-1165
List price: $1,245

If the name C-TECH Electronics doesn't immediately ring a familiar bell, the name C. Itoh probably will. C-TECH has sold 6- and 8-ppm (pages per minute) laser printers to the original equipment manufacturer (OEM) market for several years, and the CI-4 is the first model to be marketed under the well-known C. Itoh label for consumers.

The basic CI-4 model comes equipped with 512K of RAM and 14 bitmapped resident fonts. The standard, out-of-the-box emulation is HP LaserJet IIP, and the package includes parallel, RS-232C, and RS-422A serial interfaces. While this basic configuration might serve the light-duty user nicely, you'll want to increase the RAM by an additional 1 or 2 megabytes if you're interested in being able to do graphics and desktop publishing work.

If you desire PostScript compatibility, the optional page description language (PDL) cartridge is required; this cartridge carries a suggested list price of $450, and you'll also need 2MB of RAM (list price, $230) over the base 512K. The review unit came equipped with the PDL cartridge as well as the extra RAM.

With the PDL cartridge installed, a full complement of 35 PostScript-compatible fonts are ready for use, and since they are scalable fonts, they can reproduce in any desired size supported by your application software.

Control functions and setup are easily handled via a soft-touch control panel. Four colored LEDs and a 16-character LCD for messages keep the user posted of the printer's status, as well as displaying menu options for changing the configuration settings.

Small, unobtrusive, and ready for business, the CI-4 is a demure 14.3 inches wide by 15.9 inches deep by 7.7 inches high; it weighs in at 28.7 pounds. The small footprint gives you more desk space, and the light weight makes it easy to move about the workplace.

A 100-sheet bin feeds paper into the CI-4, and an output lever selects either faceup or facedown delivery modes. Optional paper-handling accessories include a second bin paper feeder which holds 300 sheets (list price, $175) and a faceup output tray (list price, $30).

Additional emulation cartridges are also available as separate options for the CI-4 if you need them, and they include IBM ProPrinter XL, ProPrinter XL24e, Ep-

son FX-850, Diablo 630, and HP GL cartridges, in addition to the PDL cartridge. There is also one HP font cartridge.

The CI-4 outputs documents at 300-dpi resolution at the rate of 4 ppm, which makes it good for most users working in environments where high-speed output isn't as crucial as some of the other worthwhile features that come standard with the CI-4. One of these features is the separate drum and toner units, which are replaced independently of each other, resulting in greater economy for consumable supplies.

Solid performance, compact size, and good expandability make the CI-4 a good choice for today's needs with the flexibility to grow into tomorrow's.

Circle Reader Service Number 304

EPSON EPL-8000

EPSON AMERICA
20770 Madrona Ave.
Torrance, CA 90503
(800) 922-8911
(310) 782-0770
List price: $1,999

The Epson name is synonymous with rugged, dependable workhorse printers, and Epson lives up to its name with the EPL-8000 laser printer.

This midsized unit measures 10.5 inches high by 18.8 inches wide by 15.1 inches deep, so it takes up more desktop area than some of the other lasers reviewed here, and with a weight of 40 pounds (including paper and toner), it's certainly one of the heavier printers covered, as well. Adding the optional lower paper tray and faceup output tray increases the overall dimensions to 13.3 inches high by 18.8 inches wide by 24.6 inches long, so you'll need to allocate additional space if you plan to use these options.

The standard RAM configuration is 1MB, and you can install an additional 1MB on the controller board. An optional expansion board accepts .5MB to 6.5MB of RAM to boost the printer's RAM to a 7.5MB maximum. The review unit was outfitted with 1.5MB of RAM and the optional Adobe PostScript emulation.

Speed is certainly an area in which the EPL-8000 excels, with 10-ppm output. The paper cassette can accommodate paper weights from 16 to 24 pounds, and you can use weights up to 42 pounds if you feed the paper manually. Additionally, the printer can handle plain paper, labels, colored paper, paper with punched holes, envelopes, transparency film, and cardstock. The standard paper cassette will hold up to 250 sheets of standard 20-pound bond paper, and output paper delivery is facedown unless the optional faceup output tray is utilized.

The EPL-8000 comes standard with 27 fonts (14 bitmapped and 13 scalable), and installing the PostScript option adds an additional 43 scalable fonts. The printer also features a slot for accepting HP-compatible font cartridges.

The EPL-8000 features built-in HP LaserJet Series III (PCL5) emulation as well as Epson FX/LQ emulation as part of the standard package; optional Epson GL (HPGL emulation) and PostScript are also available.

Standard interfacing is either parallel or serial, and the printer can accept one optional interface, as well (also either parallel or serial). The printer will automatically accept print jobs coming in from either interface, and each interface may be assigned a separate emulation.

All controls for selecting functions and operations are easy to use and top-mounted for easy access. A 20-character LCD keeps users informed of the printer's operational status as well as presenting menu choices for configuring the unit.

According to Epson, the toner cartridge has a life expectancy of 8000 pages at 5-percent density, which makes it one of the longest-life toner cartridges available. Print density and coverage are razor sharp at 300 dpi.

The EPL-8000 combines speed and power with the Epson name for quality and reliability. Its rich assortment of standard features, coupled with excellent expandability options, makes the EPL-8000 a good choice for just about any printing chore.

Circle Reader Service Number 305

A NOTE ON PRICES

With hardware changing more rapidly than ever and with options more plentiful than ever, hardware prices can be a tricky business. The following pointers should make your purchase easier.

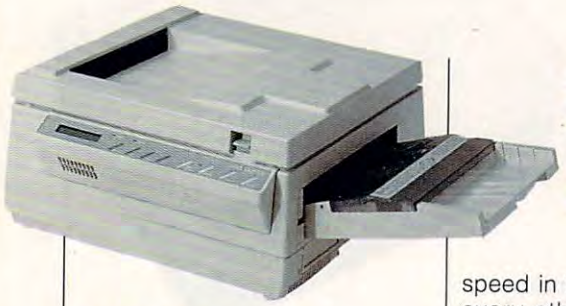
1. It pays to shop around. Be sure to look at street prices, which can be considerably lower than list prices.

2. Verify price and configuration details with manufacturers or vendors before you buy. Because hardware technology evolves rapidly, a product may have changed by the time our review appears.

3. Make sure that the printer configuration you have in mind matches the price you want to pay. Manufacturers have responded to consumer demand for options by offering all kinds of packages, and it's easy to become confused about prices if you're not careful.

Unless otherwise noted, the price listed for a particular printer is the list price for a standard configuration (not necessarily the review configuration). Again, though, it's a good idea to verify pricing before you buy.

—MIKE HUDNALL



EVEREX SYSTEMS
48431 Milmont Dr.
Fremont, CA 94538
(800) 821-0806
(510) 498-1111
List price: $1,995

EVEREX LASERSCRIPT LX

If you're looking for a laser printer that offers HP LaserJet Series II compatibility as well as exceptionally fast PostScript output, then the Everex LaserScript LX is probably going to be the ideal printer for you.

The LaserScript LX comes equipped with 2.5MB of RAM as the standard configuration, although this can be factory-upgraded to 4.5MB. The review unit contained the standard configuration, which proved to be quite adequate for all of the text and graphics tests.

When it comes to internal fonts, the LaserScript LX is one of the richest printers available, with its 24 HP LaserJet–compatible fonts and 35 PostScript fonts. Additional fonts can be added using the two cartridge slots, which will accept HP and compatible font cartridges. (Note that the cartridge support feature is an option that must be upgraded at the factory. If you want to use the cartridge slots, make sure you order the LaserScript LX with the cartridge support installed.)

Interfacing is another area that this printer has well covered, with parallel, RS-232C serial, and AppleTalk interfaces built in as standard equipment. Print speed for the LaserScript LX is rated at 6 ppm for normal text output in the HP-emulation mode, and it was a strong performer in this mode with every application it was used with.

The real strength of the LaserScript LX, however, is its output speed in PostScript mode; it left every other printer in the dust when outputting PostScript graphics, posting the fastest times of any printer tested for the accompanying PostScript benchmarks—and by an extraordinary margin. To say that this is a fast PostScript printer is a great understatement.

Controls for the LaserScript LX are conveniently located on the front panel, and they consist of an LCD window, eight soft-touch keys, and three LED indicators. I found it easy to set up the LaserScript LX and change configuration parameters. The handy 15-page quick-reference guide supplied with the unit helped a great deal. It's probably all the documentation that most users will ever need, although an equally excellent thick spiral-bound user's manual contains additional information on the printer's features, maintenance, technical specs, and upgrades.

The LaserScript LX measures 16.1 inches wide by 15.4 inches deep by 8.3 inches high; it weighs about 35 pounds loaded and ready for work. The paper tray holds 150 sheets of 20-pound paper, and the faceup tray can also hold 150 sheets. You can feed paper of all popular sizes automatically or manually. Output resolution is 300 dpi.

The LaserScript LX is an excellent printer that combines all of the most sought-after printer features with dazzling PostScript speed and full HP LaserJet Series II compatibility. What more could you ask?

Circle Reader Service Number 306

HEWLETT-PACKARD LASERJET IIIP

It's virtually impossible to hear the term *laser printer* without thinking of Hewlett-Packard—and for good reason. HP is the company that, quite literally, made the term a household phrase, at least to PC users. Since HP first introduced the original LaserJet printer many years ago, the company has continued to refine the product, and the basic laser printer of yesteryear has evolved into a high-performance output device known as the LaserJet IIIP. With this model, HP again shows its talent for making good things even better.

The IIIP is a good thing that comes in a small package: 14 inches wide by 16 inches deep by 8.25 inches high, to be exact. This small footprint makes finding a suitable location for the IIIP on your desktop or on a shelf easy, and because it weighs only 22 pounds, you can move this printer easily without having to use a roll-about stand.

As with all other HP laser models, the IIIP offers 300-dpi output, and it comes with HP's PCL5, the latest version of this accepted standard for printer output data.

HEWLETT-PACKARD
19310 Pruneridge Ave.
Cupertino, CA 95014
(800) 752-0900
List price: $1,595

"What I needed were sales letters with color graphics, a bunch of different typefaces, great print quality, and a little peace and quiet."

I got it. The new Citizen GSX-240.

The GSX-240 gives you everything you're looking for in a printer. It's fast, reliable, inexpensive and versatile. With optional Color On Command™ and built-in scalable fonts, the GSX-240 will enhance the looks of any document you create. And with Citizen's patented C.A.T. Citizen Acoustic Technology™ it will do it all, quietly. In fact, the GSX-240 is among the world's quietest printers.

Command-Vue IV™, our patented control panel, allows you to control over 100 printer functions at the touch of a button. The GSX-240's 360 x 360 high resolution insures crisp, clean output every time you print. To see the latest in dot matrix printing technology call 1-800-4-PRINTERS for an authorized Citizen dealer near you.

The Citizen GSX-240. It only prints everything you need.

CITIZEN™

You can use the PCL functions for scaling type to create characters from .25 point to 999.75 points (over 13 inches tall) and for special effects such as reverse (white-on-black) printing, patterned fonts, and more.

You'll find that all of the IIIP controls are conveniently located at the top front panel of the printer. Six push-button switches and an LCD facilitate your selection of various menu and print-mode options.

Serial and parallel interfaces come standard on the IIIP, and an RS-422 adapter is available as an optional accessory.

Eight proportionally spaced scalable typefaces and 14 bitmapped fonts also come standard and are built into the printer. In addition, you get a font cartridge slot that accepts any HP LaserJet–compatible font cartridges, including scalable typeface cartridges. Need more? This expansion slot accommodates HP "personality" cartridges such as the PostScript and Epson FX/IBM ProPrinter cartridges.

Our review unit came with 1MB of RAM, which is the standard configuration for the IIIP. You can install additional RAM in 1MB or 2MB increments to the two available slots for a maximum of 5MB. While 1MB will prove quite satisfactory for all text work and most graphics applications, your minimum configuration should be at least 2MB if you intend to print full-page graphics at 300 dpi. If you use only 1MB of RAM, any full-page graphics will print at 150 dpi on the IIIP.

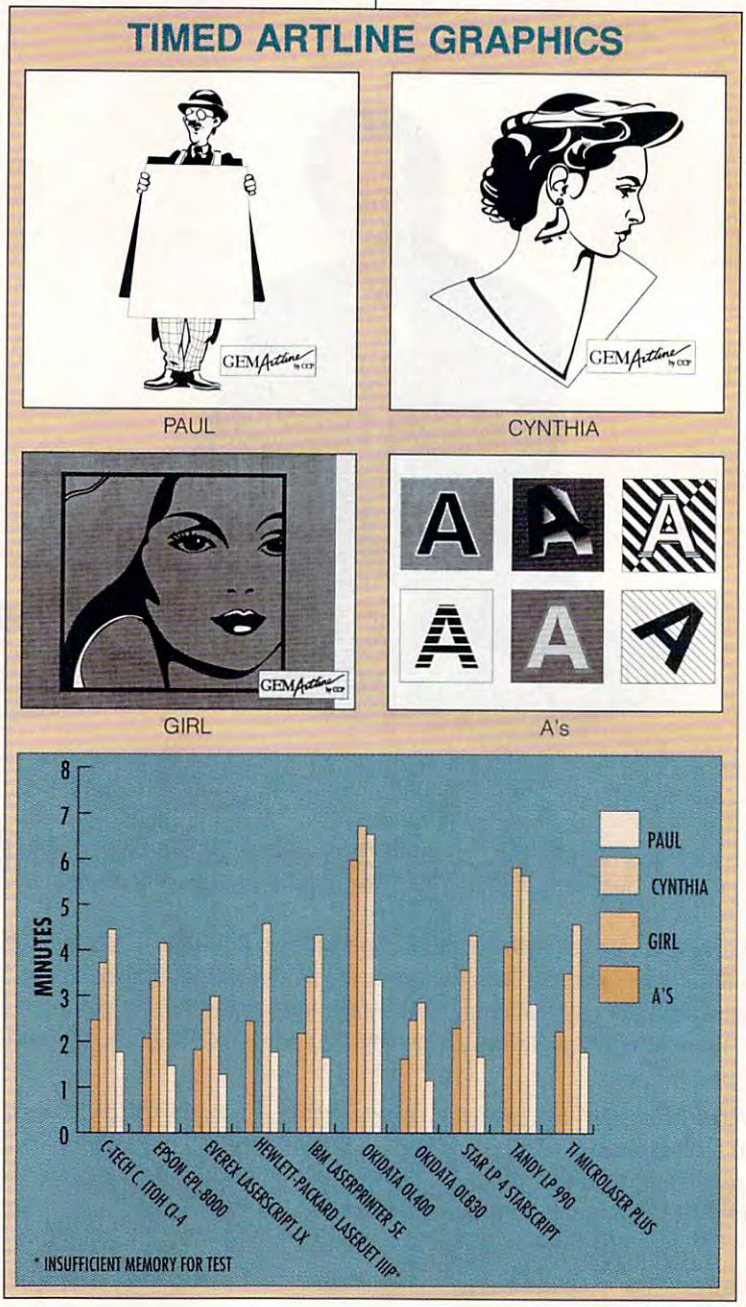
The IIIP is compatible with all LaserJet IIP accessories, including toner cartridges, font cards, and paper trays. This compatibility is an important point to keep in mind if you're already a IIP owner and considering an upgrade or a second printer.

A special feature of the IIIP, HP's exclusive Resolution Enhancement technology remaps all characters and graphics to produce the smoothest curves and highest definition possible at 300 dpi.

This 4-ppm printer from the company that literally set the standards for laser printers is an excellent choice for affordable laser output.

Circle Reader Service Number 307

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



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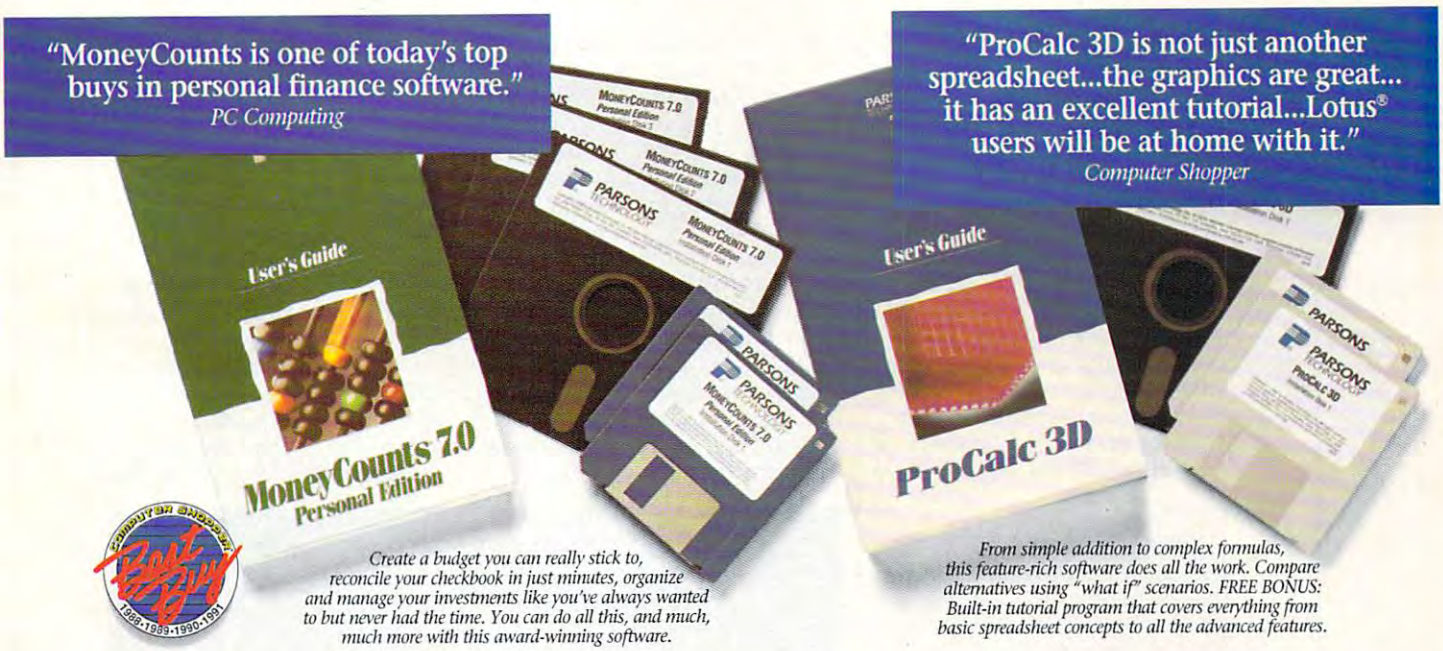

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2. Your order must be postmarked by midnight, December 31, 1992.
3. Limit of one offer per household.
4. These products cannot be resold at any price.
5. This offer not available to computer software resellers.

System Requirements.
Both programs require an IBM or compatible PC with 512K RAM (640 recommended), DOS 2.11 or later and a hard drive. Work with all monitors and printers. Mouse supported but not required.

Questions? Call toll free 1-800-223-6925.

Circle Reader Service Number 164

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IBM LASERPRINTER 5E

LEXMARK INTERNATIONAL
740 New Circle Rd.
Lexington, KY 40511
(800) IBM-2468
List price: $1,595

This may come as a surprise to some readers, but IBM and other major brand leaders in the PC industry do not always manufacture their own products. Quite frequently, in fact, these larger companies will purchase existing products or technologies from other, smaller companies who have particular expertise in selected areas. For example, the IBM LaserPrinter 5E reviewed here is manufactured and distributed for IBM by Lexmark, a laser printer manufacturer based in Kentucky. Of all the laser and LED page printers reviewed here, the 5E is the only one made right here in the United States.

The 5E is a bit larger than some comparable laser printers, but with dimensions of 10.2 inches high by 14.2 inches wide by 20.6 inches deep, it can still fit comfortably on most desktops. Moving the 33.6-pound 5E can be a chore, though, so you'll want to use a roll-about printer stand if you plan to move this printer much.

The 5E comes equipped with 512K of RAM as the standard configuration, but you can expand this with 1MB, 2MB, and 4MB memory-upgrade options. For any type of graphics, desktop publishing, or even spreadsheet work that incorporates charting functions, you'll want to increase the RAM, since the 512K won't be enough to handle these chores.

The 5E comes with HP LaserJet II Series emulation and IBM Personal Printer Data Stream emulation, and you can add PostScript and PCL5 emulations if you like.

The 5E's 26 standard fonts consist of 16 Type 1 scalable fonts and 10 bitmapped fonts. Additional fonts can be downloaded (Type 1) or added via the PostScript upgrade option.

The commendable 5-ppm print speed makes this printer 25 percent faster than most comparable lasers, which are rated at 4 ppm. This additional speed makes a big difference if you generate lots of output; a 50-page document takes only 10 minutes to output on the 5E, whereas the same document takes over 12.5 minutes on a 4-ppm printer.

Setting up the 5E couldn't be easier, thanks to a single-touch 16-character LCD panel that provides status and operation commands. All setup options are menu driven and easy to understand, augmented by excellent documentation.

A standard 200-sheet tray handles paper on the 5E. You can buy a 100-sheet auxiliary feeder, an envelope feeder, an additional 200-sheet tray, an A5 paper tray, and a heavy-duty label and cardstock tray as optional accessories.

Print resolution is 300 dpi, and special PQET (Print Quality Enhancement Technology) circuitry

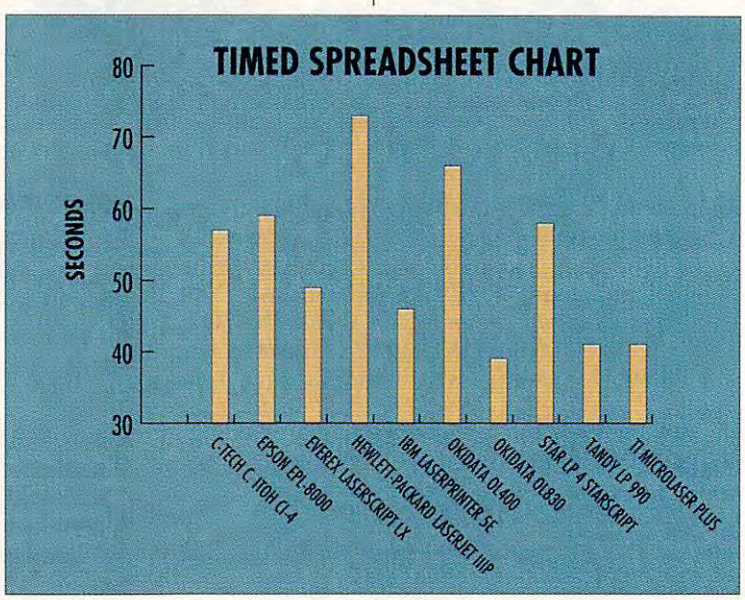
LASER PRINTER TESTS

Speed plays a significant role in everyday computing and printing. Nobody wants to waste time waiting for printouts, so our printer benchmark tests measure how long a particular printer takes to produce output from an everyday application, the kind you might use in your home or office.

All ten of our low-cost laser printers were timed as they printed out Windows fonts, a spreadsheet chart, ArtLine graphics, and ruled forms. In addition, for those printers that arrived with PostScript capabilities, we timed output of four PostScript graphics.

Remember that the lower the number (or the lower the bar in the graph), the faster the performance.

—MIKE HUDNALL



OKIDATA
532 Fellowship Rd.
Mount Laurel, NJ 08054
(609) 235-2600
List price: $1,099

in the 5E increases the image sharpness by smoothing jagged or uneven edges of text and graphics. The 5E also permits adjusting the print density (darkness) and line weight to suit individual preferences.

The 5E proves that American-made products can still compete favorably with foreign-manufactured ones—and even excel in some areas.

Circle Reader Service Number 308

OKIDATA OL400 LED PAGE PRINTER

Okidata's OL400 LED Page Printer provides a very affordable way to have HP LaserJet Series II compatibility and 4-ppm output at 300-dpi resolution without using a laser as the imaging medium.

Although it's the entry-level model in Okidata's OL Page Printer line, the OL400 shares all of the unique engineering features that make the OL Page Printers so innovative.

The OL400's footprint is approximately 17.75 inches wide by 17.75 inches deep. With a height of 5.25 inches, the OL400 has about the same desktop area and profile as a standard desktop PC. At approximately 27 pounds with a fully loaded paper tray installed, it is easily transportable.

The standard configuration is 512K RAM, but you can expand memory to a maximum of 2.5MB via a 1MB expansion board that accepts an additional 1MB of RAM. While 512K will prove adequate for most basic text applications, I recommend at least 1.5MB for any moderate graphics output (2.5MB is desirable for full-page graphics and DTP uses).

The OL400 can produce output at the rate of 4 ppm all day long. While this isn't a dazzling speed, it's a respectable pace that parallels the pace of many similarly priced laser printers, and it's considerably faster than any impact or ink-jet technologies.

Speed isn't everything, however, especially when you consider all of the other features that come as standard equipment with the OL400: 17 resident bitmap fonts (the equivalent of HP cartridges A, B, C, F, L, and Y), 200-sheet tray capacity, top (facedown) or rear (faceup) paper delivery, the ability to accept downloadable bitmap fonts formatted for HP LaserJet Series II printers, and a card slot to accept any of the eight available optional bitmap Okidata font cards. Other printer pluses include the inherent benefits of LED printing technology and the OL400's operational economy.

Unlike laser printers, which use a laser beam and a moving mirror assembly to direct the beam across the paper, the Okidata LED technology uses a stationary bar with an array of thousands of LED elements embedded in it. This LED array is about .5 inch thick and spans the full paper width (8.5 inches). The LED array provides a perfectly stable imaging light source that "paints" thousands of dots at a time at 300 dpi, rather than a single laser beam moving constantly from place to place to paint individual dots at this resolution. Since the array doesn't move, the output image is razor sharp from edge to edge. Another benefit: Because the LED array uses far fewer moving parts than a laser, there are fewer things to go wrong or generate noise.

Toner cartridges are economical. Since all unused toner is recycled, you don't waste any, and the average cartridge gives you about 1,500–2,000 pages, depending on image density. Because the image drum is a separate unit from the toner cartridge, the OL400's overall operational economy is impressive. The average life for an image drum before replacement is approximately 15,000 pages (or about 7–8 toner cartridges).

I rate the output quality of the OL400 excellent in every respect. The resolution is crisp and well defined, coverage is incredibly uniform from corner to corner, and the blacks are absolutely opaque. When outfitted with some additional RAM, the OL400 makes an excellent choice for virtually any text, graphics, or even desktop publishing applications at a very affordable price.

Circle Reader Service Number 309

OKIDATA OL830 LED PAGE PRINTER

What looks and feels like an Okidata OL400 but delivers 8-ppm output speed and PostScript capability? If you said the Okidata OL830, you guessed correctly.

The OL830 shares the same 17.75 by 17.75 inch footprint as the OL400, but at 6 inches high, it stands .75 inch taller than its sibling. It weighs in at a trim 27 pounds with a fully loaded 200-sheet paper tray installed, making it small and light enough to move around the workplace as needed. You can install an optional second-tray mechanism for those situations (such as network printing) in which having an additional 200 sheets available is desirable.

A parallel interface is standard, and an optional accessory board which provides both RS-232 Serial and AppleTalk interfaces is also available. The OL830 supports HP LaserJet Series II, Diablo 630,

OKIDATA
532 Fellowship Rd.
Mount Laurel, NJ 08054
(609) 235-2600
List price: $1,999

and Adobe PostScript emulations, making it capable of supporting just about any application's printer requirements.

The OL830 comes with 26 HP II–compatible fixed bitmap fonts and 17 Adobe PostScript scalable fonts as standard equipment. The OL830 also has a card slot available for accepting any of the optional Okidata/Adobe font cards (Garamond and More, Futura and More, Optima and More, and PostScript Essentials). Installing any of these cards boosts the OL830's font capacity to 35 PostScript scalable fonts.

As with all of the models in Okidata's OL Page Printer line, the OL830 uses a fixed array of thousands of LEDs to produce pristine images of absolute uniformity for the entire page area. The printer comes standard with 2MB of RAM and delivers 8 ppm at 300 dpi. You can expand RAM to a maximum of 4MB.

Unlike the arrangement in most laser printers, which incorporates the image drum into the toner cartridge, all Okidata OL Page Printers keep the image drum as a separate unit from the toner cartridge. This scheme not only makes sense but results in excellent operational economy, since the image drum requires replacement only about every 15,000 pages instead of about every 2,000 pages when the toner cartridge is replaced.

The Okidata design recycles all unused toner back for reuse, so there's no waste. Since none of the toner is wasted, the cartridges last longer, and they are less of an environmental hazard than less efficient cartridges. In fact, the cartridges are literally aluminum tubes with sliding toner compartment doors and plastic end caps, so they're largely recyclable. Changing a toner cartridge takes less than a minute and doesn't generate any mess at all because of the design of the toner cartridge and printer, and the efficient recycling of toner powder.

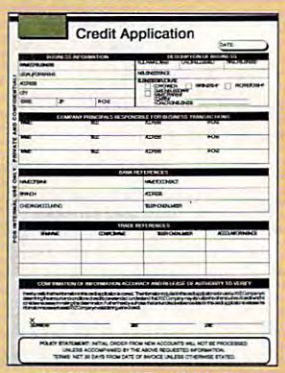
The OL830 gives you flexible paper output routing. You can use either top output, which provides collated copies facedown, or rear output, which ejects the pages faceup. The printer comes supplied with a standard letter tray; optional accessories include legal, executive, A4, and envelope trays. The OL830 can also accept manual feed input of single sheets, envelopes, mailing label stock, and overhead projection transparency cells.

If your requirements call for HP II and PostScript compatibility (with Diablo 630 emulation, to boot), excellent output at the rate of 8 ppm, economical operation, and high reliability, then the OL830 is probably what you've been looking for.

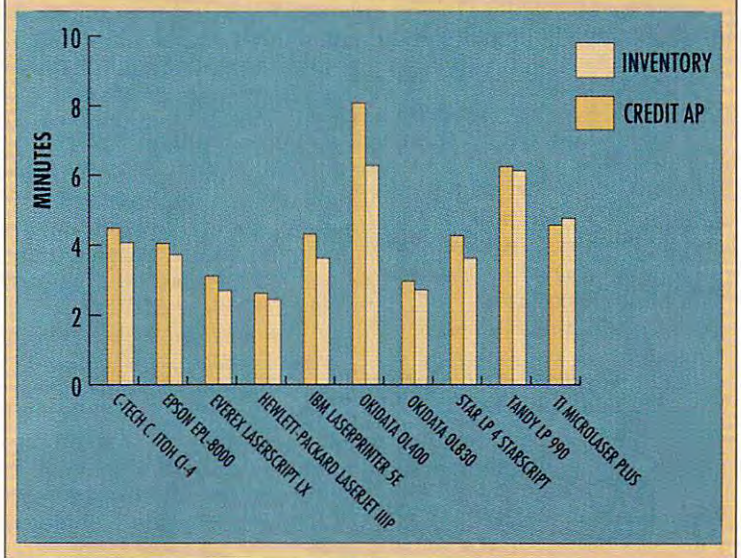
Circle Reader Service Number 310

TIMED RULED FORMS

INVENTORY



CREDIT APPLICATION



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Because its features and performance are so much like a laser, you'd think the new NX-2430 Multi-Font was actually a laser printer. It has 13 scalable fonts, which allow you the creative freedom to customize your documents. And it has the extra conveniences that make lasers so easy to use, like real-time LCD display and automatic emulation switching. What's more, its print quality is excellent for both text and graphics.

But don't be fooled—the NX-2430 Multi-Font is a very reliable, extremely affordable, 24-pin dot matrix. And it's backed by Star's exclusive 2-Year Parts and Labor Warranty. For more information, call 1-800-447-4700.

SCALABLE AAA FONTS	AUTO AEC EMULATION	LCD DISPLAY	QUIET MODE	LANDSCAPE LOADING	360 DPI

star

IT TAKES A LITTLE EXTRA TO BE A STAR

Circle Reader Service Number 113

STAR LASERPRINTER 4 STARSCRIPT

STAR MICRONICS AMERICA
420 Lexington Ave.
New York, NY 10710
(800) 227-8274
List price: $1,995

Star Micronics was one of the earlier manufacturers of dot-matrix printers for the home and personal computer markets, and the company has built an excellent reputation for producing rugged, reliable machines that do what they're supposed to. Many of them have been reviewed favorably in the pages of COMPUTE. The Star LaserPrinter 4 StarScript combines Star's legendary reliability with truly innovative features that make this model something special.

The LaserPrinter 4 StarScript is physically identical to the less expensive LaserPrinter 4 except that this model, the StarScript, comes with two megabytes of RAM and Star's PostScript emulation language, StarScript, as standard equipment. In addition to emulating PostScript, this printer also supports HP LaserJet IIP and Epson FX-850 emulations. Consequently, you're assured of finding an appropriate emulation for virtually any software package you'd want to use.

Maintaining compatibility was obviously important to the designers of the LaserPrinter 4 StarScript, since the printer can use HP-compatible font cartridges and can also accept downloadable HP LaserJet IIP– and Type 1–compatible fonts. The number of fonts that you can download is limited by the amount of memory available. You can use optional 2MB and 4MB memory expansion boards to boost download capacity, and the extra RAM is a good idea for heavy graphics applications, as well.

The StarScript feature puts 35 scalable fonts at your disposal, as well as 14 bitmapped fonts (7 resident fonts in both portrait and landscape orientations). You get 300-dpi resolution and an output rate of 4 ppm.

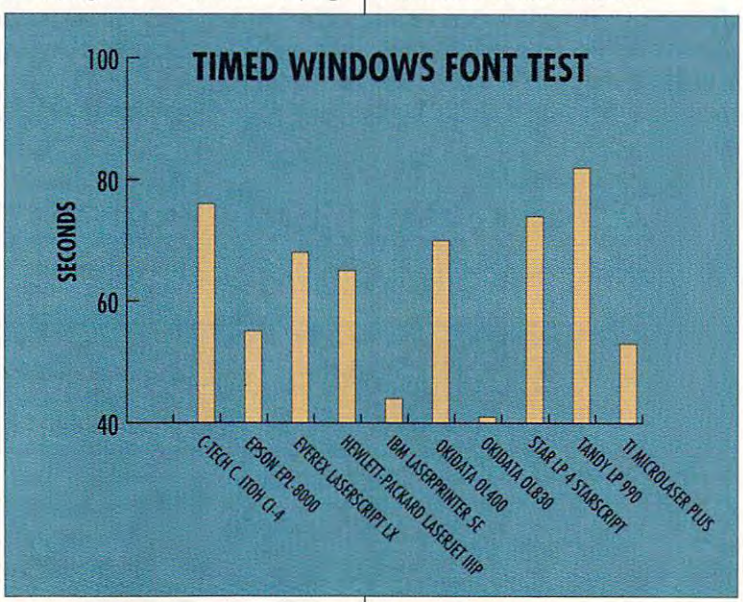
Paper stocks with weights from 16 to 28 pounds feed into the printer via a multipurpose tray that holds 50 sheets. If you find the multipurpose tray's capacity too limited for your requirements, you can get an optional lower paper cassette that holds 250 sheets. The multipurpose tray can also accommodate five paper sizes (letter, legal, A4, executive, and B5) and four envelope sizes (monarch, com-10, DL, and C5). Odd sizes of paper stocks, ranging from 3.8 to 8.5 inches wide and 5.8 to 14 inches long, can also be fed in manually. A versatile performer, this printer also handles plain paper, as well as overhead projection transparencies, adhesive labels, and postcards.

Printed output can be delivered either faceup (20-sheet maximum) or facedown (50-sheet maximum). The LaserPrinter 4 StarScript uses disposable EP-L toner cartridges with an approximate life of 2500–3500 pages. The number of pages you get from a cartridge depends on the print density.

Star covers most interfacing needs in this model by offering parallel, RS-232C serial, and AppleTalk connections. You select the desired active interface, emulation, and other variable feature parameters by using the printer's soft-touch control panel and a 16-digit LCD. I found the documentation supplied by Star to be excellent (up to Star's usual high standards), and setup's a snap, since everything is menu driven and straightforward.

The LaserPrinter 4 StarScript measures 16.4 inches wide by 15.2 inches deep by 7.3 inches high and weighs only 26.5 pounds with a toner cartridge in place. Its size, price, and features will make it an attractive choice for many users.

Circle Reader Service Number 311



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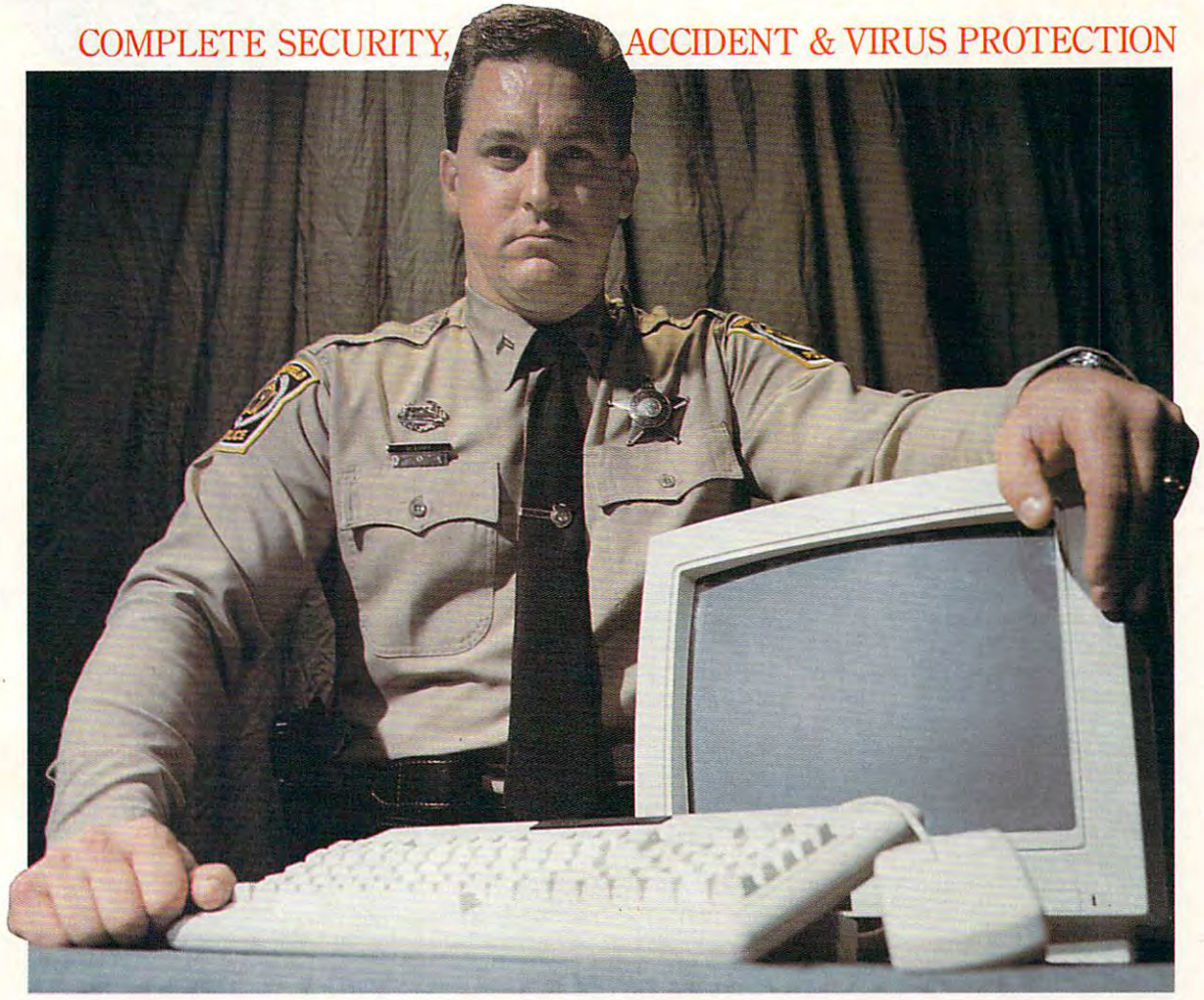

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Villa Crespo Software

Circle Reader Service Number 258

TANDY LP 990

TANDY/RADIO SHACK
1800 One Tandy Center
Fort Worth, TX 76102
(817) 390-3011
List price: $1,499

Tandy has achieved high recognition among consumers, especially those who use computers. With the Tandy LP 990 laser printer, the company's latest offering in the way of nonimpact printers, Tandy will continue to attract attention. As always, the design team at Tandy has done its homework and produced a product rich in features that will appeal to many users.

The LP 990 tips the scales at just a tad over 33 pounds loaded with paper and toner, and the printer's dimensions are approximately 10.5 inches by 13.25 inches by 14.25 inches, which gives it an almost cubelike appearance. The small footprint makes the LP 990 right at home on a desktop, shelf, or printer stand.

You can upgrade the LP 990's memory from the 512K RAM that comes standard with this printer to 2MB. This is a worthwhile investment if you're doing any kind of graphics work, as the 512K is not really adequate for anything but text and very minimal graphic embellishment.

The LP 990 boasts several emulations, including the HP LaserJet Series II, Epson FX-80, IBM Graphics Printer, IBM ProPrinter, and Diablo 630/630ECS printers. Parallel and serial interfaces come standard on this Tandy printer.

As with the other printers reviewed in this month's Test Lab, the LP 990 outputs text and graphics at a resolution of 300 dpi. Tandy includes 22 resident internal bitmap fonts (Courier, Courier Bold, and Line Printer in both portrait and landscape orientations), and you can add fonts by installing font cards in either or both of the printer's two available font card slots. The LP 990 also supports downloadable fonts, with the number of simultaneously resident fonts limited only by the amount of available memory.

Letter, legal, invoice, executive, A4, and B5 paper sizes in weights up to 34 pounds work with the LP 990, as well as #10 (commercial), monarch, international DL, and international C5 envelope sizes. You can feed paper manually or automatically via the tray. The standard paper tray is letter size and holds 250 sheets of 16- to 20-pound paper; an optional legal-size tray is also available. Finished output can be delivered either faceup or facedown.

As with other Tandy products, the supplied documentation is very clear and easy to understand, making frequent use of illustrations to augment the text. You'll be up and running quickly with the help of the 68-page user's guide; a 142-page technical reference manual provides detailed information on printer control codes, font character sets, and other technical material that most users will never need to consult. Still, it's nice to have around, just in case.

I found setup and operation of the LP 990 very simple and straightforward. Soft-touch controls and an LCD status panel make configuring and changing settings easy and uncomplicated.

With a print speed of 9 ppm, the LP 990 is a quick performer, comparing favorably with some more expensive models from other manufacturers. If you don't require PostScript for your output applications, the LP 990 is a good HP-compatible printer that should serve you admirably.

Circle Reader Service Number 312

TEXAS INSTRUMENTS MICROLASER PLUS

TEXAS INSTRUMENTS
P.O. Box 202230
Austin, TX 78720-2230
(800) 527-3500
List price: $999

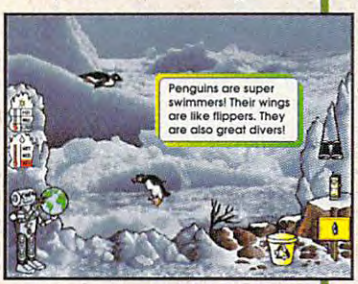
The Texas Instruments microLaser Plus laser printer is a 300-dpi model that's loaded with many of the standard features frequently offered as options on competitive models.

The microLaser Plus weighs 33 pounds, so it isn't exactly a lightweight printer. Its dimensions of 13.4 inches wide by 14.2 inches deep by 10.9 inches high, however, make it compact enough to sit on a desktop.

The microLaser Plus comes equipped with 512K of RAM, but if you have plans to use this laser printer for any meaningful graphics output or desktop publishing work, you'll want to increase that amount. RAM can be added a megabyte at a time using expansion cards that snap into sockets within the system compartment. The printer holds up to four of these expansion boards, giving you a maximum memory configuration of 4.5MB. If you intend to add the PostScript option, you'll need at least 1MB of additional RAM (2MB to print on legal-size

BEASTLY FUN!

Zoo Keeper features over 50 real-life animal photos, courtesy of ZooLife Magazine!



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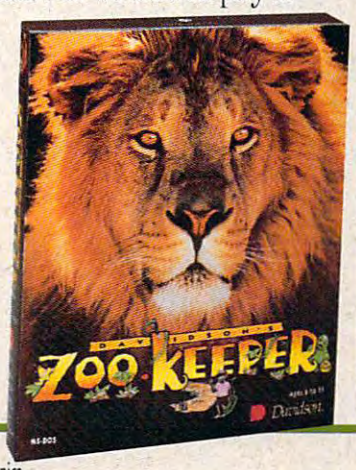

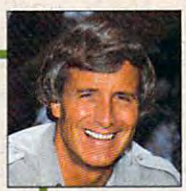

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Jack Hanna

Director of Columbus Zoo and host of the syndicated television show *ZooLife with Jack Hanna.*

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Available at Babbage's, CompUSA, Egghead Software, Electronics Boutique, Software Etc., Computer City, Best Buy and other fine retailers.

Circle Reader Service Number 189

HOW MUCH SPEED DO YOU NEED?

How much money should you spend on a laser printer? Just glance at the list prices of this month's laser printers, and you'll see that you probably won't have to take out a second mortgage to buy a capable one. You will, however, want to invest some time considering features, upgradability, and your own needs. A major consideration in your buying decision will probably be speed.

According to a public relations consultant for Star Micronics, a laser printer's speed depends on three factors: processing speed, engine speed, and the type of data being printed.

Processing speed is the time it takes the printer's internal "brain," its microprocessor, to process commands received from the computer. The two major classes of processors on the market are Motorola 68,000 chips, which handle most printing tasks with no problem, and RISC (Reduced Instruction Set Computing) chips, which are designed to handle commands in much less time. Engine speed, on the other hand, is determined by how long it takes the printer's engine to move a sheet of paper from the input tray to the output tray. When you read the specifications for a laser printer and find a pages-per-minute statistic, that's the engine speed. Laser printer engine speeds normally range from four to ten pages per minute.

Processing speed and engine speed together determine throughput speed, which is the time it takes for a document to print from start to finish.

As you may have guessed, printers with faster throughput speeds cost more than their slower counterparts. Of course, the faster, more expensive printers will catch your eye, but before one catches your pockets, make sure that you really need it.

"Buyers need to keep in mind that anything will print on any [laser] printer," says Michael Grabel, Okidata's nonimpact printer product manager. "Some things will look better or be more cost effective [on one printer than on another] when using certain applications." However, how much you ultimately spend on a laser printer depends on how important your time is and on what kinds of printing tasks you typically have for your printer.

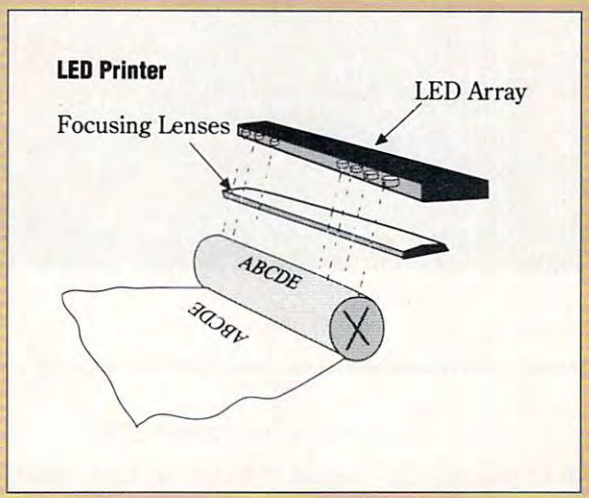
Printing tasks, says Tammy Lawson, product manager for Okidata's microLaser, fall into five main categories: reports and correspondence, spreadsheets, graphics, desktop publishing, and other.

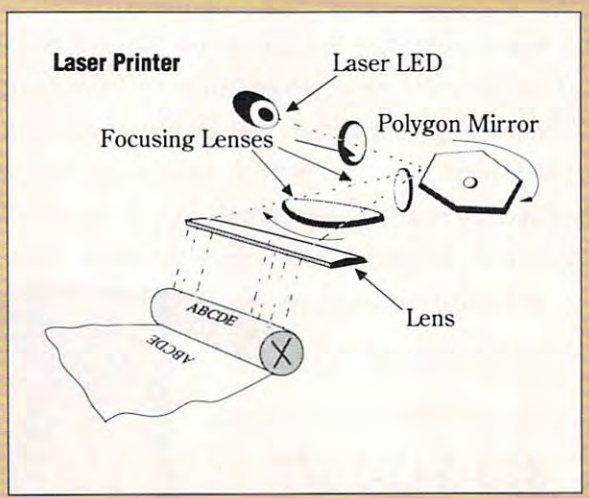
If you're concerned mainly with producing attractive letters without extensive use of fonts, a basic printer without PostScript that prints 4–5 ppm using a 68,000 processor is fine. That's because basic text printing doesn't slow down the microprocessor with a barrage of complex commands. The same is true of printouts for DOS-based spreadsheets. You can manage with a basic printer equipped with a 68,000 processor. However, Lawson advises, you should be sure that you buy an upgradable printer so that you can take advantage of PostScript as your needs increase. If you're using a graphically based spreadsheet like Excel and plan to experiment with fonts, point size, and graphics, you'll need a more powerful printer. PostScript printers that support at least 17 fonts, print 8–9 ppm, and sport 68,000 processors are your best bet. If you operate advanced graphics applications, make sure that the printer supports at least 35 fonts.

Desktop publishers who don't have printers with microprocessors that can handle large numbers of complex commands can end up spending more time watching hourglass icons than doing anything else. To prevent that, both Lawson and Grabel suggest buying printers with RISC processors.

Before you invest in a laser printer, take time to analyze your workload and the kinds of printing that you do. It's a good idea to consider your future needs, too. The applications you use will help you determine the types of data that your printer must process and thus which printer might best meet your needs.

—DANIELLE BEST





paper in PostScript).

Texas Instruments offers two PostScript options for the microLaser Plus. One of these PostScript boards (#2559978-002) adds the PostScript interpreter and 35 PostScript fonts, while the other (#2559978-003) adds the PostScript interpreter and 17 PostScript fonts. This is a good arrangement, since some users won't require all 35 fonts, although they may indeed desire the PostScript scaling and graphics-printing capabilities. The 17-font board provides a more affordable means of upgrading the basic microLaser Plus to PostScript. The review unit came outfitted with 2.5MB of RAM and had the 35-font PostScript board already installed in it.

The microLaser Plus comes equipped with a parallel interface as standard equipment, but if you need more than just a parallel interface, there are other interfaces also available as user-installable options. An optional RS-232C serial interface may be coresident with the parallel interface. An optional AppleTalk board adds AppleTalk and RS-422 communication along with the RS-232C serial interface. This option is handy if you have a mixed work environment composed of PCs as well as Macintoshes. It should be noted, however, that in order to use AppleTalk, the microLaser Plus must also be equipped with a PostScript board and at least one 1MB memory expansion board.

The control panel on the microLaser Plus has 12 soft-touch switches and a single-line, 16-character LCD. You can access all of the printer's functions easily through a menuing system that steps through all settings in a logical order.

The Texas Instruments documentation is excellent. An eight-page installation instruction brochure gets you up and running in just a few minutes, while a thick, spiral-bound user's manual provides a wealth of information on just about anything you could wish to know about the printer: its settings, capabilities, options, fonts, and specs.

The 9-ppm print speed, excellent standard emulations, and user-installable upgrades are sure to make the microLaser Plus an attractive choice for many users.

Circle Reader Service Number 313

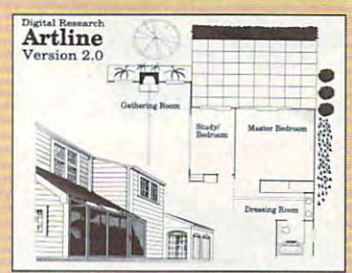
NEXT MONTH:

CUTTING-EDGE NOTEBOOKS

TIMED POSTSCRIPT TESTS

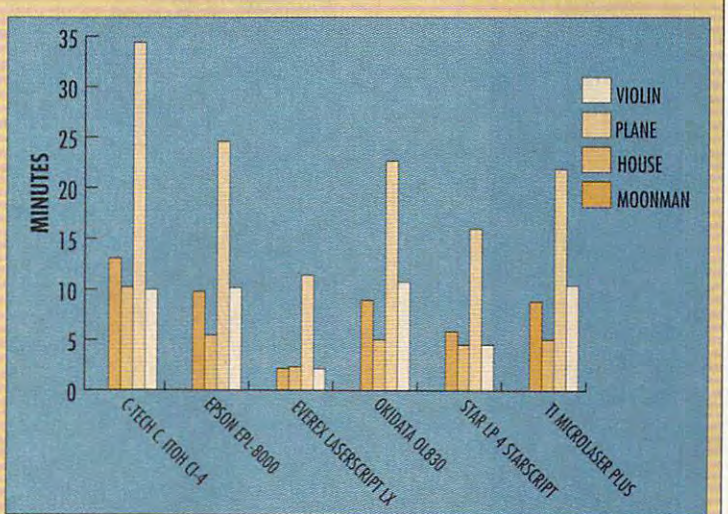
VIOLIN

PLANE



HOUSE

MOONMAN



LASER PRINTER OPTIONS

In your search for the printer that best fits your needs, you'll want to pay close attention to the features and price of a standard configuration as well as the options you might need for the future and their prices. The prices of the options listed below are list prices supplied by the manufacturers. Because these prices are subject to change and because street prices can be significantly lower, it's a good idea to call around to verify the best prices for your needs. Those needs may include local service and support, in which case you'll want to check into local retail channels. If you decide that you don't need local service and support, however, mail-order channels may be your best bet. In some cases, as our reviews point out, it's a good idea to order your printer with extra memory or other options already installed rather than waiting to make the upgrades later.

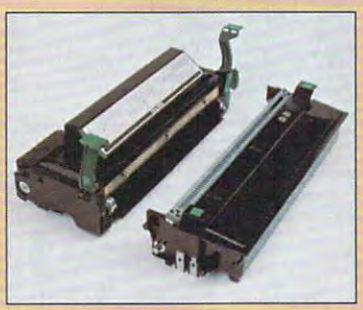
C-TECH C. ITOH CI-4
1MB RAM module—$165
PDL cartridge—$450
second bin paper feeder—$175
faceup tray—$30
HPGL graphics—$190
Epson FX-850 emulation cartridge—$190
IBM ProPrinter XL emulation cartridge—$190
Diablo 630 emulation cartridge—$190

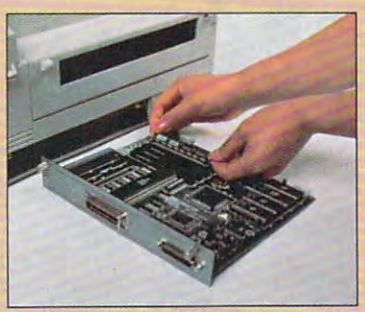
EPSON EPL-8000
memory expansion board without memory—$65
½MB memory—$49
2MB memory—$179
Adobe PostScript identity card—$649
Epson GL identity card—$299
lower paper tray—$399
legal paper tray—$79
faceup output tray—$35
long-life imaging cartridge—$239

EVEREX LASERSCRIPT LX
2MB memory upgrade—$200
HP-compatible cartridge support (font cartridge)—$160

HEWLETT-PACKARD LASERJET IIIP
1MB memory board—$230
2MB memory board—$390
letter-size input tray—$69
legal-size input tray—$79
executive-size input tray—$75
A4 paper tray—$89
executive paper tray—$89
envelope tray—$89
HP Epson Fx/IBM ProPrinter emulation cartridge—$175
Adobe PostScript printer cartridge from HP—$695

IBM LASERPRINTER 5E
1MB memory module—$199
2MB memory module—$399
3MB memory module—$799
PostScript option—$499
75-envelope feeder—$379
100-sheet auxiliary paper feeder—$279
200-sheet paper tray (letter)—$69
200-sheet paper tray (legal)—$79
scalable font card—$399
PCL5 emulation option—$199
AppleTalk option—$349
A5 paper tray—$109
heavy-duty label/cardstock tray—$69





OKIDATA OL400
LED PAGE PRINTER
1MB memory board—$239
1MB memory chip—$219
Serial I/F—$95
Parallel I/F—$95
legal paper tray—$89
letter paper tray—$89
envelope paper tray—$89
executive paper tray—$89
A4 paper tray—$89
universal (letter) paper tray—$109

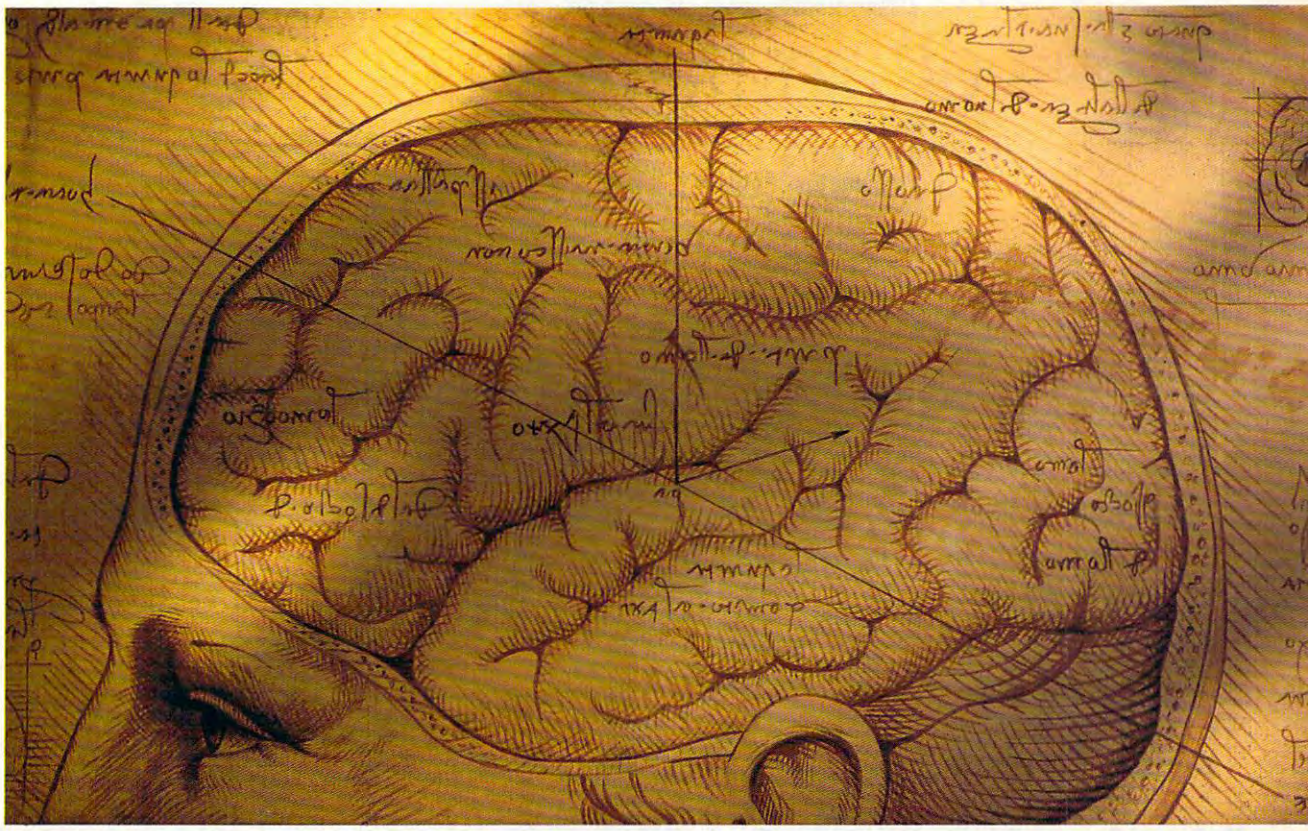
OKIDATA OL830
LED PAGE PRINTER
2MB memory expansion—$399
Second-tray mechanism—$329
AppleTalk/RS-232C serial I/F—$199
legal paper tray—$89
letter paper tray—$89
envelope paper tray—$89
executive paper tray—$89
A4 paper tray—$89
universal (letter) paper tray—$109

STAR LASERPRINTER 4 STARSCRIPT
1MB memory upgrade—$299
2MB memory upgrade—$499
4MB memory upgrade—$999
letter-size cassette—$195
additional letter-size cassette—$69
executive-size cassette—$79
legal-size cassette—$85
envelope cassette—$109

TANDY LP 990
1½MB memory upgrade—$599.95
paper bin—$69.95
envelope feeder—$349.95

TEXAS INSTRUMENTS MICROLASER PLUS
17-font Adobe PostScript and1½MB memory—$400
AppleTalk for PS17—$500
35-font Adobe PostScript and 1½MB memory—$750
AppleTalk for PS35—$850
RS-232, RS-422 AppleTalk, not including cable—$100
Epson 850/1050 emulation cartridge—$135
IBM ProPrinter emulation cartridge—$135
Diablo 630 emulation cartridge—$135
second 250-page drawer—$275
40-envelope feeder—$275
legal paper drawer—$55

—COMPILED BY TRACY MYGRANT AND DANIELLE BEST



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For the beginner at interactive computer services, we've got news, travel information, stock quotes, entertainment and games, a complete encyclopedia, free time to sharpen your online skills, and more.

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Circle Reader Service Number 103

Computing in the lap of luxury, making music, and helping the visually challenged make full use of computers

Atoms that migrate from the voids eventually stack up and form into what researchers say look like tiny *hills* and long, thin *whiskers,* which can eventually pierce insulating layers in the circuits, causing shorts and other problems.

The researchers found, however, that electromigration damage is similar to mechanical deformation, which occurs when malleable metals are stretched, bent, or hammered. Armed with that knowledge, specialists should be able in the future to construct materials that minimize electromigration and prevent its effects from reaching the consumer. If you would like more information, contact the Georgia Institute of Technology, Atlanta, Georgia 30332-0800; (404) 894-2000.

For the Visually Challenged

Add two new software programs—Dvorak on Typing for the Blind and Visually Impaired, and Close-Up 4.0—to the growing list of products making it easier for visually challenged users to get the most out of the time they spend with their computers.

Dvorak for the Blind and Visually Impaired, from Interplay, is designed to help the visually challenged learn touch typing. Dvorak features a human voice that sounds out letters as you type. Beginning students receive step-by-step instructions regarding hand placement, the location of the keys, shifting, and other typing fundamentals. After learning the basics, the user progresses to typing sentences and paragraphs and, finally, full correspondence.

Suggested retail price is $79.99. For more information, contact Interplay, 3710 South Susan, #100, Santa Ana, California 92704; (800) 969-4263 or (714) 545-9001.

Close-Up 4.0, a remote-control software package from Norton-Lambert, wasn't designed specifically with the visually impaired in mind, but its makers claim that the program is so simple, blind and visually challenged users can handle it with ease.

Since the majority of visually impaired people rely on voice synthesizers to read what's on a computer screen, simple tasks can become nightmares when users are faced with a plethora of icons and commands. Close-Up offers *uncluttered,* straightforward commands, and as a result, makes communicating with PCs in remote locations very manageable.

The Close-Up Dual Pack supports both DOS and Windows and has a suggested retail price of $199. For more information, contact Norton-Lambert, P.O. Box 4085, Santa Barbara, California 93140; (805) 964-6767.

Whistle While You Work

Like to whistle a few bars while you work? Then you'll like what Patch Panel Software has designed: a DOS-based, pop-up, music-playback utility that gives your lips a rest and lets your computer do the whistling for you.

Whistle-While-You-Work, which supports the numerous Ad Lib–compatible sound boards for PCs, runs in the background while you're busy with your daily computing in the foreground. In fact, the program is so small—occupying only 24K of RAM (it pages songs from disk)—that "you can squeeze it into little holes in upper memory using the DOS 5 HIMEM.SYS driver," according to Patch Panel, which says this means that the program doesn't require any DOS memory—something very important for a background driver. The program reads both Ad Lib's ROL and Creative Lab's CMF file formats and their instrument banks.

Whistle-While-You-Work is available for $50 (plus $3.50 shipping and handling). For more information, contact Patch Panel Software, 11590 Seminole Boulevard, Seminole, Florida 34648; (813) 397-3530.

Leather for the Executive

Discriminating executives will be elated to know that opulence has reached even the laptop level: the Notepad 386SX-20 from Lighthorse Technologies is encased in *leather* for the ultimate in portable computing.

The computer comes complete with your choice of a 40MB, 60MB, or 80MB hard drive; 2MB of RAM, expandable to 6MB; one 3½-inch 1.44MB floppy drive; DOS 5.0; a side-lit, paper-white LCD VGA-compatible display with 640 × 480 resolution; a 9600-bps send-and-receive fax with software and a 2400-bps modem with MNP 5 software; a PS/2 mouse port, serial and parallel ports, and an external monitor port; and a rechargeable ni-cad battery.

This leather luxury doesn't compromise on price, either: The 40MB version sells for $2,499, suggested retail price. Discriminating executives should contact Lighthorse Technologies, 4105 Tolowa Street, San Diego, California 92117; (800) 443-3446.

Companies with items of interest suitable for "News & Notes" should send information along with a color slide or color transparency to News & Notes, Attn: Jill Champion, COMPUTE Magazine, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Although space is limited, all items will be considered for publication. ❐

JOIN THE COMPUTE SEARCHSTAKES

YOU MAY WIN STAR'S LASERPRINTER 4 STARSCRIPT! DIAL 1-900-454-8681!

Cost for call $1.50 first minute, $1.00 each additional minute.
Must be 18 or older. Touch-tone phone required.

Star's LaserPrinter 4 StarScript is packed with all the features to bring true desktop publishing into your office! With an expanded scalable font selection, two megabytes of memory, and the creative powers of PostScript, the easy-to-operate LaserPrinter 4 StarScript offers unlimited possibilities in a desktop printer. And now it may be yours!

IT'S GRAND TO WIN

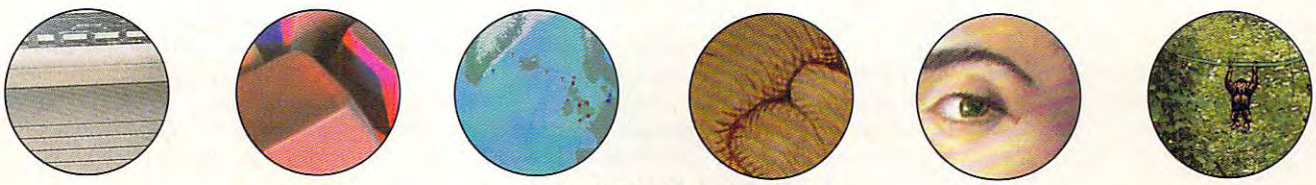
Every month, from now until November, you'll have the chance to win fabulous prizes by playing the Compute SearchStakes. You'll also have the chance to win the SearchStakes Grand Prize by submitting the solution to any two monthly SearchStakes, plus the solution to the Grand Prize SearchStakes, to be featured in our upcoming December issue.

IT'S FUN TO PLAY

Each of the six picture disks displayed below is a portion of a photo or illustration taken from an ad in this issue. To solve the October SearchStakes, locate the ads from which these disks were taken and note the page number for each. If the ad has no page number, simply count that page or cover as zero. Then add up all six page numbers. That is the solution to this month's SearchStakes.

IT'S EASY TO ENTER

Once you find the solution, you may enter the October SearchStakes automatically on a touch-tone phone by calling **1-900-454-8681 by 11/30/92. The cost for the call is $1.50 for the first minute, $1.00 for each additional minute.** Average call is estimated to be 2–3 minutes. Callers must be 18 or older. You may also enter by mailing your answer on a 3" x 5" piece of paper, along with your name, address, and phone number, to: "October Compute SearchStakes," 324 West Wendover Avenue, Suite 200, Greensboro, N.C. 27408 by 11/30/92. No purchase necessary. For more information on how you may win this month's prize, valued at more than $1,995, turn to page 41!



Sponsored by Compute Int'l Ltd., N.Y., N.Y.

FEEDBACK

Return to NUMKILL, the future of GeoWorks, the joy of SX, getting sound out of an MCA bus, and your BASIC plot

BASIC Solution

In your July 1992 issue, you printed a letter from Clark Harper, who wanted to access a directory with a space in its name (DREAM TE). You recommended PC Tools, but there are numerous free solutions to the problem.

The one most widely available is BASIC. Start BASIC (if you are using QBASIC or QuickBASIC, press F6 to go to the Immediate window). Type *CHDIR "DREAM TE":SYSTEM* and hit Enter. You'll find yourself at the DOS prompt in the DREAM TE subdirectory.

You can use MKDIR to create a subdirectory with a space (type *MKDIR "DREAM TE"*) or RMDIR to remove a subdirectory with a space (type *RMDIR "DREAM TE"*).

STEVE OFFNER
CARLSBAD, NM

Thanks for your elegant solution.

Serious Work

Thank you for taking GeoWorks seriously. I began using GeoWorks because of hardware limitations. Now that I have hardware sufficient to run OS/2 and Windows, I find that I still prefer GeoWorks.

I've used the PC/GEOS operating environment as an introduction to personal computers for a number of people and continue to believe that this is the best way for people to begin to use a computer.

I also believe that the environment is rich enough to allow the advanced user many ways to find new and more sophisticated ways to increase his or her productivity.

I couldn't help but react with amusement when I read that the newest versions of WinWord and Excel allow you to drag and drop text and that Windows 3.1 actually gives you scalable fonts. What will they think of next?

While I realize that Windows' enormous installed base will probably keep GeoWorks from being the success it deserves to be, I (and many others) have found the best computing environment for both now and the foreseeable future in GeoWorks.

Once again, you have my gratitude for paying regular attention to a program that I use 90 percent of the time.

LARRY FREDERICK
IRVING, TX

We don't think we're giving away any industry secrets when we tell you that GeoWorks will just keep getting better and better.

Recently, we spoke with Brian Dougherty at the Software Publishers Association symposium in Seattle about the pen interface GeoWorks is preparing for an as-yet-unnamed computer maker.

We asked whether it will be a new product or just an add-on to the interface we all know and love. He said that the actual GEOS operating system—not the desktop you see in GeoWorks Ensemble or Pro, but the primitives that drive the desktop—can be made to assume any look, and that with a different set of libraries GEOS has run on the Macintosh and looked exactly like any other Macintosh application.

He spoke of a future in which common appliances such as dishwashers and telephones would have pen-based operating systems and indicated that GEOS was up to the challenge right now.

He also said to watch for the GEOS pen-based computer to emerge some time next year.

MCA Sound Card

I have a dilemma I hope you can help me solve. I have an IBM PS/2 Model 50. I wanted to add a sound card, but I'm having trouble finding something compatible with the IBM computer.

LES SCHWARTZ
MINNETONKA, MN

Remember when buying an IBM meant the end of your problems with compatibility? The MCA bus changed all of that.

Fortunately, there are enough PS/2s to make the market appealing, and some manufacturers are providing MCA bus versions of their cards.

Media Vision is offering CDPC, a plug-and-play multimedia PC subsystem. The CDPC includes built-in speakers, CD-ROM, and sound card with MIDI. It sells for $1,295. Contact Media Vision, 47221 Fremont Boulevard, Fremont, California 94538; (800) 845-5870.

Falling off the Jargon

In your April issue, you printed an article called "PC Jargon Made Easy."

One thing that you didn't mention and that I have long been curious about is what the letters—such as *SX, AT,* and *XT*—that follow some computer types represent.

I own a 386SX, and I would like to know what the difference is between it and a regular 386.

E. S. BARKER
MINE CENTER, ON

The XT and AT designations stand for extended technology *and* advanced technology. *The XT is a PC with a built-in 20MB hard disk. The AT is basically a PC with an 8-MHz 80286 microprocessor, a hard disk, and a 16-bit bus.*

Ladies And Gentlemen, Start Your Savings!

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6210

FEEDBACK

The standard Intel 386 is often called a 386DX. It can manage a 32-bit bus (which is the reason for the rise of the MCA and the EISA bus technology). But most people didn't care about a 32-bit bus, so Intel created the 386SX specifically for the 16-bit bus.

The 486 is a more interesting case. The 486SX is simply a 486 with its on-board math coprocessor disabled. If you need a math coprocessor and you own a 486SX machine, you need to buy the 487 math coprocessor.

The 487 isn't really a math coprocessor at all but a complete 486 chip with its on-board math coprocessor intact. Installing it turns off the 486SX chip so that it just sits there on your motherboard gathering dust and occupying space, while the 487 takes over completely as the CPU. The 486 and 487 aren't pin compatible, however, so don't try placing the 487 in the 486 spot.

Recently, there has been a proliferation of chips based on the 386 technology. A couple of companies have released clones of the 386. One has released a 386 with an on-board math coprocessor (making it a slightly slower version of the 486).

And there's a 386SL chip that's designed for laptops. Among its power-saving features is its capability to shut down temporarily when no processing is going on.

Incidentally, be skeptical of manufacturers' claims of new technologies that drive chips at double speed. They claim that processing speed is doubled, but memory access is still at the poky chip speed. These turbochargers will make your computer faster but not twice as fast.

As evidence that the horizon recedes with every step we take, by the time you read this, the parallel-processing Intel 586 will soon be out. (Intel is planning to rename the chip, so you may read about it under another name.)

BASIC Problem

Since my system inconveniently turns Num Lock on when it boots, I looked at your answer to Jerry Johnson on page 48 of your February/March issue as my solution.

However, when I tried to execute NUMKILL.EXE, it locked everything up. I had to reset my computer. What am I doing wrong?

DICK FRECH
CASPER, WY

You created a text file with the lines

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```
DEF SEG = (0)
POKE 1047, (PEEK(1047) AND 223)
SYSTEM
```

and named it NUMKILL.EXE. Attempting to run this text file as an EXE file will lock up your system.

The listing is a BASIC program which you need to run within GW-BASIC or compile with a compiler such as QuickBASIC. Compiling the program NUMKILL.BAS (minus the SYSTEM command) with QuickBASIC will create an executable file called NUMKILL.EXE which will accomplish your purpose.

Or you could put the following line in your AUTOEXEC.BAT file:

```
GWBASIC NUMKILL.BAS
```

and this will load GW-BASIC, run NUMKILL.BAS, and (with the SYSTEM command) exit GW-BASIC to DOS.

Uncovering a Plot

I need information about plotters. I have an SP-600 plotter from Enter Computer, and I find I can write a program in GW-BASIC as the manual shows, like this.

```
PRINT #1 LN 20, 30, 300, 300
```

But if my program calculates values for A, B, C, and D and uses this, nothing happens. Here is how I've written the program line that should output to the printer.

```
PRINT #1, LN A, B, C, D
```

GEORGE D. JOHNSON
FERGUSON, MO

The SP-600 is compatible with Hewlett-Packard plotters, so any references you can find to HPGL (the Hewlett-Packard plotter graphics language) will do the job. I think your problem here is in BASIC syntax. Try this.

```
15 a = 20 : b = 30 : c = 300 :
  d = 300
PRINT #1, 'LN'; A, B, C, D
```

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

POINT & CLICK

Clifton Karnes

TWO SHAREWARE MUST-HAVES

Looking at the popular online services now, I see about 200 new or improved Windows shareware programs each month.

When Windows 3.0 was released a little over two years ago, there were very few shareware programs available. Although this number grew steadily each month, it wasn't until about six months ago that things really heated up. Looking at the popular online services now, I see about 200 new or improved Windows shareware programs each month. As you can imagine, not all of these offerings are winners, but among their ranks are many superb programs. This month, I'm going to talk about two must-have shareware treasures: BackMenu and WinZip.

BackMenu is the work of Englishman Ian Heath of SP Services (P.O. Box 456, Southampton, United Kingdom SO9 7XG; +44 703 550037). It's a user-configurable pop-up menu that I've found indispensable. BackMenu lurks invisibly in the background, waiting for you to call it into action. You do this by clicking the right mouse button on any open space on your desktop (you can also configure the program to use the left or middle button on a three-button mouse). BackMenu will show you a list of all your installed programs plus as many of its own special options as you want to run.

To install programs on BackMenu, you edit its INI file (by default BackMenu installs a menu option to load the INI file into Windows' Notepad). Each program entry consists of the menu text and the program's name and startup directory. BackMenu supports hierarchical (also called cascading) menus, where one entry displays a secondary menu. In addition, you can specify whether you want a program to run minimized or maximized, whether you'd like BackMenu to prompt you for command line parameters, and whether you'd like to run the program automatically when BackMenu is loaded for the first time.

As I mentioned earlier, BackMenu offers several special functions of its own. These include About (which lists the author's name and the program's registration status), Execute (which lets you run programs from a command line or open a dialog box to browse for the program you want to run), Exit Windows, Groups (which automatically creates BackMenu entries for all the programs in your Program Manager groups), ReloadMenu (which reloads BackMenu's INI file), Remove Menu (which unloads BackMenu), Set Options (which allows you to specify the default INI file, BackMenu's hot key, and the mouse button), Info (which displays your machine's free memory and free system resources), and Task (which brings up a list of the active tasks).

I use BackMenu as a supplemental launcher to Program Manager, but you can make it your default shell. If you choose this option, BackMenu will automatically load the programs in your Startup group.

BackMenu has a registration fee of £20 (about $35). You can order using your VISA or MasterCard, and the bank will take care of the currency exchange.

WinZip is the work of programmer Nico Mak (P.O. Box 919, Bristol, Connecticut 06011-0919; 800-242-4775, 713-524-6394; $29). It's a shell for ZIP, LZH, SPX, and ARC files that lets you both create archives and examine existing archives. WinZip is a Windows shell, and it requires the DOS archive programs to run. For example, to use WinZip with ZIP files, you'll also need PKZIP and PKUNZIP. The fact that WinZip uses these programs for the archiving and unarchiving doesn't adversely affect either its speed or its ease of use.

To use WinZip to examine a ZIP file, simply double-click on the ZIP filename, and WinZip will load with the files displayed (the installation program takes care of the associations). If you have Windows 3.1, WinZip supports drag and drop, so you can leave it minimized on your desktop and drag files from File Manager to the icon.

From the WinZip display you can view DOC files (WinZip supports all your file associations, so if you double-click on a WRI file, WinZip will run Write with the file loaded). You can also use WinZip's built-in viewer if you prefer, which allows you to select a group of files to view. In addition, you can run programs, test the archived files for viruses, and delete files.

As you'd expect, you can also extract any file or group of files to any subdirectory you specify.

Creating archives is a little tedious and arcane using the DOS command line, but with WinZip, it's a piece of cake. There are two methods. With Windows 3.1, you can simply add files to an archive by dragging them from File Manager to the WinZip icon on your desktop. The other method is to open a WinZip dialog box and tag the files you want to add. Both methods are fast and simple to use.

There are a half-dozen Windows archive programs around, but WinZip is the best I've found.

You can find both these programs on your favorite online service, or you can contact the authors at the addresses in the text. ❐

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HARDWARE CLINIC

Mark Minasi

MEMORY MAILBAG

The articles that I did on memory management a few issues back generated a lot of letters (most of which—grumble grumble—didn't include return envelopes). Here are two in particular that need answering. The first is a very common question about memory versus memory addresses, and the second asks if there's a way to reclaim some of the upper memory space taken up with ROM BIOS chips.

When is extended memory not extended memory, and where's the best place to store your ROMs?

Question: In your discussion of memory allocation, you very clearly described how the first 640K is allocated. I'm still confused, however, about the remaining 384K [of the basic 1024K of addresses accessible to the 8088 and all chips following it]. Your description of its allocation seems to say that all of it is reserved for video memory, ROMs, and buffers (and so is unusable to me). Yet I seem to be able to use it if I set up a VDISK or use Lotus 1-2-3 version 3.1. Further, I must use the /E parameter to make the VDISK work, and the documentation says /E means to use extended memory. As my computer has only 1024K of memory, I have no extended memory. How can I be using these addresses that I'm not supposed to be able to use, and how can I be using extended memory when I haven't got any?

Answer: The key to understanding the answer is in understanding that there's a difference between memory and memory addresses.

Designing a computer is like designing a new town. We would start by buying some land. For the purposes of simplicity, let's say that we buy 1024 acres of farmland and set about designing a community. As the planning or zoning board, we would divide the land up into lots and then zone the lots according to use.

Suppose we zone the first 640 lots for residential use, the next 128 for industrial, and the remaining 256 for commercial buildings. We now have addresses and purposes for those addresses, but nothing in those addresses. Sure, there's now a lot called 200 First Avenue, but it's only a muddy rectangle of ground.

Similarly, the designers of the original IBM PC back in 1980 had to zone the memory addresses of the 8088. The 8088 itself can address up to 1024K of addresses. You may recall from previous columns that the 640K limitation isn't anything carved in stone, and with some architectural rearrangement, DOS could instead have a 1024K limitation. Some of those 1024K of addresses must be reserved for the use of the hardware; you can't give all of the memory space to user programs. The designers of the PC had to draw the line between user programs and system needs somewhere.

Once the town is zoned, we can start putting houses in the residential addresses—filling our PC with memory. But suppose a prefabricated house vendor shows up with 1024 houses? (That's a PC motherboard that has 1024K of memory on it.) The vendor plunks down houses in the first 640 lots, filling our conventional addresses. But the zoning board (that's the requirements of PC hardware compatibility) precludes the vendor from putting any of the houses in the top 384 addresses. The top 384 lots don't have normal system RAM (houses) in them; rather, they have special RAM. That area is filled in for a PC with some RAM physically located on the video board and perhaps some ROM located on the motherboard or add-in boards. There's simply nowhere to put the extra 384 houses, which is why XTs and PCs—8088-based computers—don't have more than 640K of system RAM. There are, again, other RAMs and ROMs, but they're physically separate from the main system RAM.

Now let's move along to the 80286 and later chips. They have memory limitations of 16MB or more, so now we'll have to zone the addresses above 1024K. Continuing the town-planning analogy, suppose that we've had our town operating for 30 years, when a community springs up outside our original 1024 lots. We'd call that a suburb of the town. It might have a different tax rate, be governed differently, and have different levels of access to the privileges accorded town residents. For example, suburbanites might have to pay a fee to use the town parks, whereas the town residents might be able to use the parks for free. It's the same with extended memory. The addresses above 1024K aren't accessible to the vast majority of DOS programs, as they have to be rewritten to a special protected operating mode in order to address extended memory. (The exception, you'll recall, is the High Memory Area, but let's ignore that for the moment.)

Let's return to the case of the vendor of prefab houses who finds himself with 1024 houses as he arrives at our new town. Again, he puts houses on the first 640 spaces and is then told that he can't put houses on the top 384 addresses. "What'll I do with these extra 384 houses?" he wails. "Take them out to the suburbs," he's told. So he puts the remaining 384 houses in the extended addresses, as the 384 addresses that he skipped from 640 to 1024 will be filled with buildings from another source.

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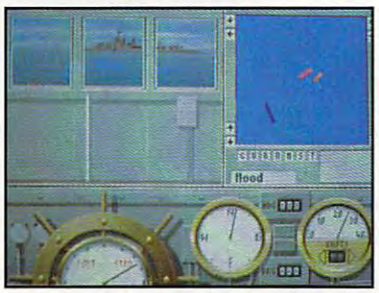

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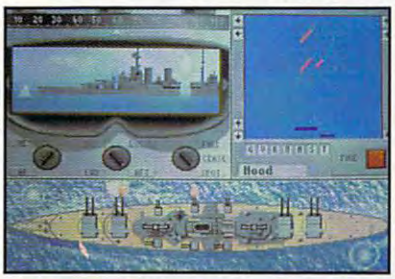

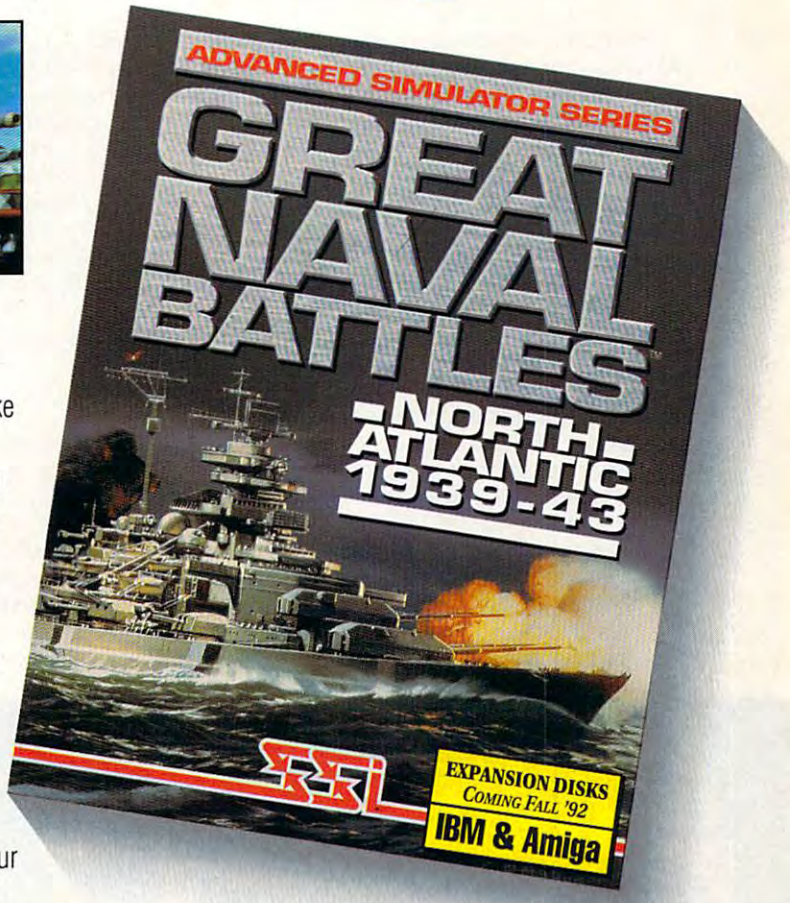

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Getting back to the original question: What's happening with a 286 computer when it counts to 1024K on power-up? First, understand that 1024K is a count only of program memory. There's more memory in the computer—video RAM on the video board, system BIOS ROM on the motherboard, and ROMs and perhaps small RAM buffers on add-in cards in the system—that isn't counted. The 1024K fills up the first 640K and can't fill up any of the addresses between 640K and 1024K, or the PC will have program memory in the same addresses as video memory or ROM. Just as you can't put two houses on the same lot, two separate memories wired to the same address would malfunction. So the extra 384K of RAM is given an address starting at 1024K and going up to 1408K.

There may be one more thing confusing you here. I've said that the reserved area from 640K to 1024K contains memory, but it's not completely full. You'll usually find that there are plenty of unused addresses between 768K and 1024K, a fact that created the memory manager market in the first place. Many people seem to think that all of the addresses from 0K through 1024K must be filled by something before any addresses above 1024K can be filled. But that's not true. So in answer to the original question: The 286 with 1024K of RAM has placed 384K of the RAM in extended memory, and that's the memory that VDISK and 1-2-3 version 3.1 are addressing.

Question: I'm trying to configure my memory manager to free me a lot of space so I can load my network drivers high into Upper Memory Blocks (UMBs). I have a lot of ROMs in the 768K–1024K range. My system BIOS ranges from 896K through 1024K, half of my space, and a number of ROMs fill up a lot of the part between 768K and 896K. Can I get those ROMs out of there, freeing up space for more UMBs?

Answer: You probably can, but it'll be tricky. Here are two approaches.

First, you could purchase the latest version (6.*x*) of the Quarterdeck Expanded Memory Manager 386 (QEMM-386) and turn on the Stealth option. Stealth under QEMM actually moves ROMs off to addresses outside of the low 1024K of addresses, creating tons of UMB space. The ROMs are important, however, so that wouldn't be a good long-term answer. For example, if you use a hard disk controller that has some ROM on it, that ROM contains important programs that tell the system how to read and write to your disk. If QEMM permanently zapped those ROMs, you'd soon see *Sector not found* or *General failure* error messages. That's where Stealth is nifty; it constantly monitors program activity, watching for an attempt-

ed ROM access. When that happens, Stealth freezes the computer briefly and exchanges the locations of the ROM and UMB. The program that you loaded in the UMB then becomes temporarily unavailable, and the ROM returns long enough to respond to whatever request it was needed for—to read or write disk data, put characters on the screen, or what have you. Once the request has been fulfilled, Stealth again switches the places of the ROM and UMB. The program that was loaded in high memory is brought back, and the ROM is returned to the nether reaches of the PC's address range.

Stealth is a nice feature, but consider a few cautions before using it. First, all this ROM and UMB switching takes time. The more ROM accesses your system does, the slower the system becomes. Second, Stealth makes your system a trifle less stable, as some ROM programs are very time sensitive and the time required to make them switch may cause failures, such as network or disk drive timeouts. The performance of Windows slows dramatically. So try it out and see if it works for your particular hardware setup.

The other way is to tell your memory manager to just ignore all or part of a ROM and just stuff a UMB over it, essentially paving over the ROM area.

I know I said that Stealth has to be constantly vigilant to system requirements for the programs in ROM, but there are usually a number of programs in ROM that are unnecessary. For example, a good bit of your system BIOS ROM contains instructions on how to start up the computer, what to do before loading DOS—the memory test and the like. That part of the BIOS program is no longer required, so there's no problem if you put a UMB on top of it. Sure, it would cause the system to crash if it needed that program, but it won't.

You tell your memory manager to pave over a part of your ROM by simply including its addresses when you call your memory manager. For example, the line in my laptop's CONFIG.SYS that starts up the DOS 5.0 memory manager looks like this:

```
DEVICE=EMM386.EXE NOEMS I=C000-DFFF
I=F000-F7FF
```

Ordinarily, you'd never include addresses F000 and above, but a bit of experimentation led me to discover that I could grab 32K of addresses from the system BIOS.

How did I know which addresses I could overwrite with UMBs? I did it the hard way; I spent a few hours one night trying out ranges of addresses.

As always, when experimenting with a memory manager, make sure you have a bootable floppy nearby! ❐

COMPUTE/NET

Troy Tucker

WHEN DATA WORLDS COLLIDE

When voice and image data become one, we'll see a revolution in the field of communications. A few companies have already begun developing for this future event.

This month I'm going to step off the beaten trail and into an area of communications that, for the moment, doesn't involve online services. Imagine a device that incorporates the telephone, television, and personal computer into a single unit. If this device existed, it would revolutionize the communications industry. You could carry on visual telephone conversations, watch television, and interact with a graphical database—all at the same time! Well, it's here—sort of.

Ever hear of a VideoPhone 2500? AT&T unveiled its creation on January 6 this year. It's not the supercomputer that I described earlier, but it has the potential of becoming just that. The VideoPhone 2500 is a full-color, full-motion videophone that uses standard phone lines to transmit voice and video data. While this may be old news to you, I think it deserves a second look.

First of all, the videophone carries a $1,499 price tag. While that may seem a bit inflated and beyond the means of the average consumer, the videophone is packed with some sophisticated hardware. It contains a superfast 19.2-Kbps (kilobits per second) Paradyne modem that is used to transmit compressed voice and image data. A 3.3-inch color LCD displays the images, and a color video camera captures them for transmission. Both are mounted in a single unit on a swivel base. It looks a little like a Nintendo Gameboy mounted on an ordinary telephone. Adjustments can be made to the camera's focal point, the display's brightness and contrast, and the frame rate. Should you receive a call when your appearance is less than perfect, you can turn off the video transmit so the caller can't see you.

Video data can be transmitted at a maximum of 10 frames per second. If you know anything about video, then you know that this isn't a flicker-free system. Television operates at about 30 frames per second, and movies operate at 24 frames per second. Certain settings allow you to trade resolution for motion, but the maximum output is 10 frames per second.

In order for the videophone to send and receive voice and image data, it must first compress it. AT&T gave this job to Compression Labs (San Jose, California). Compression Labs is currently working on a video conferencing peripheral, Cameo Personal Video System Model 2001, targeted for the Macintosh and PC and compatibles. The Cameo requires a special digital ISDN (Integrated Service Digital Network) line, but it can transmit up to 15 frames per second at 128 × 112 resolution.

The ISDN is an international plan to install totally digital phone lines. Once implemented, ISDN will offer better reliability and throughput using digital channels that can handle much higher speeds than voice circuits. The ISDN will allow users to connect to computers, fax machines, telephones, and other communications devices. Voice, data, and video will travel simultaneously over the same digital lines. The ISDN could be a communications revelation that would serve as a catalyst for many new hardware and software developments.

Of course, switching over to this advanced service isn't going to happen overnight—that is, if the phone companies have anything to say about it. They have a lot of old switching equipment in operation. They're not just going to pull the plug and junk it. There are many other problems to consider, too. Do you know what happens when the power goes down when you're using a digital phone service? No more phones. If you plan on taking advantage of an ISDN line, you must have an expensive device called a PCISDN, which makes the connection. Also, all household (analog) telephones will be worthless on an ISDN. Another headache will be connecting computers to digital networks. It may be difficult to produce an internal adapter. And I've just scratched the surface. There will undoubtedly be many other stumbling blocks in getting this service active nationwide.

When the ISDN is available, businesses will probably be the first to take advantage of it. Digital PBX systems are already in place; they just aren't used to their full potential at present. AT&T is working on a prototype for the home that will convert analog to digital. This, hopefully, will ease some of the consumer's financial burden when the switchover takes place. No matter how the ISDN service is implemented, it will be slow and painful. But when it finally is in place, we're sure to see some pretty amazing things.

Speaking of amazing things, by the time you read this, COMPUTE/NET will be going through some remarkable changes. Operating under the auspices of PowerVision, COMPUTE will be a major part of the first 9600-bps online service aimed at consumers. You'll find games, software downloads, graphics, and information galore, to say nothing of the one-to-one interaction with editors and computer enthusiasts. Look for more coverage of this change in future issues of COMPUTE. In the meantime, I'll see you online! ❐

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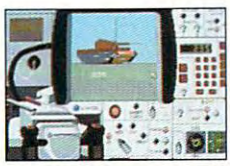

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GAB

INTRODOS

Tony Roberts

YOUR FILES' BEST ATTRIBUTES

Use ATTRIB to track down files based on their "personalities."

Each of us has attributes. My wife has gray eyes; my daughter has blond hair; I have no hair. Each of the files on our computer systems has attributes, too. These attributes tell us something about the properties of the file.

Files can be marked as system, hidden, read-only, or archive. Although you shouldn't be concerned with these attributes on a daily basis, they come in handy when you need to change a file's properties.

The ATTRIB command in DOS 5.0 permits you to view and change any of a file's attributes. Earlier versions allowed access to the archive and read-only attributes but kept the system and hidden attributes under wraps.

Move to the root directory and enter *ATTRIB* at the DOS prompt. You'll see a list of files and their attributes. Included in the list will be the DOS system files, which are marked SHR—system, hidden, and read-only. This is how DOS protects these crucial files. To delete them, you'd need to turn off the hidden attribute, turn off the system attribute, and turn off the read-only attribute. This is hardly something you could do by accident.

Most of the other files will either have no attributes set or will be marked A, signifying that the archive attribute has been set. This usually indicates that the file has been changed since the system was last backed up.

Of all the attribute settings, the archive attribute is certainly the most useful to the average computer user. Read-only can be of some value if you have reference documents that you don't want changed.

The system and hidden attributes are generally best left to the system to control, but occasionally it helps to be able to change those attributes. Some software, for example, makes use of system or hidden files to store default information, scores, or other data it doesn't want anyone tampering with. If you decide not to use the software, you delete all the files and remove the subdirectory.

But sometimes the subdirectory just refuses to be removed. You get messages insisting that the directory isn't empty, even though you're certain that it is. Move to the offending subdirectory and enter *ATTRIB*. Chances are you'll see that there are hidden files lurking there. Now use the ATTRIB command again to reveal the files.

For example, if the hidden file was named PROGRAM.DAT, then the command ATTRIB –H PROGRAM.DAT would reveal it. Now you should be able to delete the file and remove the subdirectory.

This example illustrates how to remove attributes from any file. Type *ATTRIB*, then a minus sign and a letter indicating the attribute to be removed, and then the filename. Adding attributes to files follows a similar process, but a plus sign is used in place of the minus sign.

If you have several files to work on, DOS 5.0's ATTRIB command works with wildcards, too. ATTRIB +A *.DOC would turn on the archive attribute for all the DOC files in the current subdirectory. If you append /S to the above command, ATTRIB will do its work in the current directory and any subdirectories within it.

The archive attribute comes into play when you back up your hard disk. The DOS backup command, and most other commercial backup software, turns off the archive attribute once a file has been backed up. The next time you run your backup software, you can elect to back up only those files that have changed—as indicated by the archive attribute.

I normally don't back up application files as part of my regular backups. After all, I have the original disks if the software ever needs reinstallation. I do, however, want to back up all of the files that are created or changed after the installation.

As soon as I install a new application, I move to the directory where the installation took place and issue the command ATTRIB –A *.* /s to turn off the archive attribute for all of the new files. This prevents acres of printer drivers and help files from being needlessly copied to my backup disks.

The archive attribute also can be used in conjunction with XCOPY. If you use the /A switch with XCOPY, the program will copy only those files whose archive attribute is set. If you use the /M switch with XCOPY, the program copies only those files whose archive attribute is set and then, once the copy is complete, turns off the archive attribute for files successfully copied.

You can make use of this ATTRIB/XCOPY combination to copy several files to floppy disks, even when you know the files won't all fit on one floppy disk. Let's say you wanted to copy all of your spreadsheet files to floppy. First, turn on the archive attribute for the files with a command such as ATTRIB +A *.WK1. Then use XCOPY *.WK1 A: /M to copy the files to the disk in drive A. When the disk is full, XCOPY will stop. Simply insert another disk and reissue the same command. The archive attribute for the files that made it successfully to the first disk will be turned off, so those files won't be copied again. Continue the process until all the specified files have been copied. ❐

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TIPS & TOOLS

Edited by Richard C. Leinecker

Kill or protect your subdirectories, keep your computer clean, speed up WordPerfect, and more.

You Can Never Be Too Secure

There's a simple and effective way to protect your subdirectories from prying eyes. When creating a directory with MKDIR or MD, add an embedded character to the end of the filename. A directory won't show the embedded character, and if someone tries to log to the directory with CHDIR, the message *Invalid directory* will appear.

Here's how it's done. Begin at the DOS prompt and type *MD NEW.* Then, before you hit Enter, hold down the Alt key and type *2, 5,* and *5* on the numeric keypad. Now hit Enter. An ASCII character 255 will be at the end of the directory name but won't show up in a directory listing.

Anytime you want to enter a character that's not part of the regular character set, just hold down the Alt key and then type the character value with the numeric keypad.

To enter the directory, type *CD NEW* followed by Alt-*255.*

WINSTON WAN
HOUSTON, TX

Perfect Control

The Ctrl key is more useful in WordPerfect 5.1 than most people realize. Using it in combination with the right- and left-arrow keys moves the cursor an entire word in either direction. With the Backspace key, it deletes the word to the left of the cursor; with the Delete key, the word to the right. Ctrl-End deletes all characters to the right of the cursor. Ctrl-PgDn deletes the page from the cursor down (it asks for confirmation first, though). Ctrl-Enter inserts a page break.

These key combinations can save you the time and frustration involved in using the arrow keys to move one character at a time.

ANDEEP TAMHANKAR
HAZLET, NJ

Director Ease

To list files with certain extensions, most people type *DIR *.EXE.* With DOS versions 3.3 and higher, you can leave off the * character and the DIR command works the same. Instead of *DIR *.EXE,* just type *DIR .EXE.*

TOM DOAN
SUNNYVALE, CA

Computer Hygiene

Over the past years, I've tried dozens of computer-cleaning devices and solutions. I've discovered that some of the best and cheapest products are found around the house. To clean a keyboard or mouse, use pure isopropyl alcohol (*not* rubbing alcohol) on a cotton swab or ball.

Make certain to vacuum (not dust) mouse pads often. The dust buildup gets rolled into your mouse easily and cuts down on productivity. If your mouse goes frantic, clean the rubber ball with liquid dishwashing detergent. Don't use hand soap. It leaves a buildup that can cause problems over time.

I've discovered that the main ingredients in window cleaners and expensive CRT cleaners are almost identical. Don't use either product on an antiglare screen. Anything other than water will probably smear the antiglare coating. Use a soft cloth instead of a paper towel, since it doesn't leave as many streaks.

GEOFF BARTAKOVICS
CHICAGO, IL

Safer Backups

People back up their hard drives and consider themselves protected against any misfortune. They may not be as safe as they think.

The main problem is that most people who have upgraded to DOS 5.0 don't have a bootable floppy. Having one on hand can solve a whole bunch of simple hard drive problems. I've had many occasions when my CONFIG.SYS or AUTOEXEC.BAT files were edited, and the computer no longer booted from the hard disk. Since I had a bootable floppy on hand, I rebooted with it and fixed the problems with the boot files.

It's a good idea to have emergency files on the disk, too. A text editor, FDISK, UNERASE, FORMAT, and SYS are just several suggestions. Backup copies of CONFIG.SYS and AUTOEXEC.BAT help, too.

Another problem you'll run into is that if your hard drive crashes, you won't have a copy of the restore program readily available. For these cases, it's a good idea to keep a copy of the restore program on a floppy somewhere, ready to use. Of course, you can install the software again, but it's a lot easier to restore the entire hard drive with one operation instead of two.

BEN SEREBRIN
LAKELAND, FL

New Dogs, Old Tricks

When I upgraded to an 80386 from an 8088, I had a lot of software still on 5¼-inch disks. My new system has a 3½-inch drive as A and a 5¼-inch drive as B.

Most of my software is written to be installed from drive A. Since my A drive is a 3½-inch and most of my software is on 5¼-inch disks, there's a problem. I solved it with the DOS ASSIGN command. I typed *ASSIGN A:=B:* from the command line, and then DOS thought that my 5¼ was actually my A drive. When I was through, I restored the default settings by typing *ASSIGN* without any parameters, returning everything to normal.

JAMES C. STEELE
LEBANON CHURCH, VA

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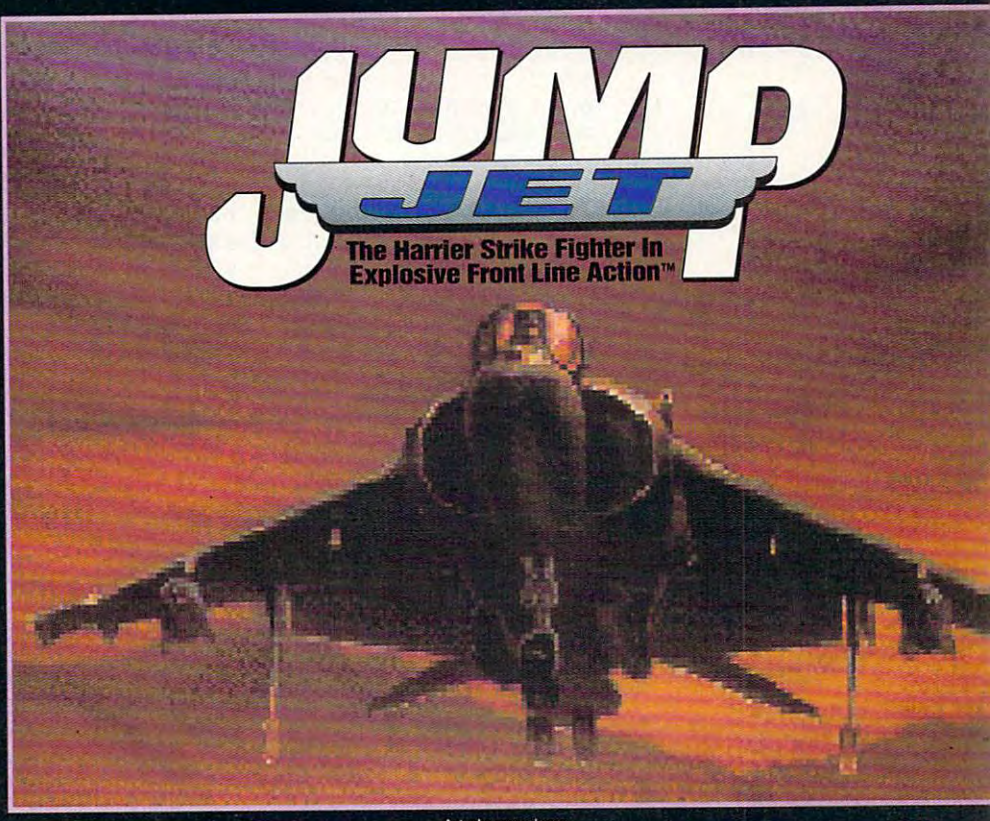

Actual screen shown.

Actual screens may vary.

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GAD

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Killing Subdirectories

Back up safely, stay on time with prompts, and eliminate drive confusion.

DOS left one important command out. That's the one that deletes an entire subdirectory. True, it's a dangerous command, but it's also useful. I wrote a small program that does this; it's called Killdir.

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

```
DEBUG KILLDIR.COM
File not found
-e 100 be 80 00 ac 0a c0 74 44
-e 108 ac 3c 0d 74 3f 3c 20 74
-e 110 f7 8b d6 4a ac 3c 0d 74
-e 118 04 3c 20 75 f7 c6 44 ff
-e 120 00 b8 00 43 cd 21 72 28
-e 128 f6 c1 10 74 2e 52 ba 79
-e 130 02 b4 09 cd 21 5a 2a e4
-e 138 cd 16 24 df 3c 59 74 08
-e 140 24 df 3c 4e 74 06 eb ee
-e 148 52 e8 1a 00 b4 4c cd 21
-e 150 ba 5b 02 b4 09 cd 21 b4
-e 158 4c cd 21 ba 67 02 b4 09
-e 160 cd 21 b4 4c cd 21 55 8b
-e 168 ec 81 ec 36 01 8b c5 2d
-e 170 a6 00 50 e8 b2 00 b4 2f
-e 178 cd 21 89 5e fc 8b d5 81
-e 180 ea 2e 01 89 56 fa b4 1a
-e 188 cd 21 8b f5 81 ee a6 00
-e 190 8b fd 83 ef 56 b9 23 00
-e 198 f3 a5 83 ef 46 80 7d 03
-e 1a0 00 75 08 83 c7 03 8b 76
-e 1a8 04 eb 10 8b f7 ac 0a c0
-e 1b0 75 fb 4e 8b fe b0 5c aa
-e 1b8 8b 76 04 ac aa 0a c0 75
-e 1c0 fa 8b c5 2d 56 00 50 e8
-e 1c8 7f 00 2b c9 ba 57 02 b4
-e 1d0 4e cd 21 72 10 8b 56 fa
-e 1d8 83 c2 1e b4 41 cd 21 b4
-e 1e0 4f cd 21 73 f0 b9 10 00
-e 1e8 ba 57 02 b4 4e cd 21 72
-e 1f0 1a 8b 56 fa 83 c2 1e 8b
-e 1f8 fa 80 3d 2e 74 07 52 e8
-e 200 64 ff 83 c4 02 b4 4f cd
-e 208 21 73 e6 b4 1a 8b 56 fc
-e 210 cd 21 8b c5 2d a6 00 50
-e 218 e8 2e 00 8b 56 04 b4 3a
-e 220 cd 21 81 c4 36 01 5d c3
-e 228 55 8b ec 8b 7e 04 b4 19
-e 230 cd 21 8a d0 fe c2 04 41
-e 238 aa b0 3a aa b0 5c aa 8b
-e 240 f7 b4 47 cd 21 5d c2 02
-e 248 00 55 8b ec 8b 56 04 b4
-e 250 3b cd 21 5d c2 02 00 2a
-e 258 2e 2a 00 4e 6f 74 20 66
-e 260 6f 75 6e 64 0d 0a 24 4e
-e 268 6f 74 20 61 20 64 69 72
-e 270 65 63 74 6f 72 79 0d 0a
-e 278 24 53 75 72 65 3f 3c 59
-e 280 2f 4e 3e 24
-
RCX
CX 0000
:184
-W
Writing 0184 bytes
-Q
```

If you have the Checksum program from the July issue of COMPUTE, type *CHECKSUM KILLDIR.COM*. You should see the number 062 on your screen if you typed KILLDIR .COM correctly.

To use the program, just type *KILLDIR* followed by the name of the directory you want to kill. Test it with a junk floppy disk first to make sure you've typed it in correctly.

RICHARD C. LEINECKER
MIAMI, FL

Prompt Tips

There are lots of times when I only have a short time to work and I need a constant reminder of the time. I've found that the best way to do this is to change my prompt so that every time a DOS command is issued, the computer tells me the time.

You're probably familiar with the standard prompt of pg. The *$p* shows the current drive and path, and the *$g* adds a > character. You can add *$t* to the beginning or end of that so that the time is displayed at each DOS prompt. Prompt tp$g will display the following.

```
21:56:51.64C:\XY>
```

For a neater appearance, try adding the *$_* command to add a carriage return to your prompt. The string t_pg will display this.

```
21:56:51.64
C:\XY>
```

You can also add the date if you want to be reminded of that, too. Here's a prompt with both the time and date. The string d_t_pg will display the following.

```
05-02-1992
21:56:51.64
C:\XY>
```

To really jazz up your prompt, you can add your name. PROMPT Rick Leinecker's$_incredible prompt$_pg will display this.

```
Rick Leinecker's
incredible prompt
C:\XY>
```

Have fun experimenting. If you want to explore prompts further, or if you have a favorite prompt trick that you use, drop me a note.

RICHARD C. LEINECKER
MIAMI, FL

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

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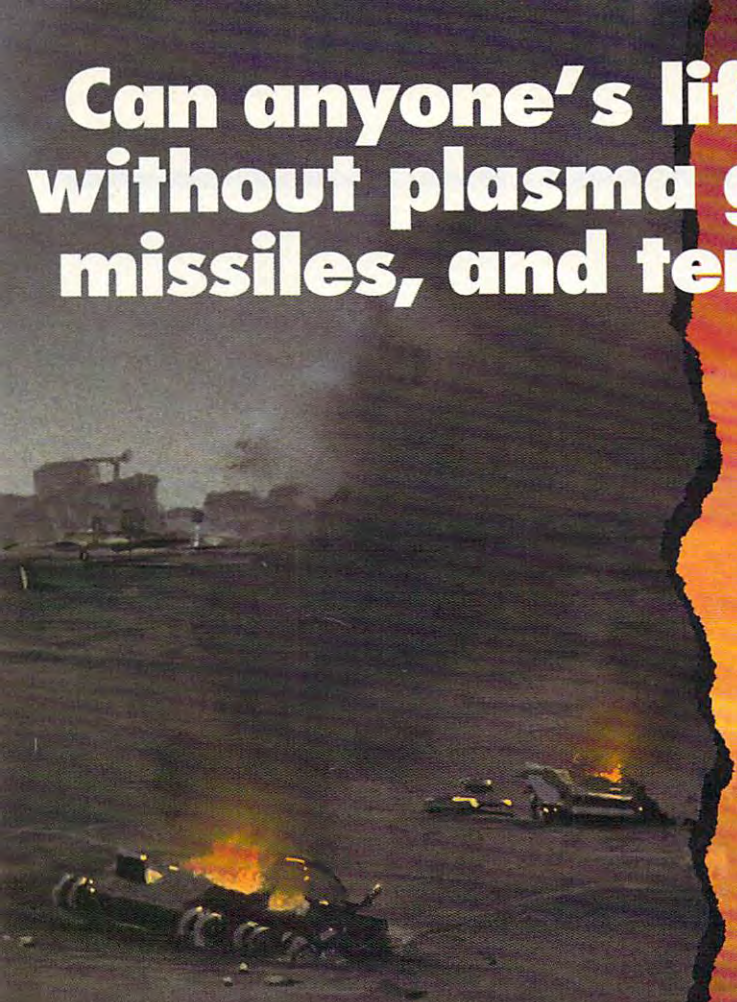

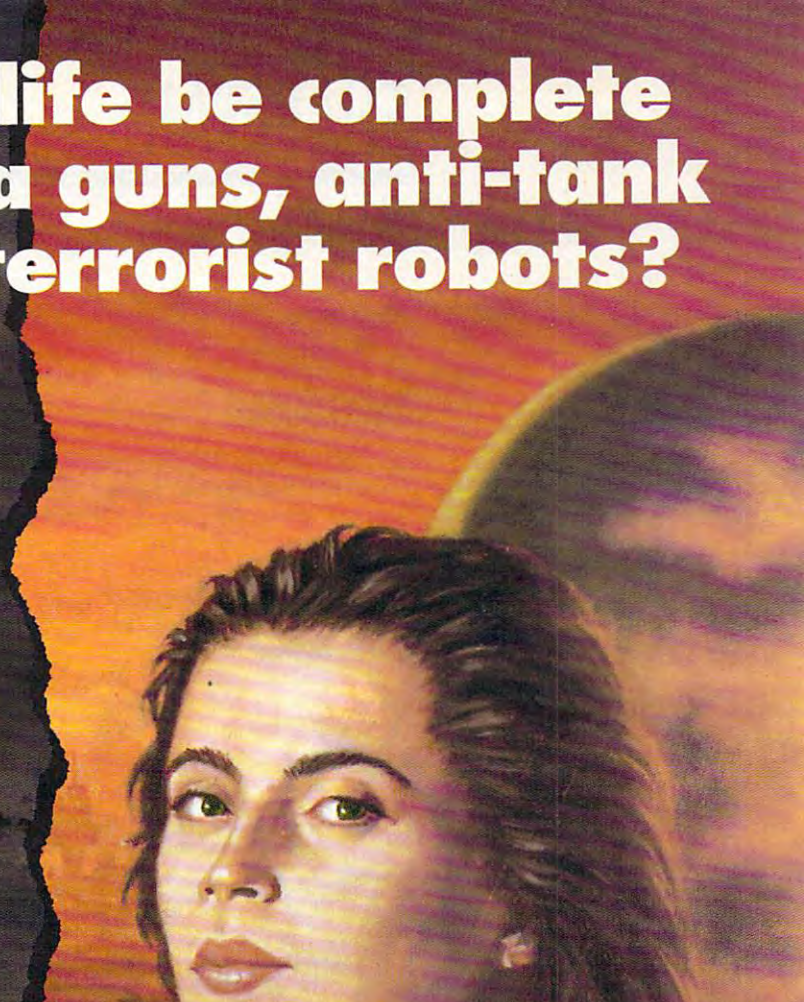

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SHAREPAK

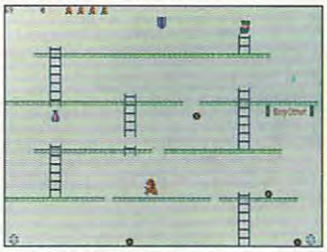
Steve Draper

A TREMENDOUS TWOSOME

October's SharePak offers two fun and challenging games that will keep you busy for hours on end. First, there's Jill of the Jungle, a game that proves women adventurers can be every bit as bold and daring as their male counterparts. Also included on this month's disk is Aldo's Adventure, a challenging new twist on one of the most popular arcade favorites of all time.

October's SharePak puts some spark in your fun.

Challenge the wilderness in Jill of the Jungle.



Climb to the top in Aldo's Adventure.

COMPUTE's monthly SharePak disk contains the best of PC shareware. We look at hundreds of titles and consider only the very best, spending many hours putting our SharePak disks together. We select programs with reader appeal, then test them and pick only the very best. Finally, we check for viruses and assemble the programs on a disk with documentation and a menu program for the easiest possible installation. This saves you valuable time and expense.

What is shareware? It's software that's written by programmers, usually on a limited development and promotion budget, who provide evaluation versions for people to distribute freely. They hope that you'll like the program and any inducements that come with registration well enough that you'll send in a filled-out registration form. But with shareware, unlike software you get off the shelves in your local software store, you aren't stuck with both it and a large bill if you don't like it.

Jill of the Jungle

You'd better be ready for some real action when you load this game onto your computer. Jill of the Jungle is a graphical adventure, puzzle challenge, and arcade game all rolled into one. The list of features for this game is pretty impressive. At the top of this list is the supersmooth 256-color VGA animation, which is easily comparable to the animation in the top Super Nintendo and Sega Genesis hits. Other features that set this game apart are unlimited lives, multiple skill settings, save-game options, joystick support, digital sound effects, an exciting Sound Blaster soundtrack, and graphics support for CGA and EGA as well as VGA cards. I was impressed by how good this game looks in CGA, but the game really shines on VGA systems.

Your quest starts on the main level, the Jungle Map. From there, you guide Jill through 16 levels, each one filled with new adventures and challenges that you must help Jill overcome. Don't let the vivid scenery distract you, because danger lurks around every corner. Be sure to keep an eye on your health level, or you'll have to start the level over. But Jill's far from defenseless; she can run, jump, and climb faster than her numerous adversaries, and she has two powerful weapons at her disposal, a knife and a spinning blade.

They don't sound like much at first, but with practice, these weapons become very effective. They can be thrown and then guided to the target by your momentum, and they magically return to you. You'll need to learn several knife tricks to win. Jill can also acquire the ability to transform into other creatures, an ability she'll need in order to hop, swim, and fly her way to victory. If you're ready for some real adventure, give Jill of the Jungle a try.

Jill of the Jungle requires DOS 3.0 or higher, 512K of RAM, and CGA, EGA, or VGA graphics. An 80286 or faster processor is recommended. The registration price is $15.

Aldo's Adventure

Aldo's Adventure is a spinoff of a real classic, Donkey Kong. The object of Aldo's Adventure is deceptively simple: Get the man to the treasure chest located somewhere on the screen. All you have to do is climb a few ladders and jump off a few ledges. Sounds easy, doesn't it? Don't bet on it. Barrels constantly fall out of chutes at the top of the screen and roll down to meet you. If one hits you, you're finished. Aldo's Adventure is very unforgiving. There's no save-game feature to help you here: It's your skill against the computer, and the computer's one tough customer. And I didn't even mention the high walls, the floors you can walk on only once, and the pits of fire. If you're tired of easy-to-win arcade games, you won't be disappointed by Aldo's Adventure.

Aldo's Adventure requires DOS 2.0 or higher and EGA or VGA graphics. The registration price is $15. ❐

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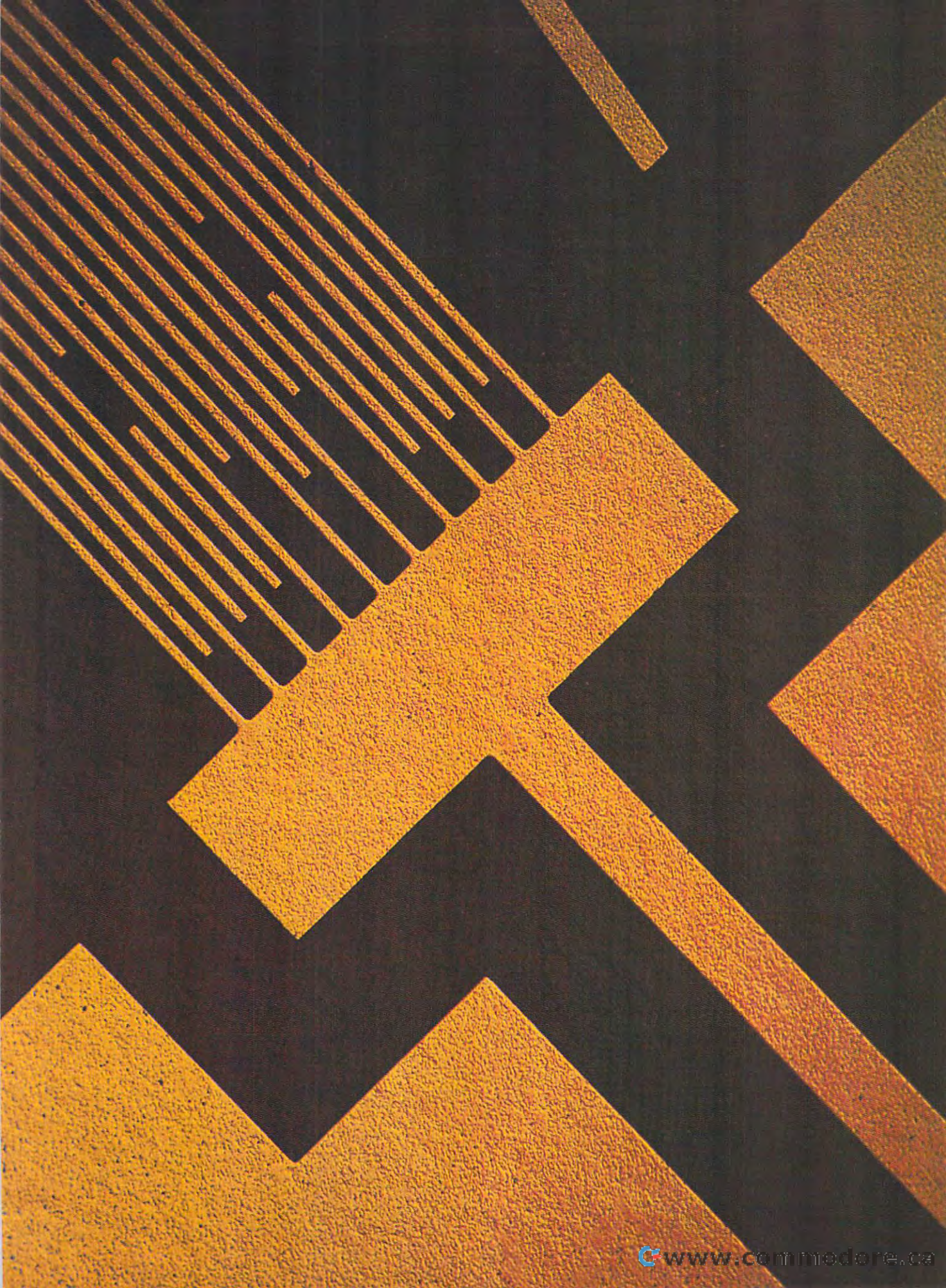

ARTICLE

A LOOK INSIDE THE SOUL OF YOUR MACHINE

MIPS, BIPS, AND SUPER-CHIPS

BY LAMONT WOOD

Computers have revolutionized society. The arrival of computers meant that huge, difficult mathematical models could be automated for the first time. The fallout from this revolution has included a varied array of benefits, ranging from atomic power and powered flight. But the most enduring result of the revolution was a continually burgeoning demand for increased efficiency and improved performance. This demand has ensured that the revolution will continue, both in society and—every bit as significantly—inside the computer itself. You want to talk about revolution? Take a look at this:

Since the VAX 11/780 was introduced by Digital Equipment (popularly known as DEC) in October 1977, its performance has come to represent a standard or benchmark. This standard is called MIPS, which refers to millions of instructions per second. More exact ways of rating computer speed have since come along, but you still hear people gauging computers in terms of VAX MIPS. The base price of the unit—the size of two soft drink vending machines—was considered a breakthrough for 32-bit computing at $130,000.

Today, 15 years later, you can get 41 times its performance on a desktop for one-sixtieth the price.

And the experts agree that the last 15 years have only been a warmup. The pace of progress is actually accelerating. Whereas the power of a desktop PC went up by a factor of 10 or so during its first decade (1981–1991), its power should easily grow another hundredfold in its second decade. Desktop BIPS (billions of instructions per second) are confidently expected in a few years.

Or as Gordon Campbell, president of microprocessor maker Chips and Technologies in San Jose, California, puts it: "We've been on the brink of new breakthroughs throughout the 1980s, and the 1990s won't be any different. Progress was slower in the first half of the eighties than in the second half, and the pace is still accelerating."

Others point to the law first formulated by Intel cofounder Gordon Moore: The number of transistors that can be fitted on a microchip (and, hence, the potential power of that chip) will double about every 18 months. The law has been generally holding true—and it's expected to hold true into the foreseeable future.

Cheaper, Faster

Moore's Law is unique in that it defies Murphy's Law: "As [the microprocessor] gets smaller, it gets cheaper, and it gets faster," notes Lew Pacely, Intel's product manager for high-end 486 products.

As for questions about technological limits, the experts simply shrug them off. Some may eventually be encountered, but remember that the current status quo would have seemed impossible just a few years ago.

"There were a couple of predictions that we have, in the last few years, figured out were false," says Pacely. "The first is that we would not know what to do with all these transistors we were going to be able to put on a chip. It's very clear now that we'll find a use for every one of them. The other is that we would have problems using optical technology [for reducing circuit dimensions to microscopic dimensions to fit on a chip]. At the submicron level it was thought to be impossible.

"But very high precision optics overcame the problem of the submicron level, and I think we also underestimated the power of computers to design computers. We found we could use the previous generation on the next generation to make it faster, and that cycle has been compounding itself."

ON THE HORIZON

Progress is expected to follow several intertwined threads:

Smaller geometries. As components can be made smaller, more can be added to a chip, allowing more complexity. Smaller geometries also mean faster speeds, since the smaller transistors can change state faster and since signals don't have to travel as far. (Only in the microcircuit world is the speed of light considered a performance barrier.) The Intel 486 uses circuit traces 0.85 micron wide, geometries on some other recent chips are as low as 0.5 micron, and there is experimental work at the 0.35 level and lab work at the 0.1 level. (A micron, incidentally, is a millionth of a meter—bigger than a virus but smaller than a protozoan. A human hair is 70 microns wide.)

Bigger chips. Designers have found that most of the speed barriers they struggle against result from having to move signals off one chip and onto another, dealing along the way with a jungle of capacitance, impedance, and other electrical engineering concerns. But the speed of operations within a given chip is much less restrained. Chip speeds, in other words, can be faster than system speeds, so the idea is to embody as much of the system as possible inside one chip. So we see math coprocessors, memory caches, and memory management circuitry being added to microprocessor chips. Larger chips are harder to make, of course, but Moore's Law keeps pushing back the horizon. The Intel 8088, designed in 1978, has 29,000 transistors. The Intel 486, designed in 1989, has 1.2 million.

Faster speeds. The speed of a microprocessor chip is governed by the speed of its clock, which can be likened to the rpm of an engine. All things being equal, the greater the rpm, the faster the engine.

"A fair amount of work has gone into hiking clock speeds," notes Roy Druian, manager for 680x0 marketing for Motorola in Austin, Texas. "You run the clock faster, look for things that break, fix them, speed up the internal signal paths, redesign portions of the circuit, and do geometry shrinks in the process." The Motorola 68030 originally had 1.25-micron geometry and ran

THE P5 STORY AT PRESS TIME

At the time of this writing, Intel is playing very close to the chest with information about its impending 80586 computer chip. (It's generally known as the 80586, though Intel calls it the P5 chip and claims not to have come up with a name for it yet. Giving chips numbers instead of names has been a mixed blessing).

About all Intel will say is that it will have 3 million transistors, that it will be backward compatible with the 8088, that it will perform superscalar processing (executing more than one instruction per cycle) but not really parallel processing. However, it will have a powerful floating-point math coprocessor on the chip and will perform multiprocessing in the areas of data integrity and fault tolerance (these are present on the 80486 but will be enhanced on the new chip).

—ROBERT BIXBY

MATH COPROCESSORS

You've probably heard a lot about math coprocessors lately, including television ads (the Intel ads letting you know that there's a vacancy inside your 486SX computer where a math coprocessor should go).

Math coprocessors take over the task of floating-point math, which is a very complex process ordinary CPUs are very bad at. The math coprocessor was invented, quite literally, to extend the machine language instruction set of the 8088 CPU. Using its own simple math instructions, the CPU might have to perform hundreds of operations—each eating up several clock cycles—to come up with a floating-point result. Meanwhile the coprocessor might have a single instruction that will reach the same result in a few clock cycles.

Do you really need a math coprocessor? Probably not. Check your applications. Most applications make no use of a math coprocessor whatsoever, and these programs will not perform better with a coprocessor installed. A few, like Lotus 1-2-3 and most other spreadsheets, will take advantage of the added performance, and the decision to shell out the $100–$1,000 cost of a math coprocessor will depend on how crucial it is to you to get high-speed performance out of those programs. A very few programs (like AutoCAD and some other CAD programs) require a coprocessor and won't work at all without one.

What kind of performance boost should you expect? With a program that takes full advantage of the math coprocessor, you might see gains of 10–400 percent in performance. This increase not only makes your spreadsheet recalculations scream but also makes many graphics packages and games perform better (flight simulators especially). In a game that depends on polygon rendering, simply refreshing the screen requires a huge amount of processing time, and most of that processing is floating-point math.

If you have a computer that doesn't have a math coprocessor, which coprocessor do you need? You should choose a coprocessor with a number similar to your CPU's (8087 for 8088 and 8086 chips, 80287 for 80286 chips, and so on) and with a rating at the same clock speed as your CPU's. A faster or slower chip will perform. But a faster chip will cost substantially more and won't make the system faster than a coprocessor of the proper speed. And a slow coprocessor will actually slow the system down, according to an Intel spokesperson.

The companies that make math coprocessors for the Intel series of CPUs include Intel, Weitek, Cyrix, and IIT. Virtually any coprocessor will give you the same performancein combination with the CPU it was designed to assist, with very slight variation among manufacturers. If you need a coprocessor, this is one decision that can be based almost entirely on price. However, if you're in the market for a new computer, the best floating-point performance can be had with the 486DX, which has an on-board coprocessor, or the 486SX/487 combination. Having the CPU and coprocessor on the same chip is much more efficient than having them in separate locations.

Interestingly, the 486SX has an on-board math coprocessor. It's simply disabled. When you install a 487 math coprocessor, you might think that it's simply making up for the disabled part of the 486SX, but you'd be wrong. The 487 is in fact a complete 486 CPU with on-board coprocessor. When it's installed, it disables the 486SX, which just sits there taking up space while the 487 takes over the work of the computer. In case you're thinking of replacing your 486SX with a 487, though, don't even try. The chips are not pin compatible.

—ROBERT BIXBY

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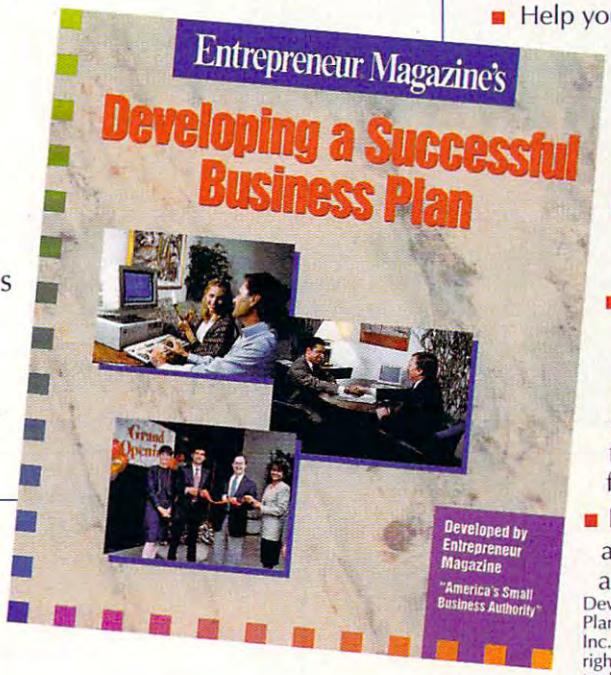

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THE QUEST FOR SUPERCHIP

Digital Equipment Corporation (DEC), long the major source for compact computing with its line of VAX minicomputers, has found itself without a niche. There is virtually nothing a minicomputer can do that a desktop computer can't do. When the NeXT computer appeared, some users referred to it as the desktop minicomputer. DEC was an early player in the microcomputer market with its Rainbow computer. Unfortunately, it wasn't quite PC compatible, and it lost out in the battle for market share. DEC has since introduced a line of PC compatibles, but after layoffs, grumbling among the stockholders, and its first two quarterly losses in its 30 years of existence, DEC clearly wants to avoid being perceived as a me-too clone maker and restore itself as a technology leader.

The name of its new technology is Alpha. The initial result of DEC's research is an astounding 150-MHz 64-bit RISC chip containing 1.68 million transistors in a space smaller than a postage stamp. Alpha is a superscalar chip, which means that it can process two instructions per cycle, making the speed of the 150-MHz version an incredible 300 MIPS. By the end of the year, there will be a 200-MHz version. And, according to DEC, that's only the first step for a chip designed to eventually process data at 400 billion instructions per second. The chip is the centerpiece of a versatile system architecture that can be scaled from the palmtop to the supercomputer with very few changes. In fact, there are rumors of a DOS-compatible Alpha desktop system which might appear in a year or so, and Cray Research has already selected the Alpha chip in its own massively parallel processing supercomputer designs. From John Rollwagen, chairman and CEO of Cray Research (quoted in DEC promotional literature): "Each Alpha processor is expected to have roughly the same peak performance as a CRAY-1 system." The Cray on a chip could be your next CPU.

—ROBERT BIXBY

at 25 MHz; it now uses 0.8-micron geometry and runs at 50 MHz. Druian sees no reason a microprocessor can't be made to run at 250 or even 500 million cycles per second. (And indeed, at almost the same time he was saying this, Digital Equipment announced that its new Alpha microprocessor had run successfully at 200 MHz. The firm is confident that it can eventually get 400-BIPS performance out of the chip's descendants.)

Clock doubling. If chips run so much faster than systems, why not let them run as fast as they can and have some kind of buffer between them and the system to handle the speed difference? That's what's done with the new Intel 486DX2. It runs at 50 MHz on a 25-MHz system. The 25-MHz system circuitry is much less expensive than 50-MHz system circuitry, yet it achieves about 85 percent of the speed of a true 50-MHz system.

Greater efficiency through complexity. As more components can be added, a chip can be made to do more complex things that will enhance its performance even at the same clock speed. Whereas the Motorola 68000 takes 20 to 30 cycles to perform an instruction, the 68030 takes 6.6 cycles, and the 68040 takes 1.3. And progress has been similar in

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FIRST MIPS

The march to ever higher desktop MIPS and BIPS did not, as you might expect, start in 1981 with the coming of the IBM PC. The desktop micro revolution actually even predates the VAX 11/780 of MIPS fame.

A patent for the microprocessor chip was awarded last year to California engineer Gil Hyatt based on design work he did in the 1960s. But the 4-bit Intel 4004, introduced at the end of 1971, is generally accepted as the first microprocessor chip to see the light of day. Sporting 2,300 transistors, it was designed by Intel engineer Marcian E. "Ted" Hoff to replace 12 chips in a calculator for a (now defunct) Japanese calculator company called Busicom. Intel told Busicom it could keep the $60,000 development fee if Intel could market the chip itself. The 4004 initially sold for $200. Its smallest geometry was ten microns, and it performed about 60,000 instructions per second.

But 8-bit microprocessors—ones powerful enough to run computers—have a different origin, beginning in late 1969. Having broken into the dispersed data-processing market with a dumb desktop terminal, Datapoint (then called Computer Terminal) of San Antonio, Texas, decided it needed to offer a smart terminal, one that could be programmed (through a built-in cassette drive) to emulate any of the major computer terminal brands then being sold. But the company also decided that the terminal—the Datapoint 2200—needed to be an unintimidating little box that anyone could use.

"It was to have the footprint, size, and shape of an IBM Selectric typewriter," recalls Vic Poor, now retired, then newly hired technical director of Datapoint. "The keyboard was the same, and even the type size on the screen was about the same as you would have gotten with a Selectric. It all seems absurd today, but there was no PC in those days, and the idea was to have something that would sit on a secretary's desk and be as comfortable as a typewriter. But to do that, we needed to cut the chip count and power dissipation as much as possible."

As part of the downsizing effort, Datapoint set out to replace the processor circuitry with a processor chip, and contracted with both Intel and Texas Instruments to produce a chip to Poor's specifications. Both were so slow at making the chip that in the meantime Datapoint came out with a (very crowded) 2200 with conventional processor circuitry.

The first 2200s were shipped in early 1971, and some went to a Pillsbury office in Minneapolis, Poor recalls. He checked with a technician there to see how the machines were working out and heard that one had been sent to a chicken-processing plant in El Dorado, Arkansas, for a payroll program.

"Oh. What kind of communications link are you using?" Poor asked, assuming the Datapoint 2200 was being used as a terminal for a mainframe program and wondering how they found a phone line to such a remote place that was reliable enough for data.

"None," replied the technician. They had written a payroll program in assembly language on the 2200 itself, using the 8K of memory the terminal contained. Data was "transmitted" to and from headquarters by mailing cassette tapes.

Subsequently, everywhere they looked they found customers doing unexpected things with the 2200, like process control and accounting. Just about everything but terminal emulation, in fact.

The desktop personal computer was born—created, as it were, by the users.

"I suppose I do feel proud of it," Poor says now. "But if we had not done it, someone else would have. We understood it only in terms of what the customers were doing with it, and we just responded to that."

Meanwhile, TI and Intel belatedly came back with their chips. TI was first, but the chip wasn't very reliable, and TI abandoned the design when it saw that Datapoint had lost interest, Poor recalls. Intel's was more reliable, but it was a year late. As with Busicom, it was decided that Datapoint would keep its money and Intel would keep its chip, and Intel added the device to its catalog as the 8008. The 8008 soon developed into the 8080 and then the 8086. The 8086 was too advanced for the market, so Intel crippled it to create the 8088. Another series of chips—the Zilog Z-80 that powered the CP/M machines of the late 1970s—also developed from this early CPU research. That's how the seeds of the future were planted.

the Intel dynasty. (Keep in mind that microprocessor instructions are typically arcane things like "pop the stack," and a million per second would not equate to a VAX MIPS.) One of the key selling points of the "P5" chip is that it will be able to perform more than one operation per cycle, which Intel calls superscalar processing.

More parallelism. Even a multitasking chip can really only execute one instruction at a time. You could multiply a computer's effectiveness by lining up two or more microprocessors in parallel. A master processor could break up tasks into discrete chunks and pass them through simultaneously, eliminating delays. While not much of that is being done now, more parallelism is constantly being added to individual processors. For instance, early Intel microprocessors performed binary multiplications at the rate of one bit per cycle, notes Pacely. But Intel was able to add circuitry to later chip generations that would "look ahead" and multiply bits in parallel.

More layers. As chips get larger, they also get deeper. By stacking layers, you multiply the processing power without taking up more real estate. The Intel 486 uses three layers, and four-layer chips are being planned.

RISC architecture. Reduced instruction set computers (RISC) were supposed to be the wave of the future, with their ability to get higher performance by performing simpler things at higher clock speeds.

Today, the developers shrug. "RISC is great marketing technology," says Pacely. "Remember artificial intelligence? Its basic concepts got integrated into a lot of products, but there never was an artificial intelligence market per se. RISC is just a computer architecture, and the people who build processors may position them as RISC to be different. But everyone uses a certain amount of RISC in chips these days, since it lets a lot of simple things get done in one clock cycle."

More brain sweat. You might think that we could miniaturize endlessly. But there is a very definite limit to circuit size. For instance, when geometries get below about 0.3 microns, the designers are likely to start running into quantum effects: The components will be so small that they will obey the odd laws of quantum physics instead of the laws of Newtonian physics that rule the macroscopic world inhabited by people (commonly called the real world).

"The real issue is that we won't be able to draw circuit traces at the quantum level and will have to switch

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from optics to particle beams or something," says Pacely. "But are we thinking that clever people won't find a way to solve these problems? No. They will. It's a relatively straightforward engineering problem, not a breakthrough science problem."

THE LIGHT FANTASTIC

"The quantum problem will probably be as much a problem as any past problem that we overcame," agrees Druian. "We thought there would be problems at the one-micron barrier, but we addressed them. As you migrate down in size, there are always new problems you have to address, but I don't see them as significantly different from previous ones. Whatever the width of an atom is, we'll probably run into problems there. But I understand work is being done on light chips."

"There are a lot of advantages to light," adds Campbell. "There is no electronic radiation, it doesn't heat up, and it's faster (than copper-transmitted signals) by a factor of 2 or so. People are looking at light very seriously, but the density you can get is not competitive with silicon—not that you can't get single elements small enough, but there is no way to get 4 million on a chip. Silicon technology is pretty mature in that sense. Maybe by the end of the decade, we'll see light chips."

Meanwhile, Intel has stated publicly that it expects to be selling 386-compatible 2-BIPS chips with 100 million transistors, running at 250 MHz, by the end of the decade. There are those who disagree with this prediction—because it's too conservative. "Two BIPS? We'll see it more like about 1997. The pace is picking up," notes Dean McCarron, analyst with In-Stat, a semiconductor market research firm in Scottsdale, Arizona.

THE WRITING ON THE WALL

As for what use we'll make of this deluge of MIPS and BIPS, sources agree that we'll probably see more and more resources devoted to the user interface and communications. After all, our computer applications have remained basically the same: accounting, word processing, databases, and so forth. Where the extra power could be best harnessed would be in making the interfaces simpler and in speeding up communications.

Handwriting recognition interfaces are already being touted, and mass-market voice recognition can't be far off. Virtual reality on the order of the holodeck on "Star Trek: The Next Generation" may not be in the cards yet, but we'll probably see stabs in that direction. All parts of the entertainment industry await advances in the computer hardware to make their interaction more friendly, more intense, and more real. Education might cease to exist as we know it and merge with entertainment and information in an industry that will form the backbone of a culture that is yet to be born.

In the meantime, hang on to your hat. The excitement has only begun.

Most of the advances in society since the dawn of civilization have been the result of developments in machine technology from the wheel to the microprocessor. Our dreams of a future where dwindling resources are divided like loaves and fishes to feed, clothe, and house the multitudes rely on the development of the machines that multiply the power of our intellect the way levers and wheels multiply the power of our musculature. Rapid progress in the microprocessor field helps to make that vision of an abundant future more assured. ❑

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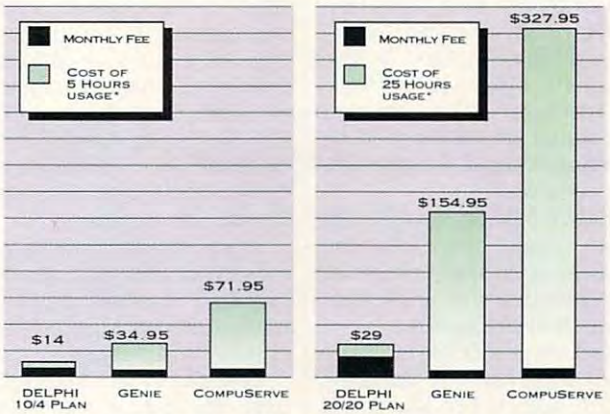

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Circle Reader Service Number 161

PRODUCTIVITY CHOICE

Save time and memory and load up on special features with the best version of Windows yet.

Clifton Karnes

WINDOWS 3.1

If you're using Windows 3.0, upgrading to 3.1 should be the easiest decision you've ever made. If you're not using Windows yet, 3.1 may make you want to come on board. What's so good about 3.1? It's faster, crashes less often, runs DOS programs better, has a first-rate File Manager, comes with its own font technology (TrueType), makes compound documents possible with OLE, and more.

Speed. That's one thing we all want, and 3.1 is much faster than 3.0. There are several reasons for this dramatic speed increase. First, there are new video drivers, including an SVGA driver that's faster than the third-party 16-color drivers I've seen. Next, hidden inside the system is Fast Disk, an improved 32-bit hard disk driver that boosts disks driven by Western Digital and compatible controllers.

Besides being faster, 3.1 is more robust than 3.0. You can say goodbye to almost all the unrecoverable application errors that plagued 3.0.

The biggest single improvement is the new File Manager. In 3.1, each of File Manager's drive windows is divided into a directory tree on its left side and a window displaying the files in the selected directory on the right. You can open and display multiple drive trees and directories, so copying and moving files between disks is quick and easy. And since this version of File Manager is fully MDI (Multiple Document Interface) compliant, you can minimize drive displays at the bottom of the File Manager window.

One of File Manager's neatest new features is drag-and-drop. To see it work, run Notepad and iconize it on the desktop. Now run File Manager and tile it so the Notepad icon is visible. Click on a text file in File Manager, drag it to the Notepad icon, and release the mouse button. The file is loaded into Notepad.

Drag-and-drop works with most Windows accessories, and it will work with any third-party Windows programs that choose to support it.

Perhaps File Manager's best new feature is its speed. As an example, the File Manager in 3.0 rescans a drive every time you switch. Since the new version lets you open a new drive window without closing the current one (by holding down the Shift key and double-clicking on the drive icon), rescanning isn't necessary.

Support for DOS programs has been dramatically improved in the new Windows, too. Not only do DOS apps run faster, but 3.1 now manages icons for DOS programs in a consistent way. This means that if you specify an icon for a DOS app in Program Manager, that icon (rather than the homely generic DOS icon) will appear on the desktop when you minimize the program.

Perhaps best of all for DOS applications, Windows 3.1 lets you use your mouse in a windowed DOS app. The mouse response isn't as fast as it is in text-based DOS programs, but it's a super convenience.

Resources should no longer be a problem for anyone. Windows 3.1 provides much more memory for resources, and most people will never run low.

Now there's a local reboot option, which allows you to reboot a single Windows or DOS application without rebooting your whole system. To use it, simply hit Ctrl-Alt-Delete, and you'll see a screen that offers you the option of pressing Enter to kill the current app, pressing Ctrl-Alt-Delete again to reboot your system, or pressing Esc to return to Windows. This feature is a real lifesaver.

If you've never gotten along with the LOAD= and RUN= lines of your WIN.INI, you'll be

happy to hear that there's a new group called Startup. All the apps you place in this group automatically run when Windows boots. To start a program minimized, simply select that option in the program's properties dialog.

Multimedia sound support is now built into Windows, so if you have a Sound Blaster, Ad Lib, or Roland card, you'll be able to take advantage of applications that use sound hardware. And 3.1 can map sounds to system events.

OLE (Object Linking and Embedding) is a major enhancement to Windows that lets you actually create compound documents by embedding one application inside another. It's like DDE, but it goes a step beyond. With OLE, not only does the client application get a copy of the server application's data in the client's native format, but it gets a copy in the server's native format, too. This means that if you're using OLE, you can double-click on an embedded document, and the creating application loads with the embedded data in it, ready for editing.

TrueType is an outline font technology, like PostScript, that was developed by Apple, licensed by Microsoft, and incorporated into Windows 3.1. If you don't already have a collection of fonts, then TrueType is great news for you because Windows 3.1 includes a basic collection of 13 high-quality outline fonts. If you do already have a font manager, such as ATM or Facelift, and an investment in fonts, you may not want to use TrueType.

Now, to the all-new SMARTDrive. SMARTDrive 4.0 is an EXE file, and you run it from your AUTOEXEC.BAT. It automatically loads itself into high memory, unless you tell it not to. And now it caches writes, which gives it a big performance boost. If you're nervous about caching writes, you can turn this feature off or just cache writes on selected drives. You can now control SMARTDrive interactively, too, which means you can turn it on or off and adjust its parameters while it's running.

When you run the new SMARTDRV.EXE, you'll probably want to specify the same two parameters that the developers did for SMARTDRV.SYS. For example, if the line in your CONFIG.SYS file says DEVICE=SMARTDRV.SYS 1024 512, you use the line SMARTDRV.EXE 1024 512 in your AUTOEXEC.BAT. SMARTDrive automatically configures itself to cache writes for optimum speed. (If you're a Stacker user, note that this new version of SMARTDrive is Stacker aware and works fine with stacked drives.)

There's more. In addition to all this, Windows 3.1 adds several new utilities and enhances others. One of the most useful new apps is Character Map, which displays a grid of all the characters available for each font in your system. When you double-click on Character Map (in the Accessories group), you'll see a character grid with font names listed alphabetically in a drop-down list box.

If you click on a character, you'll get an enlarged view of it. There are buttons to copy the selected character to the Clipboard and to append groups of characters. Once in the Clipboard, you can paste the character or characters into your document.

There are several enhancements to Control Panel's Desktop module, too. First, there's an animated screen blanker that offers full password protection. The screens aren't going to put After Dark and Intermission out of business, but they're all usable. In addition, Desktop now sports several new, attractive wallpaper bitmaps. My favorites are Marble and Slash.

That's Windows 3.1 in a nutshell. My recommendation is simple: If you're a 3.0 user, upgrade! If you've never tried Windows before, this is by far the best version of Windows yet. Give it a try. I don't think you'll be disappointed. ❐

Circle Reader Service Number 303

IBM PC or compatible (80286 or faster, 80386 recommended); 640K conventional memory and 256K extended memory (1024K recommended for 80286, 2048K recommended for 80386); high-density floppy drive and hard drive with 6MB free (10MB recommended); EGA, VGA, SVGA, 8514/A, XGA, Hercules, or compatible graphics adapter; DOS 5.0 recommended—$149.95; upgrade—$79.95

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PERSONAL PRODUCTIVITY

Daniel Janal

KILLING TIME IS KILLING YOU

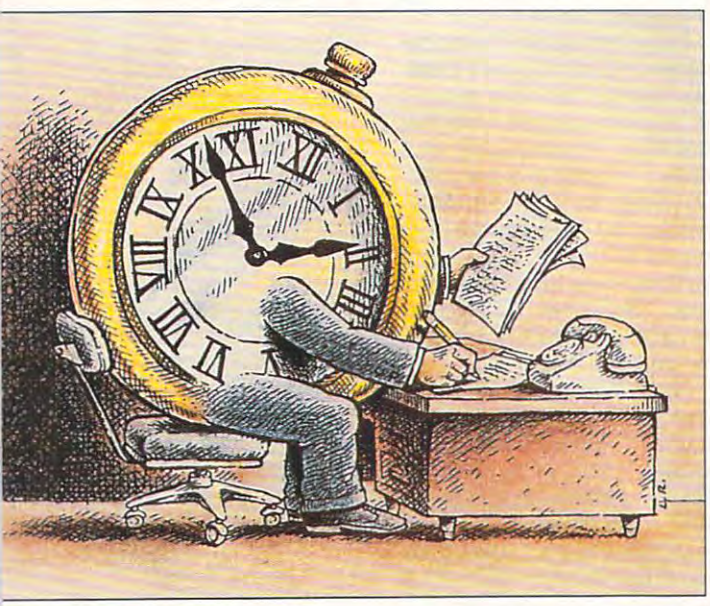
So you have a few minutes to kill. What's a little time? Might as well play Taipei or a few hands of Solitaire.

Those five-minute intervals come when you're waiting for an appointment or a revised document or the copy machine or while you're stuck on hold. Just enough time to leave a dead spot in a busy day. Not quite enough time to do anything meaningful. The problem is that if you have 12 five-minute delays, you've killed an hour.

Every minute of your life is precious and never to be recalled. Here are steps you can take to increase the value of those wasted moments spent drifting in the doldrums.

Set one-minute goals. Ken Blanchard, author of *One-Minute Manager,* says it only takes one minute to determine what you want, how to get there, and how to measure your effectiveness. Take this time to determine where you want to go and what steps to take to get there.

If time is money, you need to use these strategies to beat the clock.



Complete simple chores. Write thank-you notes, pay bills, write checks, balance your checkbook.

Handle routine office maintenance. Fill that laser printer tray, file old papers, throw out stuff you'll never need. Eliminate clutter; you'll become more efficient as you become more organized.

Review your agenda. What's going to happen tomorrow? Here's your chance to jot a quick note for an upcoming meeting or gather information to improve your presentation.

Delegate. What tasks can your assistant or colleagues do? Take a moment to clear your desk of tasks that can help others improve their skills, and you'll be able to breathe easier.

Call people back. You probably have phone calls that haven't been returned for days because they weren't urgent. Show you have class by returning all calls—even if you only have to deliver a polite "No, thanks" to salespeople.

Proofread. Why take a chance on a typo in a memo with your name on it? As long as you have time to kill, don't let a typo kill you. While a spelling checker can catch many errors, it won't catch an error in usage or a soundalike *(to, too, two).*

Run errands. Create a logistical road map for the errands you must run. Make sure you don't backtrack while driving. Also, group appointments so they make sense.

Have a meeting. What? In just five minutes? Sure you can. Just use these four principles from Dale Carnegie. What is the problem? What is the source of the problem? What are the possible solutions? What is the best solution? By sending a request that the first question be answered before the meeting, you'll have everyone focused on the topic and thereby save time. By following this formula, your employees might even solve the problem without you!

Automate your software functions to create timesavers. Create macros that address envelopes, dial your online service, upload and download mail. If you use different configurations for your AUTOEXEC.BAT file, you might want to get Easy Boot from Clear Software. It lets you create different files for each configuration you use. A real timesaver.

Create templates for work that you have to do over and over again. For instance, if you write many proposals, create a master form that includes the material that never changes—like your company's background, mission, and philosophy. Leave blank spots for the client's name.

Gather all your notes in one place. Software programs that include contact managers can store the names, phone numbers, and addresses of your clients and coworkers, as well as notes related to them. Those little details won't get lost in the shuffle anymore.

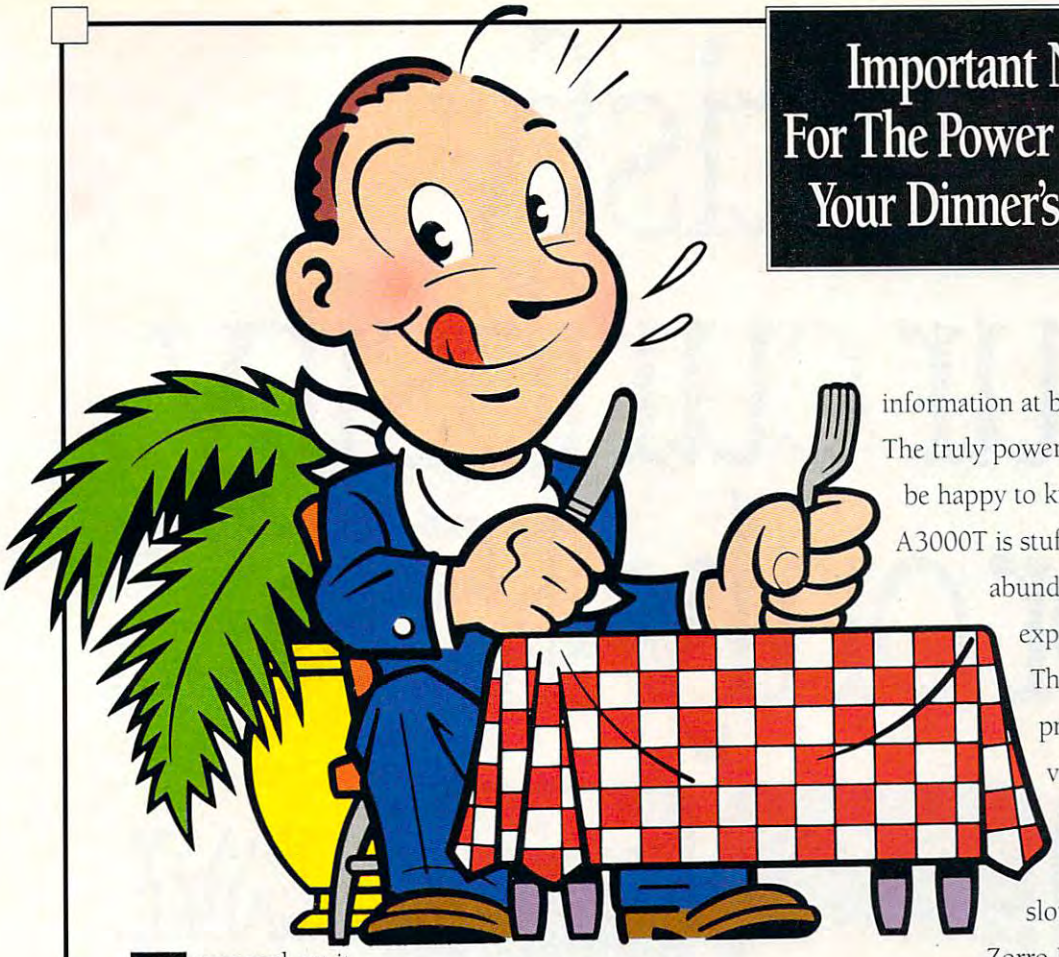
Take an objective look at your time usage. Do you play a game of Solitaire at lunch, only to look up and find that all of your colleagues have gone home for the day? It might be time to remove the addictive games from your computer before your boss removes you from the payroll.

Create a to-do list. Number the items in terms of priority.

Correspond. Respond to letters with a handwritten note on the sender's stationery. You'll save the time it would take to create a fresh letter, and the sender will know what you're responding to.

Time is more than money. It's the stuff of life itself. If you fill dead moments with simple tasks, you'll avoid boredom and be more effective. ❐

Important News For The Power Hungry: Your Dinner's Ready.



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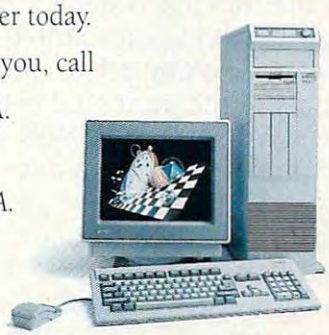

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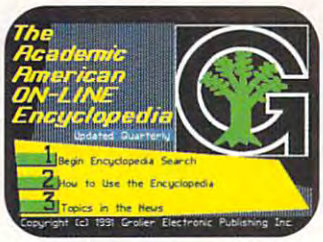

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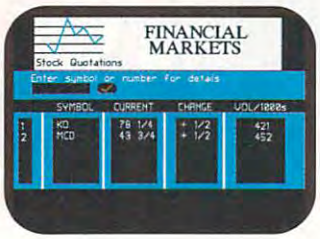

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OS/2 TO OR NOT TO OS/2

ARTICLE BY MARK MINASI

Is a hybrid of Windows and DOS better than either?

It hasn't received as much press as Windows 3.1 or DOS 5.0, but the other new operating system is here.

It seems as if OS/2 has always been "the operating system we'll use sometime in the future." Unfortunately, that future has been just about every year since 1984, when the operating system was pre-announced by IBM and Microsoft. Talk to any OS/2 advocate, and you'll hear a litany of excuses why OS/2 isn't on your desktop today. The excuses have been coming for years: "Nobody's going to really start writing programs for it until Presentation Manager [the OS/2 version of Windows] appears" and "People are waiting for the 386 version."

The Leader of the Flock

The 386 version is here, complete with Presentation Manager, in the form of OS/2 2.0. Why should people be flocking to it? What's so special about 2.0, anyway? The reasons to run OS/2 are simple:

- It's more stable than Windows in most cases, because it's a real operating system.
- It multitasks DOS programs, and it includes all of the features of a state-of-the-art memory manager.
- For those who prefer one, OS/2

OS/2 TO

also offers a graphical user interface (GUI) that's superior to the Windows GUI.
• Finally, for the adventurous, OS/2 frees you from some of the annoying limitations of the DOS file system.

A Real Operating System

The most important reason to consider OS/2 for your machine is that it's a real operating system. At last. Microsoft describes Windows as an operating system, but it's not. An operating system does three things:

• It provides a file organization system (subdirectories and such).
• It provides disk management tools (programs that erase, copy, back up, restore, and move files, to name a few examples).
• It provides a method of loading and executing user programs.

Windows certainly does the last, and in a manner preferable to the usual DOS C:\> prompt. But it definitely doesn't provide a file system. If you're running Windows, DOS provides the file system.

Windows does contain file management tools in the form of the benighted File Manager—but how many people actually *use* File Manager? Most either open up a DOS prompt to do basic disk maintenance or use some alternative like Norton Desktop for Windows.

Windows isn't an operating system. DOS and Windows together are an operating system.

By contrast, OS/2 is a complete operating system built around the 386/486 family of chips. It can directly address 512MB of RAM and over 2,000,000MB of disk space. (No, that's not a typo. That's 2 *trillion* bytes of disk space.)

While that may sound like quite a bit more than the amount of memory on your PC, OS/2 will also allow you to load more programs than you've got RAM for, using the technique known as virtual memory. With virtual memory, OS/2 uses free disk space as if it were free RAM. That's nice, as disk space is usually easier to come by than RAM space, but, of course, there's a price: You pay for virtual memory in access speed. Disk access is considerably slower than RAM access, so virtual memory slows things down—sometimes by a bit, sometimes by a lot. Still, it's better than nothing if you're RAM-crammed. Certainly virtual memory isn't a back door available with DOS.

The most important reason you should consider OS/2 for your machine is that it's a real operating system. At last.

Double the Bits

One strength of OS/2 over Windows is that it's a 32-bit operating system, while Windows is a 16-bit operating environment. Windows was built around the 286 processor, which can only address 16MB and can work with pieces of data no larger than 64K. Yes, you read that right: 64K.

This 64K limitation makes writing programs that use large data areas difficult. BASIC users may know that most implementations of BASIC under DOS are limited either to a 64K program overall or to 64K of data and 64K of program. These limitations stem directly from those of the 8088 processor, limitations inherited by the 286. The 386, on the other hand, can address data areas as large as 4096MB, or a little over 4 billion bytes.

Multitasking Without Tears

Since OS/2 was built from the ground up with multitasking in mind, it's a more stable multitasker than Windows. Windows programs sometimes intrude upon one another's memory areas, resulting in the all-too-familiar Unrecoverable Application Errors. Those don't exist in OS/2.

When an OS/2 program attempts to overwrite another program's memory space, the offending program is shut down by OS/2 without crashing the whole system. (There are no more UAEs in Windows 3.1, but that's only because Microsoft renamed the error message. Unfortunately, this hasn't eliminated the errors themselves. It's kind of like when the Reagan administration whipped inflation back in the early eighties by redefining what *inflation* meant in the government's statistical records.)

"A better DOS than DOS! A better Windows than Windows!" was OS/2 promoter Lee Reiswig's cocky refrain. Many who heard him thought that IBM had bitten off more than it could chew. After all, DOS 5.0 is pretty good, and Windows 3.1, while flawed, is the desktop system of choice for millions of users. OS/2, by contrast, still hasn't broken the 1 million mark, even after five years of sales. So is this all IBM puffery?

In addition to the intrinsic stability of DOS multitasking derived from OS/2's multitasking foundation, OS/2 contains the memory management capabilities of DOS 5.0—and more. How's 720K of free RAM space for a DOS session sound? With a bit of memory management hocus-pocus, I've gotten the free space in a DOS session up that high.

Surprisingly, OS/2 2.0 has turned out to be largely what it was promised to be. It's as good a DOS multitasker as DESQview, and its implementation of Windows even compares favorably with Windows 3.1, which is faster in some ways than its predecessor, 3.0. Running a standard Windows benchmark test on both Windows 3.1 and the OS/2 2.0 Windows emulator on the same machine shows that OS/2's Windows emulator does most things about as quickly as Windows itself. Of the 125 tests that the benchmark performs, OS/2 was faster than Windows in 25 of the tests and no more than 20 percent slower on most other tests. This comparison is with 3.1. The comparison with 3.0 is even more favorable.

Many DOS speed benchmarks, like the old LANMark speed test, often fail in multitasking environments, making speed comparisons difficult and casting doubt over the general quality of the multitasking. OS/2, however, makes them all run without a hitch. I find myself spending entire days in OS/2, if only to multitask DOS programs under OS/2.

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Circle Reader Service Number 122

A GUI to Love

Let a user work with the Macintosh for a while and then work with Windows for a while, and that user will come away saying that the Mac is *still* easier to use. Ask for specific likes and dislikes, and you'll probably hear that the consistency of the Mac's user interface makes it the favorite.

In the Windows world, the author of the PIF Editor clearly was different from the author of the Control Panel. And the Control Panel has a look and feel radically different from that of the File Manager.

Why, for instance, do you download fonts to your printer with the Control Panel but monitor the progress of printing with the Print Manager?

In OS/2's Workplace Shell GUI, on the other hand, all applications and utilities work alike. OS/2 gives specific powers and attributes to everything on the screen: things like program icons, folder icons representing data files, or the printer icon. There's only one printer icon because there's no print manager. The printer icon represents both the printer itself (its connections, fonts, memory, and the like) and the things that the printer is doing (the print jobs).

OS/2 calls all of these things objects, and all objects have attributes and properties. You can see these properties by clicking on them with the right mouse button.

Click on the printer object with the right button, and you'll see the menu of things that you can do with the printer. Double-click on the printer object, and it opens up to reveal objects within it that represent the print jobs waiting to be printed. Click on *those* objects with the right button, and their properties are revealed. The print jobs can be viewed (even if they contain graphical information—a graphical metafile viewer is built into OS/2), deleted, or individually held or released.

There isn't space here to do justice to the Workplace Shell, so I'll offer this one piece of advice: Get in the habit of right-clicking on everything. You'll be amazed at what you can do.

The objections to OS/2's size are outrageous. It's only a little larger than DOS and Windows together, and it's a 32-bit operating system.

High-Performance File System

After 11 years, DOS still hasn't mended its old ways where files are concerned. Filenames are still limited to eight characters with three-character extensions. Not even the advent of Windows has resulted in a better file-naming strategy. OS/2 offers an improvement in the form of HPFS—the High Performance File System. HPFS is designed to speed up disk access, something immediately obvious with database files over 1MB in size. HPFS also allows filenames of up to 254 characters in length and keeps much more information about when the file was used. Unlike DOS, which provides a single piece of date information (the date the file was last modified), HPFS also remembers when the file was first created and when it was last read. HPFS gives you real control over the files on your disk. Imagine the value of this last piece of information; you can identify the files that you haven't even looked at in the last year or two, as a prelude to sweeping them off to floppies.

OS/2 Objections

But what about some of the objections to OS/2?

- It's too big.
- It's too slow.
- It's not compatible.
- It needs too fast a system.

Some are true; some are misconceptions. OS/2 certainly requires a powerful computer in order to work. Any multitasking graphical operating system would. But it doesn't require any more power than Windows does. A few weeks' work with Windows led me to conclude that there's never been a better excuse for buying a 486 than using Windows. If you're happy running Windows on a 16-MHz 386SX with 4MB of RAM, you'll be happy with OS/2 on such a machine. Personally, I find this level of machine a bit too slow to work with, but it's a matter of what you're used to. I recommend, as a minimum configuration for Windows or OS/2, a 25-MHz or faster 386. This is hardly an unreasonably expensive proposition these days. You need that kind of power to run some *games*.

The foolishness of predicting a product's failure based on its stringent hardware requirements can be illustrated by a story. I attended a meeting in 1983 wherein some other industry watchers and I saw a preview of the first version of Lotus 1-2-3. The product will never take off, some said, because few consumers have the required 256K of RAM.

The real outrage about the objections to OS/2 is the concern some writers have expressed about OS/2's disk requirements. They claim that it's ridiculous for an operating system to take up 20MB of hard disk space. That *is* a significant expenditure of real estate, but they forget that the operating system performs the functions of DOS and Windows—and much more. Windows 3.1 takes up about 10MB on the disk, and DOS 5.0 with all the trimmings takes up about 3MB, for a total of 13MB. For just 7MB more, OS/2 gives you all the features of DOS and Windows, plus the advantages of a full-blown 32-bit operating system. In that light, it doesn't seem like a bad trade.

Despite my personal feeling that OS/2's success would be a very positive thing for the industry, you can't have missed the somewhat defensive tone of this article. The defensiveness arises mainly because, while there are reasons to like OS/2 as well as reasons to dislike it, I fear that many won't even give it a try because of the very uninformed press this operating system has received. OS/2 2.0 is an inexpensive upgrade if you already own DOS or Windows, so give it a try. See if it isn't all it was promised to be.❑

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ART WORKS

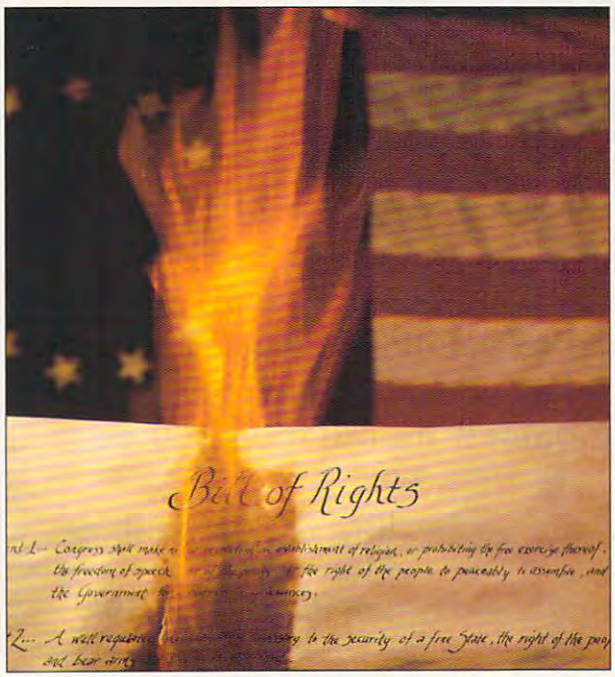
Robert Bixby

WHOSE OX IS BEING GORED?

What do you object to? Chances are, no matter how tolerant you are, there is some limit to what you consider acceptable. And, regardless of your feelings about nudity or depictions of sexual behavior, there is some limit beyond which graphics become objectionable. The same is probably true of the stories told in novels and movies.

The only question seems to be where the line should be drawn. Should kissing be allowed in movies? There are cultures in which it is not. Should all depictions of women be removed by censors from magazines? I received a frantic letter from one of our readers in Saudi Arabia, asking for a copy of the text on page 12 of the February/March issue because the censors had torn out the advertisement on page 11. If you have that issue, you might want to locate the offending page. Seeing the picture, you might even agree with the Saudi censor. The censor looked at the picture and was stirred deep in his heart; this stirring made him believe that anyone who looked at the picture would feel similar stirrings. That would be bad. Therefore, out came the picture.

Civil rights and civil wrongs: The book burners really have just one piece of kindling in mind.



The mental process of the censor is one much commented on in the online world, and I've been involved in a discussion with two other writers for some time about it. The argument boils down to this: Is there a definable difference between erotica and pornography? Erotica is generally considered to be acceptable, at least among adults, while many people seem to think pornography is so corrosive to morals that it should be illegal.

Sometimes it's fun to consider examples of banned books from past eras. The mild titillation of *Lady Chatterley's Lover,* for example, kept it banned in this country for decades. Thomas Hardy's *Jude the Obscure* was decried so widely and heatedly that some unfortunate readers bought it *hoping* to find naughtiness in it—and one of those readers actually wrote to Hardy to complain that he felt he'd been cheated. Hardy, one of the great novelists of the nineteenth century, stopped writing novels in disgust over the endless furor they created among the ignorant. He turned to his far less successful poetry, and the world is a poorer place for it.

It's important to remember the example of Hardy and D. H. Lawrence (author of *Lady Chatterley*) when we hear people trying to restrict language and depictions on television or in computer games (as one of our own columnists did a few months ago). No one can argue that all artists could measure up to Hardy, but when Hardy turned his back on the novel, it was an incalculable loss. In my personal value system, it would be worth putting up with all the hack porn writers on earth to have just one more Hardy novel.

There have always been upstanding, civic-minded bozos willing to take a stand and draw the line between what is acceptable and what is not. These people are always the least qualified to do so, being unable to tell the difference between art and swill, and imagining a sense of outrage to be a moral guideline. They're with us yet, as eager as ever to provide us with arbitrary guidelines—passing out blinders, prosecuting museums for art shows, ripping pages out of magazines, organizing letter-writing campaigns to have television programs taken off the air, influencing advertisers to turn their backs on certain magazines, passing laws that allow seizure without due process of any material that they find mildly offensive.

These facts should be of concern to any desktop publisher. A caustic wind of intolerance is sweeping the landscape. Your reaction may be that you don't publish anything that could possibly offend anyone. It may be that you will tone down what you publish so no one can be offended by it. Or it may be that you will give up publishing in order to avoid confrontation.

When you hear a spokesperson demanding censorship, remember the suppressed authors throughout history. Drawing a line kills human expression, and however different you feel you are from a publisher under attack for pornography, an attack on any of us is an attack on all of us.

What is your opinion on this matter? Please write to me in care of this magazine, or leave a letter in COMPUTE/NET. ❐

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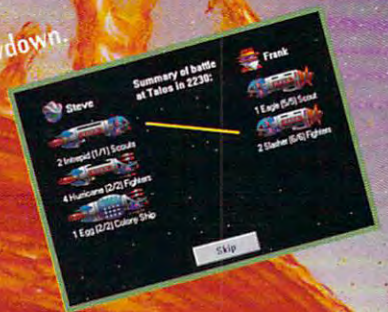

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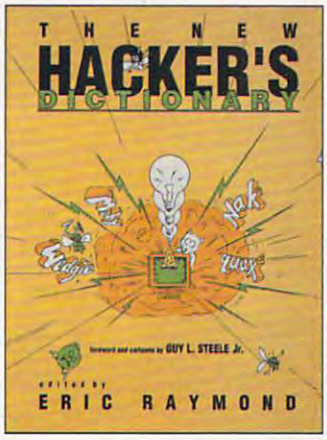
PATHWAYS

Steven Anzovin

HACKERSPEAK

Hardly anyone, even a writer, spends much time browsing through a dictionary. There are just too many dull entries between the interesting words. But a very few dictionaries make fascinating cover-to-cover reading. One is *The Devil's Dictionary* by Ambrose Bierce—the essential source book for cyclics, a group that must include most people who work with computers. Another is the recently published *New Hacker's Dictionary,* edited by Eric Raymond (MIT Press, 55 Hayward Street, Cambridge, Massachusetts 02142; 617-253-5646; $10.95).

The book of heavy magic: Learn the real language programmers use in talk mode.



The New Hacker's Dictionary is nothing less than a lexicon of hackerspeak (also called hackish), the jargon used by those happy few who are obsessed by computers and how to program them. Hackers themselves have been collecting hacker terms and definitions for years from online sources as far afield as Moscow and Australia, and this book is an etymological history of all the major hacker subcultures (such as the warring UNIX factions, the brutally suppressed hacker underground inside Big Blue, the old-timers who still use slang from the glory days of the PDP-10, and so on). I'd go so far as to say that this book is required reading not just for hackers (who'll be delighted to learn the derivation and alternative usages for their favorite slang) but for anyone who's interested in computers.

Here's a sampling of the more interesting and/or essential words described in *The New Hacker's Dictionary* (some definitions have been edited for space).

bagbiter. A program or piece of hardware that works clumsily or not at all; a programmer or designer (rarely a hacker) who creates such a tool.

computron. The mythical absolute unit of computing power; also, the mythical elementary particle emitted during computing.

crufty. Badly built, overly complex, semiuseless; for example, used to describe despised hardware (such as anything manufactured by IBM) or ancient, semifunctional programs in dead languages like FORTRAN or COBOL.

frobnicate. To fiddle with, as in to make small adjustments to a program just for the fun of it.

hack. Clever code that could be produced only by a hacker; a neat hack is code that even other hackers admire.

hack mode. What hackers usually are in when in front of their machines.

hacking run. Extended hacking session; may lead to raster burn.

holy wars. Long-running, emotional, and ultimately unresolvable hacker disputes over fundamental issues no one else cares about, like what programming language is best, which text editor is more efficient, how many spaces to indent control structures in chunks of code, and so forth.

kluge. Pronounced *klooge,* sometimes spelled *kludge.* An ad hoc programming solution to a particular problem, but one that is difficult to understand and work with.

lossage. Loss caused by a bug or failure that is not limited to a single instance; for example, the loss of data during repeated system crashes caused by a serious bug in the operating system. *The Macintrash running System 7 is subject to much lossage, as is a PC under Microsloth Windows.*

luser. Pronounced like *loser.* A loser user; used disdainfully by some hackers to describe any nonhacker.

MESS-DOS. Also MESSY-DOS, MESS-DOG, and so forth. MS-DOS, so named for its clunky interface and obnoxious limitations.

raster burn. Eye malady hackers get from looking at dirty or out-of-focus monitors during back-to-back hacking runs.

real programmer. Macho programmer who writes code only in machine language or assembler, without documentation, and in such an idiosyncratic style that other hackers despair to figure the program out.

wannabee. A would-be hacker; someone given to overusing terms like those in *The New Hacker's Dictionary.*

Usage of hackerspeak may not qualify you as an authentic member of hackerdom (you have to do some actual hacking for that or risk being branded as a bogus wannabee), but at least you won't risk getting lost following the online threads of real wizards as they swap their heavy magic in talk mode. It's enough to make you quit bit-twiddling and head for the Big Room—the great outdoors. ❐

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Create a world of pristine mountains and topaz lakes or forge your own path across Mars in this spectacular 3-D landscape generator.

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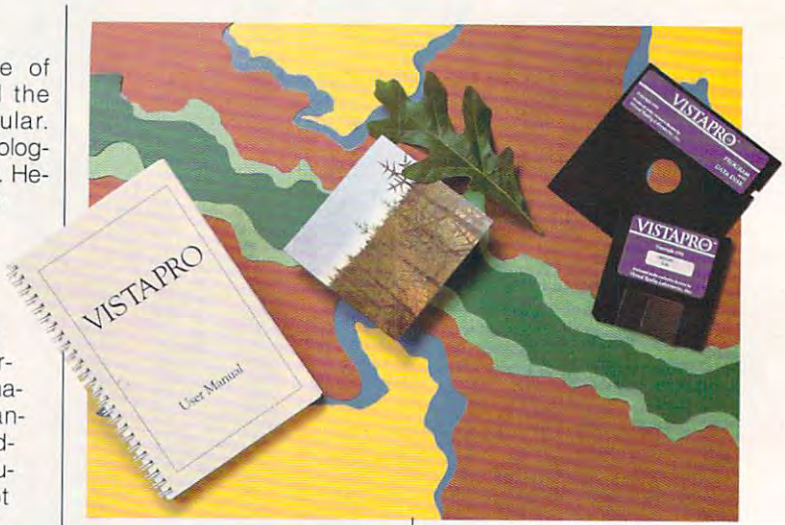
VISTAPRO



From the ragged edge of Olympus Mons we find the view of Mars spectacular. Treading lightly on the topological lips of silent Mount St. Helens, we survey the grim damage that she has wrought. The more pastoral among us will want to wade knee-deep in the shimmering blues of Crater Lake; perhaps the nascent mathematicians among us will wander off to explore the shadowy fractalscapes of the Julia and the Mandelbrot sets. No need to fear losing your way in these virgin panoramas; with VistaPro you blaze new trails. Forget the tour guides, the road maps, and the Fodor's handbooks—your mouse and your PC will take you as far as your mind may wander, both on earth and beyond.

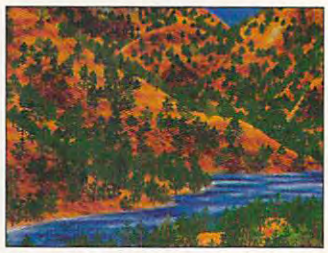
Virtual reality, the bombastic watchword of the nineties computing society, only recently broached the home front when Virtual Reality Laboratories tried its hand at three-dimensional modeling. Until then, true landscape generators seemed forever in the province of NASA supercomputers. Now, just master the mechanics of an Instamatic camera, and Mars exploration soon follows. Acquire a little technical skill, and VistaPro's renderings can take your breath away.

Before moving any mountains, virtual reality pioneers should familiarize themselves with the essentials. U.S. Geological Survey data serves as the basis for VistaPro's imaging work. A Digital Elevation Model, or DEM, provides the VistaPro engine with 3-D coordinates—samples taken at 30-meter intervals in the real world to measure elevation changes. VistaPro plays connect the dots and fills in the resulting polygons, quickly approximating the original landscape.

The VistaPro main control panel displays a relief map to the left. Lighter shades represent higher elevations including cliffs and peaks, greens and browns indicate hills and valleys, and blue, of course, demarcates rivers, lakes, and seas. Here, on this miniature version of the landscape, you can add personal touches to reality. Click on the top of a mountain, and a river threads its way into a valley, there to puddle into a small pond. Click again, and the sea rises; an ocean covers the lowlands.

You also practice your photography on this geological playfield. Move the pointer to a promontory—it affords an excellent view of your new sea—and place your camera. Set your sights on that tiny accidental island (one of the many joys of creating worlds, these little surprises) and click again to set your target. You could render this pristine worldlet now, but great art requires a modicum of skill. Look to the right, and you'll see the main control panel.

Among your options here are sophisticated target and camera controls. More precise than the simple point-and-click method used on the Topo Map, these gadgets allow you to place your camera and choose your target with meter-by-meter accuracy. Just click on the boxes corresponding to *x*-, *y*-, and *z*-axes and enter the desired coordinates with the keypad. Other gadgets affect banking, head-



VistaPro's renderings can take your breath away.

ing, and pitch—all rotational controls that can lend your work some artful spin. At times, these controls actually engender a touch of vertigo, but as long as you imagine the camera in your hands, you'll have no trouble setting up magnificent shots.

Also on the main control panel you'll find a button to scatter pines or oaks across the countryside, a button to smooth rough terrain, a button to ripple the surface of the sea, and even a button that summons fog. Activate the Color Map and remap the sky to grays for overcast days; turn rivers to red, and they become menacing lava flows. Outfit your camera with any size zoom or wide-angle lens; move the sun at your whim and cast shadows in any direction. Adjust the vertical scaling, and peaks reach the stratosphere; a tweak later, and they become bottomless pits. These tools seem almost magical in their ability to effortlessly conjure misty islands, majestic mountains, and sweeping plains from the meagerest of numbers. A certain amount of artificial intelligence ensures that cliffs too sheer for clinging snow don't show drifts; trees, too, will not grow where they would not in nature.

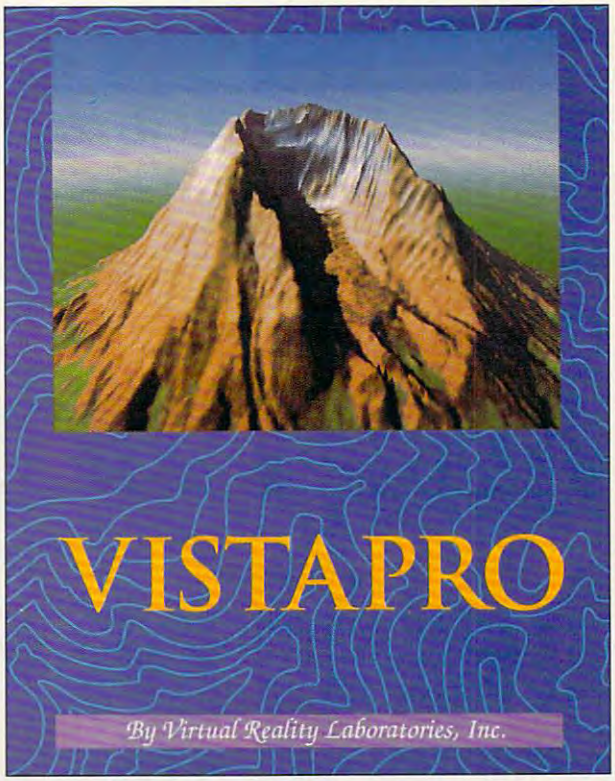
Graphics modes range from a passable VGA resolution of 320 × 200 to a far more robust 1024 × 768 SVGA, each with a healthy palette of 256 colors. VESA drivers are necessary for all but the lowest resolution; for maximum resolution, the video card should carry a megabyte of memory on board. The higher the resolution, the greater opportunity for photorealism, and after a few sessions with VistaPro, the expense of an SVGA upgrade seems quite modest. Still, photorealism isn't everything, and even standard VGA will yield some stunning views.

Rendering times, the confirmed weakness of all virtual reality generators, run from scant seconds to hours in VistaPro, depending on the resolution and options selected. A low-resolution image with large polygons and no trees requires only two seconds or so on a 486DX running at 33 MHz. Increase the resolution to 1024 × 768, call for dense flora, invoke Gouraud shading, decrease the size of the filled polygons, and you'll have time to rent and watch a movie before VistaPro delivers. More likely you'll leave your PC to perform these intense operations overnight. The script generator, which allows for linear flybys, requires similar lengths of time to show significant results, but it does save in a compressed animation format. Playback speed for these sequences begins at 16 frames per second from a hard drive; from a large RAM disk, expect replays at a seamless 30 frames per second.

Virtual Reality Labs sells prepackaged scapes disks that include DEM data from the equatorial and Valles Marineris regions of Mars, the Grand Canyon, Colorado ski areas (Aspen, Breckenridge, and Vail), and Yosemite National Park, among others. Each retails for $35.

On the VistaPro horizon, you can expect to see a terraforming utility that will allow drastic alterations of any landscape. Another package will extend the flight paths of VistaPro animations to incorporate loops and banking; simulated roller-coaster and dune-buggy motion will add to the thrills. More important for digital realists, though, VistaPro itself will evolve. Version 2.0 promises road building and clouds, star fields and new varieties of trees. You may also add buildings, import foregrounds and backgrounds, and render much larger landscapes—all to be available for a small upgrade fee.

More than a window to places we always wanted to visit, VistaPro offers a glimpse of an imminent future wherein simulations are almost as good as being there. Commendable in every respect, this software awakens our explorer instincts and arouses our artistic sensibilities besides. ❐



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MULTIMEDIA PC

David English

SWEET SIXTEEN

Just when you thought it was safe to buy a sound card, companies start touting their new 16-bit cards. Is an 8-bit card good enough, or should you spend the extra money for a 16-bit card?

When talking about the ability of a sound card to convert sound into digital form, the number of bits describes the amount of audio information a card can handle with each operation. With 8-bit sampling, you're theoretically limited to a signal-to-noise ratio of 48 dB (decibels). That means you'll hear a fair amount of hiss along with the music or speech you record or play back. With 16-bit sampling, you can achieve a signal-to-noise ratio of 96 dB, which is theoretically as quiet as a CD audio disc.

With the new 16-bit sound cards, you can record and play back near CD-quality sound.

There's a similar difference in frequency response, which is a card's ability to capture and reproduce high- and low-frequency sounds. A 16-bit card can sample at 44 kHz, letting you work with frequencies as high as 22 kHz—near the upper limit of human hearing. An 8-bit card is generally limited to sampling at 22 kHz, which yields an upper-end frequency of 11 kHz. Or put another way, an 8-bit card sounds like a cheap FM radio, while a 16-bit card, in theory, sounds as good as a high-end CD player.

I've used qualifying expressions, such as *generally* and *in theory,* to describe these two kinds of sound cards because some manufacturers have been able to stretch the limits of their 8-bit cards, and 16-bit cards can fall short of their potential due to electrical interference from other computer components.

Also keep in mind that 16-bit samples take up a lot of disk space. An 8-bit 22-kHz recording in mono takes up a manageable 1.3 megabytes per minute, but a 16-bit 44.1-kHz recording in stereo takes up a whopping 10.5 megabytes per minute. Fortunately, you can choose either sample rate with a 16-bit card, so you can reserve your 16-bit sampling for special occasions. Software and hardware compression can also substantially lower the disk space requirements.

Recently, we've seen the introduction of two 16-bit sound cards for consumers: the Pro AudioSpectrum 16 (Media Vision, 47221 Fremont Boulevard, Fremont, California 94538; 800-845-5870; $349) and the MultiSound (Turtle Beach Systems, 1600 Pennsylvania Avenue, York, Pennsylvania 17404; 717-843-6916; $995). As you can tell by the prices, these cards are aimed at opposite ends of the multimedia market.

The Pro AudioSpectrum 16 is a full-featured multimedia card with connectors for a SCSI CD-ROM drive, a joystick, and a MIDI synthesizer, as well as the usual audio-in and audio-out jacks. It's compatible with programs that support the Windows 3.1, MPC, Sound Blaster, Ad Lib, and ProAudioSpectrum sound standards. Because it doesn't have a DSP (Digital Signal Processor), you'll need a 80386 or 80486 in order to record in stereo at the full 44 kHz.

The MultiSound doesn't have a CD-ROM connector or Sound Blaster, Ad Lib, or Pro AudioSpectrum compatibility, but it does have a DSP (running at a speedy 20 million instructions per second) and a built-in Proteus synthesizer. The DSP will allow the MultiSound to perform on-the-fly compression and decompression once Microsoft chooses an audio compression standard for Windows. As for the Proteus, it's a great-sounding sample-based MIDI synthesizer that, by itself, sells for about the same price as a MultiSound. Listen to the Proteus demo that's included with the Windows driver. You'll be amazed at how a single PC card can accurately emulate 126 different musical instruments and play as many as 32 of them at a time.

Which should you buy? If you need to keep your costs down and require a single board for CD-ROM, Windows, and games, the Pro AudioSpectrum 16 is currently the best deal around. It doesn't cost much more than an 8-bit card, and you'll be ready for applications that support 16-bit sound. If you're willing to spend the extra money, want to be prepared for future compression standards, and can take advantage of the on-board Proteus, buy the MultiSound. It's the premium choice for Windows-based multimedia applications. ❐

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ENTERTAINMENT CHOICE

At last: a Star Trek adventure that boldly goes where no other has gone

Keith Ferrell

STAR TREK: THE 25TH ANNIVERSARY EDITION

Star Trek has an interesting software history. Ideally suited, it would seem, for translation to interactive entertainment, Star Trek has nonetheless fared poorly. Even as an endless series of paperback and hardcover novels climbed bestseller lists, motion pictures set box office records, and plastic models, comic books, memorabilia, and conventions added tens of millions to Paramount's coffers, interactive Star Treks sparked little fire.

Not for want of trying. There was an Atari arcade and cartridge game with an emphasis on action. There were several text adventures, including one, The Kobyashi Alternative, that remains among the finest text games ever produced. There was an adaptation of the fifth motion picture, and a long-rumored interactive version of "Star Trek: The Next Generation" was released spottily.

Not for want of trying, indeed, but it may be that no one tried very hard. Now, there is Interplay's Star Trek: The 25th Anniversary Edition, and it's quite an achievement.

Star Trek is all about context. Mel Brooks once pointed out that successful entertainment virtually always deals with "families in a house." On Star Trek, the family was Kirk, Spock, McCoy, and crew; the house was the starship Enterprise. That context, refined to the point of cliché over nearly five dozen television episodes and half a dozen movies, is a comfortable place for millions of fans, who tend not to like surprises, turning to both old and new generations for familiarity, not innovation.

To have an interactive Star Trek hit, you have to find and reproduce that comfort level, deliver that familiar contextual security blanket. Make the reader, or viewer—or player—a part of that family inside that house.

That's what Interplay has done, and it has done so very well. The family feels like the Star Trek family, complete with black sheep and familiar adversaries. The universe about which the Enterprise and crew ramble reminds us of the universe brought to us by NBC back in the 1960s. Where new elements have been added—some aspects of the program owe debts to the Star Trek motion pictures—they are easily and unobtrusively incorporated.

Interplay made many wise decisions. The game consists of a series of episodes, each with an opening title, giving the feeling of another installment in the TV series. And the sixties' TV series is what the game celebrates. Despite a few non sequiturs, this is the old Enterprise crew—the tatty velour uniforms, the faces relatively unwrinkled, bellies not yet expanded by middle age, hair still pretty much their own.

The program has two levels: interactive story sections focusing on characters and other sections focusing on starship combat and navigation. The character-oriented sections are by far the more successful, with a lean and effective interface, striking animation and illustration, and some pretty good dialogue.

The combat and navigation sections are the only sequences that take place aboard the Enterprise, and it's unfortunate that interaction with the starship and its crew is so limited. Upon reaching destinations, however, the game moves to its next level and truly comes into its own. Kirk, Spock, McCoy, and security officers beam to planetary surfaces, the interiors of other spacecraft, or space stations;

there, they deal with the challenges that face them. Just like the TV show, no?

The first episode, Demon World, serves as a good shakedown cruise for the entire game. You begin, in fact, during war game exercises against another Federation ship. Upon completion of the exercise, Starfleet issues orders and you set course. Achieve standard orbit and beam down.

Planetscapes and ship interiors are striking and vivid. A simple interface lets you move, pick up, talk, use, or look. Communicators, phasers, tricorders, and medical gear are all operable.

Perhaps unavoidably, the episodes are essentially sequences of puzzles and problems. (Then again, puzzles and problems underlay much of the television series.) Answers and solutions are not always obvious, and it's worthwhile trying to pick up, use, or speak with any item or entity on a screen. Also, try various approaches to problems in different sequences; if you fail at one item, try it again after completing other sequences.

Pay close attention to the world around you. Use the tools at your disposal and the special skills of your crew. Talk to each other. While the game risks your suspension of disbelief occasionally with wholly inappropriate dialogue options, for the most part the characters converse at a level comparable to that of the average TV scripts. And, of course, some of the favorite lines from the TV show are incorporated here.

The problems and the armatures around which they are built communicate a vibrant Star Trek feel. The mood of the episodes varies. There are cosmic mysteries, action-oriented plots, vast alien creations, even a comedy of sorts. Each episode is different, and skills and technologies acquired in one are sometimes available in another.

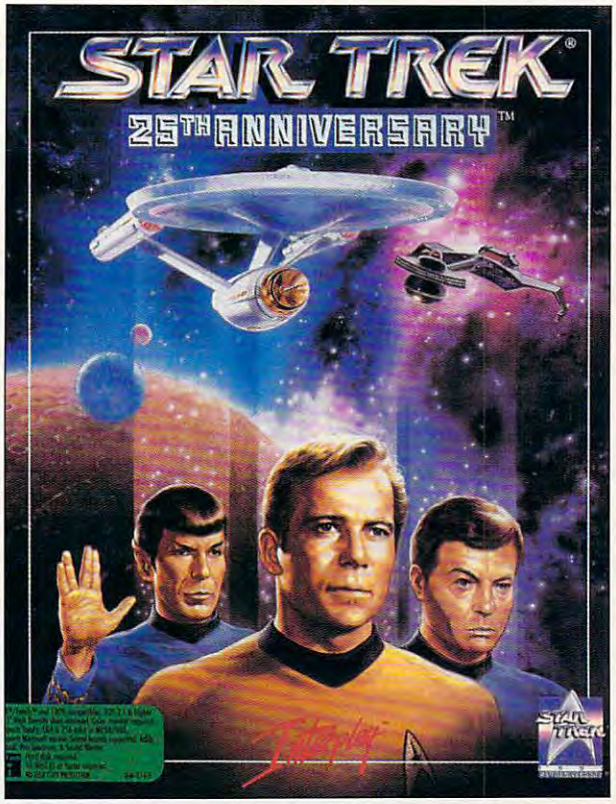
Best of all, there is a long episode, essentially a two-parter, that actually could have served as a script for the old series. All of Gene Roddenberry's favorite motifs are here: an alien god, a plea for peace, Kirk and company—which is to say humankind—on trial. At the end of this episode, the program achieves a moment of emotion rare in software, and its authors are to be commended.

Only occasionally does the game lose its consistency, but when it does, the inconsistencies are annoying. In some episodes, all members of a landing party fire phasers simultaneously; in others, where firepower is more crucial, only Kirk fires.

Unfortunately, the climax of the program seems a bit of a letdown, at least to me. Vengeance, the final episode, is in some ways the most challenging, and yet in other ways it counteracts all that has gone before. Resting upon reflexes rather than reflection, firepower and arcade skill rather than insight and intelligence, this episode feels almost out of place.

Documentation is commendably slight yet gives you the information you need to begin. Getting started takes a while: Decompression and installation on a fast 386 required the better part of an hour, and there were occasional lockups while graphics loaded.

Special note should be made of the sound and music in the program: These aspects are used brilliantly to enhance the illusion of Trekkiness, with incidental music as well as main themes beautifully reproduced.



If anything, the game is too short, although there are dozens of hours of entertainment here. It's just that you might not want this Star Trek to end. We can hope that Interplay is permitted to do further episodes in the Trek saga. I'd like to see, for example, a full-length game, a novel- or movie-sized episode.

Perhaps Interplay will give us such a program. Certainly this one, and any subsequent products that manage to achieve its level, should boldly go through the roof. ❐

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GAMEPLAY

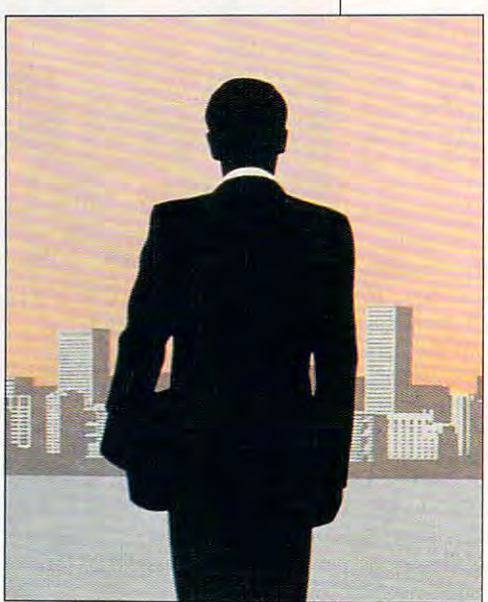
Orson Scott Card

LAST CARD

A last word of advice for game developers as science fiction master Orson Scott Card bids farewell.

After more than four years of writing this column, I'm through. My goal was to write not reviews but criticism of games. I found this exhilarating, but it has one drawback: You're talking theory, not specifics. After a while, you start running out of theory. Instead of leaping into each month's column, excited to have a chance to write it, I find myself backing into it as if at gunpoint. It's time for somebody else to do this.

But I have this one last column. What do you put in your last column?



I could write about the need for upgrades of old games: I'm dying for a Windows version of LodeRunner, for instance.

Or I could tell about how I finally found America Online, which is doing everything right and nothing wrong. I've put my money where my mouth is, moving my whole family onto AOL for E-mail and starting up a bulletin board on AOL called Hatrack River Town Meeting, where I hang out with the really nice people who show up to add to the conversation.

Or I could write a rave review of Robert X. Cringely's *Accidental Empires,* an opinionated and highly entertaining book which takes a jab at the personalities who created the personal computer industry.

Instead, I want to leave a simple truth with the gamewrights and publishers: You are not in competition with each other.

You talk about going after Sierra On-Line or shooting down Microsoft Flight Simulator. But this sort of thing is pointless and bound to fail.

That's because computer games are to business software as fiction publishing is to textbook publishing. Each computer user is going to buy only one word processor, one spreadsheet, one database, just as each school system is going to buy only one seventh-grade English textbook.

But computer gamers are going to buy as many computer games as look like enough fun to be worth the money. Just as fiction buyers will buy as many books as they think they will enjoy reading, as long as they can afford them.

Your competition isn't Sierra On-Line or MicroProse. Your competition is bicycling and board games, television shows and movies. And books. And just as there's plenty of room for three or four or six highly profitable movies in the same summer, there's plenty of room for a dozen or a score of hit games at the same time.

Stephen King didn't have to shoot down James Michener in order to become a best-selling novelist. Anne Tyler didn't have to steal away Judith Krantz's readers. Instead, they simply wrote the kinds of stories they believed in.

Art creates its own audience. I don't look at Stephen King's sales and think that somehow I've got to stop him so that my books can take the place of his. Instead, I look at his sales and think, "That wonderful man is teaching millions of people that reading a book can be better than any of the alternatives." He brings people out to the bookstores looking for an unforgettable experience. Some of them are going to pick up one of *my* books, and if I've done well, some might enjoy it and buy more.

You can't concern yourselves with what will be a hit or what will be commercial, because that will kill your art. You have to think about what you yourself care about and enjoy in a game, and then create a game which embodies that.

Just because you're not as rich as some other gamewright doesn't mean you've failed. That's the way Bill Gates keeps score, not the way artists keep score. You have to measure your success by the way your audience responds to your games. No matter how small that audience is, it's yours. Your game is part of the lives and the memories of those people in a way WordPerfect or Lotus 1-2-3 or Windows can never be.

So get back to work. I'm restless, and I want another game to play. I have no idea what that game should be like. You'll just have to make it up and show me. I'll know it when I see it. In the meantime, I'll read a book. ❐

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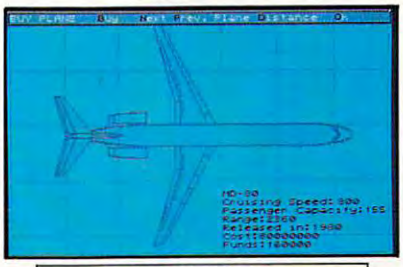

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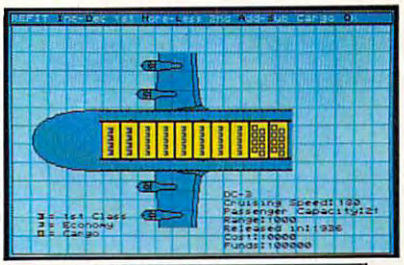

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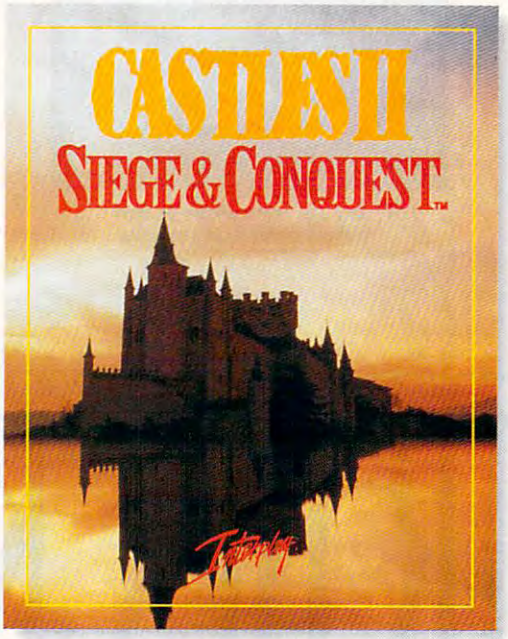

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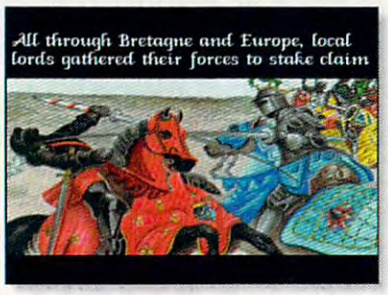

MS-DOS Screens Pictured.

gather gold and grain, mine for iron, trade for timber and stone, research new weaponry, and pay the church for indulgences ...just a few of the fun things that go into a good, medieval day's work!

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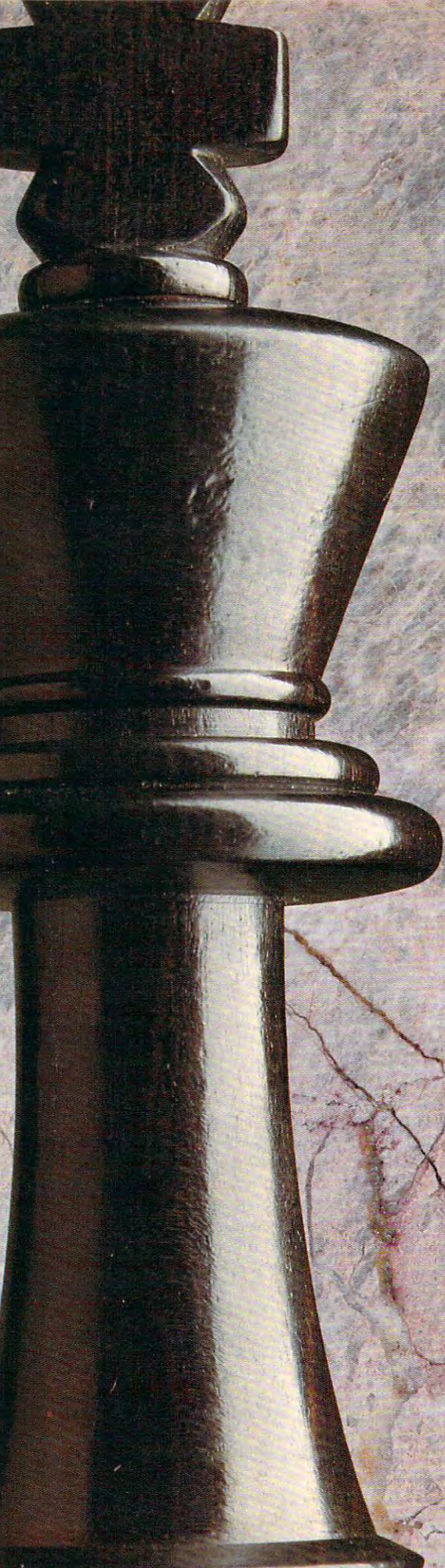

COMPUTERS BRING CHESS INTO THE TWENTY-FIRST CENTURY

CHECK AND MATE: THE ANCIENT GAME MEETS MODERN TIMES

BY AUTUMN MILLER

It was the stuff of nightmares. I found myself in Las Vegas, demonstrating chess moves to a roomful of grand masters. With each of my moves, they seemed more amused. Sweat began to form on my temples.

I was playing chess against my colleagues in North Carolina, demonstrating a new online chess network (called Leisure LINC then, but now called USA Today Information Center) to world-class players. I could tell that the grand masters loved the idea of playing in realtime against opponents thousands of miles away. But they were laughing at my moves! And I was the office champion!

That was six years ago. Today my game can still inspire a few giggles, but I'm getting better—slowly. I've studied chess books, analyzed my games with higher-rated players, and fared decently in a few tournaments.

My problem has been that I never have anyone near my level to play against, except in tournaments. And a tournament isn't the best place to test out wild ideas or to try out unpracticed book learning.

Ever-Ready Rivals

But now I've finally found the perfect opponent—a player I can learn from, a player that will always be slightly better than I, a player willing to play on demand—my computer.

Chess programs come in many varieties. Novice-level programs aren't expensive, but if you're leery about spending money on chess, you can try a public domain or shareware program such as Ed's Chess before you go shopping for a fancier program.

Ed's Chess, available on America Online in the COMPUTE/NET section, offers game playing in either human-versus-computer or computer-versus-computer mode. The program will give a beginner a good workout.

Other programs combine a little chess teaching with strong chess-playing ability. The most readily available program with some instructional aids is Chessmaster 3000. An absolute beginner can learn the basic moves and rules of chess with this program and then move up.

For the novice, Chessmaster 3000 can be set to play at different levels and to assume different personalities. The novice can also learn the tried-and-true openings, such as the English, the Sicilian, and the Queen's Gambit Declined, while the computer suggests book moves (time-tested responses that follow traditional lines of strategy to reach a particular position). A player goes out of the book when testing a new strategy or responding with an uncommon, less familiar move.

Once you're out of the book, Chessmaster 3000 can also provide advice on what move to make next. But I recommend testing out your own ideas as well (that's the only way to learn), and you can always take moves back. With most computer games, if you use the advice function for all your moves, the computer will beat you.

Chessmaster 3000 has a blindfold chess capability, a championship mode (no takebacks), and a tournament setting in which you play against a variety of player personalities.

Chess Community Secrets

Although famous chess games like Chessmaster 3000 are generally very good, a number of excellent chess programs are virtually unheard of outside the chess community.

These programs are most useful in training you in the details of play, taking you from novice to master. Some of the programs offer training features and databases that chess professionals actually use from time to time, and the programs' play is good enough to beat even the pros occasionally.

The ChessMachine. Grand masters around the world have been impressed—and embarrassed—by The ChessMachine, a plug-in card for an IBM PC or compatible (an external version is available for laptops). The card comes complete with its own processor, clock, and memory. The 86C010 (ARM2) processor, a 32-bit RISC (Reduced Instruction Set Computer) processor, calculates four times faster than a 33-MHz 386. Calculation speed is arguably the most important asset of a chess computer.

The program that comes with The ChessMachine beat the $10,000 Mephisto chess computer to become the 1991–1992 World Chess Microcomput-

THE GRAND MASTER POLL

Will mastering the computer make you a master?

COMPUTE polled a number of chess professionals at the New York Open International Chess Tournament held at the New York Ramada Hotel at Madison Square Garden, asking whether an amateur who had a computer as a teacher could ever achieve master standing.

"With a computer, you have the proverbial 24-hour opponent," says International Master Elliott Winslow (an international master is one rank below a grand master). "You also have the chance to take back moves when no one's looking. And more computers can analyze now."

Grand Master Arthur Bisguier adds, "All the computers I've seen play very tactically. They'll sharpen your tactical weapons, because you have to play correctly to beat them."

Columbian Master (a national master is one rank below an international master) Luis Hoyos-Millan notes that by playing over particular positions or openings on the computer, he gets more confidence and feeling for that position. "Plus, software can keep a record of the game for you," he says. These records can later be reviewed to pinpoint your errors.

On the other hand, all players polled warned about playing only against computers because, as Winslow says, they play differently from humans: "Like, you can't expect a computer to be wily."

Grand Master Yasser Seirawan says, "If a person played only a computer, he would have a very warped style—a computer style. If you take a [novice] who starts at level 1 and works his way up to level 99, [he] would end up at master level, but it would be very intriguing to see how that person would fare against a human."

"A computer has computer weaknesses, and a human has human weaknesses," Bisguier agrees. "I teach my students how to hang tough, how to make a move that might enable the opponent to win or escape, but that's going to involve risk for my students. They might lose. A computer won't take risks."

In fact, the dry, rigid logic of computers can make them rather stupid. Grand Master Patrick Wolff says, "Computers play their own special kind of chess. They don't understand anything, but they see everything in a certain range."

"The big problem with a computer is that even if you figure out how to beat it, it keeps doing the same thing," International Master Alex Sherzer says. "But if you insist that it play different openings or if you change the way that you play, then you won't be repeating the same game."

International Master Ilya Gurevich, 1990 World Junior Chess Champion, considers the way computers approach the game. "Computers play to win material, and they then can be mated very easily," he says. "That's not the way players play."

New York Open winner, Grand Master Eric Lobron, was the least favorable in his views of computers' matching human creativity in chess. "With computers, I think kids lose the feeling of the game," he says. "They become too mechanical. And with computers, you don't try as hard. You don't psyche up. Chess is a competition."

But Lobron is willing to concede that "sometimes humans aren't available. If the computer is better than you are, it can help you improve."

The predominant response from the cream of the international chess world was a qualified yes: A computer can teach the basics of the game in a quick, easy, and entertaining manner. But to learn the nuances needed to become a world-class contender, you'll need to study and pit yourself against human competition.

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er Champion. Grand Master Yasser Seirawan says that he can beat the card only about 70 percent of the time in blitz (time-limited) chess.

Chess players are rated on a scale that goes up to 3000. The U.S. Chess Federation (USCF) awards the National Master title to anyone reaching a rating of 2200. Grand Master John Nunn estimated The ChessMachine's rating to be about 2500 in blitz chess.

Knightstalker. Chess instruction is taken into the twenty-first century by Knightstalker, a program designed by the people who make ChessBase, the most popular database used by chess professionals. Knightstalker combines a strong chess-playing program with computerized instruction manuals. The program can answer what-if questions, give feedback, and point out mistakes.

A full chess-training program—ChessBase University—is achieved when Knightstalker is combined with the ChessBase Access game-review program. Knightstalker is strongest in teaching openings. ChessBase Access provides deeper analysis and explanation. A demo disk of these two programs and the mother program, ChessBase, is available for postage and handling charges.

Zarkov. Another strong opponent is Zarkov 2.5. Zarkov's most recent claim to fame is defeating the Mephisto chess computer in two tournaments. Zarkov learns from its mistakes, so it becomes stronger as you get better.

Like Knightstalker, Zarkov offers game analysis; however, it doesn't have the extensive self-contained game database. For study, it can retrieve the last variation used in its associated Bookup professional chess database, and its opening book can be expanded. Zarkov's analysis can be added to the Bookup database files.

Chess Databases

As mentioned earlier, chess databases are important for the serious chess player. In all tournaments, players record their moves on score sheets. These score sheets are later compiled and sometimes annotated for publication in books. And during the past ten years, computer databases have joined books as standard reference works.

Top-level players have large libraries of score-sheet compilations. These compilations alert them to new theories, new positions, and the openings preferred by their upcoming opponents. Lower-level players, once they have a firm grip on chess theory, find these compilations helpful in learning new variations of their favorite openings.

These programs have a limited market, targeted as they are at strong players. They can't be found in most software stores or catalogs. But if you're beating chess programs on a regular basis, there are three computer chess names you might want to keep in mind: ChessBase, NICBASE, and Bookup. These programs don't play chess. They merely organize games and replay them.

Mortal Match-ups

Once you've used these other products and can give the computer a beating from time to time, you're definitely ready for some human interaction. Although local chess clubs can be a little intimidating, you might want to check them out. You'll need a chess clock (a double clock contraption used to keep the game moving), simple plastic or wooden Staunton-style weighted chess pieces (keep your Civil War set on display at home—it will peg you as an amateur), and a roll-up vinyl playing board (so much for the elegance of chess).

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Software, hardware, organizations, and services you should know about when you enter the world of computerized chess:

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There's a different lingo as well: *kibitzing* (analyzing a game with others—preferably out of earshot of the people playing the game), *zugzwang* (a move you're forced to make but probably don't want to), *bad bishops* (bishops whose center squares are blocked by their own pawns), and *weak squares* (unprotected or poorly defended squares). Blitz games (where each player has only five minutes to make all moves or lose—lots of fun and physically exhilarating but a leading cause of baldness) are the preferred games, because more chess can be played and a silly sacrifice (giving up a piece to gain a better position or set up a combination) can actually be successful.

If you don't feel quite up to that, you can make contact with other players, while remaining behind the safe shield of your computer.

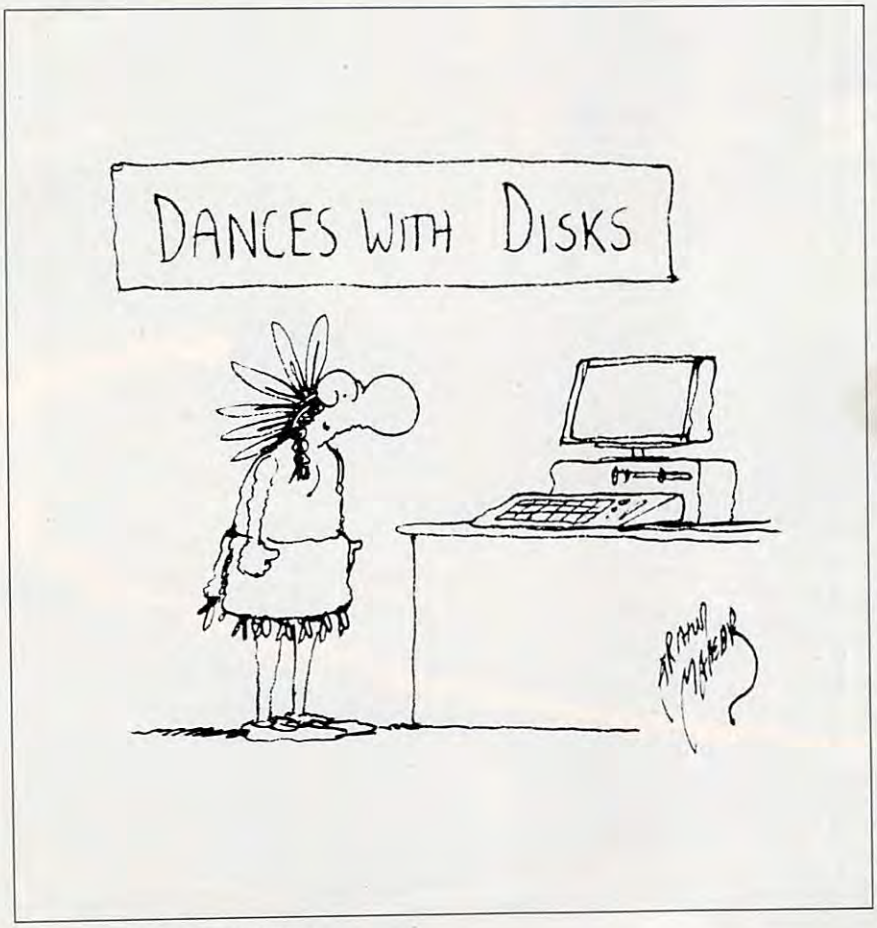
BBSs. Hundreds of computer bulletin boards around the country have chess information, and many multinode boards allow you to play chess interactively with other board members.

ChessNet. If you'd like a special stand-alone program that lets you play against its chess-playing program or if you'd like to play against a friend by regular telephone service or through CompuServe, you're looking for ChessNet. The upcoming ChessNet Club version will connect as many as eight boards simultaneously over the same phone line, permitting schools and other groups to compete inexpensively. ChessNet's ultimate goal with the new product is to create National Chess League connect clubs around the world via modem.

CompuServe. A recent coup was scored by CompuServe when it arranged to have the USCF (the official chess organization of the U.S.) rate its postal chess (several days permitted for each move). Because of the strict rules for USCF-rated play and CompuServe's lack of specialized programming, the postal games are played by the cumbersome expedient of bulletin board postings. However, the Chess Forum area appears to be attracting potent players.

CompuServe doesn't have any graphical chess interface, but members can use programs such as ChessNet or Battle Chess for interactive play.

USA Today Information Center. USA Today Information Center offers the widest range of chess services of all the networks. It has both over-the-board (interactive) and postal play, as well as network-rated blitz tournaments (15 minutes per side to allow for communication and typing time) and postal ladder tournaments.



Because the network is designed to accommodate competitive-level chess, a number of strong opponents can be found there.

The Sierra Network. True to its philosophy, The Sierra Network offers great graphics for over-the-board play but is limited in that it's difficult to locate higher-rated opponents. It offers neither chess news nor features found on the other networks (such as postal chess). Most members seem to just want to play a casual game. Sierra is just for fun.

Prodigy. During the 1990 World Chess Championship, Prodigy did some extensive work. Each of the 24 games can be replayed online. For the event, it also devised a chess tutorial and provided detailed biographies of the competitors, champion Garry Kasparov and challenger Anatoly Karpov.

Prodigy states that during the World Chess Championship, between 25,000 and 50,000 members checked in for game results and score sheets.-

America Online. Another chess section can be found on America Online. Here members can play postal chess through the bulletin boards, download chess games, and read sporadic chess news reports.

It's Your Move

It's hard not to become addicted to chess. After all, it's been the obsession of players at all levels for countless generations. And if you dare explore the network offerings, you'll find yourself in an international community, where the common language isn't war or diplomacy, but chess.

All around the world, grand masters are national heroes and household names. But in the U.S. very few could name the World Chess Champion (Garry Kasparov), let alone the current U.S. Chess Champion (Russian whiz-kid émigré Gata Kamsky).

In America, an aura of pipe smoke and the nutmeg smell of book bindings surround people's perceptions of the game. Most picture it as a game for gray-headed professors emeritus. Don't believe it. Chess isn't an intelligence test to be enjoyed only by supergeniuses. It's a game of logic, playable by anyone who can learn how the pieces move.

The world of chess is as congenial as it is competitive, and by learning the language and the fundamentals, you can make friends all over the world and reap great personal rewards.

Before you know it, you may be joining the USCF to get its monthly *Chess Life* magazine, full of strategy articles and tournament information. Who knows? Maybe I'll even see you across the board one day. ❐

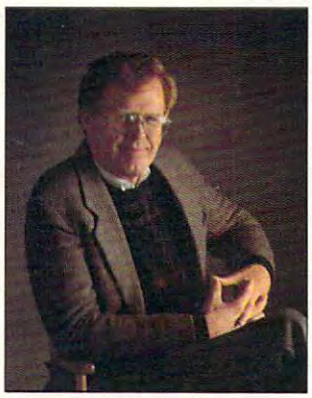
64/128 VIEW

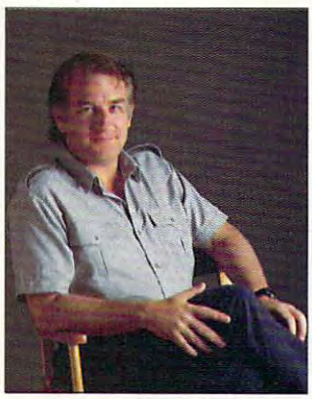
This month, I'll introduce readers to the editorial staff members who edit the pages of Gazette.

Tom Netsel

This month, readers who subscribe to Gazette and Amiga Resource will have a chance to meet the editors who produce those sections.

As editor of Gazette, I'm lucky enough to have the help of technical editor Bruce Bowden. Bruce answers many of the questions that appear in Gazette's "Feedback" column, and he serves on the committee that selects type-in programs. Bruce describes his journey from a math and physics background to computing as "a natural extension of an abiding interest in formal systems."





Gazette's editorial staff consists of editor Tom Netsel (left) and technical editor Bruce Bowden.

Bruce bought his first 64 in 1984 and began making his mark writing unique shareware programs—probably the best known of which is Graphic Assault System, a graphic utility.

He joined the COMPUTE staff in July 1990 and divides his time between Gazette and other technical and online service duties. (He is known as Sourceror on QuantumLink.) Though the IBM is his principle tool these days, he remains faithful to "the greatest 8-bit computers ever built."

I'm the other Gazette staff member. I joined COMPUTE's features department in 1987, coming from a mixed background of electronics, photography, and journalism. The first stems from an interest in amateur radio that led to electronics training in the U.S. Navy followed by a stint at Cape Canaveral during the Apollo/Saturn V days.

From the Cape, I moved to New York to study photography. That field eventually led me back to central Florida as a photojournalist.

In the early 1980s, I gravitated from the newspaper's darkroom to its newsroom, trading my Nikon for a word processor. A short time later, I picked up a degree in journalism and a computer.

A professor at the University of Central Florida in Orlando recommended a new model called the Commodore 64. I tried it, liked it, and bought it. Commercial software for it was scarce then, but I found COMPUTE!'s Gazette and began typing in programs. ❐

GAZETTE

Can a GEOS fan find happiness using a non-GEOS word processor? Try one of these and see.

WORD PROCESSING WITHOUT GEOS

BY DOROTHY HEMME

GEOS is wonderful, and I love geoWrite. I'm attracted to this graphics environment by its various fonts and type sizes, its pull-down menus, and its allowing the user to point and click on icons.

With all of geoWrite's printing options, I can tailor my writing to fit my audience. Whenever I write letters to family members, its crazy fonts help me express my mood. At school, when I want to give my students short, clear directions for an assignment, the 14- and 18-point font sizes are great for emphasizing these instructions. So what's the beef? Why not use GEOS all the time? It's a great program, and I love it.

My problem is that I also hate geoWrite. I'm sorry to have to say this, but it does have its faults. As Steve Vander Ark mentioned in his November 1991 "GEOS" column, geoWrite is slow and tends to skip letters when you're cranked up, typing rapidly. Since I use a 128, I don't have as great a problem as those who use a 64 and have to enter text in BSW font with screen-size margins so that the computer doesn't have to keep redrawing the screen.

While GEOS lets me use a number of fun fonts, its print quality—unless you have a laser printer—leaves a bit to be desired for serious correspondence. I don't own a laser printer, I don't have the funds to invest in one, and I don't have the time to send off my geoWrite documents to a printing service and then wait for the mail to bring them back.

Since I also use a modem and have a need to transmit files in true ASCII to an Associated Press computer, I don't want to type an article with GEOS, save it to disk, run a separate spelling checker program on it, resave the corrected article, pull down the menu to

convert GEOS to a sequential file, save it again, and then finally load my terminal program.

I know this will sound like out-and-out heresy to GEOS lovers, but my solution is to use regular, commercial word processor programs of the non-GEOS variety. Although these programs have no icons to click on and I've had to memorize a few commands, I feel this minimal investment of brainpower is worth the effort. For those of you who have true letter quality printers and 9-pin dot-matrix printers, regular word processors may be more to your liking in their versatility, print quality, and ease of use. Don't get me wrong; I still love and use geoWrite. But there are times when other word processors are better for the task at hand.

A Speedy Solution

I've used several good word processors upon occasion, and here are some I can recommend. COMPUTE's SpeedScript is a great word processor, and there are versions for both the 64 and 128. Included on the SpeedScript disk is a conversion program to change the word processor's screen code program files to true ASCII sequential files. Until recently, I had to save the file, exit the original program, load the conversion program, load my text file, and then switch disks while the program converts and saves my sequential file to disk.

I discovered a program on QuantumLink called SpeedScript Modified for the 64. It takes any version of SpeedScript and alters it so that it can load and save sequential files. The only downside is that SpeedScript Modified has no 80-column preview mode. When I write an article that's to be sent by modem, however, it doesn't have to be previewed as a printed page, so a preview feature isn't important.

If you print hardcopies of most of your documents, however, the SpeedScript disk does include an 80-column preview patch for modifying SpeedScript. With the press of a couple of keys, you can see onscreen how your printed page will look before you send your document to the printer.

Like many programs, SpeedScript has a few surprises even for veteran users. I recently discovered that it does have an option that will let me print a file to disk as a true ASCII or Commodore ASCII sequential file. This often-overlooked format command saves me the bother of using a conversion program. Now I can upload files by modem with even less hassle. Sometimes it pays to read the manual!

Separate spelling checker programs are available for both versions of SpeedScript. These programs must be run after you've written and saved a document.

I often have occasion to use hanging indents with Roman numerals when typing outlines or test questions and answers, so I need a program that offers variable margins. SpeedScript does offer a margin-release option. With both versions of SpeedScript, text is formatted automatically with preset page lengths and margins, but these are easily changed with a simple format command. Give this one a try. SpeedScript is quick, and it uses simple format commands. It beats trying to drag icons to an exact spot and risking the possibility of dropping them in the wrong area.

The Fleet's In

Another solution to my writing problems when I have specialized needs is Fleet System by Professional Software. I have version 2, but I'd like to upgrade to version 4 for the 128, with its pull-down menus. Unfortunately, both of these programs have been discontinued, but copies often show up at swap meets. In addition to the spelling checker disk that works within the program, version 4 has a thesaurus.

Version 4, like SpeedScript, has true word-wrap, which makes looking over your typing much easier. Fleet System 2 doesn't have word-wrap, which is a drawback, but it does have advantages of its own. It works with the 64 in 40-column mode and can scroll to 80-column width for a preview. In 80-column mode on a 128, it presents an exact view of what's on each page.

Fleet System comes with a short tutorial and a detailed but easy-to-understand user's manual. This word processor has all of the advantages you'd expect in a commercial word processor. It can link long files, has local and global search and replace, has an extra text area if I need to look at the disk's directory or other files, and offers a sophisticated way to move blocks of text.

All margins in Fleet System are variable; just set them at the top of the file. Later, if I want to change the margins, I simply and easily insert a command to change them inside the document. The margins are just like those found on a typewriter. I can change them for a Roman numeral outline with the hanging indents that I need when preparing question numbers and items for a test.

When I use a letter quality printer, I save the file as is with no adjustments. Like GEOS, I just choose the selectable printer driver. If I'm printing a test for students, I normally use a dot-matrix printer. In this case, I use the printer's escape codes and print in double-strike or near letter quality mode. This produces printing that is clearer and easier to read than normal draft mode. This isn't a difficult operation, folks. Usually, one embedded command lets me use a variety of printing options.

If I have to send a Fleet System file through my modem, I hit one key, and I can store the file to disk as true ASCII. I cut out all formatting commands, which are essential only for a printer, and save text only. All the operations are accomplished while I'm still in the word processor. I don't have to change disks or resave numerous times to get the ASCII file.

The Right Stuff

With The Write Stuff by Busy Bee Software, I believe I have found word processor nirvana for the 64 and 128. Yes, folks, it slices, it dices, and it makes quick work of any writing chore. For me, it has the right stuff.

The Write Stuff is much more complex than SpeedScript and Fleet System, so you'd expect a thick manual filled with time-consuming tutorials and explanations. Not so! The manual is small and thin, but the word processing disk itself contains 68 help files that you can load and read while still in the word processor. Use them as you need them, or use the Manual Maker program to print out all of the help files to read later.

Busy Bee states that The Write Stuff is not only a "full-featured, high productivity" word processor, but that it's also "intended for use by beginners, children, and occasional users." This is accomplished through a command line at the top of the screen that offers only five options: Help, Edit, Print, Save, and Load. A novice can start typing right away, save what's been written, and then hit the Print command. A print menu lets you select options such as Double Space, Margins, Linefeeds, Justify, Number of Copies, Start at a Given Page, Wait Between Pages, or Preview on an 80-Column Screen. In the Edit mode, you can Eat Text (delete it) by word, sentence, and paragraph; restore deleted text; or clear all text above or below the cursor. Nothing has to be memorized or referred to in order to type and print a draft. Neat, huh?

More experienced and sophisticated users, however, will appreciate the program's gamut of features. Once past the novice type-and-print stage, you'll want to explore and use these powerful options, with the help of The Write Stuff's enclosed cheat sheet.