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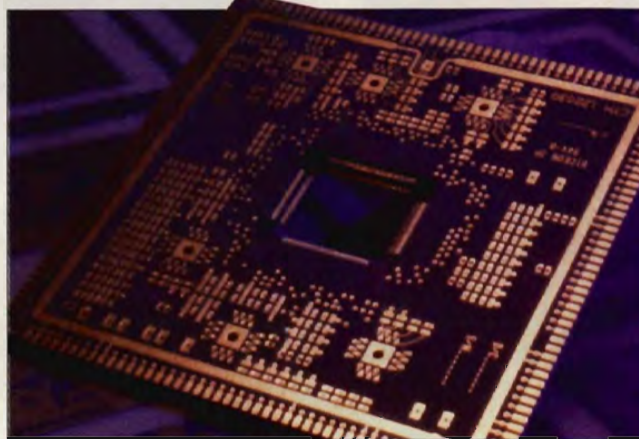
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## Clifton Karnes

I've had it with rude, crude, and socially unattractive Windows programs. You know the ones I'm talking about. They install themselves all over your hard disk, polluting your WIN.INI with entries, filling your WINDOWS and SYSTEM directories with files, and sometimes even defiling your root directory. They're impossible to move or delete, so I've decided to complain.

What I'm going to do is give developers six golden rules for Windows programs. It's worth mentioning that I'm looking at this problem from the point of view of both a user and a programmer. And I have to tell you that I've sinned myself. As a programmer, I've broken most of these rules, but the end user inside has turned me around. I've seen the light, and I will sin no more. So here's the law, from one of the converted.

1. Don't place files in any directory except your program's own directory and subdirectories. This is by far the most important rule. Not only should all your files go in your program's directory and subdirectories, but all your INI files should go there as well and *not* in the WINDOWS subdirectory. If you have several *separate* programs that will be installed in different subdirectories and that need to share DLLs, put them in a directory you own, and mark the location with an environment variable so your other programs will know where to find them.

2. Don't add entries to WIN.INI. Use your own INI file, and place it in your program's directory.

3. Include explicit instructions for the user on how to uninstall your program manually. If you've followed rules 1 and 2, uninstalling will simply be a matter of deleting the program's directory and all its subdirectories.

4. If your application puts files in any directory other than its own (and following rules 1 and 2, it shouldn't), include an uninstall program.

5. If possible, keep hard-wired references to directories your program uses out of INI files. This may be difficult, but if you follow all of the rules above plus this one, a user not only can delete a program easily but can move it to another disk by just drag-

ging the main directory.

6. Don't require that your program's executables be on the user's path. You may suggest this as a convenience, however.

Those are the golden six, but until all developers see the light and start following these guidelines, we'll still have problems. So what are we supposed to do? Well, there are several commercial programs that help you remove programs. Perhaps the most useful is Uninstaller 2 from MicroHelp. It looks at your system intelligently to determine which files a program is using and then zaps them. This tool can be dangerous, however, so I recommend it only to experts.

Another option is the INI Tracker found in The Norton Utilities 8.0. This program makes snapshots of your sys-

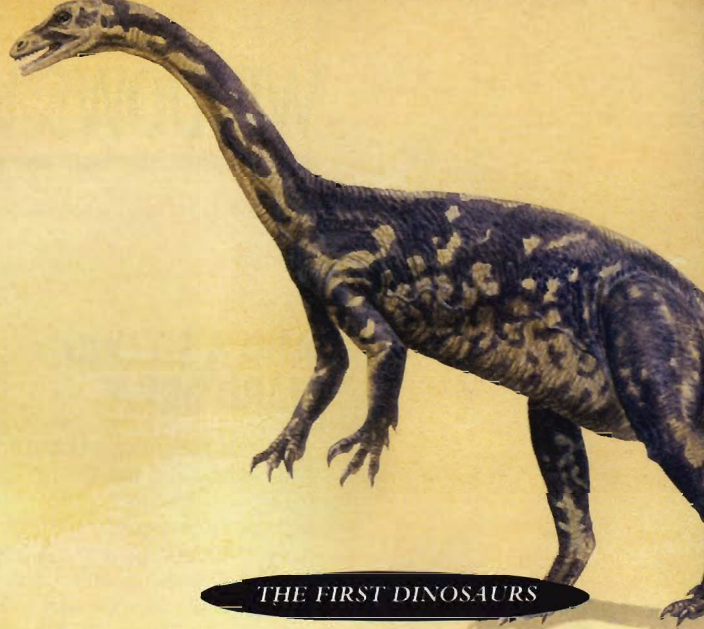


tem files and your WINDOWS and SYSTEM directories, as well as any other directories you tell the program to watch. This is a very useful tool.

My favorite tools, however, are two tried-and-true batch files I wrote shortly after Windows 3.0 arrived on my hard disk, BEFORE.BAT and AFTER.BAT. These programs make a snapshot of your system before and after you do an install and then compare the two snapshots. I've published these before in COMPUTE, and I've recently updated both programs to make them faster. If you're interested, look for them in B&A.ZIP in COMPUTE's forum on America Online—they're free. Whatever you do, you'll need at least one of these tools to do battle against all those inconsiderate Windows programs out there. □



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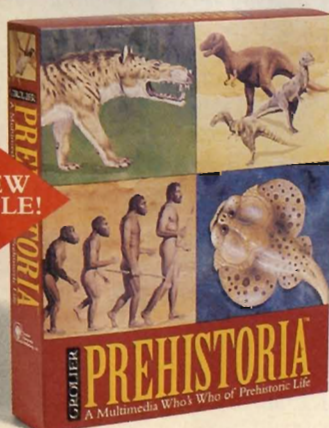


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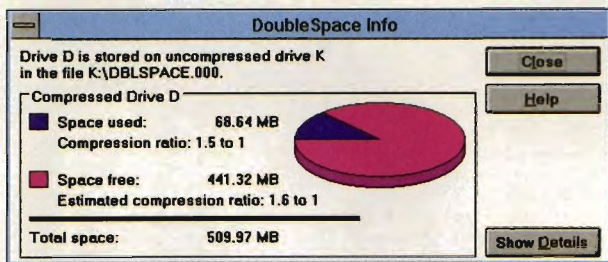
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# WINDOWS WORKSHOP

Clifton Karnes

## ADD A SECOND HARD DRIVE

Windows programs gobble up disk space like there's no tomorrow. Realtime compression programs such as Stacker and DoubleSpace help a lot, but sooner or later, you're going to run out of free magnetic media. Then you'll have some tough decisions to make. If your computer and hard disk are both serviceable (at least a 386DX computer and a hard disk of 100MB), the best solution is probably to install a second hard disk.



**Even after installing a number of programs, I have room to spare on my new DoubleSpaced Western Digital 340MB drive.**

If the idea of doing something like this doesn't turn you into a quivering mass of Jell-O, you're probably ready to dive into your computer. Before you do, however, there are some things you should know about that I discovered when I added a second hard drive to my system.

First, I'm talking here about upgrading IDE drives. Chances are that if you bought your system in the last two years, you have an IDE drive. For IDE drives, you can probably add a second drive pretty easily if you add a drive by the same company. If you add the same kind of drive you already have, the chances of encountering problems are significantly reduced.

In my case, my system is a Gateway 2000 486DX2-66 that came with a 340MB Caviar IDE drive from Western Digital (714-932-4900). This drive

has given me excellent service in the last year, so deciding to add an identical drive was easy. It's also a good representative choice, because Western Digital invented the IDE interface, and the WD2340 has become an industry standard (Norton uses this drive in its benchmarks).

Now, on to the upgrading story. The first thing to do is check with your system maker to verify that you can add a second drive. If you can, decide on the drive, and you're ready to start gathering stuff and spending money. In addition to the drive, you'll need several parts. If you buy a drive upgrade kit, these parts may come with it. If you simply buy a second drive, you'll have to find these parts somewhere. If your drive is smaller than the drive bay it fits into (which is the case with the WD2340), you'll need a metal bracket to hold the drive and from four to six screws to attach the drive to the bracket. You'll also need two plastic guide rails to attach to the drive bracket (or to the drive itself if it's large enough to fit into a drive bay), and you'll need four screws to attach the guide rails to the bracket (or drive). You'll also need two jumpers to configure the drives as master and slave. Your drive cable should have a connector for daisy-chaining a second drive, but if it doesn't, you'll need a new cable.

There are two sources to consider for these parts (bracket, guide rails, screws, and jumpers). You might try your computer manufacturer. It may be able to supply these at little or no cost. Gateway, for example, agreed to send all of these parts to me and only charged me for shipping (\$9). However, it took three weeks for the package to reach me, and when it arrived, I only had one screw (instead

of ten) and one jumper (instead of two).

A local computer store is also a good bet. My local CompUSA had all of this stuff available for under \$10.

After you have everything you need, you can hook up the drive. You'll need directions for this because the drives must be connected on the data/control cable in a particular order. Next, you need to place jumpers on each drive to identify it to the system correctly. Last, you have to plug in a power connector to the new drive. If you don't have a free one, you need to get a Y power plug.

After you install the hardware, you need to tell your PC about the new hard drive. To do this, you have to run your computer's setup program and configure the drive. If you're installing a drive that is identical to your first drive, you simply copy the information from the first drive to the second.

After setup is configured properly and your PC recognizes the new drive, you need to partition it and format it. (In the old days, before IDE, you had to low-level format the drive first.) To partition the drive, you run DOS Fdisk. The important thing to remember is that you want to create an extended DOS partition using the entire new hard disk.

After Fdisk finishes, you need to format your new hard drive with the DOS Format command, using the /u option. (You don't need to use the /s option, unless you're configuring your new drive to be your boot drive.) Next, if you're planning to run Stacker or DoubleSpace on the new drive, do it now before you fill the drive up with programs.

That's all there is to it. If everything goes smoothly, the installation shouldn't take more than an hour. □



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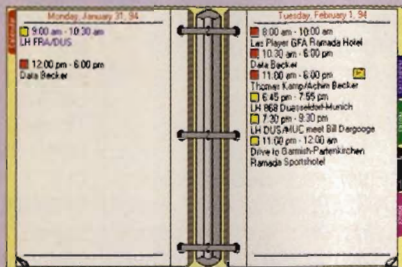
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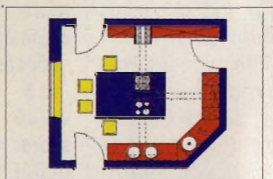
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# FEEDBACK

Edited by Robert Bixby

## Correction

The scheduling program published in the April 1994 "Feedback" will fail without the following modification. You must insert a line between the 14th and 15th lines. This line must contain only the command CLOSE. Here is what the 13th through the 19th lines of the program should look like.

```
SHELL "date > junk.!!!  
<return.!!!"  
OPEN "junk.!!!" FOR  
  INPUT AS #1  
LINE INPUT #1, a$  
CLOSE  
SHELL "del junk.!!!"  
SHELL "del return.!!!"  
FOR i = 1 TO 19 STEP 3
```

ROBERT BIXBY  
GREENSBORO, NC

## Switching Drives

I have some old software on 5¼-inch floppies that has to run from the A drive. My new computer has a 3½-inch drive as the A drive. Is there a way to switch the A and B drives to fool my old software?

ROBERT DELPIZZO  
FLANDERS, NJ

The Assign command might work. To fool your computer into thinking your B drive is your A drive, type assign a b at the DOS prompt. This will assign the A drive designation to your B drive (the B drive will respond as either A or B). To do a complete flip-flop, type assign b a. Your A drive will respond as drive B, and your B drive will respond as drive A. To get things back to normal, just type assign.

## Wish List

Here's what I would like to see: a typing tutor for children, a word processor for children, articles that combine a BASIC type-in program and some electrical construction using ICs, and, finally, interesting things I

can do with my computer that require the application of my intelligence rather than the contents of my pocketbook.

HENRY H. FALES  
ORLEANS, MA

Many software publishers are recognizing the special need for children's word processors (watch the review pages). It doesn't involve ICs (except for the ones already built into your computer), but here's a simple typing tutor that requires only the cost of this magazine and a bit of typing. When run, this program prompts you for a script file—the file containing the text that you'll type. You'll have to prepare the script yourself.

This file must be a simple ASCII file with a carriage return at the end of each line (and each line must be under 80 characters in length). The program will read the file line by line and display the text that you should type. If you make a mistake, the program will beep. When you reach the end of a line, a new line will be displayed. If you get tired of typing, press Esc to end the program. If you quit the program or if you reach the end of the script, the program will display your typing speed in words per minute and the number of errors you've made. Then it will show you your statistics for all previous sessions with the program and give you the option of seeing a bar graph displaying your speed and errors over the past 16 sessions.

Periodically, you might want to delete the HIGHSCOR file because it could become extremely large, and watching your scores from hundreds of past sessions scroll by could become tedious. (In this listing, as in all program listings in COMPUTE, an indented line is a continuation of the preceding line.)

## RANDOMIZE TIMER

```
DIM eror(255)  
error = 0: counter = 0: counter2 = 1  
CLS  
LOCATE 23, 1: PRINT "Press Esc  
to quit."  
INPUT "Name of file to type"; a$  
CLS  
OPEN a$ FOR INPUT AS #1  
begin = TIMER  
WHILE NOT EOF(1)  
  LINE INPUT #1, line$  
  LOCATE counter2, 1: PRINT line$  
  FOR i = 1 TO LEN(line$)  
    letter$ = MID$(line$, i, 1)  
    counter = counter + 1  
  waitloop:  
  in$ = INKEY$  
  IF in$ = CHR$(27) THEN GOTO  
  score  
  IF in$ = "" THEN GOTO waitloop  
  IF in$ <> letter$ THEN  
    error = error + 1  
    eror(ASC(letter$)) =  
    eror(ASC(letter$)) + 1  
  BEEP  
  GOTO waitloop  
END IF  
LOCATE counter2 + 1, i: PRINT  
in$;  
NEXT  
counter2 = counter2 + 2: IF  
  counter2 > 20 THEN counter2 = 1:  
  CLS  
WEND  
score:  
CLOSE  
CLS  
sec = INT(TIMER - begin)  
wpm$ = STR$(INT((counter / 5.5) /  
  (sec / 60)))  
wpm$ = RIGHTS$(wpm$,  
  LEN(wpm$) - 1)  
wpm$ = RIGHTS$("000" + wpm$,  
  3)  
PRINT "You typed"; counter  
PRINT "letters in "; sec;  
  " seconds"  
PRINT "for an effective typing  
speed of"  
PRINT wpm$; " word(s) per  
minute."  
PRINT "with"; error; "error(s)."  
OPEN "highscor" FOR APPEND AS  
#1  
PRINT #1, wpm$; " wpm with ";  
  STR$(error); " errors."  
CLOSE  
SHELL "pause"
```

**Adding a CLOSE,  
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better software,  
finding more  
"Feedback," avoiding  
young pirates,  
and making a case  
for caddies**

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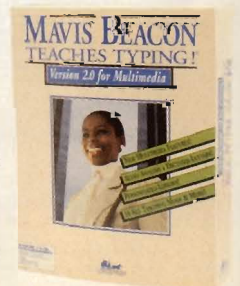
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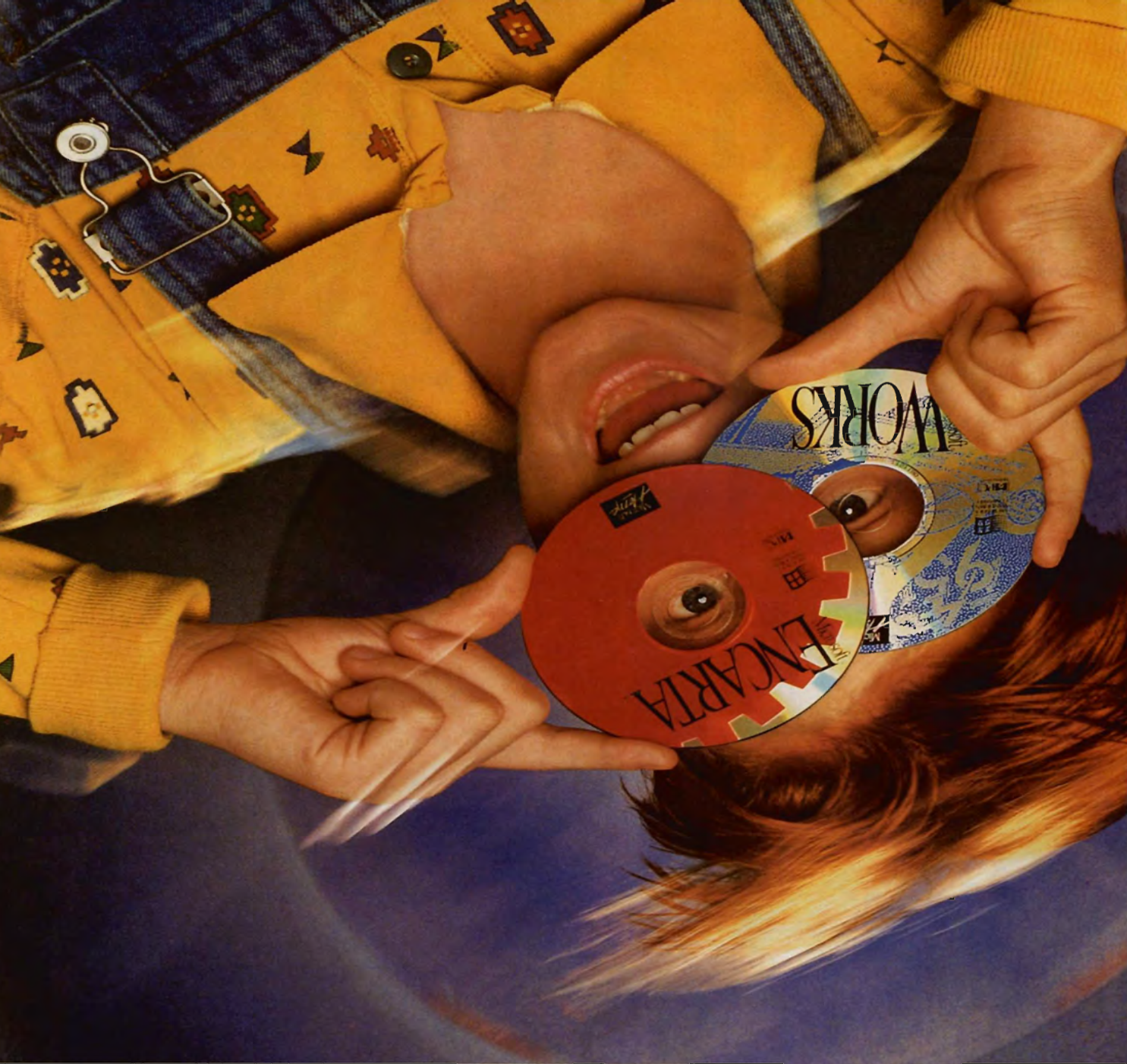
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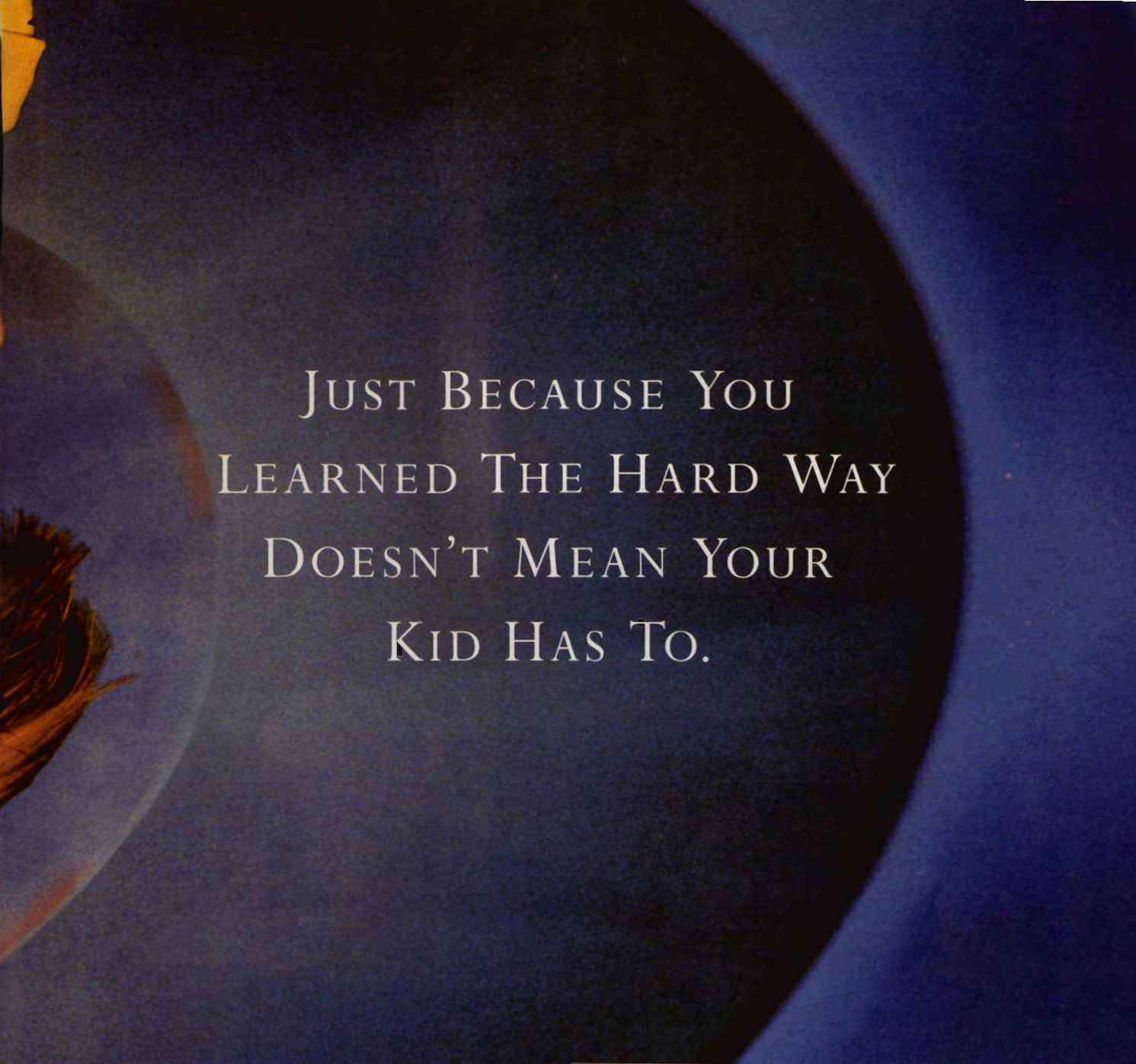
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**COMPAQ**

Circle Reader Service Number 209

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# FEEDBACK

```
SHELL "type highscor lmore"
FOR i = 32 TO 255
IF error(i) > 2 THEN
IF message$ = "" THEN
message$ = "You seem to have
trouble with the following
letter(s)": PRINT message$
PRINT CHR$(i) + " ";
END IF
NEXT
PRINT
PRINT "Type P for a graph of your
progress."
endloop:
in$ = INKEY$
IF in$ = "" THEN GOTO endloop
IF LCASE$(in$) <> "p" THEN END
CLS : SCREEN 12: counter = 0
OPEN "highscor" FOR INPUT AS
#1
WHILE NOT EOF(1)
LINE INPUT #1, a$
counter = counter + 1
WEND
```

```
CLOSE
IF counter > 16 THEN schlubfactor
= (counter - 16)
interval = 16 : counter3 = 0
OPEN "highscor" FOR INPUT AS
#1
IF schlubfactor THEN
FOR i = 1 TO schlubfactor
LINE INPUT #1, a$
NEXT
END IF
WHILE NOT EOF(1)
LINE INPUT #1, a$
scor = VAL(MID$(a$, 1, 4))
error = VAL(MID$(a$, 13, 4))
ccolor = ccolor + 1: IF ccolor > 15
THEN ccolor = 1
LINE (counter3, 479)-(counter3 +
39, 479 - (scor * 2)), ccolor, BF
LINE (counter3 + 10, 479)-(
counter3 + 30, 479 - error), 4, BF
LINE (counter3 + 10, 479)-(
counter3 + 30, 479 - error), 14, B
LINE (counter3, 479)-(counter3 +
```

```
39, 479 - (scor * 2)), 0, B
COLOR 7: LOCATE ((479 - (scor *
2)) / 17), 1 + counter3 / 8: PRINT
scor
COLOR 4: LOCATE ((479 - (scor *
2)) / 17) - 1, 1 + counter3 / 8:
PRINT error
counter3 = counter3 + 40
WEND
COLOR 7: LOCATE 1, 1: PRINT
"Press any key to end program."
finalloop:
a$ = INKEY$
IF a$ = "" THEN GOTO finalloop
END
```

## More Than Meets the Eye

Readers: There's more to COMPUTE than what you're holding in your hands. Each month, we have an additional "Feedback" program, a business productivity column, and sometimes even a whole extra feature in the COMPUTE area on America Online. If you're

# What Do PC Jet Jockeys Want?

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few practical ways to prevent someone from copying a program, and they all disproportionately inconvenience the legitimate user and are virtually ignored by pirates (or gossips, if you prefer). Here are some methods that have been used.

You could supply with the program disk a difficult-to-copy sheet of codes in, say, silver ink on white paper. Then make the program demand a random code that can only be obtained from the sheet and fail to run unless the correct code is entered.

Using a dongle is another solution. Give the program away and let people copy it at will, but include code that requires some electronic device plugged into the parallel port—a dongle (named for Don Gull, a programmer who was in a situation much like yours)—and limit the availability of the dongles.

You could personalize each program you hand out, having it request from the user a list of very personal pieces of information—mother's maiden name, name of family pet, telephone number of a friend, and so forth—that would only be known by the person who should be using the program. Then, whenever the program runs, it will operate properly only if the right information is entered during a preliminary interrogation.

All of these systems (except the dongle) are very easily defeated, unfortunately. If anyone reading this has additional suggestions, please send them to us at COMPUTE, and we'll forward them to Dr. Mansour.

## Caddy Lack

A review in the January 1994 COMPUTE states that it's an advantage for a CD-ROM drive not to require a caddy. This makes me (and maybe all educators) nervous. The CD-ROM caddy is a requirement around students. The \$5 or so that a caddy costs is money well spent because it prevents the disc from being damaged. I always try to buy CD-ROM drives that require a caddy.

DON MEINK  
CROFTON, NE

Do you have a question about hardware or software? Have you discovered something that could help other PC users? If so, we want to hear from you. Write to "Feedback" in care of this magazine. Readers whose letters appear in "Feedback" will receive a free COMPUTE baseball cap while supplies last. We regret that we cannot provide personal replies to technical questions.

## FEEDBACK

on America Online, press Ctrl-K and type *compute* into the dialog box that appears. Then click on OK. It will take you to our area, which contains all of the material from the magazine—and a whole lot more.

ROBERT BIXBY  
GREENSBORO, NC

## The Naked CD

Aren't all CD-ROMs manufactured the same, and isn't the digital technology used to play the CD-ROMs universal? Then why can't all CD-ROMs be played on the Imagination Machine, Panasonic's R\*E\*A\*L, the Sega Genesis, the PC, the Mac, and so on?

DAVID LEDFORD  
GASTONIA, NC

All CD-ROMs (and music CDs, too) are manufactured the same way. They all have the same capacity, they all spin the same way, and they're all read from the center to the periphery. But the information contained on the CD is very different. A series of bytes designed to display an image on a PC screen would be pure garbage to a Sega Genesis or a Nintendo CD-ROM sys-

tem. The individual computer commands—opcodes and operands—vary considerably from one CPU to the next. File structures might also vary, so not only could one system make no sense of the data on the disc designed for a different system, but it might also be unable to find it.

## Student Pirates

I'm an assistant professor of English literature at Eastern Mediterranean University in North Cyprus. I recently wrote a Turbo Basic program that teaches students figures of speech used in English poetry. My students use the program under my supervision and like it very much. The snag is that people here have no consideration for copyright, and if I let just one disk of my program out of my sight for a few minutes, then my program will be like a rumor traveling through the island from one student to another. Is there a way to stop users from copying the software from the floppy to the hard disk or to another floppy?

WISAM MANSOUR  
FAMAGUSTA, NORTH CYPRUS

What a beautiful phrase—"like a rumor traveling through the island from one student to another." You must be a great teacher. Unfortunately, there are





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## W INFO FILE

### PagePlus 2.0

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**In Brief:** The low-price PagePlus provides several high-end features, such as process-color separations and a table editor.

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## PagePlus 2.0

**W** of all the packages reviewed here, PagePlus is the best bargain. It provides about 80% of the functionality of high priced programs for less than 10% of the cost. PagePlus is the only low-cost product that supports process-color separations, and it has other useful features that make it an enticing alternative to the high-end applications in this review, which can be more expensive and difficult to learn.

PagePlus' ability to perform process-color separations is its most noteworthy feature. It has all the prepress functionality you need, except for traps and spreads. You can compensate for ink build-up, as well as make dot gain corrections. In my tests, PagePlus' color separations were as good as those printed by high-end programs, and even better than Ventura's.

PagePlus offers a powerful table editor, text frames that easily link and jump text, and a ChangeBar that lets you assign line weights, colors and many other attributes with a few mouse clicks. You can move the rulers into your editing area, so you can quickly measure and resize objects.

The \$59.95 price tag is simply incredible. And, for another \$40 you get the PagePlus SuperPack, which includes over 100 TrueType fonts and several hundred clip-art images. Several useful manuals cover the basics of desktop publishing, including some excellent design tips; a vast improvement over last year's documentation.

There's little you can't do with PagePlus. The one major drawback is a lack of automatic page numbering: When you add or delete pages, you must go back and renumber pages by hand.

PagePlus is a great program for small or mid-size businesses that need a powerful short-document DTP package.

*William Harrel is a freelance writer and desktop publisher based in Weaverville, Calif. Reach him on WIX as wharrel.*



PagePlus lets you perform almost any short-document layout task you can think of, easily and inexpensively.

## W REPORT CARD

### Recommendations...

	Short one-color documents	Long one-color documents	Short spot-color documents	Long spot-color documents	Short process-color documents	Long process-color documents
Easy Working Desktop Publisher	B	B	C	C	D	D
Express Publisher	B	C	C	C	D	D
FrameMaker	B	B	B	B	D	D
PageMaker 5.0	A	A	A	A	A	A
PagePlus 2.0	A	B	A	B	A	B
PFS: Publisher	B	B	C	C	D	D
Publish It! (TimeWorks)	C	C	C	C	D	D
QuarkXPress	A	C	A	C	A	B
Ventura Publisher	B	A	B	A	C	B



Quark Xpress handles process color better than any other program we tested and Ventura Publisher works best for long documents. Neither is a DTP program for all seasons, though. Because it has something for everybody, we've rated PageMaker as the best overall program. It's easy to use, yet provides process color separations and long-document options such as indices and table of contents. PageMaker lets you scan images directly into your layouts. You can place and

manipulate graphics easily, and the stylesheet options are strong. It also has excellent cross-platform compatibility with the Macintosh version of PageMaker.

Serif's PagePlus is another strong application. It's also a terrific bargain. If you're doing short document publishing, PagePlus provides everything you need and more. It's easy to use and has a wealth of options. The lack of automatic page numbering and a few other long-document features leave it less powerful than PageMaker, but at less than 10% of the price, who's quibbling?

# INTRODOS

Tony Roberts

## MEMORY THIEVES RUN UNDETECTED

Have you ever looked into your refrigerator and found something old and unrecognizable tucked into the back of the vegetable crisper? Did you hold your nose and wonder how something so ancient and useless had been allowed to sit there for so long?

Recently, my friend Steve called, saying he was having trouble getting his system set up with DOS 6.2. I had him fax me his configuration files, and what I saw was as horrifying as lettuce that had turned from a crisp, green head to a gooey, brown puddle.

Steve's main concern was that he wasn't getting all of the free memory he thought he should with DOS 6.2. He had tried running MemMaker, and that had helped some, but there still wasn't enough memory to run the programs he wanted.

Steve had upgraded DOS as new versions came along, but he had done so blindly. He hadn't removed the outdated relics of the old versions as he upgraded to the new software. He was still using the CONFIG.SYS and AUTOEXEC.BAT files he had set up years ago, and he was wasting memory as a result.

The first memory drain was found in the CONFIG.SYS file, which included the statement LASTDRIVE=Z. The LASTDRIVE command allows you to specify how many disk drive names you will be using. The DOS default is five, for drives A-E. Each disk drive name uses about 100 bytes of memory. Steve's LASTDRIVE command indicated that he wanted to use 26 drive names, A-Z. In practice, however, drive F is the last drive used on his system. By changing LASTDRIVE=Z to LAST-

DRIVE=F, he was able to recover 2000 bytes of memory.

The big memory gobblers were found in the AUTOEXEC.BAT file, however.

First, Steve was using the Append command at a cost of 9K. This DOS dinosaur was introduced back in the DOS 2.x era. At that time, hard drives were just being introduced, and the subdirectory system was developed to help users keep track of all the files on those huge 10MB wonders. Software written for earlier versions of DOS didn't know how to deal with subdirectories. Such software assumed the current subdirectory was the only directory in town.

The Append command was a smoke-and-mirrors trick to allow the old software to see past its blind spot and find files that resided in other subdirectories. Of course, all modern software is equipped to handle subdirectories, so who needs Append?

Another useless bit of software clogging up Steve's system was Graftabl. This program, which occupied 14K, was designed to allow PCs with CGA adapters to display additional characters while in graphics mode. Steve junked his CGA adapter and monitor years ago. He should have stopped running Graftabl at the same time.

Finally, Steve's AUTOEXEC.BAT file was loading the DOS Print utility, unnecessarily bottling up more memory. Back in the early 1980s, there were times when printing from DOS was handy or even necessary, but today, most folks find that printing directly from their application software is the way to go.

Altogether, Steve was loading about 30K in unused, unnecessary software. Once he cleaned out the prehistoric artifacts, he had plenty of room to run the software he wanted.

Steve had arrived at this quandary because he was afraid to make any changes in his configuration files, fearing that he'd ruin something. After all, things *seemed* to be working.

I've never been a believer in the "leave well enough alone" philosophy. It's good practice to take an occasional look at your initialization files to see whether there's any fat that can be trimmed from them. If you don't know a CONFIG.SYS from an AUTOEXEC.BAT, find a spouse, friend, or coworker who does.

If you want to experiment on your own, grab a DOS manual and look up some of the suspect commands to find out what they do. (First, make an emergency boot disk containing your existing AUTOEXEC.BAT and CONFIG.SYS files.) Once you identify a possible memory gobbler, use the REM command to make temporary changes that can be undone easily if necessary. When DOS finds the command REM (this is short for *remark*) at the beginning of a line, it ignores the rest of the line. If the system behaves strangely, you can remove the REM, and things will return to normal. On the other hand, if performance stays the same or improves, it's a good bet that the command was superfluous and can be deleted.

DOS commands aren't the only programs that cause problems. Over the years you may have added several terminate-and-stay-resident (TSR) utilities to your system. These programs, which stay in the background waiting for you to activate them with a special key combination, can perform a variety of chores. But once you stop using these programs, remove references to them from your AUTOEXEC.BAT file, or they'll continue to load and occupy memory that could be used elsewhere. □

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### REPORT CARD

Recommendations...  
Windows Magazine 9/93  
"Pick a Publishing Powerhouse"  
by William Harel.

	Short one-color documents	Long one-color documents	Short spot-color documents	Long spot-color documents	Short process-color documents	Long process-color documents
Easy Working Desktop Publisher	B	B	C	C	D	D
Express Publisher	B	C	C	C	D	D
FrameMaker	B	B	B	B	D	D
PageMaker 5.0	A	A	A	A	A	A
PagePlus 2.0	A	B	A	B	A	B
PFS: Publisher	B	B	C	C	D	D
Publish It! (TimeWorks)	C	C	C	C	D	D
QuarkXPress	A	C	A	C	A	B
Ventura Publisher	B	A	B	A	C	B

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## PENTIUM PCs: THE FIRST GENERATION

Edited by Mike Hudnall  
Reviews by William Harrel

**Y**our computer isn't fast enough, you say? Before you buy a 486, check out one of these next-generation speed demons. Intel's promise of lightning-fast Pentium power has finally materialized. These seven workhorses are the fastest computers ever to appear in Test Lab. Granted, you'll pay about twice as much for one of these babies as for an equally equipped 486-66, but if you need to push Windows, OS/2, or another graphical user interface to the limit, you certainly get what you pay for: Pure processing power! Massive storage! Extensive expansion options!

### OK, So Just What Is a Pentium?

A Pentium processor is, by all rights, nothing more than a 586. Intel changed the name because words, unlike numbers, can be trademarked. Hence, if and when another company comes up with comparable technology, that technology can't be called Pentium.

And what a next step it is! This is by far the most complex PC microprocessor to date. It has more than twice as many transistors as the 486DX2 and a wide (64-bit, as compared to the 486's 32-bit) data path. What this means to you is about a 75-percent performance boost. However, utilizing all this power requires some unique system board configurations. In other words, the boards and their various components must be manufactured properly. To get the most from the Pentium chip, your computer must have strong hard drive and video subsystems. Pentium systems also perform better with an external processor cache. Think of an external cache as a fast memory chip area where data waits to be processed. This is somewhat technical, but experts agree that Pentiums run significantly better with caches of at least 256K.

As you will see, correctly configured Pentiums are hot machines, and they are not as expen-

sive as the first releases of 486s, which ran well over \$5,000. You can find a well-equipped Pentium for under \$3,500, and prices are bound to drop with increased competition. By this time next year, you can expect 486s to replace 386s as entry-level computers, as Pentiums move into the mainstream.

### Review Criteria

As you read this, literally hundreds of Pentium configurations are becoming available. The following configuration is what COMPUTE's editors consider the minimum configuration for a Pentium system.

If you shell out the money for a computer this powerful, it should have enough memory for Windows to spread out in, and it

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**“Pure  
Processing Power!  
Massive storage!  
Extensive expansion  
options!”**

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should anticipate future memory-hogging applications (such as Windows 4.0). The first requirement for participation in this roundup is that the system come with 16MB of system RAM. In addition to memory, you'll also need plenty of hard drive space. Hence, vendors were asked to supply systems with at least 350MB hard drives, and they easily complied—each of these machines comes with at least 450MB of hard drive storage.

If you run graphics applications under Windows, you already know how slowly some of them display on your monitor. The sluggishness is due primarily to a bottleneck where the graphics adapter meets the mother-

board bus, which until recently had a 16-bit path. Recent local-bus technology widens the path to 64 bits. There are two types of local bus, VESA (Video Electronics Standards Association) and PCI (Peripheral Component Interconnect). PCI is the newer type, and once it's perfected, it's expected to be superior. All of the machines examined here have PCI local bus.

Vendors were also asked to supply a 256K external cache. Remember that a cache is a bank of ultrafast memory chips that catch and hold data in anticipation that the CPU will soon need it. Having this data waiting in the wings significantly enhances performance. Each of the vendors supplied a 256K cache. Most of the systems here allow you to increase the cache size to 512K and beyond. A larger cache should enhance the performance of each of these systems.

Finally, if you spring for a system with lightning-fast graphics, you'll want a good monitor, so this roundup required vendors to equip their systems with high-resolution, 15-inch monitors. All complied. In fact, two companies, Gateway and MidWest Micro, went the extra mile (well, 2 inches anyway) and sent 17-inch displays. The larger monitors make text easier to read at high resolutions, but overall, the quality of the display subsystems that ship with all these systems is impressive—crisp and clear with great colors.

### Speed Thrills

The first thing power users want to know about a group of computers is which one is fastest. However, to most people, a benchmark point here or there is a moot point. As long as the machine has sufficient power and isn't significantly slow for its class, a number of other issues are more important, such as expandability and what you get for your money. To evaluate these issues, I

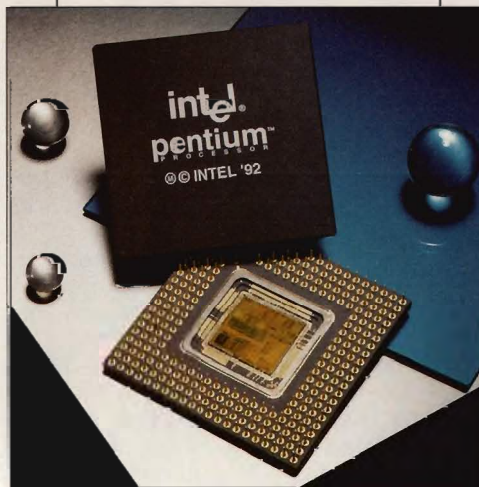
opened the machines and examined the motherboards to find out how easily you can install drives and expansion cards. I found out which graphics card each manufacturer uses and how much RAM is on it, whether you have to purchase more video memory to get the most from the display system, how big the hard drive is, and so forth.

This is not to say that speed isn't important. And I checked it—thoroughly. I ran the industry-standard SYSmark93 for Windows benchmark tests developed by Business Applications Performance Corporation (BAPCo). The BAPCo SYSmarks are real-world tests based on standard Windows applications that many people use, such as Word for Windows, Excel, Lotus 1-2-3, and PageMaker. BAPCo tests systems in six different application categories: word processing, spreadsheet, database, desktop graphics, desktop presentation, and desktop publishing. Results are charted in each category, and an average SYSmark score is calculated. For the results of the BAPCo tests and further explanation of how they work, see the methodology sidebar, "Explaining the Numbers," and the accompanying graphs.

### Configuration

When you're buying a new system, it's important to check out the configuration. In other words, how big is the hard drive? Does it come with a CD-ROM drive? A sound card? You can save a lot of money by not paying retail for these options later. It's also important that the equipment installed fits your application. If you buy a system with a graphics card that does not support the number of colors and resolution you need, you'll have to buy another graphics card.

Should your new Pentium be housed in a desktop case or a tower? The answer depends on where you'll put it and what your expansion needs are. Usually, a tower resides under the desk, and a desktop system sits on top of it. More important, towers provide more expansion options. The Dell desktop system, for example, has only three accessible drive bays and two internal ones. Two of the accessible bays are already taken by the CD-ROM drive and the combo (two in one bay) floppy drives. You can install only one more accessible drive (removable hard, tape backup, and



so forth). Of the two internal drive bays, one is already used by the hard drive. You can install only one more hard drive in the Dell system.

Granted, most people need only one hard drive. But you never know where your computing might take you. If you plan to use your new Pentium as a network server or as a graphics- or video-editing station, you can't get enough hard drive space. You need as many drive bays as you can get. You should look at one of the tower configurations, such as the Insight machine, which has five accessible and eight internal bays.

Also important are the types of accessible drives installed in

your system. Each of these computers comes with a double-speed CD-ROM drive (twice as fast as the original technology). As programs get larger, CD-ROMs will be used more and more to distribute software. And they are essential to multimedia applications. All but the Dell and MidWest Micro systems come with only one floppy drive, a 3½-inch 1.44MB. Apparently, there's an ongoing trend to phase out the slower, smaller (in storage capacity), and less dependable 5¼-inch floppies. If you've been computing for a while, you probably have data on the older 5¼-inch 1.2MB disks. The additional drive would cost about \$100.

Hard drive access speed also affects how fast your computer runs. All these systems come equipped with built-in IDE hard drive controllers on the motherboards, and most of the systems in the roundup use them. However, two companies, Micron and Insight, included PCI controllers. Similar to processor caches, caching controllers hold data in anticipation that the processor will soon call for it. Depending on the size of the cache, this cuts down

considerably on hard drive access. Since the hard drive is the most frequent bottleneck in a computer, the less it's accessed, the better. As you'll see from the following reviews and test results, hard drive controllers can increase the speed of your computer, depending primarily on what kinds of applications you run. However, in most cases, the motherboard-controlled hard drives perform fine.

If you plan to run games or multimedia applications (such as multimedia encyclopedias) on your system, you'll need a sound card. Two of the vendors, Dell and Gateway, included sound cards for the price listed in the features table, and Gateway even

# TEST LAB

sent along a couple of Labtec CS-180 speakers. With the ZEOS system, you might not need to buy a sound card. It comes equipped with on-board business audio, which allows you to record and play sound—as long as you have a microphone and speakers. The sound quality isn't as good as that of the industry-standard 16-bit sound cards, but it's fine for most desktop and business applications.

## Built-in Options

In addition to peripherals, you should also look at built-in expansion options, such as the number of drive bays, the number of expansion slots, the maximum memory size, and so on. Mostly, these systems are equally equipped: three 64-bit PCI slots and five ISA, or 16-bit, slots (the MidWest Micro has only four ISA slots). The main difference is how the machines use them. Each machine reviewed here uses a PCI slot for the graphics adapter and one ISA slot for the CD-ROM drive controller. The Insight and Micron machines use an additional PCI slot for the hard drive controller, and the Gateway and Dell computers give up an ISA slot for a sound board. Additionally, all of these systems support RAM configurations up to 128MB.

Other than drive bay options, only the ZEOS system has notably different built-in options. In addition to the on-board business audio discussed above, the ZEOS also has an on-board SCSI option. SCSI is a peripheral interface that excels at high-speed data exchanges and works well for large hard drives (1GB and above) and high-capacity tape backup drives. With the SCSI option built in, you don't have to use an expansion slot, leaving the slot for other options. The ZEOS supports SCSI-2, the latest SCSI technology.

## Before You Buy

All of the computers in this Test Lab roundup are fine machines.

## Austin Power System 60

**Direct price: \$3,799**

**Warranty: two years, parts and labor (first year with on-site service); extended warranties available; units sent in for repair returned to customer within 48 hours of arrival at Austin's repair facility**

**Pros: best speed, SCSI card, reasonable price, space-saving desktop design**  
**Cons: caddy required for CD-ROM drive, limited expansion options**

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With that in mind, you might have a tendency to select the more glamorous, faster machines. In reality, unless your application taxes a system to its limits (say, desktop publishing or serving a network), you wouldn't notice any performance difference between the fastest and slowest of these Pentiums. Unless you really need the fastest computer, look instead at what you get for your money. How big is the hard drive? Will you have to purchase additional memory for the video card? How big is the monitor? Do you need sound? How good is the warranty?

Barring any unforeseen durability problems, you can't go wrong with any of these computers. The real issue is that you get everything you need for the right price.

WILLIAM HARREL

## AUSTIN POWER SYSTEM 60

Need a fast computer? Austin's Power System 60 is the one to buy. This desktop dynamo performed best overall on the BAPCo tests, doing exceptionally well on the desktop graphics benchmarks. In fact,



this machine's speed, small footprint, durable construction, and overall performance leave little to be desired. It even comes with a SCSI card (the Toshiba CD-ROM drive is a SCSI device), which means it has the ability to chain as many as seven high-capacity drives, such as Bernoulli removable, tape backup, and optical drives. However, its compact desktop design means that most of your drive expansions must be external.

The graphics speed probably comes from the Diamond Stealth 32 PCI adapter. The Power System 60 is the only computer here with this adapter. Austin loaded the graphics card with 2MB of DRAM, the maximum configuration. The graphics and text display not only with crystal clarity but with blazing speed as well.

While this is a great computer, it's not perfect. The case's small design squeezes the components together, making access to them difficult. For example, the hard drive bays are located under the power supply, which makes getting to them a chore. Granted, you don't change or install hard drives often, but by the looks of this configuration, you might have to turn to a technician. Another drawback is that the memory banks are beneath the accessible drive bays, meaning that installing memory isn't as easy as it should be, either.

I wish that the Toshiba CD-ROM drive did not require a cad-

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dy (case). While this provides a little added protection for the CDs themselves, it's a nuisance having to fool with the caddy each time you change a disc. And finally, the Austin documentation is somewhat sparse. If you like to install options in your computer yourself rather than take it to a professional, you won't find much help in the manuals. But then again, this computer isn't really designed for easy expansion.

These are, of course, small complaints. Most people don't change their system configurations often. Otherwise, the Power System 60 is an exceptional value. It comes with a two-year parts warranty and a one-year on-site warranty. Technical support is free for as long as you have the machine. I called Austin tech support and got right through. The technician was both courteous and knowledgeable.

This is the computer of choice for speed-hungry power users.

Circle Reader Service Number 371

## DELL DIMENSION XPS P60

Dell's offering is an attractive mid-size computer, even though it turned in relatively middling times on the BAPCo tests. A desktop model, the Dimension XPS P60 is compact, light, and very easy to expand. In general, Dell's review system ran just slight-

**Dell Dimension XPS P60**  
**Direct price: \$3,946**  
**Warranty: one year, parts and labor**  
**(with on-site service)**

**Pros: reasonable speed, excellent engineering, sound card, 5¼-inch floppy drive, space-saving design**

**Cons: expense for this configuration, limited expansion options, relatively small hard drive**

**DELL COMPUTER**  
**9505 Arboretum Blvd.**  
**Austin, TX 78759**  
**(800) 289-3355**

ly slower than the other systems (except for the MidWest Micro and ZEOS machines, which were slower). On the spreadsheet test, however, it held its own, performing a little better than most of the other systems.

This computer comes with a Creative Labs Sound Blaster multimedia system. The sound card drives the CD-ROM drive, so you don't have to use two slots to get both options. The review system also came with Multimedia Products' Sound Effects library, an extensive collection of sound clips you can use in your presentations or assign to Windows events (such as error message dialogs and application openings).

Perhaps the best things about this computer are its ultralight construction (29 pounds) and easily accessible expansion options. You open the case by removing one thumbscrew on the back of the system. The case flips open to reveal a very well engineered motherboard and case layout. The Dimension's bays and memory banks are easily accessible.

It was considerable of Dell to install a combination 3½-inch and 5¼-inch floppy unit, which requires only one bay for both drives. By the way, the Dell system is one of the two computers reviewed here that come standard with a 5¼-inch drive. (The

MidWest Micro system is the other.) If you have lots of programs and data stored on 5¼-inch floppies, this feature could be important to you.

The video card in this system is a Number Nine GXE with 3MB of RAM—a MB more than any of the others. However, the extra MB didn't do much to improve performance. The Dimension's performance on the graphics tests was mediocre. The combination of the GXE and Dell's excellent 15-inch monitor, however, made for crisp, clean graphics.

A minor drawback is the system's 450MB hard drive (each of the other systems has a hard drive with at least 500MB). This computer's hard drive is adequate for most applications, but I wonder why Dell didn't go the

### A NOTE ON PRICES

With computer technology changing more rapidly than ever before and with options more plentiful than ever before, computer prices can be a tricky business.

It pays to keep the following points in mind:

Computers are available in a variety of configurations, each with a slightly different price. Also, because of the rapid changes in this market, a computer manufacturer may change system components, software, or prices between the time a review is written and the time the magazine hits the stands. By the time you read this, for example, some computer manufacturers may offer a 66-MHz Pentium system for the same price we've listed for their 60-MHz systems.

Remember, too, that you're buying support in addition to the computer. Find the support policy that meets your particular needs.

At COMPUTE, we make every effort to verify prices. This month, the price that appears with each review is for the review configuration. It's a good idea, however, to call the manufacturer or vendor to make sure that the configuration you want matches the price you have in mind.

—MIKE HUDNALL



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extra mile like everybody else—especially since this machine costs a few hundred dollars more than most of the others. Granted, you get Dell's great reputation and a great little computer, but . . .

The Dimension is backed by a responsive technical support staff. This is not the machine to buy if you need a graphics workhorse or a network server, but it's great for a workstation and home office use. My only real objection is that it costs too much.

Circle Reader Service Number 372

## GATEWAY 2000 P5-60

Gateway's P5-60 scored right in the middle of the BAPCo tests, showing good, strong performance on all of them. Surprisingly, the system's performance was relatively

**Gateway 2000 P5-60**  
**Direct price: \$4,127**  
**Warranty: one year, parts and labor (with on-site service)**

**Pros: great 17-inch monitor; sound card and speakers; excellent expansion options; sturdy, excellent design**  
**Cons: none**

**GATEWAY 2000**  
**610 Gateway Dr.**  
**N. Sioux City, SD 57049**  
**(800) 846-2000**

even across the board. It didn't excel on any of the tests. In other words, this computer is plenty fast enough, but not especially adept at any particular application. The real story behind the P5-60 is expansion options and value.

Out of the box, this is a formidable-looking machine. The tower construc-



tion is sleek and sturdy. Inside the case you'll find plenty of room for adding drives and other expansion options. The memory bank area is so roomy that you can get to it with both hands, if need be. The P5-60 holds as many as five accessible drives and three fixed disks. In the review system, two of the five ac-

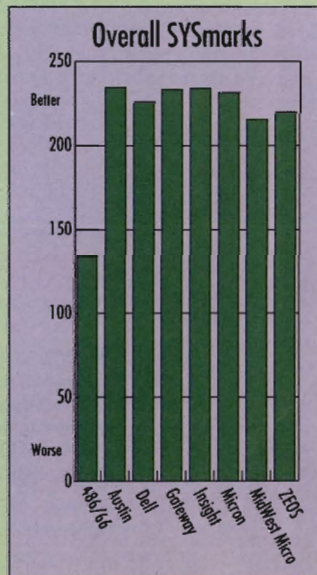
### EXPLAINING THE NUMBERS

Are Pentiums fast? I'll say. The Business Applications Performance Corporation (BAPCo) SYSmark93 benchmarks were used to test these computers. The tests run a series of Windows applications in six categories. The categories and applications are as follows.

- Word processing:  
WordPerfect 5.2, Word for Windows 2.0, Ami Pro 3.0
- Spreadsheet:  
Lotus 1-2-3 4.0 for Windows, Excel 4.0
- Database:  
Paradox 1.0
- Desktop graphics:  
CorelDRAW! 3.0
- Desktop presentation:  
Freelance Graphics 2.0, PowerPoint 3.0
- Desktop publishing:  
PageMaker 5.0

Systems are graded with SYSmarks. As you study the graphs, notice that the Pentiums turned in scores between 200 and 275 SYS-

marks. These scores are compared to that of the calibration system, which is a 486DX-33 with 8MB of RAM. The calibration system runs at 100 SYSmarks, or about 2½ times more slowly than



the average Pentium. To make the tests more meaningful, the BAPCo tests were run on a 486-66 with local bus; the results are included in the charts for comparison. Notice that the Pentiums ran about 75 percent faster than the 486-66 with a comparable display system.

Notice also that some of the Pentiums are more adept at certain types of applications than others. You should look for a system that suits your particular needs. If you need an overall business machine, select one that performed strongly across the board.

The BAPCo software is currently available for an introductory price of \$99. Write to Business Applications Performance Corporation, 2801 Northwestern Parkway, M/S NW1-20, Santa Clara, California 95051. You can call the company at (408) 988-7654.

Circle Reader Service Number 378



cessible bays were occupied by a floppy drive and a CD-ROM drive.

Of all the computers reviewed here, Gateway's P5-60 has the most impressive display system. The graphics subsystem is powered by the ATI mach32 with 2MB of memory (the same adapter that's in the Insight machine but with a MB more memory). Gateway also sent its 17-inch, high-resolution CrystalScan monitor. The larger monitor makes text easier to read at higher resolutions, and the CrystalScan displays graphics dazzlingly. In fact, you can't get better graphics and colors without shelling out an additional \$1,000 for a monitor with a Sony Trinitron tube.

The review system came with an optional Gateway sound card and Labtec speakers, which add just over \$100 to the cost. When you purchase a P5-60, you get your choice of one software application from a list of about ten titles, includ-

ing Microsoft Word, Access, and Excel. Gateway guarantees the machine with a one-year on-site warranty. Several extended warranty options are available, including a two-year parts warranty, rather than the one-year on-site warranty. Gateway's technical support lines are extremely busy. More than once, I waited several minutes to speak to a technician. But once I got through, the support person knew his machine well. My questions were answered clearly and considerately. However, the manual that comes with the P5-60 is quite thorough—you may not have to call tech support at all.

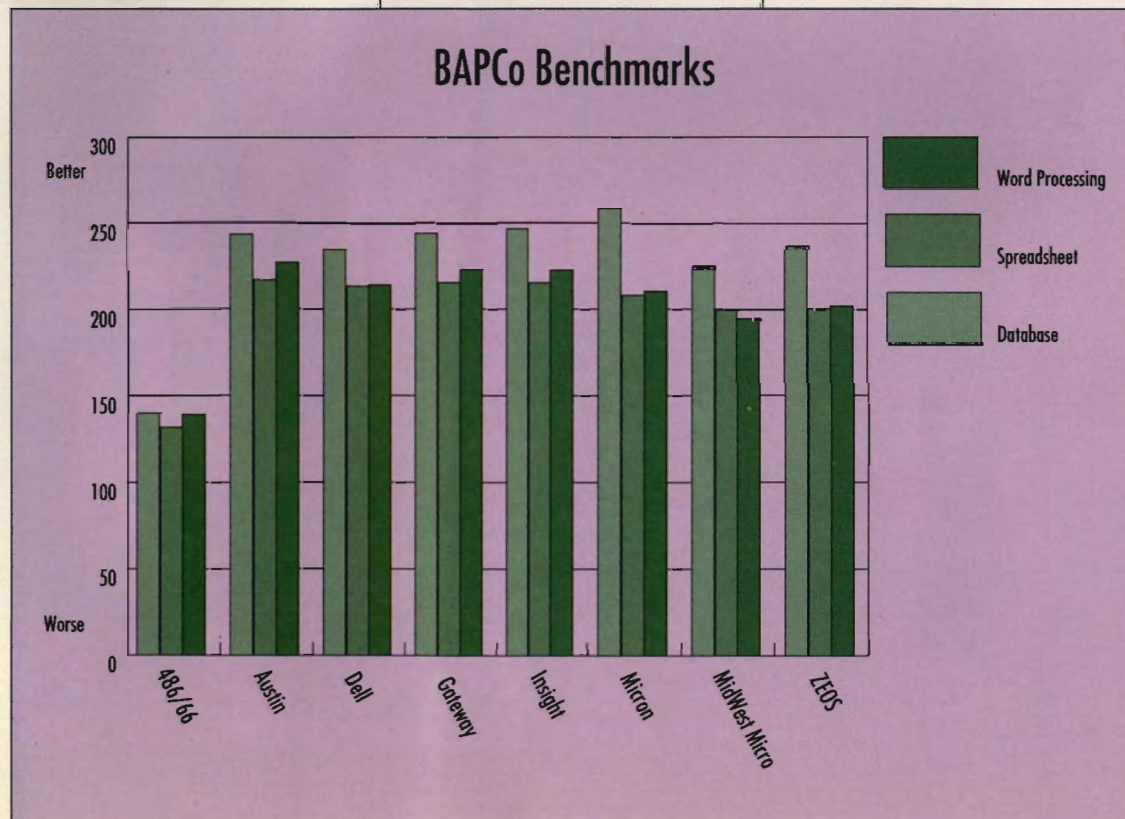
OK, so this is not the fastest computer in the bunch. It is, however, my pick for best value. If you plan to use this system for a graphics workstation, you should consider spending a few hundred dollars more for the 17-inch monitor.

Circle Reader Service Number 373

## INSIGHT PCI P60 CD

Like the Gateway machine, the Insight PCI P60 CD comes in a sturdy tower case and is easily expandable. It's also the second-fastest computer in this review, primarily because of the Intel PCI disk controller that Insight supplied in the test system (included in the price quoted in the features table). It performed well in all of the BAPCo categories, coming in slightly behind the first-place Austin computer in all instances. The only other machine that performed as well is the Micron, which also came with a PCI disk controller. The PCI P60 CD is a fast computer.

I came close to choosing this system from Insight as the best value, but there are a few areas where it falls slightly short. For example, even though it has the same graphics card that the system from Gateway has (an ATI mach32), the



# TEST LAB

card comes with only 1MB of memory. To max the card out, you'd have to purchase another MB. Also, the standard monitor is capable of a resolution of only 1024 x 768, rather than the 1280 x 1024 supported by the graphics card and the rest of the monitors in this review. While you probably wouldn't want to run Windows at 1280 x 1024 on a 15-inch monitor (the text would be too small), you'd find the extra dots helpful when working with graphics.

These small drawbacks aside, this computer is no slouch. It has more drive bays—five accessible and eight internal—than the others, making it ideal for a network server. The system's speed also makes it a great desktop publishing system.

One reason for this computer's tremendous speed is the Intel disk controller. While this is not a cach-

**Insight PCI P60 CD**  
**Direct price: \$3,349**  
**Warranty: one year, parts and labor**

**Pros: great price; excellent expansion options; strong, sturdy design; reasonable speed**  
**Cons: graphics card with only 1MB RAM, monitor incapable of 1280 x 1024**

**INSIGHT DIRECT**  
**1912 W. Fourth St.**  
**Tempe, AZ 85281**  
**(800) 927-7848**

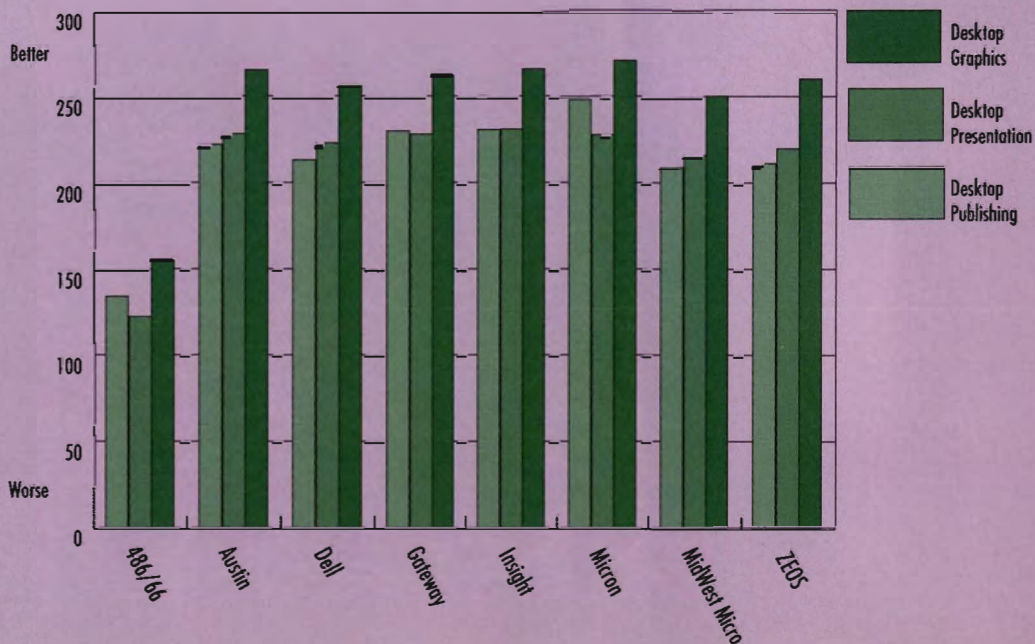
ing controller (as is the one in the Micron machine), it does boost system performance significantly. The computer was tested with and without the controller, and there was about a 10-percent performance difference, which is significant when



working with large spreadsheet, database, and graphics files.

Insight does not offer buyers a choice of software applications, but the company does include four CD-ROM titles. Which titles you receive depends on what's available when you order your computer. I got a multimedia encyclopedia, an almanac, Publish It!, and

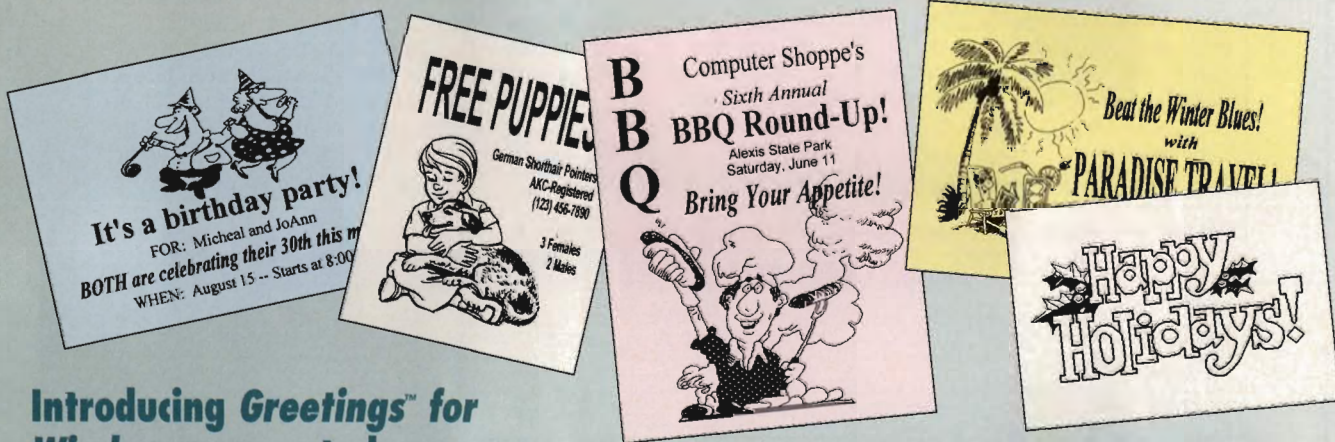
## BAPCo Benchmarks



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# TEST LAB

an interactive animals book. Insight systems have a one-year warranty, but it's not an on-site warranty. You have to send the system in to get it fixed.

With speed, expansion, Insight's reputation for dependability, and a relatively low price tag, you really can't go wrong with this computer. My minor objection—the skimping in the display system configuration—can be corrected for a few hundred dollars more. If you need speed and expandability, check out this Pentium.

Circle Reader Service Number 374

## MICRON P60PCI POWERSTATION CD

Now here's another blazingly fast computer. The Micron P60PCI PowerStation CD came in fourth on the overall SYSmark tests but performed exceptionally well on the database, desktop graphics, and desktop publishing tests. In fact, it turned in the fastest times in both database and DTP processing. This desktop machine is not only fast but easily expandable.

Like the Dell desktop, the PowerStation offers easily accessible drive bays and memory banks. My only complaint is that the processor chip socket is under the exhaust fan, making it difficult to get to. Most people never change their processor chips, but if you ever need to, it could be a chore in this system.

The feature that makes this computer stand out is the Green Cache hard drive controller installed in one of the PCI slots. This caching, mirroring controller came with 16MB of memory. Re-

	Austin Power System 60	Dell Dimension XPS P60	Gateway 2000 P5-60
<b>Price</b>	\$3,799	\$3,946	\$4,127
<b>BIOS type and version</b>	AMI 1.00.03 AFI	AMI-Dell 1993	AMI 1.00.03 AFI
<b>Case style</b>	desktop	desktop	tower
<b>CD-ROM drive</b>	yes	yes	yes
<b>Graphics adapter</b>	Diamond Stealth 32	#9GXE	ATI mach32
<b>Graphics adapter RAM</b>	2MB	3MB	2MB
<b>Maximum resolution/colors</b>	1280 x 1024/256	1152 x 870/256	1280 x 1024/256
<b>Maximum resolution/refresh rate</b>	1280 x 1024/60Hz	1024 x 768/90Hz	NA
<b>Floppy drives</b>	3.5"	5.25" and 3.5"	3.5"
<b>Hard drive controller location</b>	motherboard	motherboard	motherboard
<b>Hard drive controller</b>	proprietary	proprietary	proprietary
<b>Hard drive size</b>	525MB	450MB	540MB
<b>Hard drive speed</b>	10 ms	12 ms	11 ms
<b>Monitor size</b>	15"	15"	17"
<b>PCI/VESA local bus</b>	PCI	PCI	PCI
<b>Sound card</b>	no	yes	yes
<b>Accessible drive bays</b>	3	3	3
<b>Internal drive bays</b>	2	2	2
<b>Available expansion slots</b>	2 PCI and 4 ISA	2 PCI and 4 ISA	2 PCI and 4 ISA
<b>Total expansion slots</b>	2 PCI, 4 ISA, and 1 PCI/ISA	3 PCI and 5 ISA	3 PCI and 5 ISA
<b>Installable RAM</b>	128MB	128MB	128MB
<b>Installed external cache</b>	256K	256K	256K
<b>On-board business audio</b>	no	no	no
<b>On-board SCSI</b>	no*	no	no
<b>Choice of software bundle</b>	one Lotus application	none	one application
<b>Windows version included</b>	Windows 3.1	Windows 3.1	WWG 3.11
<b>Other software included</b>	CD-ROM bundle	Sound Effects Library	Gateway 2000 bundle
<b>Warranty</b>	2 years, parts	1 year	1 year
<b>On-site service warranty</b>	first year	1 year	1 year

\*SCSI card included \*\*1280 x 1024/256 with 2MB on card, monitor capable of 1024 x 768

member that a cache holds data in anticipation that it will soon be needed by the processor, increasing speed by cutting down on hard drive access. The BAPCo tests were run with and without the controller. The overall difference in performance was a whopping 15 percent, taking the PowerStation from the slowest ranking to fourth place, and to the fastest for a few applications. The Green Cache controller supports up to four IDE drives, several different memory configurations, and a wealth of options for fine-tuning

**Micron P60PCI PowerStation CD**

**Direct price: \$4,388**

**Warranty: one year, parts and labor, including on-site service and lifetime tech support**

**Pros: caching controller, speed, space-saving design**

**Cons: expense, lack of speed without caching controller**

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Insight PCI P60 CD	Micron P60PCI PowerStation CD	MidWest Micro Elite P5-60 PCI	ZEOS Pantera
\$3,349	\$4,388	\$3,299	\$3,395
AMI 1.00.05.AFI	Phoenix for Pentium 1.03	AMI 1.00.03.AFI	Phoenix 4.02
tower	desktop	minitower	tower
yes	yes	yes	yes
ATI mach32	Diamond Viper PCI	Diamond Viper PCI	Diamond Viper PCI
1MB	2MB	1MB	2MB
1024 x 768/16**	1280 x 1024/256	1280 x 1024/16	1280 x 1024/256
1024 x 768/72Hz	1280 x 1024/60Hz	1280 x 1024/60Hz	1280 x 1024/74Hz
3.5"	3.5"	5.25" and 3.5"	3.5"
PCI slot	PCI slot	motherboard	motherboard
Intel PCI IDE	Green Cache DC-690B PCI	proprietary	proprietary
525MB	540MB	528MB	535MB
10 ms	10 ms	11 ms	12 ms
15"	15"	17"	15"
PCI	PCI	PCI	PCI
no	no	no	no
5	3	4	4
8	2	4	4
1 PCI and 4 ISA	1 PCI and 4 ISA	2 PCI and 3 ISA	2 PCI and 4 ISA
3 PCI and 5 ISA	3 PCI and 5 ISA	3 PCI and 4 ISA	3 PCI and 5 ISA
128MB	128MB	128MB	128MB
256K	256K	256K	256K
no	no	no	yes
no	no	no	yes
none	Microsoft Office	none	one Lotus application
Windows 3.1	Windows 3.1	WWG 3.11	WWG 3.11
4 CD-ROM titles	none	none	none
1 year	1 year	3 years	1 year
no	1 year	no	optional

# TEST LAB



hard drive access.

The PowerStation's graphics subsystem is powered by the Diamond Viper PCI. The ZEOS and MidWest Micro computers also use this adapter, and I noticed that both of them did relatively well on the graphics tests. The MidWest Micro system turned in a lower score, but it had only 1MB of video RAM, which can somewhat slow the display.

The system I reviewed came with WordPerfect for Windows, but by the time you read this, Micron will bundle Microsoft Office with its Pentiums. In addition, the systems will come with 66-MHz Pentium chips. You should note, however, that most tests to date have not revealed a significant performance difference between 60-MHz and 66-MHz chips. The 66-MHz chips are only slightly faster.

The PowerStation comes with a one-year on-site warranty. The technical support staff is knowledgeable. I really like this computer, but it costs more than \$1,000 more than some of the others, primarily because of the caching controller, which is necessary for the PowerStation to maintain its peppy performance.

Circle Reader Service Number 375

## MIDWEST MICRO ELITE P5-60 PCI

The Elite P5-60 PCI is the least expensive system reviewed here, and it's also the slowest. All of the other Pentium machines in this round-

**MidWest Micro Elite P5-60 PCI**  
**Direct price: \$3,299**  
**Warranty: three years, parts and labor; 30-day money-back guarantee**

**Pros: low price, 17-inch monitor, well-designed minitower, 5¼-inch floppy drive, three-year warranty**  
**Cons: relative lack of speed**

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**Fletcher, OH 45326**  
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up turned in better scores on the BAPCo tests. Be careful, however, not to purchase a computer based on speed tests alone. This minitower system still delivers Pentium performance and has many features to recommend it, including strong expansion options, a good graphics card, and a 17-inch monitor.

The sturdy, compact tower case has four accessible and four internal drive bays, which is more space than most people will ever need. The motherboard is easy to get to; you'd have no trouble inserting cards, installing memory, or adding new drives. Unlike most of the others, the Elite comes with a 5¼-inch floppy drive, which means you wouldn't have to add one.

The Diamond Viper PCI graphics adapter in this machine is the same card that's in some of the systems that turned in impressive speeds in this review. However, this one comes with only 1MB of DRAM. You'd have to purchase another MB to get the most from the high-resolution, 17-inch monitor (with 0.26-mm dot pitch). While it's not as elegant as the Gateway 2000 Crystal-Scan, the MidWest Micro monitor will serve all but the most critical high-end color graphics applications quite well.

Also impressive is MidWest Micro's three-year REAL warranty, which includes all components, such as the hard drive, monitor, and so on. Computers don't break down often, but it's reassuring to know

## TEST LAB PICKS

If you're choosing a Pentium system for a home-based office or small business, you really can't go wrong with any of these computers. Depending on your application, each of these workhorses has something to recommend it over the others.

Hands down, the MidWest Micro system is the best bargain. It has the lowest price and comes with a 17-inch monitor, which would cost you a few hundred dollars more with most other companies. However, the MidWest Micro is also the slowest computer reviewed here, and the monitor is not really good enough for high-end graphics work. If you're looking for speed and a good graphics display, go with the Gateway 2000 machine.

If you need a blazing performer, take a look at the Austin computer. It's the fastest of these seven, it's reasonably priced, and it comes with a SCSI card for added expansion.

The three tower systems reviewed here—from Gateway 2000, Insight, and ZEOS—are all ideal for network servers. They provide excellent drive and other expansion options. The Insight and Gateway 2000 computers are slightly faster; however, only the most demanding network environment would benefit noticeably from the performance difference.

—WILLIAM HARREL

that yours is covered well past the standard one year. In three years there will be a new processor standard anyway. You might be looking at a new system by then.

The Elite's documentation is a little sparse. If you like to add cards and other options yourself, you won't get much help from the manuals. However, I called technical support a few times, and the reps knew their computers well.

Again, I was disappointed with the Elite's performance on the BAPCo tests, but speed isn't everything—surely not a reason to disqualify this computer as a good value. Many people compute on a budget and are willing to sacrifice a benchmark point or two for a few hundred dollars.

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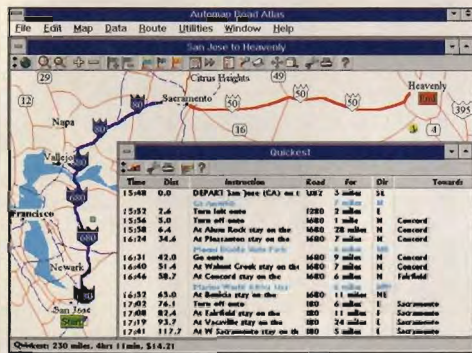
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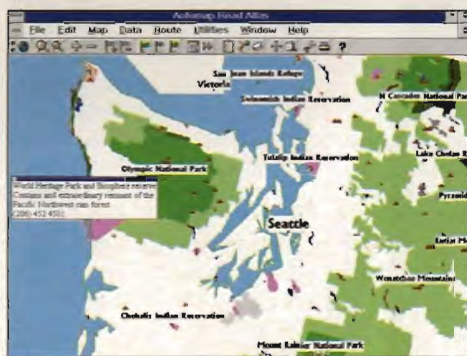
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11:49	At Olympia stay on the	IS	22 miles	N	Tacoma
12:10	Turn off onto	S512	2 miles	E	(Parkland)
12:11	At Parkland stay on the	S512	9 miles	E	(Puyallup)
12:20	At Puyallup go onto	S167	8 miles	N	Rainier
12:27	At Algona turn right onto	S76	3 miles	E	(Auburn)
12:29	At Auburn stay on the	S18	23 miles	E	(Issaquah)
12:55	Turn right onto	IR0	2 miles	E	Spokane
12:57	Take the	S202	1 mile	N	
12:58	Take the	Local road	2 miles		
13:02	ARRIVE Snoqualmie Falls (WA)				
13:02	DEPART Snoqualmie Falls	Local road	2 miles		
13:06	Take the	S202	6 miles	N	
13:12	Take the	S203	23 miles	N	(Monroe)

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# TEST LAB

## ZEOS PANTERA

Like the MidWest Micro system, the ZEOS Pantera did not turn in blazing results on the BAPCo benchmarks. However, of all these machines, this one has the most expansion options and impressive features. If you need a strong network server or have an application requiring potentially enormous storage capacity, check out this system.

Out of the box, the Pantera motherboard supports up to four IDE hard drives. There is also a SCSI-2 option, which allows you to run high-capacity SCSI drives and tape backup drives. To activate the SCSI option, all you do is plug in a chip, turn the SCSI option on in the machine's BIOS setup, and take off.

Also impressive is the Pantera's business audio feature. Unlike the system boards in the other computers, this system board comes

**ZEOS Pantera**  
**Direct price: \$3,395 (plus \$49 for SCSI option)**  
**Warranty: one year, parts and labor**

**Pros: built-in SCSI option and sound, most expansion options, well-designed case**  
**Cons: relative lack of speed**

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ready to support sound. Just plug your speakers or headphones into the back. There is also a jack for a microphone. Granted, the sound isn't comparable to the high-fidelity stereo sound you get from some high-end sound cards, but it's adequate for most applications.



Most people don't use sound with their computers often. Until now, though, you had to buy a Macintosh to get a system with sound built into the motherboard.

Speaking of the motherboard, the Pantera's is so spacious and accessible that you can drive a truck through it. Everything is easy to get to, including the memory banks, processor socket, and four motherboard plugs for the hard drives. ZEOS's documentation is thorough and easy to follow. The company also has an instant fax-back system, where you can get documentation on any of the components, such as the hard drive or graphics card.

I called the ZEOS 24-hour technical support line several times. Most often, I got through after a five-minute (or so) wait. Once, I was forced to leave a message. The Pantera line was just being released during the review period. The technicians had not been trained on these systems yet, but they did have access to pertinent documentation and the company's engineers. Typically, though, ZEOS provides great technical support.

If you're looking for the fastest computer around, look elsewhere. But if you need a sturdy system you can't outgrow, check out the Pantera. With up to four hard drives, built-in SCSI, and built-in business audio (which frees two ISA slots), this computer will serve you well now and into the future.

Circle Reader Service Number 377

## PENTIUM VERSUS POWERPC: WHICH WILL WIN THE DESKTOP WARS?

IBM and Apple are about to release a new computer chip that could revolutionize the desktop—the PowerPC. According to both companies, PowerPC computers, based on Motorola's PP601 RISC processor, will cost less and run much faster than the Pentium. And, to boot, they'll run not only Windows programs but also DOS programs and all Macintosh programs that run under System 7.

Theoretically, you'll get two computers in one. Windows will run under an interpreter developed by Insignia Solutions. Recent attempts at running Windows emulation software on Macintoshes have resulted in much too sluggish performance. Windows emulation on the PowerPC is expected to be better but not optimal. Experts are predicting that the PowerPC will run Windows programs with performance similar to that of a 25-MHz 486. If you've ever run graphics programs at this speed, you know they're a bit slow.

Macintosh applications should run faster, but where the PowerPC will excel is in applications written especially for the platform. Several companies, including IBM and Apple, are dedicated to developing PowerPC pro-

grams, but there aren't many available yet, and it could be a while before you see many. You'll probably never see as many PowerPC programs as Windows programs.

Will the PowerPC be less expensive? At first, possibly. However, Intel is poised and ready. The company has stepped up production of the Pentium chip. As you can see, from the accompanying reviews, Pentium prices are already reasonable, especially when compared to new releases of earlier technologies. Pentium prices currently run around \$3,000. The first PowerPCs are expected to weigh in at about \$2,000. However, wait a few more months, and you very well may see some Pentium systems encroaching on the \$2,000 mark. Systems based on 486 technology will cost less than \$1,000. The question is, How low can Apple and IBM go on the PowerPC?

The bottom line: More than 50,000 applications run on Intel machines. Don't bank on a new, yet-to-be-established platform. The PowerPC probably will make a difference. But it will be years before anybody loosens Intel's stranglehold on desktop computers.

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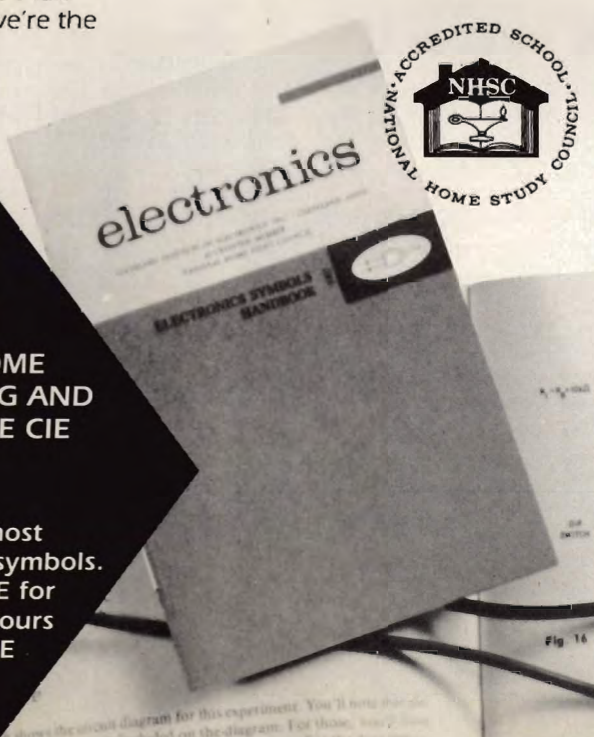
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# PROGRAMMING POWER

Tom Campbell

## MICROHELP'S HIGHEDIT

A few years ago the notion of "software ICs" spread like wildfire through the computing intelligentsia. The thought was that you should be able to plug software components like text editors and spreadsheets together with the same sort of cleanly defined interface that engineers employ to create electronic products using integrated circuits. I chuckled to myself because the notion was clearly years, if not decades, away. Vendors could never get it together to create such a cooperative programming environment... or could they?

Visual Basic was already one of Microsoft's top-selling products. Its custom controls had provided developers with a means of extending the Visual Basic programming environment without having the source code to Visual Basic itself, and they were already selling like suntan oil at a nudist colony.

Visual Basic controls, custom or not, work like this. A floating tool palette like the one you see in a paint or draw program contains a selection of control icons. You click on an icon and "paint" the control onto the screen. Most controls, such as list boxes, edit fields, and command buttons, are visible. A few, such as timers, are not. A control has methods, properties, and events. A method is a subroutine unique to that control, such as AddItem in a list box. A property is a configuration variable that can be read or written to, such as BackColor and ForeColor. An event is a user-modifiable subroutine such as Click and KeyPressed that fires when some part of the control is activated. The genius of Visual Basic is that Microsoft opens up

the custom control format and allows anyone to write custom controls that integrate Visual Basic applications quickly and easily. Just choose Add File from the File menu, choose the VBX file (internally, VBXs are DLLs) from \WINDOWS\SYSTEM, and voilà—the icon for the new control is added to your tool palette for this project. Microsoft and all the vendors I'll cover in coming months allow you to distribute the VBXs to users free, so the custom controls can become part of any Visual Basic application you care to sell. You need only pay for the control when you buy it for development. (An accompanying LIC file, which you most certainly may not distribute, identifies your system as a development environment and gives you programmatical access to the VBX control.)

One of the most asked-for custom controls on CompuServe is a text box with a capacity greater than the 50K or so built into Windows and that supports multiple fonts. MicroHelp (4359 Shallowford Industrial Parkway, Marietta, GA 30066; 404-516-0898) has filled that need with the impressive HighEdit, a custom control that handles multiple fonts, multiple windows, colored text, search and replace, left and right margins, left-justified tabs, text-only support for the Windows Clipboard, superscripts, subscripts, word wrap, and importing and exporting of ASCII files. Files can be stored in industry-standard Rich Text Format (RTF) or a proprietary HED format. There's also support for "input fields," which allow you to add mail merge to your edit control. While the documentation on input fields is somewhat sparse, they can be used for many other things, such as macros that stop and ask the user for input, or an indexing

scheme that uses invisible input fields to mark words to be indexed.

HighEdit maintains a superb balance between feature richness and flexibility. For example, there's a built-in toolbar that can't be customized, but you can easily disable it and supply your own, using standard Visual Basic techniques. Likewise, you can use HighEdit's handy built-in dialogs for font and color selection, file I/O, and search and replace, or you can use the Windows common dialogs.

The documentation for HighEdit is complete but not generous. There's no tutorial and little advice for structuring your program (for example, should you handle multiple windows within HighEdit or use MDI child windows?). Surprisingly, there was no mention of MicroHelp's other products, such as its SpellPro spelling checker, its Communications Library, or its Gizmos custom control pack, all of which can work seamlessly with HighEdit.

It seems to me that the comparison baseline for a product like this should be Write, which comes free with Windows. Here HighEdit has overlooked a few obvious features, such as undo, insertion of images via the Windows Clipboard, and decimal tabs. HighEdit is also quite slow compared to Write when loading files over about 100K. The reason for slow loads is usually that an editor is formatting the file internally as it loads, yet the HighEdit control still requires manual reformatting at times and doesn't paginate on the fly. I'd like to see those things changed. Tabs are also a bit awkward. Despite these shortcomings, HighEdit is a great way to get multiple fonts, big files, and mail merge into your next Visual Basic app with amazingly little work. □

**I chuckled to myself because the notion was clearly years, if not decades, away.**

so shall you reap.

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# TIPS & TOOLS

Edited by Richard C. Leinecker

## One-Line Time

In reading your November 1993 "Tips & Tools," I noted the ongoing quest for the simplest one-line time procedure. Here's my version. It's a batch file called FINDTIME.BAT.

```
@ECHO OFF
ECHO. | TIME | FINDis"
```

ECHO.I pipes an Enter key to the Time command. The problem with the Time command is that it waits for you to press Enter. This way there's an Enter key equivalent piped to it so it doesn't wait.

The output of the Time command is piped to Find, which filters out all but the line containing the string *is*. That's the line that reports the time.

SCOTT COILEY  
THOMASTON, ME

## Advance and Be Recognized

Have you ever forgotten your Windows screen-saver password? It can be a real hassle if you do. I've found a way to retype a password without knowing the old password. First, load your CONTROL.INI file into Notepad. Scroll down until you find a headline that says "[SCREEN SAVER]". After that it says "Password=" followed by your password in code. Delete everything to the right of the equal sign.

Save the file, exit Windows, and restart Windows. When you're back in Windows, open the Control Panel, select Desktop, open Screen Saver Setup, and type in your new password. Your new password will now work for the screen saver.

JESSE COURCHAINED  
SUN PRAIRIE, WI

## Multidisk BACK

You might recall that last month I published a tip from Kirill Semenov that used PKZIP

to back up files. His tip required the registered version of PKZIP to back up files over multiple disks. I spent some time working with his BACK.BAT program and came up with a small BASIC program that lets you use multiple disks even without the registered version of PKZIP. We at COMPUTE feel strongly that you should register PKZIP and any other shareware that you're using, but this work-around will help you get by while you wait for your registered version to arrive.

The BASIC program is Copybig, and the batch file (which is just a variation of Mr. Semenov's) is called BACK1.BAT. Replace the directories listed in BACK1.BAT with the names of the directories you want to back up. D:\WORK\TELIX and D:\WORK\CHESS are just examples. Make sure the floppies you use are completely blank. And make sure you don't overlap backup files on the floppies. If a large file takes 2½ disks, don't try to save anything else on the last disk. Continue the backup with a fresh disk.

To restore these files, you need the BASIC program Restbig and the batch file REST1.BAT.

Here is COPYBIG.BAS. Remember that an indented line is a continuation of the preceding line.

```
OPEN "ZIPFILE" FOR INPUT AS #1
INPUT #1, DR$
INPUT #1, FILE$
CLOSE #1
disknum% = 1
PRINT "Insert disk number ";
  disknum%; " then press a
  key . . ."
GOSUB WaitKey
DN$ = STR$(disknum%)
DRFILE$ = LEFT$(DR$, 2) +
  RIGHT$(DN$, 1) + FILE$
OPEN DRFILE$ FOR BINARY AS #2
LEN = 512
```

```
OPEN FILE$ FOR BINARY AS #1
LEN = 512
destpointer = 1
srcpointer = 1
ON ERROR GOTO DiskFull
TRANSFER$ = SPACE$(512)
CopyLoop:
GET #1, srcpointer, TRANSFER$
IF EOF(1) GOTO FileDone
srcpointer = srcpointer + 512
PUT #2, destpointer, TRANSFER$
destpointer = destpointer + 512
GOTO CopyLoop
DiskFull:
CLOSE #2
DRFILE$ = LEFT$(DR$, 2) +
  "MOREFILZ"
OPEN DRFILE$ FOR BINARY AS #2
CLOSE #2
BEEP
disknum% = disknum% + 1
PRINT "Insert disk number ";
  disknum%; " then press a
  key . . ."
GOSUB WaitKey
DN$ = STR$(disknum%)
DRFILE$ = LEFT$(DR$, 2) +
  RIGHT$(DN$, 1) + FILE$
OPEN DRFILE$ FOR BINARY AS #2
destpointer = 1
RESUME
WaitKey:
a$ = INKEY$
IF a$ = "" GOTO WaitKey
RETURN
FileDone:
PUT #2, destpointer, TRANSFER$
CLOSE #1
CLOSE #2
SYSTEM
```

Here is BACK1.BAT.

```
@ECHO OFF
ECHO.
IF "%1"==" " GOTO NOPARAMS
IF "%1"=="a:" GOTO BACKUP
IF "%1"=="A:" GOTO BACKUP
IF "%1"=="b:" GOTO BACKUP
IF "%1"=="B:" GOTO BACKUP
GOTO BAD_DRIVE
:BACKUP
CLS
ECHO WARNING: Backup process
ECHO may require multiple disks!
ECHO.
ECHO Insert first backup disk in
  drive %1.
PAUSE
```

Get access to  
Windows when your  
screen saver locks  
you out, and view the  
time from  
the command line.

```

ECHO.
ECHO Performing disk diagnostics
  on backup media . . .
CHKDSK /f %1
CLS
ECHO.
ECHO Backing up: D:\WORK\
ECHO TELIX and subdirectories
ECHO to TELIX.ZIP . . .
ECHO.
ECHO %1 > ZIPFILE
ECHO TELIX.ZIP >> ZIPFILE
PKZIP -rp TELIX D:\
  WORK\TELIX\*. *
QBASIC /RUN COPYBIG
DEL TELIX.ZIP
CLS
ECHO.
ECHO Backing up: D:\WORK\
ECHO CHESS and subdirectories
ECHO to CHESS.ZIP . . .
ECHO.
ECHO %1 > ZIPFILE
ECHO CHESS.ZIP >> ZIPFILE
PKZIP -rp CHESS D:\WORK\
  CHESS\*. *
QBASIC /RUN COPYBIG
DEL CHESS.ZIP
:DONE
CLS
ECHO.
ECHO Done!
ECHO.
ECHO Performing disk diagnostics
ECHO on backup media . . .
CHKDSK /f %1
DIR %1
GOTO END
:BAD_DRIVE
ECHO A hard disk is not
ECHO supported as a destination.
GOTO END
:NOPARAMS
ECHO Usage: BACK1 [DESTDRIVE]
:END

```

Here is RESTBIG.BAS.

```

OPEN "ZIPFILE" FOR INPUT AS #1
INPUT #1, DR$
INPUT #1, FILE$
CLOSE #1
disknum% = 1
GOSUB InsertNextDisk
OPEN FILE$ FOR BINARY AS #1
  LEN = 512
  destpointer = 1
  TRANSFER$ = SPACE$(512)
  CopyLoop:

```

```

  GET #2, srcpointer, TRANSFER$
  IF EOF(2) GOTO FileDone
  srcpointer = srcpointer + 512
  PUT #1, destpointer, TRANSFER$
  destpointer = destpointer + 512
  GOTO CopyLoop
InsertNextDisk:
ON ERROR GOTO
  InsertCorrectDisk
BEEP
PRINT "Insert disk number ";
  disknum%; " then press a
  key . . ."
GOSUB WaitKey
DN$ = STR$(disknum%)
DRFILE$ = LEFT$(DR$, 2) +
  RIGHT$(DN$, 1) + FILE$
OPEN DRFILE$ FOR INPUT AS #2
CLOSE #2
OPEN DRFILE$ FOR BINARY AS #2
  LEN = 512
  srcpointer = 1
  RETURN
InsertCorrectDisk:
BEEP
PRINT "Insert disk number ";
  disknum%; " then press a
  key . . ."
GOSUB WaitKey
RESUME
FileDone:
CLOSE #2
ON ERROR GOTO DoneCopying
DRFILE$ = LEFT$(DR$, 2) +
  "MOREFILZ"
OPEN DRFILE$ FOR INPUT AS #2
CLOSE #2
disknum% = disknum% + 1
GOSUB InsertNextDisk
GOTO CopyLoop
WaitKey:
a$ = INKEY$
IF a$ = "" GOTO WaitKey
RETURN
DoneCopying:
CLOSE #1
SYSTEM

```

Here is REST1.BAT.

```

@ECHO OFF
ECHO.
IF "%1"==" " GOTO NOPARAMS
IF "%1"=="a:" GOTO BACKUP
IF "%1"=="A:" GOTO BACKUP
IF "%1"=="b:" GOTO BACKUP
IF "%1"=="B:" GOTO BACKUP
GOTO BAD_DRIVE
:BACKUP

```

```

CLS
ECHO WARNING: Restore process
ECHO may span multiple disks!
ECHO.
ECHO Insert first backup disk in
ECHO drive %1.
PAUSE
ECHO.
ECHO Restoring: D:\WORK\TELIX
ECHO and subdirectories . . .
ECHO.
ECHO %1 > ZIPFILE
ECHO TELIX.ZIP >> ZIPFILE
QBASIC /RUN RESTBIG
PKUNZIP -d -O TELIX D:\WORK\
  TELIX\
DEL TELIX.ZIP
CLS
ECHO.
ECHO Restoring: D:\WORK\CHESS
ECHO and subdirectories . . .
ECHO.
ECHO %1 > ZIPFILE
ECHO CHESS.ZIP >> ZIPFILE
QBASIC /RUN RESTBIG
PKUNZIP -d -O CHESS D:\WORK\
  CHESS\
DEL CHESS.ZIP
:DONE
CLS
ECHO.
ECHO Done!
ECHO.
GOTO END
:BAD_DRIVE
ECHO A hard disk is not
ECHO supported as a destination.
GOTO END
:NOPARAMS
ECHO Usage: REST1
  [SOURCEDRIVE]
:END
RICHARD C. LEINECKER
REIDSVILLE, NC

```

**An update of last month's backup tip makes use of multiple disks.**

*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. All tips submitted become the property of General Media International. □*

## TECHNOLOGY UPDATE



## Don't let your money run out before you do!

Easy-to-use software tells you what to do now in order to be secure in your retirement years.

By Charles Anton

Someone once said, "old age is not for sissies." In fact, retirement years can be fun. But not if you ignore your health or your financial security!

To help you plan for retirement, a team of leading financial planning experts and computer programmers at MacKenzie Systems got together over the last three years to create Destiny—a computer program that lets you take control of your own financial destiny.

**Top planners.** The MacKenzie team, working with a major retirement association, talked to hundreds of people from all walks of life. People as young as 30, were beginning to worry about financial security for their retirement years.

While Destiny's calculations are sophisticated, running the program for yourself is as easy as one, two, three. You are prompted to answer some key questions and asked what expectations you have. Within a few seconds a spreadsheet and a series of graphs materialize with all the planning done for you.

**The Social Security myth.** Most people know you can't rely on social security alone to meet retirement needs. Destiny can answer this problem and many others. It uses information such as age, the assets you already own, your investment strategy and expenses you might have along the way, such as tuition for your children. If you are already retired, Destiny can show you how much you can safely spend each year.

**Can my money work harder?** As recently reported on CNN, the most common mistake people make in managing their savings is being too conservative. Destiny allows you to see the impact of following a more aggressive savings strategy at a comfortable level of risk.

By answering easy prompts on your monitor, the program stores essential information such as your age, your income, your investments and your assets. Then it tells you what you can expect to have in real dollars to take care of your security. If you'd like to change what the figures and graphs reveal for your future, you must go back to

### Your own portfolio manager.

With this program you can elect to have the personal Portfolio Manager take over. Whether you choose an aggressive approach, a standard approach or even a more conservative approach, the manager automatically selects a relatively more conservative one as you get closer to retirement.

Through Sector Management, the Portfolio Manager maintains a balance among high, moderate and low risk assets according to the allocation strategy that you choose. To maintain the right balance of investments, the manager adjusts your portfolio as time goes by. No other program incorporates these sophisticated calculations.

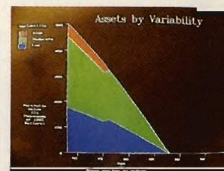


your original input and experiment with more 'put aside' money so that future income will be adequate to your wishes.

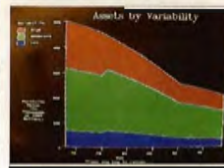
**And inflation?** Unfortunately, inflation is a fact of life. Inflation can be set at whatever level you estimate for the future in any plan you decide to follow.

The results can change in seconds to colorful graphs that tell exactly what to expect for each year of the future. Your retirement time, instead of being gray and uncertain, suddenly becomes cheerful, predictable and secure.

**Each projection could cost \$1000.** To have this personal information forecasted for any given situation by a financial advisor could cost up to \$1000. However, because this program is a moveable feast, forecast-wise, you can have as many projections as you like at one low price.



**Before.** Without a plan, you could run out of money.



**After.** Careful planning lets you live comfortably, even in your later years.

This offer is not available anywhere in the U.S. To introduce it to the public, Comtrad is offering the MacKenzie Retirement System complete with program disk, owner's manual and workbook for the low introductory price of only \$179, plus \$12 shipping and handling.

**Risk-Free technology.** The MacKenzie Retirement System is offered with a 30-day "No Questions Asked" return policy by Comtrad Industries, one of America's largest mail order houses for the past 10 years. Don't miss this opportunity to predict your future. Most orders are processed within 72 hours.

### Free book makes you an expert.

Order Destiny, and we'll send you the "Retirement Planning Workbook" absolutely free. It's not just another book about financial planning; its purpose is to increase your understanding of financial planning concepts. You'll also get an owner's manual and access to a technical question hotline.

Required: PC/XT or higher; minimum 640 K memory, a hard drive and MS-DOS 3.3 or higher.

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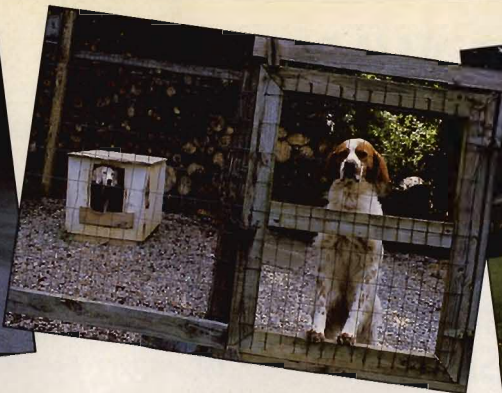


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# Could this be your dog?

New product by Radio Fence creates a hidden barrier to keep your dog in your yard and out of trouble. Finally, you can protect your dog from traffic and other dangerous situations without locking him in a pen.

By Charles Anton

All dog owners have the same dilemma. On one hand they want to give their dog the freedom to roam and exercise. On the other hand, they are worried about his safety.

Up until now the only solution was to install a costly conventional fence. Not anymore!

### No leashes or cages.

Now there's Radio Fence, the breakthrough alternative for dog owners. Radio Fence is an underground electrical barrier which works with a receiver on your dog's collar. It beeps your dog when he nears the boundary and gives him a small electrical correction if he tries to cross it. It keeps your dog safe and out of trouble without having to resort to expensive fences, runs ropes or chains that could injure your pet.

**A hidden barrier.** Radio Fence acts as a hidden barrier that gives your dog access to the whole yard but inhibits his movements into unwanted areas. Your prize-winning rose garden or pool will be safe. Unlike standard fences, Radio Fence does not detract from the beauty of your home or lawn.

### A hidden barrier that only your dog knows is there...

- No more ugly, expensive fences
- No more restrictive enclosures
- No more ruined flower beds
- No more knocked over trash cans
- No more complaining neighbors
- No more worrying about your dog's safety or protection



Radio Fence creates a hidden barrier around your yard that safely contains your pet.

### Safety and freedom.

Radio Fence will work with any size or breed of dog. The correction, which is similar to a static electricity charge, will not hurt your pet in any way.

Plus Radio Fence meets all FCC requirements, ensuring your dog's safety and giving you peace of mind.

### Custom boundary.

With Radio Fence, you will receive 500 feet of wire that can be easily installed in just two to three hours. The wire will accommodate up to a half-acre yard. The Radio Fence System also includes a transmitter with a signal powerful enough to broadcast to approximately two acres. If you want to expand your Radio Fence boundaries, simply order an additional roll of wire.

**Easy training.** By spending just fifteen minutes a day working with your dog, he will be fully trained in six to seven days. Radio Fence is more effective than other systems because it allows your pet to control the corrective treatment (which is definite but mild) and he soon learns to avoid it.

## HOW DOES IT WORK?

A crystal-tuned transmitter plugs into a standard outlet and emits a radio signal that travels along an underground wire. (The wire only needs to be buried an inch or two to prevent anyone from accidentally cutting or tripping over it.) The four-ounce receiver, worn on your pet's existing collar, picks up the radio signal and alerts him as he nears the hidden boundary that you have customized for

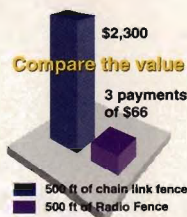
your yard. If he crosses the boundary, he will receive a small, electrical correction.

Keep your dog safe and out of trouble with Radio Fence.



You can train as many dogs as you want on the same system as long as they are each wearing a receiver collar.

**Affordable fence.** The maintenance-free design, low initial investment, and ease of installation offer tremendous savings. Other solutions could cost you thousands of dollars. Radio Fence is the economical and effective alternative to unsightly fencing.



**Three easy payments of \$66.** To introduce this product, we are offering it directly to you for a limited time at a special price. If you order now, Radio Fence is yours for only \$198. In fact, credit card customers can have the Radio Fence System in three easy monthly installments of \$66 (plus \$16 S&H). To train more dogs on one Radio Fence System, order additional receivers for only \$129 each, or you can make three payments of \$43 (plus \$8 S&H).

**Try it risk free.** At Comtrad, we back all our products with a "No Questions Asked" money-back guarantee. If you're not completely satisfied for any reason, just return Radio Fence within 60 days for a full refund. Radio Fence also comes with a one-year manufacturer's warranty and a one-year unconditional lightning warranty.

**Radio Fence.** The Radio Fence System includes a transmitter, a lightweight receiver for your pet's collar, an antennae, the boundary cable and the complete installation and training manual. Plus, you'll receive a helpful video that will make installation and training extremely simple.

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# HARDWARE CLINIC

Mark Minasi

## DOUBLE YOUR PLEASURE

The eternal question among computer users who bought machines in the late 1980s is, What can you do with an old 386 to jazz it up a bit?

Get a new motherboard. If you've been reading this column for the past few years, you know that I always recommend buying generic PCs so that motherboard upgrades are an option; if you buy from a maker of proprietary computers, then your computer will have an oddly shaped case and motherboard, rendering it incapable of accommodating a replacement motherboard.

But even if you can put a new motherboard in your computer, it'll cost about \$300 to \$800 for the board itself. And then you'll probably have to buy new RAM because the faster processor on the new motherboard will probably require it. Add the cost of eight 1MB SIMMs, and the upgrade price goes up about \$250, making the total upgrade cost a minimum of \$550 to \$1,050. For turning your old 20-MHz 386 into a 486DX2-66, \$1,050 isn't a bad price. It may not be within your budget, however.

A less expensive answer is to replace your CPU with a clock-doubling chip.

The notion of a clock doubler first appeared in 1991, when Intel announced the OverDrive and the 486DX2 CPU chips. Computer buyers want greater and greater speed, and one of the most important determinants of computer speed is the CPU speed. Consequently, there is ongoing pressure on Intel and other chip companies to turn out faster and faster CPUs.

While CPU speeds have increased tremendously, peripheral speeds have not. Most PCs have a lopsided design

that makes the wisdom of buying ever-faster processors a bit suspect. For example, I have a 486DX-50 on my desk. Let's compare it to a 1984-model XT. Speed benchmarks tell me that my CPU is 68 times faster than the XT's, and it can do floating-point calculations 1214 times faster than the XT. Let's contrast that with another area of computer technology—printing.

My laser printer prints about 270 characters per second (eight pages per minute, about 2000 bytes per page of text), in contrast to the 35-cps Spinwriter I used in 1984. As a result of the improvement in printer technology, my system is able to print about eight times faster than the XT.

Now consider mass storage. The XT's hard disk had a seek time of about 90 ms and a data transfer rate of about 150K per second. My more modern PC (which was, by the way, less expensive in 1993 dollars than the XT was in the more valuable 1984 dollars) has an access time of 8.9 ms and a data transfer rate of 1575K per second. Both printing and mass storage technology have gone through approximately a tenfold improvement over the past decade.

In short, the newer PC has an engine that can put out about 70 times the horsepower, but its tires—the printer and hard disk—can only let it drive about 10 times faster. If we were looking to make a faster PC, we'd be better off if we got a disk drive with a 1.4-ms access time and a data transfer rate of about 10MB per second, and a printer that turns out 100 pages per minute.

Before you point out that you have a disk drive that shows a 0.4-ms access time and a data transfer rate of 6MB per second, look again. If your disk drive reports those statistics, then it probably has

been equipped with some kind of cache. Caches render the results of disk benchmark programs nonsensical.

If you want your computer to be faster, you should be spending your money on faster peripherals rather than faster CPUs. Having gotten that out of the way, however, let's see what your options are for getting faster CPUs into an existing system.

The best-known options are the Intel clock-doubling chips mentioned earlier. They are only usable in existing 486DX systems. As Intel built faster and faster CPUs, it became a victim of its own success. Why? A system's motherboard must run at the CPU's speed. The difficulty of building motherboards increases exponentially as speeds rise, so moving from 12-MHz motherboards to 25-MHz motherboards is much easier than moving from 25-MHz motherboards to 50-MHz motherboards. Consequently, Intel's announced intention back in 1989 to offer a 100-MHz 486DX "soon" caused engineers to worry. Could they build a 100-MHz system to wrap around the new chip?

The answer to this conundrum seemed to be a clock doubler—a chip that could run at high speeds but on slow motherboards. It accomplished this by communicating with the outside world (the motherboard) at one speed, then performing internal operations at twice that speed.

For example, the first of these chips released was the Intel 486DX2-50, which communicates with a motherboard at 25 MHz but operates internally at 50 MHz. Specifically, an operation that does not require outside data access, such as adding two numbers that are already contained in the processor's registers (registers are very small areas of

**Multiply the speed of your computer by installing a clock-doubling chip.**

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**Clock doublers and clock triplers will speed up the processor, but your system may lag.**

memory in the CPU), executes at 50 MHz. An operation that requires outside access, such as writing or reading information to or from memory (including the program currently operating), happens at only 25 MHz.

You might think that since a normal CPU constantly accesses memory to read programs and data, most of the operations would end up taking place at 25 MHz, and very few would run at 50 MHz. That would be true except for the existence of a small area of memory called a processor cache (which is generally 8K). Often-used code or data can be kept in the internal cache, allowing small programs to run entirely inside the CPU at 50 MHz. (Communication to the external processor cache—the 64K or 256K of cache referred to in the computer ads—still operates, unfortunately, at 25 MHz.)

The beauty of the DX2 chip is that you can take an existing 25-MHz 486DX, replace the CPU with a 486DX2, and instantly get a speed boost. It won't be a 100-percent speed boost, but the 60- to 80-percent improvement you'll see isn't bad. The processors aren't inexpensive, however. A 50-MHz DX2 costs around \$350 (street price) and a 66-MHz DX2 costs around \$500.

Don't confuse a 486DX-50 and a 486DX2-50; the DX-50 is a 50-MHz chip that requires a 50-MHz motherboard, while the DX2-50 is a hybrid that runs at 50 MHz internally but only at 25 MHz on the motherboard. The DX2-66 will instantly upgrade any 33-MHz 486DX machine. Unfortunately, Intel doesn't offer an upgrade for the DX-50; there is no DX2-100.

For those with 386DX systems, there are clock doubler chips as well, but not from Intel. These chips come from Cy-

rix, makers of clones of Intel processors. The 386 clock doubler comes in two varieties, a 386DX doubler and a 386SX doubler, respectively called the 486DRx2 and the 486SRx2. These are not 486s, and they don't convert your 386 to a 486, no matter what the writing on the outside of the box says. There's no math coprocessor and no 8K cache. There is a 1K cache built into these chips, which helps speed them up. That cache requires a driver to wake it up, so you have to install cache support software along with the chip.

Installing the DRx2 is pretty easy. The 386-to-486 kit comes with a chip puller that makes extracting the old 386 remarkably easy. (I say *remarkably easy* because previously I've removed CPUs with a small screwdriver and a lot of patience. You see, you pry up one corner a trifle, then you move on to the next corner and pry it up a trifle, and so on. It works, but the chip puller is better.)

What about installing an upgrade for a 386SX, though? Most 386SXs are surface-mount soldered right onto the motherboard, so no chip puller will be of help here. Cyrix has packaged its 386SX upgrade with a nifty piggyback package: You needn't remove the old CPU; you need only clip the CPU upgrade right on top of the existing chip. It's pretty easy. The result for a 386SX or 386DX is an improvement of about 50 to 80 percent, depending on which benchmarks you run. You can find the Cyrix upgrade kits from mail-order houses for about \$250-\$300, depending on what speed chip you need. At this writing, there are only clock doublers for 16-MHz and 25-MHz 386 systems (you can use the 25-MHz upgrade for 20-MHz systems); if you've

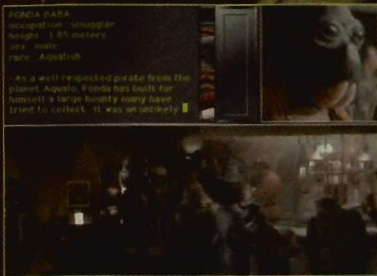
got a 33-MHz system, then you'll have to wait until the 33-MHz clock doubler ships, and if you've got a 40-MHz 386, then you're out of luck, at least for the moment (but keep your eyes open). By the way, in most cases your current math coprocessor will continue to work fine, if you've got one, but some really old 387DX chips may not work with the doublers. If you've got an old 16-MHz 386 system, call Cyrix to find out if you'll have compatibility problems.

Intel is not letting grass grow under its feet. It will soon ship a clock tripler, accelerating 25-MHz 486 systems to 75 MHz and 33-MHz systems to 99 MHz (the ads will say 100 MHz). Despite the fact that it's a clock tripler, the name of the chip is the 486DX4. I can't wait to pop one in my 33-MHz 486DX server and watch it fly.

There's more to the DX4 than just clock tripling. For one thing, Intel went back to the drawing board and redesigned much of the chip from scratch, yielding a chip that runs cooler than the DX2. That's particularly important for laptop users: I know of some DX2 laptops that have actually had keys on the keyboard melt because of the heat of the processor. Further, the DX4 doesn't have 8K but rather 16K of internal cache.

Should you buy a doubler or a tripler? It depends on what you're doing, and what your system looks like currently. If you're doing graphical things, then spending \$300 to upgrade to a very fast video card may be a better buy. If you're running Windows on a 4MB machine, then upgrading to 8MB will probably produce better speed improvements. But for a kick in raw processing power, it's probably worth getting the doublers. They're reasonably priced and very compatible. □

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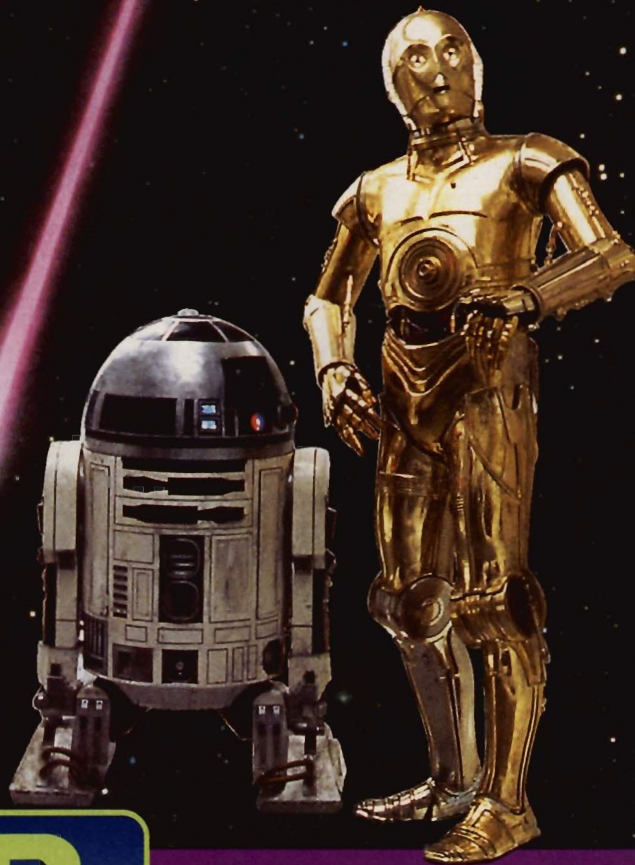


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# CHIPS AH-OY:

## The New CPUs

**Choosing a chip can seem complicated, but all you have to do is ask yourself what you need.**

Once it was easy. When you wanted a new computer with a blazingly hot central processing unit (CPU), you just bought one with Intel's newest record breaker, and all was right. Those days are gone. Now, you have to face an alphabet soup of chip makers: Advanced Micro Devices (AMD), Cyrix, Texas Instruments, and even IBM. Making matters even more confusing, Intel is producing a bewildering array of chips. And, as if that weren't bad enough, there are all these exotic chips like the PowerPC and the Alpha, which just might represent the future of computing.

What's a buyer to do? Well, fasten your seat belt, because we're off on a full-speed-ahead journey into the land of chips. Once you know what you need out of your chip, all you have to do is look over your choices.

### **The Basics**

It seems as if all of the PC CPU makers give their chips names that make them *sound* compatible with Intel chips. But how do you know that the x86 chips from all these vendors will really be compatible with your DOS and Windows programs? I was unable to find solid claims of any major program or operating system failing on any of the non-Intel chips. In my testing experience, I have yet to see even

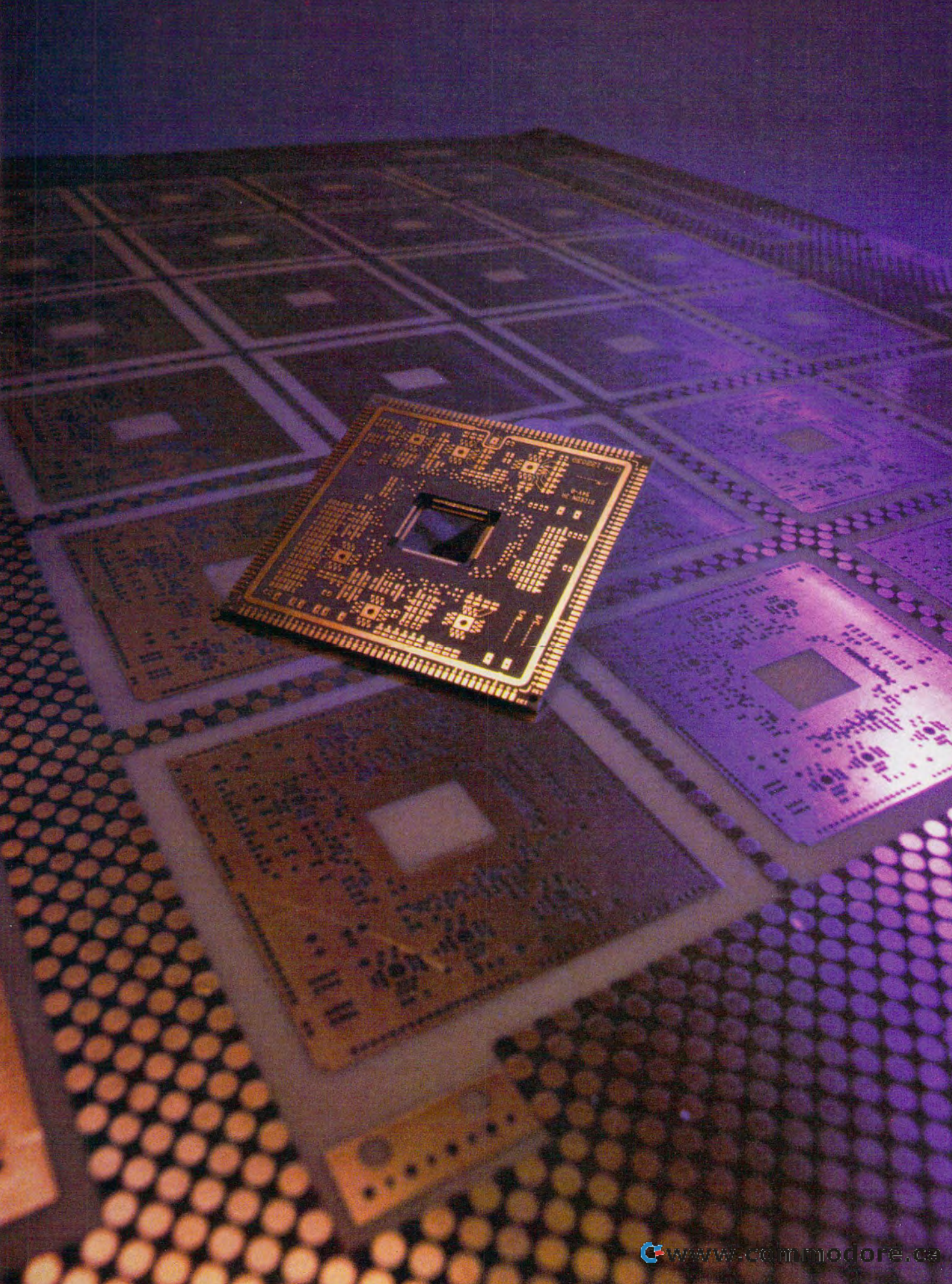
one oddity. When it comes to compatibility, you can rest easy; any x86 chip you buy today will be able to run your software.

A much harder question to answer is how fast these chips are when compared to one another. This becomes especially perplexing given the names that chips go by these days. For example, a Cyrix Cx486SLC has 486 in its name, but it acts like a 32-bit 486 only when the data is actually *inside* the chip. For data input and output, it relies on a 16-bit bus. So why bother with it? The Cx486SLC is priced and marketed to compete not against i486s, but i386SXs. Cyrix makes no bones about this: The SLC is meant to be today's low-end chip, not a middle-of-the-road 486 competitor. The newer Cx486SLC2 chips have speeds up to 50 MHz and a 32-bit external bus.

Another concern many users share is that their chip vendors might go up in smoke one day because of lawsuits. While it's true that lawsuits among chip makers are becoming more common, it's unlikely that any of the major vendors will be driven out of business. Most of the judicial battles have been won by the smaller companies, and there's little to show that the trend might reverse.

Cyrix will continue to make Intel-compatible CPUs. Intel, in the face of losing several court decisions to Cyrix,

**By Steven J. Vaughan-Nichols**



agreed in February to a settlement. While Intel may yet appeal some of the decisions that have gone against it, it now seems clear that Cyrix will be in the x86 chip business for the long haul.

### Good Chips, Good Decisions

If you're like most PC buyers, you're probably asking yourself, "How can I pick the right CPU?" There is no right or wrong CPU. The only question is whether the chip you select will deliver the performance you require. But before we talk about chips, you have to realize that the CPU is only part of the story. Overall system performance should concern you more than CPU performance.

Before you go out and buy a system, get all the information you can on its overall track record. Remember that a computer can perform only as fast as its slowest component. The components that can make a computer look like either a snail or a lightning bolt are the video card and the hard disk; their speeds vary the most.

A standard benchmark for video card performance is the WinMark. It's possible to cheat on the WinMark (some video card manufacturers are alleged to have built in circuitry that checks to see whether WinMark is

running and, if it is, generates impressive results), so the numbers generated by the test aren't foolproof. Also, there are different versions of WinMark available, which might generate different ratings. But generally, a rating above 12 million would indicate a fast video card, and a rating below 8 million would indicate a card with dismal performance. More and more, manufacturers are installing slow video to keep system prices low. Watch out for that practice.

You don't want to buy a hard disk with an access time of 40 milliseconds or above. When you buy a system, get the fastest hard disk available and install caches to speed it up even more. Generally, disk compression doesn't appreciably change a hard disk's performance.

You will want to buy a system with an EISA expansion bus and probably a VL-bus (VESA local bus) or PCI bus (Intel local bus) unless your work doesn't depend on a high-speed bus.

You'll want to buy a system with the fastest RAM available that you can afford. Even very fast RAM might have trouble keeping up with the hottest CPUs available, and for that reason, you should also look for systems with secondary caches of very fast memo-

ry—a cache of 256K is a minimum.

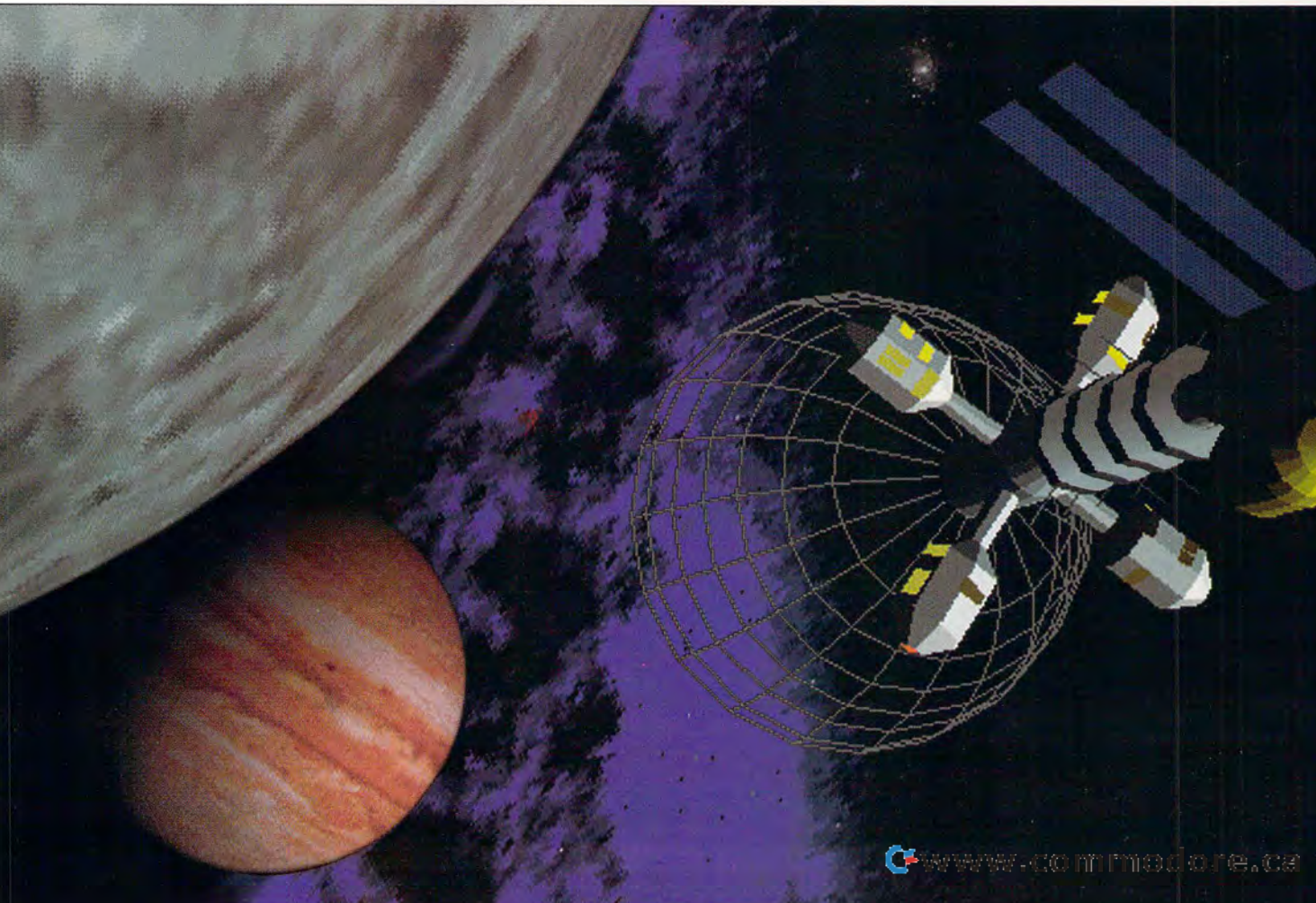
A good system is like a good team: It must be made up of good individual performers. A hot CPU will chill out if it's part of a low-performing team. But once you've made sure your system has what it takes, it's time to choose a CPU, and that's what this feature is about. The broad range of chips can generally be broken down into low-end, middle-of-the-road, and hot performers. We'll cover each of these in turn.

### The Low End

A 486 may be nice, but when your bank account is more important than your megaflops (a measure of CPU speed expressed in millions of floating-point operations per second), a 386 computer can still fill the bill. Here, your choices come down to Intel, AMD, and a pair of low-end Cyrix chips.

Intel still offers its 386DX and 386SX chips, but the real winner here is AMD. AMD's 40-MHz Am386DX-40 and Am386DXL-40 are the fastest 386 chips on the market. You'll find the Am386DX-40 in desktop machines, while the DXL, which uses only 3.3 volts of electricity, is usually found in laptops.

You might also want to consider systems with a Cyrix Cx486SLC. It comes in speeds of up to 33 MHz. In





some ways, this chip is an odd duck. It's a perfect fit for an i386SX socket, but internally, it works like an i486SX. Unfortunately, although manufacturers find building a system around the Cx486SLC simple because of its 386SX compatibility, these systems are stuck with the 386SX's slow 16-bit external data bus.

Inside the Cx486SLC (and its low-powered laptop brother, the Cx486SLCe), there's a 32-bit data path and a 1K internal cache. It's a tiny cache, but it does improve the Cx486SLC's performance. The chip includes the entire i486SX instruction set. Nor is the Cx486SLC a mere i486SX copy internally. It goes beyond the i486SX by including its own caching and power management instructions.

While the Cx486SLC doesn't compare well against the 486SX in terms of performance, it's another story when comparing it to the 386. Here, the top-of-the-line 33-MHz Cx486SLC fares well against the fastest Intel and AMD 386 chips.

The next Cyrix chip family, the Cx486DLC, zips past the 386 chips. Although it's pin compatible with a 386DX socket, the Cx486DLC comes with an i486SX instruction set with 32-

bit internal and external data paths and a 1K cache. Like the i486SX, the Cx486DLC doesn't have a math coprocessor. While the Cx486DLC blows the doors off 386DX chips, it's more of a dead heat between the Cx486DLC and the 486SX family.

The bottom line on these low-end chips is that the DLC demands your attention for fast 386-level performance. If cost is a serious issue, the AMD 386 or the Cx486SLC should be your first choice.

### The Middle of the Road

Did you ever think you'd see the day when an Intel 33-MHz 486DX would be thought of as an average chip? That day is here. Still, even power users shouldn't overlook the i486 family. With the exception of such advanced operating systems as NextStep and Windows NT, almost no software seriously pushes the limits of a fast 486.

Any discussion of 486s must start with the Intel family. These chips, with their internal and external 32-bit data buses and 8K caches, still define today's computing. The i486DX CPUs range from 25 MHz to 50 MHz. The 33-MHz i486DX is by far the most popular member of the family. This is because of the perception that the 25-

MHz i486DX is too slow for the jobs requiring a 486. The 50-MHz model suffers from overheating to this day. In addition, Intel is swinging its emphasis for high-end computing from the 50-MHz chips to the Pentium.

Edging in on Intel's territory, AMD and Cyrix are now serious contenders in the 486 wars as well.

AMD led the assault on the i486. For years, Intel and AMD have slugged it out in court. One legal challenge has to do with whether AMD can use Intel microcode; the other challenge is whether AMD can produce 486s using clean-room techniques. In clean-room engineering, engineers produce a chip that's similar to the original but not based on the original design. Rather than cloning the chip, the clean-room engineers try to create a chip that reproduces the original chip's actions and reactions. Intel's contention is that AMD doesn't have the right to do either.


Despite Intel's opinion, AMD will soon have not one, but two, full lines of 486 chips: one using Intel microcode and the other using code created using clean-room techniques. If Intel wins its suit claiming that AMD has no right to use its microcode in its 486DX chips, AMD will be prepared to

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switch its 486DX to code developed using clean-room techniques.

Today, there is an AMD alternative to virtually all i486 chips. For the i486DX-33, there's the Am486DX-33; for the i486SX-33, there's the Am486SX-33; and so on. The only Intel CPU for which AMD has yet to develop a direct competitor is the i486DX-50 chip.

In addition to the Intel twins, AMD also makes several chips that don't have Intel counterparts: the 40-MHz Am486 CPU family. In this group, you'll find both SX and DX versions. AMD also makes low-voltage chips that use an SMM compatible with Microsoft APM-aware applications (APM and SMM are explained in the sidebar titled "Chiptionary"). Some of these chips, like the 33-MHz Am486DXLV (pin compatible with the i486DX-33) can be powered down to a complete stop without losing data. Clearly, these chips will soon be popping up in laptops and green (environmentally friendly) PCs.

AMD is taking the offensive in the 486 wars. Compaq, the second-largest manufacturer of IBM-compatible PCs, is expected to be making systems built around AMD chips by the time you read this.

The Cyrix Cx486S series is pin compatible with the i486SX, and in most ways the Cx486S chips work just like their Intel equivalents. The most important difference, however, is that the Cx486S has only a 2K internal cache (the i486SX has an 8K internal cache). On the plus side, Cyrix's chips can slow down to a dead stop without losing information. This makes the Cx486S a natural for laptop vendors. Cyrix, like AMD, also has a 40-MHz i486SX-style chip for which Intel has no equivalent.

Cyrix also makes 486DX chips. The Cyrix Cx486DX50, Cx486DX40, and Cx486DX33 have 32-bit data paths and 8K caches just like their Intel counterparts.

## Double Time

The newest trend in 486s is the clock doubler. This is a chip that transmits and receives data at one speed and processes data internally at another speed that's twice the input/output speed. For example, a 25/50-MHz i486DX2 takes in and sends out data at 25 MHz. Inside the same chip, the data is processed at 50 MHz.

Once more, Intel leads the way in chip progress. The company's i486DX2 comes in models that run at 25/50 MHz and 33/66 MHz. Like their DX brothers, these chips come with 8K caches, built-in FPUs (see the sidebar titled "Chiptionary"), and 32-bit data paths. If you want Intel reliability and a strong processor, the 33/66-MHz i486DX2 demands your attention.

By the time you read this, AMD and Cyrix will each have a DX2 chip. This time, though, they're not the only major players. Texas Instruments (TI) and IBM are also in this round.

AMD offers both 25/50- and 33/66-MHz processors. AMD is also developing a 486SX-style clock doubler—the Am486SX2-50. With the exception of this last chip, the

AMD models look and act like the equivalent Intel chips.

Cyrix also has its clock doublers in 25/50 and 33/66 brands. The Cx486DX2s differ from Intel's and AMD's in two ways. First, the Cyrix chips use 8K write-back caches. In write-back caches, the tiny cache holds data until the system is rel-

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actively idle before committing the data to main memory or disk.

This results in a small but perceptible performance boost.

The other difference is that Cyrix claims its built-in FPU is faster than those used in equivalent 486s.

Texas Instruments, building on Cyrix's technology, has its s

own clock-doubling 486s: the 486SXLC2s. These chips, like the Cx486SLC, fit into 386SX sockets and use the 486SX instruction set. The important difference here is that the SXLC2 has an 8K cache. This chip comes in 20/40-MHz and 25/50-MHz flavors.

The SXLC is not the end of the TI 486 story. TI's Rio Grande project will produce chips that combine the 25/50-MHz TI486SXLC2's core with a memory controller and a Peripheral Component Interconnect (PCI) local-bus controller. Throw in low power consumption and size, and TI should establish the standard high-end chip for notebook and laptop computing for the rest of the year.

IBM has the fastest 486-style CPU of all. The company's Blue Lightning chip is a clock-tripling microprocessor. To communicate with the rest of the computer, the Blue Lightning runs at 33 MHz, but internally, it blasts along at 99 MHz. In addition, the Blue Lightning has a 16K cache—twice as large as those of its competitors.

The Blue Lightning has only one disadvantage: It doesn't come with a

built-in math coprocessor. Still, if your applications don't need FPU power, a Blue Lightning-equipped PC is the current 486 power champ. Its reign may not last long, though. AMD will soon enter the lists with its own clock-tripling CPU, and Intel plans to release a clock tripler called (confusingly enough) the DX4. The DX4 will be available in 75-, 83-, and 100-MHz speeds.

### The Replaceables

Not everyone can afford to buy a new computer every time the industry has a new champion. If you're in that situation, you're in luck. Cyrix offers several upgrade chips, and there's always the shimmering promise of Pentium upgradability.

The CxDRx<sup>2</sup> gives users a single-chip solution for upgrading 386DX computers. This clock-doubled 486 CPU fits into the 386 socket and brings with it 32-bit addressing and a 1K cache. The closest relative to this chip is the Cx486DLC.

These chips can give 16-, 20-, and 25-MHz 386DXs new life. The Cyrix CPUs run internally at twice the speed of the chips they're replacing. Unfortunately, while Cyrix will be bringing out 386DX replacement chips, there are no current plans for 33- or 40-MHz 386SX replacement CPUs.

The replacement chips that most people know about are Intel's OverDrive chips. An OverDrive chip boosts a standard 486SX or 486DX to 486DX2 performance and speeds. Also promised is a next-generation OverDrive chip based on Pentium technology that will boost 486DX and 486DX2 systems to new performance levels.

Also coming from Intel is a Pentium upgrade chip for 486 machines with special Pentium upgrade sockets. The chip is currently called the P24T, and it is expected to run at speeds up to 100 MHz. System buyer beware: Many systems with Pentium upgrade sockets will not

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be able to use the new chip because of system design. Intel has started an Intel Compatibility Lab to certify systems as P24T-ready. The chip is expected to be a fully functioning Pentium except that it will have a 32-bit data bus instead of the Pentium's standard 64-bit data bus. Is the rumored 486 OverDrive chip the same thing as the chip now known as the P24T? Only time will tell.

### The High End

At the high end, the Intel Pentium stands alone, at least for now. The Pentium, with its 60- to 66-MHz clock speed, runs much faster than any other chip in the x86 family. Pentiums with speeds of 90 and 100 MHz should be appearing as you read this.

But pure MHz numbers tell only part of the story. The Pentium's advanced design, with its superscalar

architecture, dual 8K caches, and two integer execution units, breaks all former x86 architecture speed records. How good is it? With plain, old software, a 66-MHz Pentium is almost twice as fast as an i486DX2-66. Give the Pentium some software that's been optimized for it, and it will leave the other x86 chips in the dust.

Recent releases from Intel describe the 90- and 100-MHz Pentiums as the most powerful chips on the market. The 66-MHz Pentium is expected to be the midrange CPU in a year, and the clock-tripled DX4 will be the standard for mobile computing. These same releases speak tantalizingly of a P6, a new high-end chip to replace the Pentium.

Roaring up to challenge the Pentium is AMD's clock-tripled 486 and Cyrix's M1 chip (at the time this is being prepared, M1 is the code name

for the Cyrix Pentium challenger; the chip's name could change by the time it's released on the market). AMD is also working on a direct challenger to the Pentium known (at least for now) as the K5. Details on these chips are sketchy at press time, but you can safely assume that the new CPUs will perform at speeds close to the 60-MHz Pentiums, though the manufacturers like to say, "Pentium performance or better." One stated that a 100-MHz Pentium challenger would appear.

### Raising the Roof

The x86 family is no longer the only game in town. RISC chips are rushing out from the workstation world to assault the PC's CISC land (*RISC* and *CISC* are both explained in the sidebar titled "Chiptionary"). Why, after attempts to enter the PC market that were so feeble that almost no one noticed, are RISC chips now becoming a factor in the PC market? The answer is Windows NT. Windows NT is a PC user-friendly operating system that doesn't run just on PCs.

Leading the way is the Alpha chip from Digital Equipment Company (DEC). The Alpha 21064 can run as fast as 200 MHz (DEC has promised even higher speeds to come). In addition to speed, it offers 64-bit internal and external buses and a 16K internal cache. The Alpha is simply the fastest PC chip in the land. It won't run standard DOS, but a special form of Windows NT has been written for the Alpha, and you can run DOS software under Windows NT, so an Alpha machine could be considered as an alternative to a standard PC (though a very expensive one).

A company named MIPS is also demanding attention with its R4000 series. The 64-bit R4000 chips can run as fast as 150 MHz and have up to a 32K internal cache. You may never have heard of MIPS, but its chips have what it takes to make an impact on at least the network server side of the PC world. Nintendo plans to use MIPS chips in its high-end game machines starting in 1995, so you may encounter them there, if nowhere else.

As fast and powerful as the Alpha and the R4000 are, the chip that really has the Intel-bound contingent of PC users talking is the PowerPC. This chip family has the backing of three of the PC's superpowers: Apple, IBM, and Motorola.

The PowerPC 601, the first of the series, will soon be appearing in shops everywhere as the heart of the new PowerPC Macintoshes. This chip boasts a 32K cache, 64-bit internal

## Microscope on CPUs

What are the features to bear in mind when selecting a PC based on its CPU or when selecting a CPU for an upgrade? AMD spokesperson David Frink and Cyrix spokesperson Katherine Dockerill list the following.

- Price
- Speed
- Internal bus width
- External bus width
- Size of internal cache
- Clock doubling
- Microcode
- Compatibility

AMD and Cyrix have based their success on undercutting Intel prices and matching the speed of Intel chips. Internal and external bus widths are determined by the requirements of your system. Remember, though, that 386SX chips have 32-bit internal buses and 16-bit external buses. The 386DX and all 486 chips have 32-bit internal and external buses. "An 8K internal cache is considered an industry standard [for 486s]," Frink says. Although some 386 replacement chips have 1K internal caches, you should always make sure a 486 chip has an 8K (or larger) internal cache.

By the time you read this, AMD will have released a clock-doubled Am486SX-50 chip that is expected to drive the cost of 486SX systems to the current level of 386 systems while giving them processor speeds that can compete with 486DX chips. Intel is expected to introduce a similar chip late in the spring. But don't count the 386 out yet. AMD sold 1.5

million 386 chips in the last quarter of 1993 and expected to sell another 1.5 million in the first quarter of 1994.

Another interesting development is the clock-doubled version of AMD's 40-MHz chips, providing 80-MHz performance.

*Microcode* refers to the hard-wired instructions within the CPU—the software that tells the chip what to do with the information it receives.

Compatibility comes last because chip makers ensure that their chips are completely compatible with those of industry leader Intel before they leave the design stage. "People don't buy a system based on the internal workings of the CPU but based on whether it runs software," Frink says.

The AMD K5 chip (the Pentium competitor) will operate on 3.3 volts and feature a static clock, which means that the chip can literally shut itself down without data loss in between keystrokes, or any other time it's idle. This should significantly reduce power consumption and heat, the twin bugbears of superfast CPUs. The K5 will be based entirely on AMD-developed architecture and microcode.

The Pentium will run x86 code at standard 486 speed; the code must be recompiled with a compiler optimized for the Pentium to achieve speeds faster than that. But Cyrix's M1 processor will run existing x86 code at higher speeds without recompiling.

—ROBERT BIXBY

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## Chiptionary

**APM.** Advanced Power Management. APM is an Intel/Microsoft application program interface (API) that enables programs to slow down a computer's components when they aren't needed.

**CISC.** Complex Instruction Set Computer. This kind of chip, like all the Intel processors and Motorola's 680x0 chips, has a large number of instructions embedded into the microcode. This makes the chips easier to program for, but their complex designs are harder to upgrade.

**clock doubler.** Some chips, known as clock doublers, take data in and out at one speed but process the data inside the chip at double that speed. The advantage is that CPU-intensive programs, like graphics, run much faster. The newer clock triplers go even faster by running internally at triple their I/O speeds.

**external cache.** The external cache is also known as the L2 cache. You probably know that caches, like SMARTDrive, hold data in memory so that your CPU can get to it faster than by going to your hard drive or floppy drive. You may not know that main memory itself is not fast enough to keep up with your CPU's never-ending hunger for data. To feed your CPU the data it needs, many computer manufacturers put in small amounts of very fast—and expensive—RAM that

stores data for quicker access by the CPU. Typically, external caches are 128K to 256K in size.

**FPU.** See **math coprocessor**.  
**internal cache.** The internal cache is also known as the L1 cache. Some chips have a tiny amount of very fast RAM on the chips themselves. This internal cache RAM, typically from 1K to 16K, holds data and instructions from main memory. By storing this data in ultrafast memory within the CPU, the chip is able to work more efficiently.

**math coprocessor.** Math coprocessors, also known as floating-point units (FPUs), quickly perform math calculations that normal CPUs don't do well. To make these floating-point calculations zoom, you need either a chip with a math coprocessor built in (like the i486DX) or a math coprocessor chip (such as the i387) to work in tandem with your main CPU. One note of caution: Math coprocessors do not normally help spreadsheet or financial software; graphics and CAD/CAM programs (like AutoCAD) benefit from a math coprocessor.

**microcode.** A chip's basic operating instructions.

**pin compatible.** A chip is said to be pin compatible when its pins will exactly match up with the socket openings for another chip. For

instance, a Cyrix Cx486S is pin compatible with sockets designed for an i486SX CPU.

**RISC.** Reduced Instruction Set Computer. This kind of chip has a simple design with few microcode instructions, thereby making for more efficient computers. While more difficult to program for than CISC chips, RISC chips can be quickly upgraded. In short, in the race between CISC and RISC for CPU dominance, many designers believe that RISC must eventually win out.

**SMM.** System Management Mode. Chips with SMM, like the IBM 386SL, can respond to APM instructions.

**superscalar.** A computing method in which several instructions are run at once on a chip's parallel processors. This is a common technique in RISC designs to speed up calculations.

**x-bit architecture.** When salespeople talk about a system with 16-bit, 32-bit, or 64-bit architecture, they're referring to the maximum data block size that can be processed by the CPU. With most chips the numbers are the same. For example, a 286 has a 16-bit data throughput and works internally with 16-bit chunks of data. The 386SX and most Pentium systems don't do this. The 386SX can take in and push out data only in 16-bit pieces, even though the data is processed internally as 32-bit chunks.

and external data buses, and 66-MHz speed. Although comparing CPUs of different types isn't easy (comparing clock speeds alone isn't enough because some chips accomplish more tasks per cycle than others), the 601 seems to improve on the 66-MHz Pentium's performance.

Things will only continue to get faster from there. The big three are already planning faster 601s. The PowerPC 603, with its low power consumption, will bring Pentium-level power to laptops. Past that, the 604 will bring even more power to desktop machines by early 1995. About the same time, the 620 will also appear in servers and multiprocessor systems.

### Buying Choices

What does it all mean for you? It depends on your needs. There are some things that you can't have. For instance, you can't buy a computer that won't be out-of-date in three years (maybe less). Computers are advancing too fast for anyone to stay on tech-

nology's ever-sharper leading edge.

If your aim is to get the least expensive computer you can find that will run Windows, machines packing the AMD 40-MHz Am386DX and the Cyrix Cx486SLC and Cx486DLC are worthy contenders for your dollars. Are your favorite applications programs like WordPerfect 5.1, dBASE IV 2.0, and Lotus 1-2-3 2.2? If so, consider any of the Intel and AMD 386DXs. A machine with a 386SX at its heart is now at the end of its useful lifespan, and it's not a good buy.

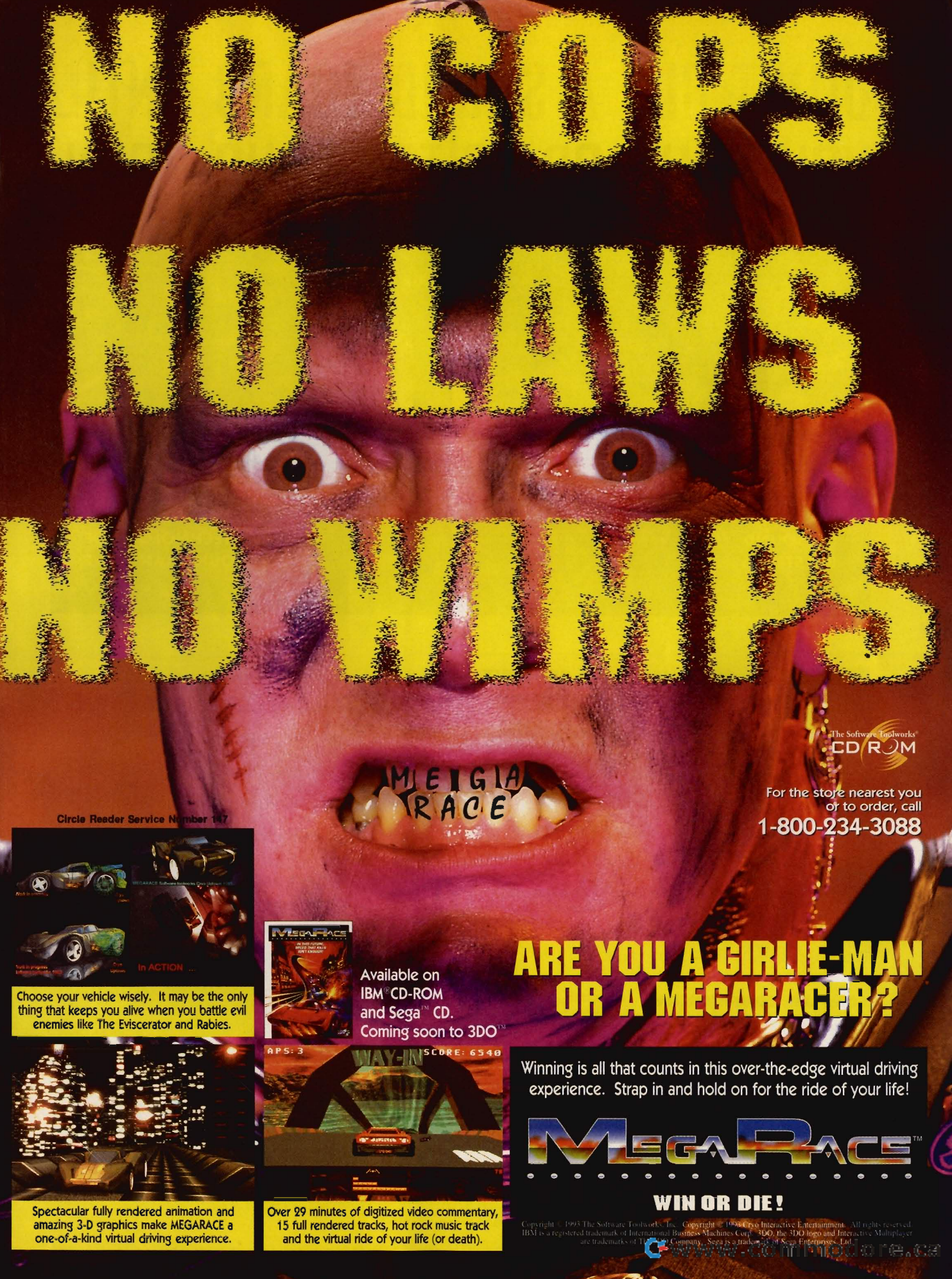
If you have a few thousand dollars earmarked for your next computer, consider a machine with a 33-MHz Intel 486DX, a 40-MHz 486DX, or any of the clock-doubled AMD, Intel, or Cyrix chips. You may want to avoid chips that don't include FPUs. Most of the time, you're not likely to use an FPU, but they sure are handy when you do need them. Some high-end design programs make extensive use of the FPU and may slow to a crawl without it.

At the high end, the Pentium almost

has to be your choice today. The 66-MHz Pentium is more valuable than the 60-MHz, and its price should be dropping by the time you read this. Even the 100- and 90-MHz Pentiums will probably come down in price in a year or so.

That's the safe solution. If you want to live more dangerously, go with a brand-new 100-MHz Pentium, a Cyrix M1, or an AMD K5. You can be the first in your town to boldly go where no computer user has gone before.

For the truly adventurous, the RISC chips beckon. If looking for a server is the name of your game, both the MIPS and the DEC chips are real possibilities. The PowerPCs, with their ability to run almost any microcomputer operating system in existence today, also look like winners. Macintosh users will have little choice about switching over to RISC, since all future Macs will be PowerPC based. That may not be a bad deal though, and PC users should consider PowerPCs of their own. The future of computing is now. □



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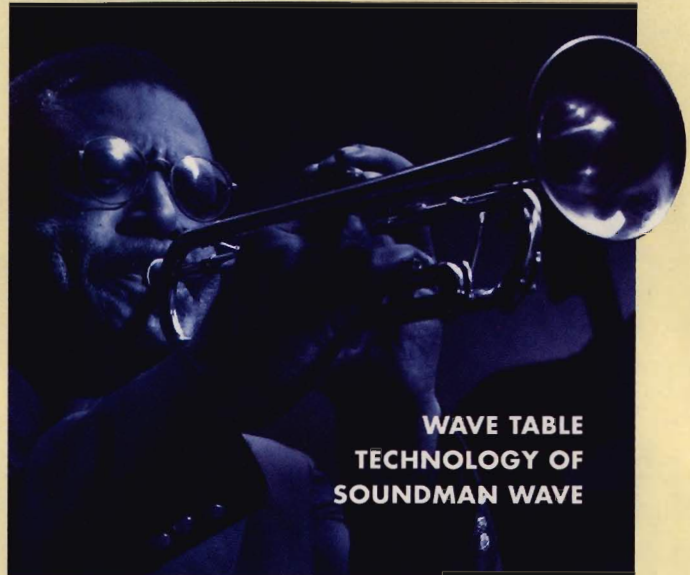
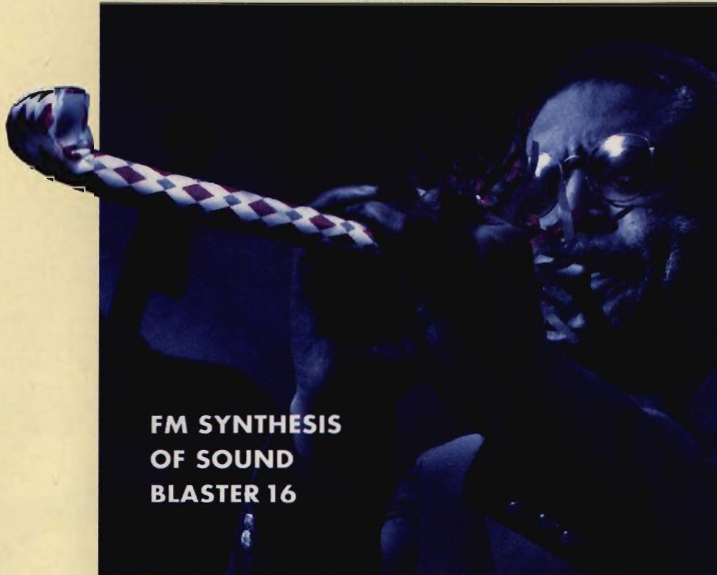
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PC SOUND

**WHY BUY A SOUND CARD?**

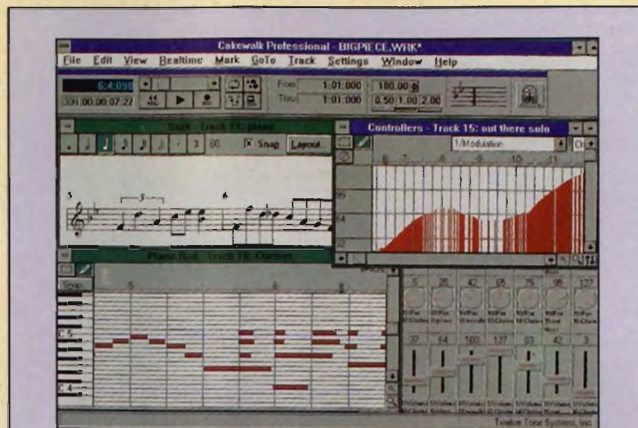
If your computer isn't equipped with sound, you're not getting everything you could out of your computing experience. If you play computer games or your kids use educational programs, using your PC's internal speaker is like always eating unbuttered toast—you can do it, but you don't get as much out of the experience as you could.

There is, of course, more to PC sound than games. Music adds to almost any experience; a PC equipped to play music takes on new dimensions. If you have any interest in music composition or learning the mechanics of music, you can get software (sometimes bundled with the sound card) that records music in standard notation as you play it. If you have a CD-ROM drive, you can play standard audio CDs through the computer as you use it to do other work (just as I'm doing as I write this).

Musicians and recording hobbyists can inexpensively create entire professional sound-mixing studios with their PCs.

And finally, voice processing is in the wings, waiting to become a major part of many PC users' lives. You can buy sound cards today that also serve as small telephone-answering and voice-mail systems. In business, voice annotation of documents is possible now with dedicated equipment; it might become an important factor in future PC use.

Voice recognition also seems a likely candidate for popularity. A current edition of Interplay's game Star Trek: 25th Anniversary, for instance, responds to voice commands (if you have the



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*COMPUTE's Getting Started with PC Sound was written by Richard O. Mann and David English.*

right sound card). When you say, "Beam me up, Scotty," or "Warp 3, Mr. Sulu," the game obeys your command.

Software developers are also saying that voice-to-text dictation isn't that far off—you'll dictate letters and memos, watching the words appear onscreen as you speak them.

**Making a Sound Choice**

Unfortunately, buying a sound card isn't easy. While there are no real standards in PC sound, a few de facto standards keep total chaos at bay. The technology

seems to change monthly, as newer cards with more and better features appear at ever-falling prices. If your sound card is at least a year old, you may want to upgrade to one of the new flashy, feature-laden boards.

Because there's so much to know about sound cards, we've attempted to sort through the technical details, explain the important matters to you, and then tell you about a selection of the market-leading cards, along with the more interesting technical innovations.

—Richard O. Mann

**WHAT YOU NEED TO KNOW ABOUT SOUND CARDS**

Before we get into actual sound card listings, we need to cover a few technical details. When you move beyond simple gaming functions, certain factors gain importance.

In the matter of 8-bit versus 16-bit hardware, the battle is long since over. You can still buy 8-bit cards, but not for long. This bit count refers to the number of digital bits used to record a single sound sample. In an 8-bit card, you can create 256 sounds from a single sample. With 16-bit sound, the number of possible sounds expands to over 65,000 per sample. (A sample is an instantaneous snapshot of the sound, much like a frame in a movie, only played back thousands of times faster.) In other words, buy a 16-bit board.

The number of voices or channels is also important. A 12-voice card plays 12 sound elements at once to create its sound; if it were an orchestra, you'd have 12 instruments. The more voices, the more rich and full the sound will be.

**Families of Sound Cards**

**The Sound Blaster family.** (Creative Labs, 800-998-5227) The Creative Labs lineup includes six sound boards and a daughterboard, starting with the original Sound Blaster Deluxe (\$115.95), an 8-bit monaural card with 11 voices. It sold so well that now everything has to be Sound Blaster compatible. The Sound Blaster Pro Deluxe (\$179.95) adds stereo and moves up to 20 voices, but

## PC SOUND

is still an 8-bit card without a CD-ROM interface. The Sound Blaster 16 Basic (\$199.95) moves to 16-bit, 20-voice FM-synthesized stereo sound, with a proprietary Creative Labs CD-ROM interface.

The Sound Blaster 16 MultiCD (\$249.95) adds a CD-ROM interface for Sony, Panasonic, and Mitsumi drives. The Sound Blaster 16 SCSI-2 (\$279.95) adds the more standard SCSI-2 interface for CD-ROM drives.

And the new top-of-the-line Sound Blaster AWE32 (\$399.95) includes improved General MIDI, 512K of RAM for MIDI sampling, and advanced text-to-speech synthesis.

You can upgrade any of the 16-bit boards to wave-table sound and General MIDI by adding a Wave Blaster daughterboard (\$249.95), which provides 128 instruments, 18 drums, and 50 sound effects in 4MB of on-board ROM, playing back in 32 voices. Also, many of the 16-bit boards have a socket for the Advanced Signal Processor DSP chip (\$69.95), which supplies hardware sound compression and QSound, a 3-D surround-sound system.

Sound Blaster boards come with an unusually rich set of bundled software. The three high-end boards include VoiceAssist, a Windows voice recognition program that lets you give voice commands to any Windows application.

**The Pro Audio family.** (Media Vision, 800-845-5870) Industry sources indicate that Media Vision's 16-bit boards outsell the other sound boards by a wide margin. They're the only licensed, Sound Blaster-compatible



*If you like to play games on your PC, be sure to check the sound card's box for Sound Blaster compatibility.*

boards on the market.

The standard board is the Pro AudioSpectrum 16 (\$299), based on a 20-voice FM synthesizer. It includes an industry-standard SCSI CD-ROM interface.

The low-end Pro Audio 16 Basic (\$199) leaves out the SCSI interface and some software to provide good, basic FM-synthesized sound.

On the high end, the Pro AudioStudio 16 (\$349) adds impressive voice recognition software, a professional wave-form editor, and MIDI software to the Pro AudioSpectrum's bundle, making it capable of serious sound mixing and editing. Sound cards featuring wave-table sound and DSPs have been announced, but aren't yet available from Media Vision.

**The Aztech Sound Galaxy family.** (Aztech Labs, 510-623-8988) The Aztech Sound Galaxy Pro 16 Extra (\$279) is a 16-bit, 20-voice card that comes with FM synthesis and a CD-ROM interface for Sony, Panasonic, and Mitsumi drives. Upgrades are available to add a SCSI interface and/or wave-table sound through a plug-in daughterboard.

The Sound Galaxy Pro offers voice recognition and the Monologue for Windows text-to-speech program in its unusually comprehensive suite of software programs. The package also includes a microphone and headphones.

Aztech offers a full line of 8-bit and 16-bit cards; the

lower-end cards are also compatible with Disney Sound Source and COVOX Speech Thing.

### Standard Wave-Table Boards

**SoundMan Wave.** (Logitech, 510-795-8500, \$349) Logitech's wave-table board uses Yamaha's OPL4 chip set to provide excellent General MIDI. This 16-bit sound board features hardware-based audio compression, a SCSI-based CD-ROM interface, an optional DSP chip upgrade (for various audio effects, such as surround sound, reverb, and chorus), a jumperless installation, and a built-in six-watt amplifier with both speaker and line-out connectors.

The board also comes with a generous selection of bundled software that includes Animation's MCS MusicRack (which features a digital recorder for recording and editing WAV files, an audio-CD player for CD-ROM drives, a MIDI file player, and an audio mixing console), Midisoft's Recording Session (which combines MIDI sequencing and notation), and Berkeley Speech Technologies' BeSTspeech ReadOut (which converts ordinary text to spoken words).

You also get Moon Valley's Icon Hear-It (which lets you add sound effects to your Windows icons) and Voyetra's SoundMan Annotator (which lets you annotate messages in any Windows OLE application).

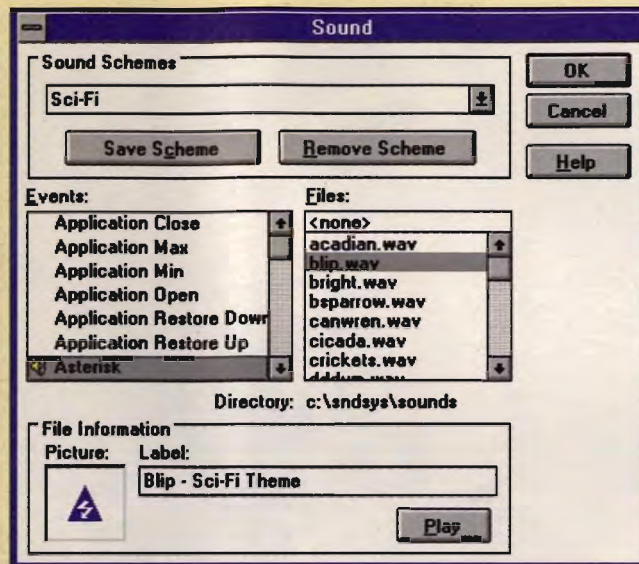
And if all that isn't enough to convince you, Logitech offers a 60-day money-back guarantee on its SoundMan Wave. If you don't like the card, return it to the place where you bought it for a full refund.

## PC SOUND

**Advanced Gravis UltraSound.** (Advanced Gravis Computer Technology, 800-663-8558, \$199) The UltraSound board has generated a lot of excitement by offering surprisingly good 32-voice wave-table sound at an extremely low price. The manufacturers decided to reach for a new standard instead of competing with the expensive wave-table MIDI boards from companies such as Roland and Turtle Beach. Although the UltraSound is a 16-bit board, Advanced Gravis made it 16-bit for playback and 8-bit for recording, with 16-bit recording available as an option. Most users record voice, for which 8-bit recording is more than adequate. Advanced Gravis is aggressively pushing software developers to write for this card and take full advantage of its high-quality wave-table features.

One interesting feature of the UltraSound is that its sound patch files are loaded onto your hard disk, then downloaded into DRAM on the board when you boot the computer. This way, they're changeable. This may not sound important to you, but it allows software developers to provide their own sounds for special situations. Psygnosis's new game *Hired Guns* replaces 60 of the UltraSound sound patches with futuristic high-tech weapon sounds. And as future improvements to the patch files become available, upgrading your system will be easy. (Creative Lab's new SoundBlaster AWE32 has a similar ability to load sound patch files from your hard drive.)

The UltraSound board comes with the interface for Sony, Panasonic, and



Microsoft Windows Sound System 2.0 includes a utility that lets you associate sounds with Windows events.

Mitsumi drives, but the more expensive SCSI interface is available as an option.

**Orchid SoundWave 32.** (Orchid Technology, 800-7-ORCHID, \$299) Based on the Analog Devices DSP chip, the SoundWave 32 provides 16-bit, 24-voice wave-table sound and a Sony CD-ROM interface. The SoundWave has the standard compatibilities and also offers both MIDI and Roland MT-32. It can use three of its modes simultaneously, so gamers can have Sound Blaster sound effects and the MIDI or Roland music the game provides. It comes with a microphone and speakers as well as several multimedia-authoring software tools.

**ViVa Maestro 16 and 16VR.** (Computer Peripherals, 800-854-7600, \$169 and \$219, respectively) The Maestro 16 board use the Aria chip set to deliver 32-voice, 16-bit

wave-table sound and includes its own SCSI CD-ROM interface—all for a very good price. The Maestro 16VR includes the Aria Listener chip, which provides hardware voice recognition.

**Reveal SoundFX WAVE 32.** (Reveal Computer Products, 800-669-3559, \$299) Using the Ensoniq Soundscape chip set, the SoundFX WAVE 32 delivers 32-voice, 16-bit wave-table sound from an unusually rich 317-instrument wave table. It comes with a Sony CD-ROM interface, a how-to video to ease installation fears, and a bundle of software that includes the entertaining SuperJAM! Jr. MIDI-based music-composition program.

**MediaMagic DSP-16 Plus.** (MediaMagic, 800-624-8654, \$259) MediaMagic, a division of Austin Computers, offers a full line of sound boards and multimedia upgrade kits. The

DSP-16 Plus is a 16-bit wave-table board that offers MPEG compression—the only board with MPEG that we found in our research for this article. (MPEG compression is usually video related, requiring a special board. This sound board won't do video compression, but it provides extremely effective audio file compression.)

### High-End Wave-Table Boards

**RAP-10.** (Roland, 213-685-5141, \$599) Roland has always been the Rolls-Royce of computer music. Its RAP-10 board converts your PC into a professional recording studio, providing both 16-bit, 26-voice wave-table sound and a sophisticated set of software tools in the Roland Audio Toolworks. It's fully compatible with all MIDI software and works with any games that provide full MIDI soundtracks. There's no Sound Blaster compatibility, however—this is a serious music tool, not a gamer's board. (But in concert with your old Sound Blaster, it's a dream come true.) It provides both reverb and chorus processing to add a finished studio quality to your music. This is state-of-the-art MIDI sound.

**Turtle Beach Maui.** (Turtle Beach Systems, 800-645-5640, \$199) Turtle Beach, supplier of the serious MultiSound (\$599) sound card for Windows, has created the inexpensive Maui board for us ordinary folks. It adds 24-voice, 16-bit wave-table sound to your existing Sound Blaster-compatible card. Use your old card for the voice and sound effects, but run the music through

## PC SOUND

the Maui board for the best of both worlds—for less money than Sound Blaster's wave-table upgrade. Of course, you'll need an extra slot to hold the board. The Maui board provides both General MIDI and the MPU-401 interface that most wave-table-enabled software supports. It also provides a way to replace patches in its wave table with sounds you record on your existing sound board.

### Windows-Specific Board

#### Microsoft Windows Sound System 2.0.

(Microsoft, 206-882-8080, \$219) The original Windows Sound System provided business audio only; it was strictly a Windows device. The new version 2.0 adds Sound Blaster compatibility for gaming die-hards, but also adds a robust set of software tools for voice recognition. A special directional microphone helps focus the software on your voice commands. The Voice Pilot and voice annotation software are also available for \$79 without the sound board. Text-to-speech software allows proofreading your documents, as the computer reads the text to you from the screen. The Windows Sound System is still not the board for serious entertainment buffs, but its business audio tools are unmatched.

#### Multifunction Board ACE Advanced Communications Enhancement Board.

(Best Data Products, 818-773-9600, \$259) Using IBM's Mwave DSP chip set, Best Data Products has created a sound board that's a lot more than other sound boards. Not only does it



Many of the SoundBlaster 16 sound cards use Creative Labs' proprietary ASP chip to offer DSP functionality.

provide 16-bit wave-table sound, but it also includes a 14,400-bps modem, a 14,400-bps fax with fax-back and fax-forward features, a telephone answering machine and voice-mail system with ten mailboxes, and an interface for Sony, Panasonic, and Mitsumi CD-ROM drives.

It does 3:1 data compression and soon will have fax-to-speech capability to read your incoming faxes to you. It has on-board call discrimination to separate voice calls from modem or fax calls, routing them to the proper channels. It can do any two of these functions at once, with the additional capability of being able to handle incoming phone calls even when you're already using

two other functions.

This is an exciting product; it shows what full use of DSP chips can do. Look for more multifunction boards in the near future.

### Conclusion

PC sound is a vibrant, lively arena with new products and ideas being heralded almost daily. The developments of the last year, bringing wave-table sound into the price range of ordinary mortals, were welcome, as the next year's surprises will be.

If you aren't participating in PC sound yet, now's the time to make your move. Study the current slate of available cards, buy one, and start enjoying a new dimension of computing.

—Richard O. Mann

### WHAT YOU NEED TO KNOW ABOUT DSP CHIPS

The coming of DSP (Digital Signal Processor) chips is revolutionizing sound boards, modems, and voice-processing hardware. DSPs are powerful computer chips specially designed to deal with electronic representations of sound at unheard-of speeds. They multitask, they operate at lightning speeds, and they understand sound.

And they're priced so low that all but low-end sound boards are adopting them. Not only do DSPs provide high performance, but they can be reprogrammed through software-only upgrades. As new capabilities are developed, you add them to your sound card by running a program from a disk—no opening the computer case and prying off old chips to replace them, or replacing whole sound boards. It's a dream come true.

One board vendor spoke of having his basic sound board on the computer store shelf along with smaller boxes containing upgrades for advanced features such as QSound, reverb, sound alteration (which he called "psychoacoustic effects"), voice recognition, voice-to-text, video integration, telephony, and things we have yet to imagine.

DSP cards are also easy to install. There are no jumpers to change; you change the settings through software.

### The Manufacturers

The primary DSPs being used in consumer-level sound boards are from Sierra Semiconductors (called the Aria chip set),

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Cynthia Krol, Accounting

**"Love it!"**

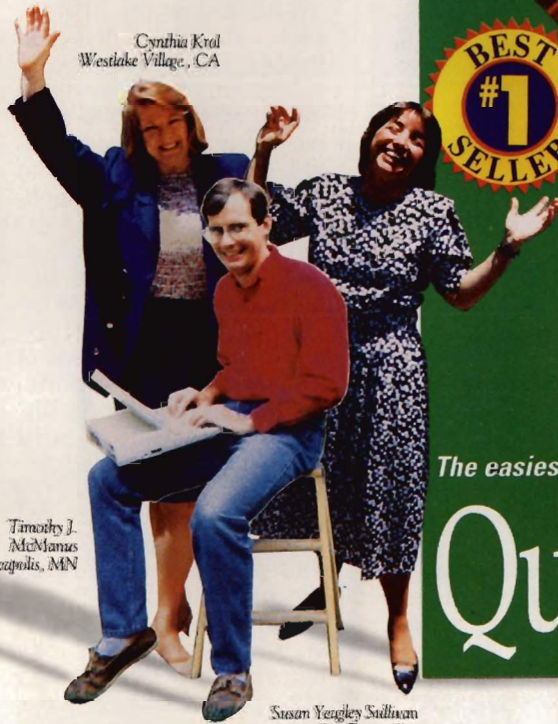
"Reports can be laid out in any conceivable way." Susan Yeagley Sullivan, Psychiatric Management

**"Easy!"**

"I haven't used the manual since I installed it." Timothy J. McManus, Campground Operator

**"Super-quick!"**

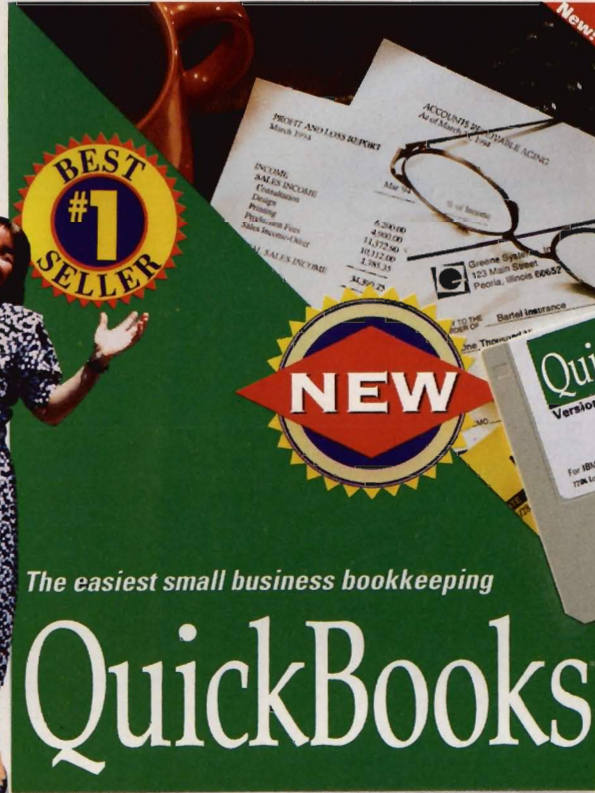
"A butt-kicking program! About time! Amen!"  
Robert D. Pinson, TV Production



Cynthia Krol  
Westlake Village, CA

Timothy J.  
McManus  
Minneapolis, MN

Susan Yeagley Sullivan  
San Diego, CA



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## PC SOUND

Analog Devices, IBM (the Mwave chip), and Creative Labs (the ASP chip). Boards equipped with these DSPs (and others) offer enough interfaces and emulations to satisfy most standard needs.

When you get into more advanced functions, however, developers have to write their software directly for the particular chip set involved. Interplay's Star Trek game with voice recognition, for example, only works with the boards using the Aria Listener chip. Advanced audio functions have no standard interfaces yet, so be aware that at least for a while, the fancier DSP functions require software written specifically for your card.

### DSPs as Add-Ons

Several sound board makers sell basic sound cards without DSPs but offer DSP upgrades on daughterboards or in other ways as add-ons. This can be an effective way to cycle into the DSP era.

### Simultaneous Operations

While DSPs multitask, there are limitations as to what can happen simultaneously. Most boards are capable of two concurrent functions (such as wave-table music and FM-synthesis emulation for sound effects), but you'll need to make sure that any board you seriously consider can perform all the functions you want at the same time.

### The Future of the DSP

DSPs offer a bright future for audio functions. There's a lot of talk in the industry about moving the DSPs onto the motherboard to allow tighter integration with



Wave for Windows 2.0 from Turtle Beach Systems turns your sound card-equipped PC into a digital audio recording studio.

CPU functions. The future should hold additional audio wonders, including—we hope—more effective compression techniques to keep file sizes down.

The next sound card I buy will be DSP based, without question. Perhaps yours should be, too.

—Richard O. Mann

### HOW TO MAKE THE BEST SOUND RECORDINGS

With today's high-quality sound cards and sophisticated sound-editing programs, you can record with near audio-CD quality. I use the phrase *near audio-CD quality* because, even though many of the sound cards' technical specifications match those of home audio-CD players, there's often a small amount of interference from your other PC cards that can cause a barely audible amount of distortion. That said, most of us won't be mastering our own CDs for major record labels, so near CD quality is still close to a sonic miracle.

To make the best sound recordings from your PC,

you'll need

- A high-quality 16-bit sound card
- A hard drive with lots of free space
- A relatively fast PC

You may also need

- A high-quality microphone
- A full-featured sound-editing program
- A decent defragmentation program

### Top of the Charts

Unfortunately, you can't always judge the recording quality of a sound card from its specification sheet. In theory, any sound card with 16-bit sampling will have the same frequency response as a typical audio-CD player. In fact, the quality of the sound can vary greatly.

Your best bet is to try the cards for yourself and decide which card sounds best to your ears. Among the generally available sound cards, Turtle Beach Systems' MultiSound and Roland's RAP-10 offer perhaps the best-quality recording, though any 16-bit sound card should give you better recordings

than any 8-bit card.

When auditioning a sound card, you should listen closely to the quality of its sound. Is the sound crystal-clear and is there absolute silence between musical phrases? Is the sound harsh or too skewed toward the high frequencies? Does the sound skip slightly when playing?

For the best results, you'll need to record with 16-bit sampling at 44.1 kHz—which will give you theoretical CD quality. (A few sound cards will let you record at 48 kHz, the sample rate used by professional DAT recorders, but that rate is even more demanding of your hardware.) When recording in stereo at 44.1 kHz, each minute will take up roughly 10.5MB on your hard drive. Plan on setting aside a large portion of your hard drive for audio recording, or consider adding a separate hard drive that would be dedicated to audio recordings.

For most sound cards, you'll also need a 33-MHz 486 or faster processor (boards that use a DSP chip to take some of the load off your main processor may require only a fast 386). Of course, you can record at a lower sampling rate, drop to 8-bit sampling, or switch to mono recording, and you won't need as much hard drive space or as fast a processor—but you won't get the same-quality recordings.

Unless you're recording strictly electronically, you'll need a good microphone. The ones that come with most sound cards are too cheap for high-quality recording. If you have Microsoft Windows Sound System 2.0, you'll need to buy a separate microphone

## PC SOUND

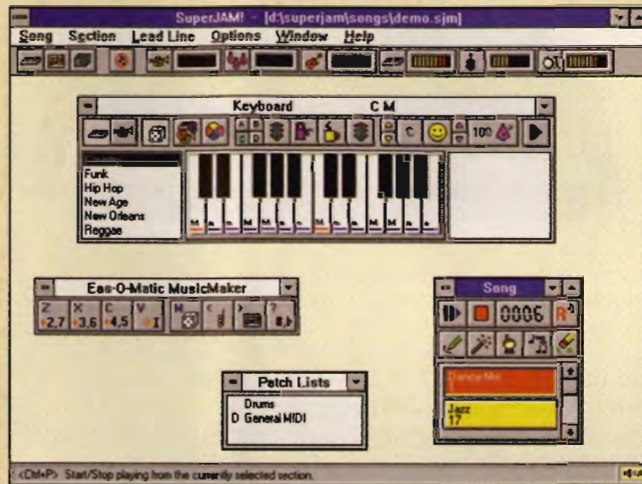
for recording—the one that's bundled with the package is optimized for speech recognition.

While most sound cards include some kind of editing program for WAV-format sound files, you're better off stretching for a dedicated program such as The Turtle Tools for Multimedia (Turtle Beach Systems, 717-843-6916, \$89), Wave for Windows 2.0 (Turtle Beach Systems, \$149), or Sound Forge 2.0 (Sonic Foundry, 608-256-3133, \$179). With these programs, you'll be able to add professional-quality digital effects, such as echo, reverb, flange, reverse, volume, and pan.

With MCS SoundTrak (Animation Development, 205-591-5715, \$79.95), you can add a new dimension to your sound through the magic of QSound. It's a revolutionary technology that adds a three-dimensional quality to sounds; you can even place individual sounds in precise positions across a full 180 degrees.

Because you'll be constantly writing large files to your hard drive, you'll also need a defragmentation program. When your computer is trying to smoothly store sound to your hard drive at 10.5MB a minute, you can get gaps in your sound recording if your hard drive is forced to write data to noncontiguous tracks. To defragment your hard drive, you can use DOS 6.2's Defrag program or one of the optimizer programs that ships with such utility packages as The Norton Utilities and PC Tools.

If you use Stacker or DOS's DoubleSpace compression, you may also slow down your hard drive, making it difficult to achieve a



*SuperJAM! from The Blue Ribbon SoundWorks lets you choose a musical style and create professional-sounding MIDI songs.*

perfect recording. If you have problems due to compression, you might set aside a large portion of your drive to remain uncompressed or consider using a separate hard drive that isn't compressed.

### Going for the Gold

If you're really serious about using your PC as an audio workstation, you should consider SAW (Innovative Quality Software, 702-733-7854, \$599) or Yamaha's CBX-D5 Digital Recording Processor (714-522-9011, \$2,995).

SAW (Software Audio Workshop) lets you play back four simultaneous CD-quality stereo tracks—that's a total of eight tracks. It also features automated nondestructive mixing with down-to-the-sample accuracy (1/48,000 of a second when sampling at the 48-kHz sampling rate). SAW requires only a 386 with eight megabytes of memory and one of the seven supported sound cards: a Creative Labs Sound Blaster 16 or 16ASP, Media Vision Pro AudioSpectrum 16 or Pro AudioStudio 16,

Turtle Beach Systems MultiSound, or Digital Audio Labs CardD or CardD+. For simultaneous recording and playback, you'll need to use either the MultiSound or CardD+, otherwise you'll have to record separately and edit in your recording. The company also sells SAW jr. (\$249), which leaves out the multitrack features and MIDI/SMPTÉ synchronization.

All in all, SAW is a remarkable program that truly pushes the envelope for professional audio from a standard out-of-the-box PC.

If your goal is the absolute best recording, you can use your PC as a front end to a dedicated recording system. That's the position that Yamaha takes with its CBX-D5, a separate four-track recording system that offers two-track simultaneous recording and four-track CD-quality playback. (The CBX-D5 has true four-track output, while SAW currently has only two-track output.) The CBX-D5 also provides on-board digital signal processing and equalization,

with 82 different reverb and modulation effects.

On the PC side, the unit ships with Steinberg Jones's Cubase Audio as its software. Because the unit has its own coprocessor, it will work with virtually any Windows 3.1-compatible computer. For storage, it uses any standard SCSI hard drive with an access time of 30 milliseconds or less. The price may seem steep, but you can produce original recordings with the CBX-D5 that really do sound just as good as an audio CD.

### End of Reel

Even though it seems complicated, making high-quality recordings with your PC is actually pretty easy. Just give it a try and experiment with the different settings—with computer-based sound capture and editing, you can always back up and start all over again.

—David English

### HOW TO SET UP A MIDI MUSIC STUDIO

Surprise! You may already have everything or nearly everything you need to set up a MIDI music studio. Many of today's sound cards have a General MIDI module built in. Others let you add a General MIDI daughterboard or—at the very least—let you add an external General MIDI module to the built-in MIDI interface.

Depending on how you add General MIDI, you may have to pay only \$100–\$500 for what would have cost \$1,500–\$2,000 in a MIDI synthesizer just 10–15 years ago.

If you're looking to purchase a sound card with General MIDI built in, there

## PC SOUND

are a variety of options. Some sound cards, such as Computer Peripherals' ViVa Maestro 16, use the Aria chip set to provide General MIDI. Synthesizer manufacturer Ensoniq offers a chip set that's used in Reveal's SoundFX WAVE 32, Aztech's Wave Power Sound Module, and Best Data Products' Soniq 16. Roland's RAP-10 uses the same chip set found in Roland's popular Sound Canvas. Logitech's SoundManWave uses Yamaha's OPL4 chip set, as does Genoa's AudioBlitz Stereo 16+ daughterboard. Media Vision will soon offer the Korg chip set in many of its sound cards.

Alternately, you can upgrade many versions of the Sound Blaster 16 sound card by adding Creative Labs' General MIDI daughterboard, called the Wave Blaster. And for external General MIDI modules, you might choose from Roland's Sound Canvas line (including the new SC50 and SC88), as well as Yamaha's Hello! Music, TG100, and new TG300.

With today's General MIDI chips, you can transform your PC's sound card into a variety of pianos, guitars, drums, violins, and other great-sounding acoustic and electronic musical instruments. Almost all the General MIDI chip sets use wave-table synthesis to re-create the musical instruments. The instruments are recorded—or sampled—and are stored in ROM, where they can be called up when needed.

Unlike traditional synthesis, where the musical instruments are re-created from a set of numbers, wave-table-based General MIDI instruments sound very close to the real thing. And as a



*Yamaha's new PSR 510 keyboard is General MIDI compatible, has 61 full-size touch-sensitive keys, and costs just \$689.95.*

bonus, many of today's top computer games include support for General MIDI, improving the music within these games by several orders of magnitude.

### Techno Hip-Hop

So you've bought a General MIDI sound card or external General MIDI module—how about a musical keyboard? If you just want to play back MIDI music files or input notes using the mouse, you don't really need a keyboard. However, if you want to use a keyboard to play music, any MIDI keyboard should work, including portable MIDI synthesizers from Yamaha and Casio.

Yamaha (714-522-9011) recently introduced two inexpensive, yet feature-packed, MIDI synthesizers: the PSR 510 (\$689.95) and the PSR 410 (\$579.95). Both are General MIDI compatible and include 61 full-size touch-sensitive keys, 128 AWM (Advanced Wave Memory) sounds, 28-note polyphony, and a new stereo bass-boost speaker system.

The 510 has 102 rhythms and styles (the 410 has 80), a "sound sharper" dial (which the 410 doesn't have), and both realtime and step recording (the 410 has only realtime recording). Because both have a built-in speaker system, you can use either model as a stand-alone keyboard or an add-on keyboard

for your computer-based MIDI system. With both modules, you get a lot for your money, and—best of all—they sound terrific.

Because you can tap into General MIDI from your sound card or external General MIDI module, you can also use one of the inexpensive MIDI keyboard controllers that don't have a built-in synthesizer. These are available from Roland, Yamaha, and many other synthesizer companies. Roland's PC-200 (\$250) and PC-200mkII (\$345) keyboard controllers are velocity-sensitive 49-note keyboards that should work with any General MIDI sound card or module with a MIDI input connector.

As for MIDI software, there are two main categories of MIDI programs: sequencers and notation programs. Strictly speaking, sequencers offer powerful record, edit, and playback features and show the music onscreen as abstract patterns, while notation programs have fewer sequencing features but show the music in traditional music notation.

In the real world, many sequencer programs include a simple notation module (which is especially handy if you read music), and many notation programs have powerful sequencing features built in.

Many sound cards include a simple sequencer program; some even include quite powerful ones.

If your sound card doesn't include a sequencer or notation program, you might take a look at Cakewalk Home Studio (\$169.00) and Cakewalk Professional for Windows (\$349.00) from Twelve Tone Systems (617-926-2480); Midisoft Sound Explorer CD-ROM (\$19.95), MIDI Kit with Recording Session (\$119.95), and Music Mentor with Recording Session (\$149.95) from Midisoft (206-881-7176); and Trax (\$149.00), MusicTime (\$149.00), MasterTracks Pro for Windows (\$295.00), and Encore (\$595.00) from Passport (415-726-0280).

Three other MIDI programs worth noting are EasyKeys (\$39.95) from The Blue Ribbon SoundWorks (800-226-0212), which lets you simulate a musical keyboard on your computer screen; MIDISCAN (\$379.00) from Musitek (800-676-8055), which lets you use a 300-dpi scanner to convert standard sheet music into computer-based MIDI files; and Musicware Piano (\$99.00) from Musicware (800-997-4266), a Windows-based program that includes an entire first-year piano course.

And for a complete MIDI music package, take a look at The Gravis Personal Piano System from Advanced Gravis (604-431-5020; \$495). It includes an UltraSound sound card with General MIDI wave-table synthesis, a MIDI keyboard, the Musicware Piano software, a set of powered speakers, a MIDI adapter, and several Windows-based music composition applications. □

—David English



## PC SOUND

### PC SOUND GLOSSARY

**ADC.** Short for *Analog to Digital Converter*. A circuit that converts an analog audio signal into a digital audio signal. See also **analog**, **digital**, and **DAC**.

**analog.** An audio signal whose fluctuating voltage pattern reflects the structure of the original sound. See also **digital**.

**CD-DA.** Short for *Compact Disc-Digital Audio*. Also known as *Red Book audio*. The CD-quality audio that comes directly from a conventional audio CD or CD-ROM. See also **track**.

**DAC.** Short for *Digital to Analog Converter*. A circuit that converts a digital audio signal into an analog audio signal. See also **ADC**, **analog**, and **digital**.

**dB.** Short for *decibel*. The standard unit of measurement used to describe a sound's amplitude or loudness. An amplitude increase of 1 dB results in a sound that's ten times louder.

**digital.** An audio signal that has been converted into numbers that no longer directly reflect the structure of the original sound. See also **analog**.

**DSP.** Short for *Digital Signal Processor*. An integrated circuit designed for high-speed data manipulation. Many sound cards use a DSP to provide reverb, 3-D, voice recognition, and other special audio effects.

**dynamic range.** The difference between the loudest and softest sounds for a par-

ticular product or situation.

**General MIDI.** An extension of MIDI that establishes a set of 128 instrument sounds that are grouped in a standard order. See also **MIDI**.

**Hz.** Short for *Hertz*. Also known as *cycles per second*. A unit used to measure the frequency of a vibrating object, such as a violin string or the cone in a speaker. The human ear can hear from approximately 20 Hz to 20 kHz (20 to 20,000 Hz).

**kHz.** Short for *kilohertz*. Unit of frequency measurement that denotes 1000 waves, or cycles, per second. See also **Hz**.

**MIDI.** Short for *Musical Instrument Digital Interface*. Pronounced "middy." A digital communications protocol that allows electronic musical instruments and computers to communicate with each other. Because MIDI sends performance information (such as note on, note off, pitch change, and volume) rather than actual musical sounds, it's a highly efficient way to store and transmit musical data.

**MIDI connector.** A five-pin DIN plug used to connect MIDI devices.

**MIDI file.** A file format for storing MIDI songs. MIDI files generally have the extension MID on the PC.

**MIDI interface.** A serial hardware device that allows a computer to send and receive MIDI data.

**MIDI Mapper.** A Windows Control Panel applet that lets you specify which MIDI device will be associated with each of MIDI's 16 channels, which sound will be associated with each of Windows' 128 MIDI instruments, and which MIDI note will be associated with each MIDI drum sound.

**MIDI software.** A computer program that can record, play, or manipulate MIDI data.

**MPC.** Short for *Multimedia PC*. Any computer, upgrade product, or software title that conforms to the standards set by the Multimedia PC Marketing Council.

**multitrack.** A device or software program that offers more than two tracks for information storage. See also **track**.

**Red Book audio.** See **CD-DA**.

**sample.** To record digitally using an ADC. See also **ADC**.

**sampling rate.** The frequency with which an ADC scans an incoming electrical signal. Higher sampling rates provide higher-quality recordings but require more storage capacity. Professional DAT (Digital Audio Tape) recorders use a sampling rate of 48 kHz, audio CDs use a sampling rate of 44.1 kHz, consumer DAT recorders use a sampling rate of 32 kHz, and many broadcasters and multimedia developers use a sampling rate of 22.05 kHz. See also **ADC**, **kHz**,

and **sample**.

**sound card.** Also known as *sound board*. An expansion board you place inside a PC that improves the quality of the PC's sound output. A program must support the sound board before it can benefit from the board's improved sound quality.

**synthesizer.** An electronic musical instrument that can generate simple or complex sounds. Most synthesizers include a MIDI interface and a keyboard, though synthesizers without a built-in keyboard (called sound modules or expanders) are becoming increasingly more common.

**tempo.** The speed that a MIDI file plays in MIDI software. Tempo is generally measured in beats per minute (BPM).

**track.** A song or sequence of sound on a CD-DA disc. When referring to a MIDI file, a track can be an individual MIDI channel or a separate part of a MIDI song. See also **multitrack**.

**WAVE file.** The standard Windows file format for storing waveform audio. WAVE files generally have a WAV extension.

**waveform audio.** A technique for re-creating voice and sound effects using digital audio samples. Under Windows, waveform audio is generally stored with the WAV filename extension.

—David English

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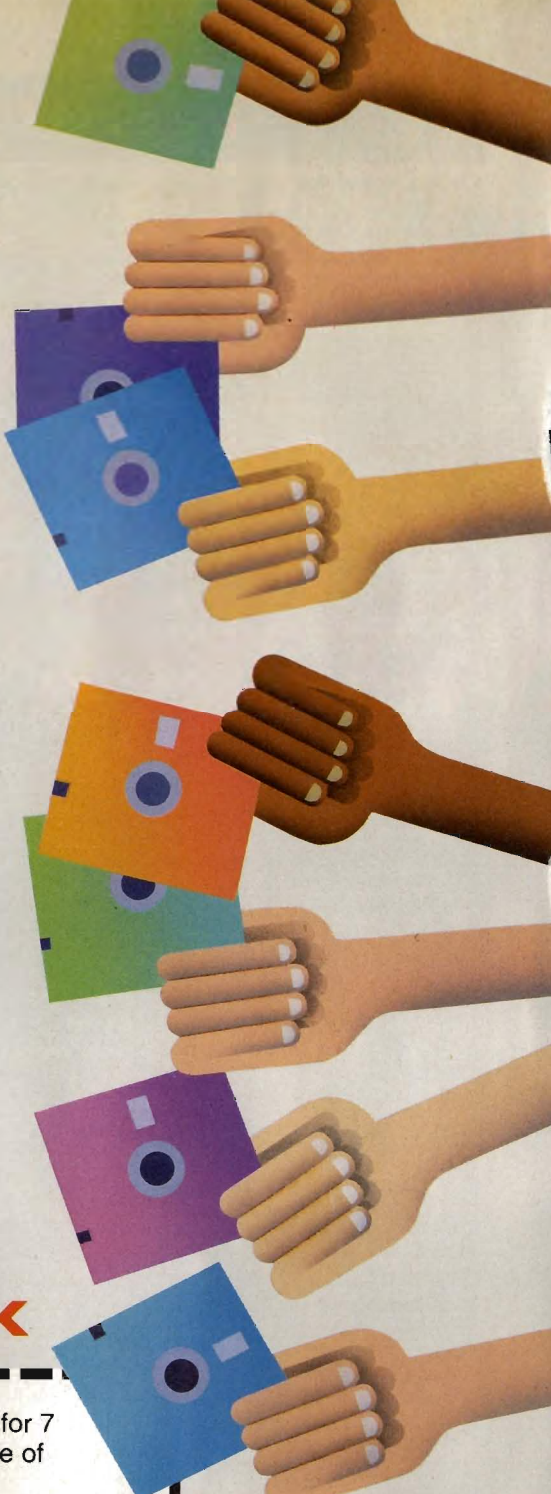
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# MULTIMEDIA GOES FAST FORWARD HOLLYWOOD

BY DAVID ENGLISH

If I had a crystal ball, I could see what software would look like in five or ten years. Since I couldn't use a crystal ball, I did the next best thing—I attended the first annual Digital Hollywood conference in Beverly Hills, California.

After four days of tutorials, panel discussions, and exhibits, I came away with the clear impression that computer software is about to go Hollywood in a big way. I also learned that the information highway has the potential to completely change software as we know it.

The Hollywood invasion has already started. The first session of the conference was sponsored by the Writer's Guild, which announced it would accept members who write exclusively for interactive media. Another session featured Hollywood agents, who pitched their Hollywood talent (writers, directors, actors, producers, and executives) and argued that they should also represent the current players in the growing interactive industry. Companies such as Softimage, Alias, and Caligari claimed that software developers could save money by employing the same computer-animation technologies used in *Jurassic Park*, *Terminator 2*, and many recent television commercials.

This warm reception from the Hollywood crowd reflects the new maturity of CD-ROM as a creative medium. Actors such as Margot Kidder, Donald Sutherland, and Howie Mandel are appearing in multimedia titles (*Under a Killing Moon*, *Conspiracy*, and *Tuneland*, respectively). Software developers are hiring Hollywood screenwriters and routinely spending \$1–\$2 million on their major titles. One panelist at the conference revealed that an upcoming project is being produced as both a film and a CD-ROM, with the usual four-month shooting schedule extended to five months to allow extra material for the interactive version.

The recording industry is also moving to CD-ROM. David Bowie's *Jump* lets you create a rock video using five different edit channels. *Freak Show*, from The Residents, is an eerie journey through a darkly lit carnival produced with state-of-the-art rendered graphics. And Peter Gabriel's *Xplora 1* includes a wealth of background

material about his album, *Us*, and features one of the best-looking interfaces around.

With conference participants evenly divided between Silicon Valley and Hollywood, a number of questions came up related to how each side will influence the other. How will ever-increasing budgets change the nature of multimedia titles? What kind of material is best suited for linear media (such as books, movies, and television), and what kind of material is best suited for interactive media (such as CD-ROM)? After working all day in the office at the computer, do we really want to be interactive with our TV, or would we rather just zone out with a good movie? Do people even have the extra time and money to give broad support to interactive media?

Finally, there was a lot of discussion about the 500-channel information highway. It appears we're moving beyond a multichannel system to a single channel that you program yourself. Already, several video-on-demand systems are being test-marketed throughout the country; these will provide movies, information, and games whenever a viewer requests them. Oracle has announced an alliance with 20 companies, including Apple Computer and Sega, that will use Oracle's Media Server software to act as a video jukebox on a phone or cable system. If these systems are successful, televisions and computers could become indistinguishable.

This new video-on-demand technology has the potential to radically change the computer industry, letting a user call up a software program from the network whenever the program is needed. You might pay for the software in message units or as a pay-per-view. You might even own the rights to use a program wherever you are—a sort of virtual ownership—so when you travel, you would always have access to the program.

While it was clear from the conference that high-quality software can be delivered over a fiber-optic network, no one knows whether people will actually want to receive their software this way. On the other hand, if each home is willing to spend just \$20 a month for this new form of interactive media, we could see a new \$20 billion industry. With that kind of money, it's easy to get Hollywood's attention. □





## MULTIMEDIA PC

By Scott A. May

Some things were just meant to be—like the newfound alliance of science-fiction games with CD-ROM. By all accounts, it's a match made in heaven. For perhaps the first time in the history of computer entertainment, the untapped potential of the medium—in terms of computing power, storage capacity, and digital technology—now challenges the imagination of science-fiction authors.

What will life be like 100,

200, or even 1000 years into the future? If you believe science-fiction game designers, our descendants will face some rather bleak times. Almost without exception, the science-fiction titles explored here are set in dark and threatening visions of the future. Typical story lines are driven by galactic war, universal oppression, technology gone awry, and various other cata-

clysmic events. Likewise, your usual course of action

involves the prevention of such terrible events, through time travel, space combat, or matching wits with an evil computer. While it's true that without conflict, there wouldn't be much story or action, such horrific scenarios tend to stereotype science fiction as a pessimistic genre.

On the other hand, what's past is prologue, meaning that whatever has already occurred could easily happen again. In the accelerated world of the future, yesterday's Hitler becomes tomorrow's deranged super-computer. Atomic bombs that once destroyed cities might be antimatter devices capable of wiping out entire solar systems. Instead of countries defending their tiny shores against hostile enemies, planets could be forced to repel strange invaders from another dimension. So it appears

that the game—an age-old struggle for peace and survival—remains the same; only the players and rules are more fantastic.

### Come Out Blasting

Perhaps it's just the nature of the beast, but many science-fiction CD-ROM titles seem to assume that a complex story line and steep learning curve automatically denote a serious, intellectual game.

Others just want to have fun, forgoing heavy ambiance for rip-roaring futuristic action. Call them shallow or science fiction lite, but these titles offer instant gratification for players who'd rather skip the hyperbole and get right to the high-tech toys.

One of the first CD-ROM-only titles to explore the arcade side of the science-fiction genre is Rebel Assault (LucasArts, 800-969-GAME, \$79.95), a multi-scenario shoot-'em-up based on George Lucas's famed Star Wars trilogy. Using actual Star Wars footage, a cast of full-voiced characters, and John Williams's original film score, the game creates one of the first truly successful interactive movies. You assume the role of Rookie One, a hot-shot pilot fashioned after the film's hero, Luke Skywalker. Prove your mettle through 15 levels of increasing challenge, including hair-raising training flights through Beggar's Canyon, first-person space combat against TIE fighters, asteroid fields, bombing runs, Walkers, Star Destroyers, and the final Death Star trench run. Other sequences feature face-to-face laser duels with Imperial Stormtroopers. The product's greatest weakness is an unfortunate lack of depth. Both the story line and the action sequences are preprogrammed, with little or no variation in the



# SCIENCE-FICT

order or outcome. Regardless, Star Wars fans—as well as students of cutting-edge programming techniques—will find the simulated arcade action well worth the price of admission.



Travel through time with *The Journeyman Project*.

Another promising example of a next-generation interactive movie is *Critical Path* (Media Vision, 800-684-6699, \$64.95). This CD-ROM combines full-motion video with realtime action and superb sound effects. The setting is a postapocalyptic world where a young helicopter pilot named Kat (Eileen Weisinger) crash-lands on the island fortress of a mad general. Kat takes refuge in an abandoned factory, where you must lead her through 15 dangerous levels to freedom. Along the way she faces hordes of mutants, armed guards, and deadly booby traps. Like the previous title, this one looks and plays great, but it suffers from a threadbare story line. Like a live-action version of early interactive cartoons, such as *Dragon's Lair*

and *Space Ace*, the movie pauses for you to take specific actions at precise moments. Failure to do so ends one life and simply rewinds the film for you to try again. The story flow is strict-

ly linear, with few alternate branches to follow; thus, the game has limited replay value. The designers offset this slightly with some enticing variations on your interaction with Kat, who displays realistic character reactions—relief, frustration, and anger—based on the quality of your play. Technically brilliant but structurally flawed, *Critical Path* showcases both the strong points and the rough edges of this promising new genre.

Released initially on disk to widespread critical acclaim, *Strike Commander CD Edition* (Origin, 800-245-4525, \$69.95) makes a great game even better. In this game set in the near future, you command a squadron of elite mercenary pilots, flying the F-16 Fighting Falcon and F-22 Lightning against a vari-

ety of foes. Based on RealSpace technology pioneered in Chris Roberts's *Wing Commander* series, the game incorporates the dynamics of a top-end flight simulation with breathtaking graphics, a branching story line, and intriguing dialogue. In addition to the game's 41 original missions, the enhanced CD-ROM version contains 24 more missions from the *Tactical Operations* supplement, as well as talking characters and digitized sound effects from the *Speech Pack* accessory. Other amendments include tweaked artificial intelligence for more challenging airborne enemies, nearly doubled animation frame rates, built-in data caching, new rudder pedal and dual joystick controls, and an optional realistic flight model for simulation purists. If you've got the system specs (a 50-MHz 486, 8MB RAM, and a double-speed CD-ROM drive are all recommended), this groundbreaking game is a feast for the senses.

One of the finest science-fiction action games created specifically for CD-ROM is *Iron Helix* (Spectrum HoloByte, 800-695-4263,

\$99.95). The story concerns an intergalactic starship on cold war maneuvers and a malfunctioning computer that changes its primary target to a heavily populated earthlike planet. Using only your wits and an unarmed remote-control biological research probe, you must search six levels of this ghostly dreadnought for clues to its destruction. Time's running out, and to make matters worse, the ship's deadly security robot is hot on your trail. The game's many outstanding features include more than an hour of atmospheric full-motion video clips, three uniquely different play levels, a wonderfully intuitive interface, and some of the smoothest step-based movement you'll find in a CD-ROM product. Marred only by its painfully derivative story line, *Iron Helix* is an otherwise excellent science-fiction adventure bound for classic status.

Sometimes, good intentions are undermined by less than perfect execution, as in the case of *CyberRace* (Cyberdreams, 818-348-3711, \$69.95). The setting is a far-off future, where inter-



Explore a futuristic city with *Noctropolis*.

# ION CD-ROMS



## MULTIMEDIA PC

planetary war has been replaced by high-speed hovercraft racing across treacherous terra firma. You play Clay Shaw, a disgruntled pilot blackmailed into competition by your corrupt government, which holds your girlfriend as collateral for your allegiance. The concept is enticing but a little overworked, marred by wooden full-voiced characters and repetitive gameplay. This DOS-based CD-ROM makes unreasonable system demands and is prone to crashing, if it loads at all. The game's high points—realistic Voxel-based landscapes and ray-traced vehicle graphics—are lost in the mire of technical difficulties.

For science-fiction action with a touch of Old World mysticism, enter the surreal world of Inca (Sierra, 800-326-6654, \$49.95), a delightfully original title from French developer Coktel Vision. This full-voiced, DOS-based CD-ROM game blends elements of arcade action, puzzle solving, and adventure gaming, augmented with digitized video and more than 40 minutes of audio-CD music. With no variation in the game's direction or puzzles, however, there's little or no replay value once the game is solved. Otherwise, Inca's diversity of design and polished presentation make it a must-see.

### Life in the Future Tense

A hallmark of good science fiction is the ability to make the inconceivable totally believable. Doing so requires much more background detail and slowly developing plot lines than most action-oriented games can afford. One of the top new titles in the science-fiction adventure genre is The C.H.A.O.S. Continuum (Creative Multimedia, 503-241-4351, \$79.95). Set in the year 2577, the story unfolds in the domed city of New Eden, capital of Saturn's Titan Colony. When an orbiting neural net-based supercomputer goes ballistic, it sends the entire population into a mass

catatonic state. It's feared that C.H.A.O.S. will soon spread to alternate dimensions, and you've been summoned to stop this threat of universal domination. This Windows-based CD-ROM features an excellent interface and extravagant artwork rendered by the same software used to model visual effects in the films *Aliens*, *Terminator 2*, and *Jurassic Park*. A double-speed drive is highly recommended to enliven the game's otherwise slow step-based movement.

Another adventure cast from a similar mold is The Journeyman Project (Quadra Interactive, 619-431-9530, \$79.95). Here, you play a

### Science CD-ROMs: Beyond Fiction

Whether you call it science fiction, speculative fiction, or future fantasy, this imaginative genre grows from the seeds of science fact. The advent of multimedia CD-ROM has opened new doors for interactive science, as both educational tool and reference guide.

Leading the pack is Warner New Media (818-955-9999) with two outstanding titles: *The View from Earth* (\$79.98) and *Murmurs of Earth* (\$59.99). The first product, available for Windows, takes you on a four-part tour of the earth, moon, sun, and ecliptic cycles. Presented in documentary style and featuring more than 600 photos and illustrations, this fully narrated slide show offers multiple levels of in-depth analysis covering dozens of related topics. Created in associa-

tion with Time-Life Books, this astonishing CD-ROM is best suited for intermediate and advanced viewers. Science buffs and NASA collectors will find serious fun in *Murmurs of Earth*, a two-disc collection of all 118 images and 90 minutes of CD audio included in the *Voyager Interstellar Record*. For those too young to remember, the twin *Voyager* probes were launched into the great unknown in 1977. On board were identical gold-plated records carrying pictures, symbols, music, and greetings from the inhabitants of earth. A fascinating multimedia curio, this DOS-based program is best when combined with Carl Sagan's 1978 book of the same name.

Take a self-guided historical tour of the U.S. aerospace industry with *Americans in Space* (Multicom Publishing, 800-245-4525,

\$59.95). Navigation is a breeze with the intuitive mission control interface. Select from a menu of seven main



*The View from Earth*

NASA projects: Mercury, Gemini, Apollo, Skylab, Apollo-Soyuz, Space Shuttle, and Space Station. Dozens of subtopics in each category feature more than 500 dramatic pictures and over an hour of full-motion video. For a more hands-on experience, climb aboard *Space Shuttle* (Software Toolworks, 800-234-3088, \$49.95) and take an active role in NASA's shuttle program, from training to spacewalking. This

exceptional product, available for both DOS and Windows, simulates 53 authentic missions and includes a multimedia history of the shuttle program.

If scientific curiosity draws you to the mysterious and unusual, set your sights on *UFO* (Software Marketing, 602-893-3377, \$59.95), a serious guide to extraterrestrial phenomena. This Windows-based CD-ROM is actually a comprehensive database of more than 1200 sightings, boasting the world's largest collection of UFO photographs. There are even digitized film clips of UFO sightings, although the grainy texture of multimedia video makes their worth questionable at best. Set the database search parameters to pinpoint sightings by a range of years, or use more eclectic criteria, such as cattle mutilation, abduction, and multiple witnesses.

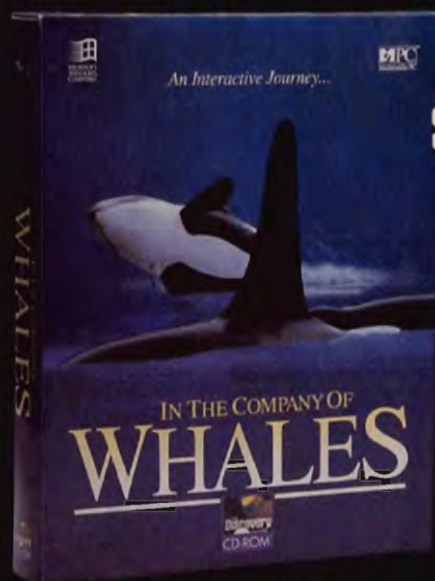
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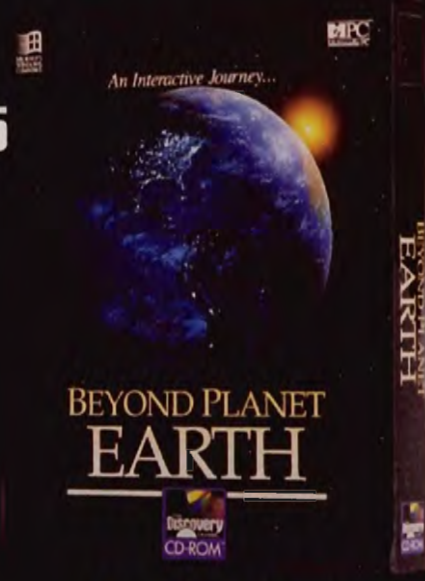
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## MULTIMEDIA PC

weary agent of the Temporal Protectorate, whose job is to monitor the space-time continuum against terrorist sabotage. If a rift occurs, you must travel back in time to mend the damage and its effects on the future. The game's best feature is its heightened sense of future ambiance, thanks to imaginative graphics and sensational sound effects. Unfortunately, it's also frustratingly slow, even on an optimized system, testing the patience of the most dedicated science-fiction gamer.

Fear of global ecological ruin drives the plot of many science-fiction adventures, including *Quantum Gate* (Media Vision, \$64.95), a unique two-hour excursion into what designer Greg Roach calls virtual cinema. You play Drew Griffith, space med student stationed on a distant mining planet, where the harvest of a rare mineral holds the key to earth's survival. Discover true friends and deadly foes at the base camp, while battling giant insects on the planet's surface. Far more abstract than most CD-ROM titles, this one works better as a limited example of interactive art than a viable source of prolonged entertainment. The game's best features are the haunting CD-quality soundtrack and an abundance of full-motion video. Decidedly unusual, but not for all tastes.

Far more accessible is *Star Trek 25th Anniversary Enhanced CD-ROM* (Interplay, 714-553-6655, street price of approximately \$79.95). Boldly go where no computer game has gone before with this fully talking version, featuring the unmistakable voices of the original

*Star Trek* crew, led by William Shatner (Kirk), Leonard Nimoy (Spock), and DeForest Kelley (McCoy). Nearly two dozen other actors join the fun, bringing the world's most popular science-fiction characters to life. Multiple scenarios, each with many possible resolutions, deliver a long-lasting challenge. This DOS-based CD-ROM's only drawbacks are the often-garish low-resolution graphics, as well as the inevitable battle for suffi-



*Colonize distant worlds with Outpost.*

cient conventional memory. Another voice-enhanced CD-ROM version of an existing title is *Space Quest IV* (Sierra, \$39.95), a wacky science-fiction parody starring the galaxy's most unlikely sanitation hero, Roger Wilco. Playable from either DOS or Windows, the game features 175MB of point-and-click lunacy, where consistency of plot is far less important than the number of belly laughs.

### **Riding the Next Wave**

What lies ahead for science-fiction CD-ROM games? Break out your shades, because the future's looking incredibly bright! The next wave of science-fiction titles represents not just a bold new step for original CD-ROM games but a whole new

direction in the development of computer entertainment.

Leading the pack is *Under a Killing Moon* (Access Software, 800-800-4880, price not available), the sequel to *Martian Memorandum*, which places you inside a live-action, Super VGA virtual world. Features of this three-disc set include totally unrestricted movement, photorealistic backdrops, and full interaction with characters played by actors such as Margot Kidder, Brian Keith,

and more than an hour of full-motion character interaction.

Paramount Interactive (415-812-8200), a relative newcomer to computer games, is looking to make a big splash with four exciting science-fiction CD-ROM titles. *Jump Raven* (\$69.95) takes you to a future urban nightmare in a race to prevent worldwide "ecocide." *Lunicus* (\$69.95) enlists your arcade skills for more earth-saving heroics in multiple 3-D environments. And *Star Trek* fans, start your drooling: Coming soon from Paramount are two titles guaranteed to send you into orbit. The *Star Trek Interactive Technical Manual* (\$59.95) lets you wander freely aboard the *Enterprise D*, home to "The Next Generation" crew. Fully interactive displays and props, captured in stunning photorealism, await your inspection. Sensors are also tracking *Star Trek*, *Deep Space Nine*: *The Hunt* (\$69.95), scheduled for release this fall. The adventure promises unparalleled character interaction, an open-ended story structure, and numerous cinematic special effects.

Already labeled "SimCity in space," *Outpost* (Sierra, \$69.95) is another upcoming CD-ROM title that blends elements of traditional resource management with space exploration. Dressed in lavish 3-D ray-traced graphics, the game simulates interstellar colonization, a formidable project triggered by the earth's impending destruction by a giant meteor. Designer Bruce Balfour's experience as systems manager for NASA lends the game its awesome authenticity. □



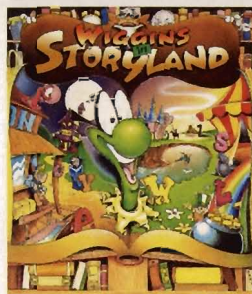
If your child has a story to tell, let Wiggins help bring it to life.



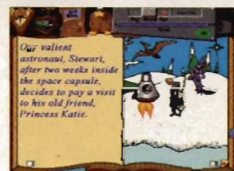
Wiggins' library is full of surprises.



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It's as magical as any fairytale. A world where children can create their own animated storybooks, complete with illustrations, music, props and a cast of colorful characters: from dinosaurs to space aliens, princesses to cowboys.

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EDITED BY POLLY CILLPAM

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## Information Hat Trick

Are you job-hunting? Do you want more information about your PC? Do you have an interest in photos or graphics? Allegro New Media has three new reference titles that should appeal to a broad range of users.

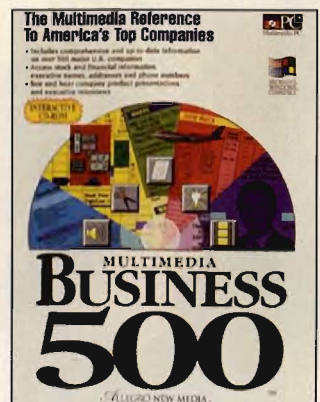
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InPrint Art Library Volume 2 is a two-disc set that's subtitled Graphic Photos and Scenic Photos. It's a stock photo library and personal graphics tutor featuring over 200 high-resolution graphics that work with popular programs. The photos are royalty-free.

PC Library is an interactive computer encyclopedia. It includes the full text—as well as thousands of pictures, tables, and charts—from over 30 best-selling computer reference books, tutorials, and manuals. It also contains over 70 interactive multimedia videos, ranging from configuring a desktop to building a complete PC. The manuals cover hardware, databases, help, word processing, spreadsheets, operating systems, and productivity. The reference books include networks, as well as home computing.



## Business 500

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## NEW MULTIMEDIA PRODUCTS

The series covers a wide range of subject areas and incorporates multisensory features such as animation, sound, and music to provide an enlivening, integrated learning experience for a child. The primary objective of the series is to teach language skills, but it also covers music appreciation, geography, social studies, and so on.

Sitting on the Farm is the first title in the series. It's both a story and a song about a farm girl whose peaceful picnic is invaded by hungry animals. There are four levels, playable in all three languages, where children can learn and explore. You can also adjust the levels of learning. A parent or teacher can turn off certain features that might distract or frustrate younger kids.

The Listen-along feature allows children to hear a story being read while the pages automatically turn. Read-along uses animations and pictures to expand vocabulary as the children read. They can click on individual words to hear the words pronounced, select a word to get a pictorial or animated definition, or play any of the 27 reading comprehension games. Using a microphone, a child can record and hear his or her own voice to practice pronunciation.

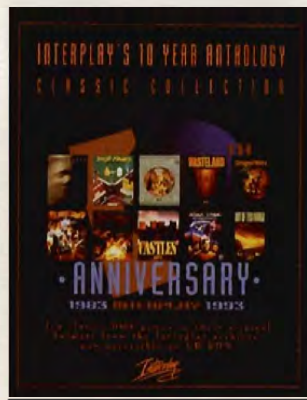
Sing-along is a musical exploration feature that helps children learn concepts such as notation and rhythm, as they record themselves singing the story's song along with accompanying music. The CD-ROM can also be used as an audio CD to play the more

than 50 Red Book audio files. Write-along encourages creativity as children compose their own stories to go with original pictures from the story or fill in blanks to write

new stories in different settings. They can also learn about six geographic regions and the animals found there. Built-in sophisticated print capabilities allow children to print and publish their own stories and coloring books.

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*Interplay's Classic Collection*

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Feeling nostalgic? How about ten of the best DOS games from the past ten years on one CD-ROM? It's called the Classic Collection, and it's available through Interplay in honor of its tenth anniversary.

"The Classic Collection is like a time capsule illustrating the evolution of computer games from the old text-based adver-



*The Sound Blaster Discovery CD 16 multimedia upgrade kit*

tures to today's highly sophisticated games," says Brian Fargo, president of Interplay. The Classic Collection contains the following critically acclaimed games: Mindshadow, Tass Times in Tone Town, Bard's Tale, Wasteland, Dragon Wars, Battle Chess, Lord of the Rings, Castles, Star Trek: 25th Anniversary, and Out of This World.

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Price TBA

Circle Reader Service Number 533

### Seeing Double

Creative Labs has new versions of its Sound Blaster Discovery CD 16 and Sound Blaster Edutainment CD 16 kits. Both kits meet the MPC Level 2 specifications for 16-bit audio and include a multisection double-speed CD-ROM drive.

The Sound Blaster Discovery CD 16 kit also contains Aldus PhotoStyler SE Photo CD software, which allows you to access and manipulate Photo CD images quickly. In addition, the kit comes with a Sound Blaster 16 and a great collection of educational software, including The Software Toolworks Multimedia Encyclopedia, The Animals!, Where in the World is Carmen Sandiego? Deluxe Edition, and Just

Grandma and Me.

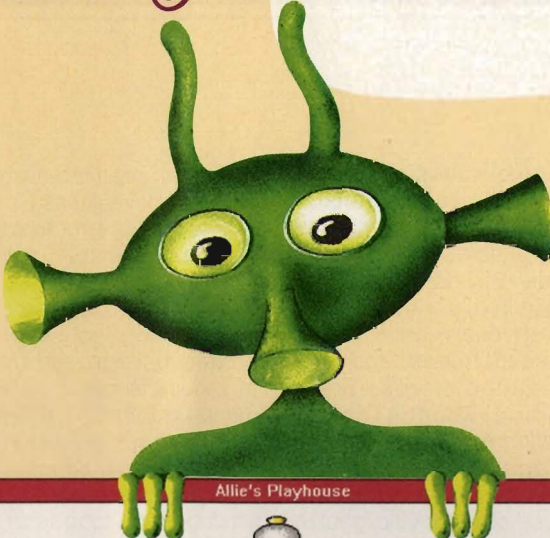
The Sound Blaster Edutainment CD 16 kit is aimed at the high-technology-entertainment enthusiast. It has a Sound Blaster 16; The Software Toolworks Multimedia Encyclopedia; Aldus PhotoStyler SE Photo CD software; Secret Weapons of the Luftwaffe; The Secret of Monkey Island; Loom; Lemmings; Indianapolis 500: The Simulation; and Sherlock Holmes, The Simulation.

In other news, Creative Labs has announced the Sound Blaster 16 Value Edition, an entry-level product for the price-conscious consumer. It's a fully upgradable Sound Blaster sound board featuring CD-quality audio, a built-in CD-ROM interface, and real-time compression and decompression. It features 8- and 16-bit CD-quality stereo sampling and playback up to 44.1 kHz. It's also compatible with all software titles written for the Sound Blaster platform.

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# MULTIMEDIA SPOTLIGHT

By Scott A. May

## ROCK RAP 'N ROLL

One of the most interesting aspects of new technology is its elimination of the learning curve. Why toil through the basics of any subject or skill when the computer can simulate it for you? Armed with today's powerful creativity software, almost anyone can become an instant artist, architect, publisher, or video director.

A prime example of instantaneous creativity is Rock Rap 'N Roll, Paramount Interactive's award-winning multimedia music studio, now available for Windows. You don't have to know a chorus from a coda to arrange and record your own original tunes with this delightful, instantly accessible program. The only requirements are an ear for music and the desire to explore your sonic sensibilities.

This is essentially the multimedia equivalent of a custom-designed, digital sampling synthesizer. A key difference is that all the samples—hundreds of them, from guitar licks and drum-rolls to vocal bursts and rhythm tracks—are pre-recorded and at your disposal. If you can click the mouse button and press a key, you'll soon be jamming up a storm, regardless of your musical background. It's the ultimate instrument for those who love music but can't play a note.

The program is divided into ten musical styles, or studios: Africa, Big Band, Blues, Latin, Rap, Reggae, Rock, Soul, Street Jazz, and Techno Pop. Each studio contains its own library of unique instruments, vocals, and sound effects. Africa, for example, features a host of

native percussion instruments such as steel drums, the shofar horn, and the unmistakable Winky Wanger. In the Big Band studio, choose from a wide selection of scat vocals, baritone and alto saxophones, and various muted horns. Some sampled sounds are of questionable merit, like the barrage of nonsensical blurbs in Techno Pop and the use of automatic gunfire and police radios as rap instruments. Overall, howev-

er, the designers address the diverse musical needs of each style very well.

Sound snippets are stored in Windows WAV format and recorded as monaural 8-bit, but they're sampled at a higher rate of 22050 Hz for maximum clarity. When you select a musical style, the computer loads that studio's entire sound library into memory. Because of this, you'll need at least 4MB of RAM, with 6MB or 8MB highly recommended. The advantage of this technique is that it gives you the ability to play, mix, and record

sounds in realtime, unhammered by drive access. The basic structure and graphical interface are identical for all the studios. Each contains a bank of ten unique song loops—pre-recorded background tracks of various length and instrumental depth. Use these to form the basis for your musical excursions. Simply drag and drop the tokens representing each song loop into the sequencer, called the Song-A-Lizer. As many as

ten loops can be used at one time, in any order, and repeated as often as you like. Click on the Start button, and custom background tracks play as a single loop, with seamless transitions between sections.

When you're ready to get into the groove, choose from one of five methods of musical interaction. At the center of the screen are two of the program's most dynamic components, called Mouse Kickers: the Vibe-A-Tron and Bop-O-Rama. Sounds are manipulated by holding the mouse button and scratching the surface at various speeds, as with the finger pads on some MIDI keyboards. Pull-down menus let you assign virtually any sound to each pad. Next to the Mouse Kickers is the Voc-A-Lizer, a push-button bank of eight sampled vocals guaranteed to enliven any song. The program's main library of sampled instruments, sound effects, and vocals is accessed through the keyboard. The top two rows—the numbers row and QWERTY row—each contain only 1 sound, arranged in 12 variations of pitch. Depending on the sound selected from a pop-up menu, you can achieve some fascinating sound distortions. The bottom two rows of the keyboard contain the remaining 21 preset sounds. Simply press a key to instantly hear its assigned sound. A pop-up keymap helps you see what you're playing.

Most people will find that not all of the included musical styles are equally suited to random, impromptu jamming. The best are undoubtedly Africa, Soul, Big Band, and Street Jazz. The Rock, Latin, and Techno Pop styles tend to produce odd combinations of tempos and ill-fitting instrumental solos. You may aspire for Kenny G and sound like Eric Dolphy, but don't worry about it. That's the challenge and reward of Rock Rap 'N Roll's remarkable musical world, where there are no wrong notes or twisted chords—only your imagination running wild.

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Create your own music with Paramount Interactive's Rock Rap 'N Roll.

er, the designers address the diverse musical needs of each style very well.

Sound snippets are stored in Windows WAV format and recorded as monaural 8-bit, but they're sampled at a higher rate of 22050 Hz for maximum clarity. When you select a musical style, the computer loads that studio's entire sound library into memory. Because of this, you'll need at least 4MB of RAM, with 6MB or 8MB highly recommended. The advantage of this technique is that it gives you the ability to play, mix, and record

ten loops can be used at one time, in any order, and repeated as often as you like. Click on the Start button, and custom background tracks play as a single loop, with seamless transitions between sections.

When you're ready to get into the groove, choose from one of five methods of musical interaction. At the center of the screen are two of the program's most dynamic components, called Mouse Kickers: the Vibe-A-Tron and Bop-O-Rama. Sounds are manipulated by holding the mouse button and scratching

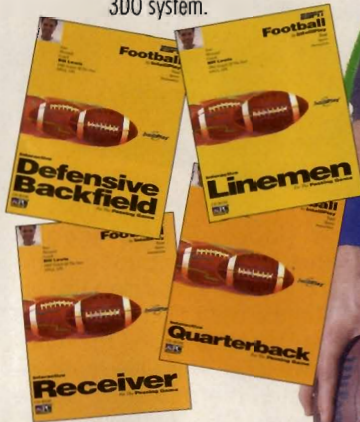
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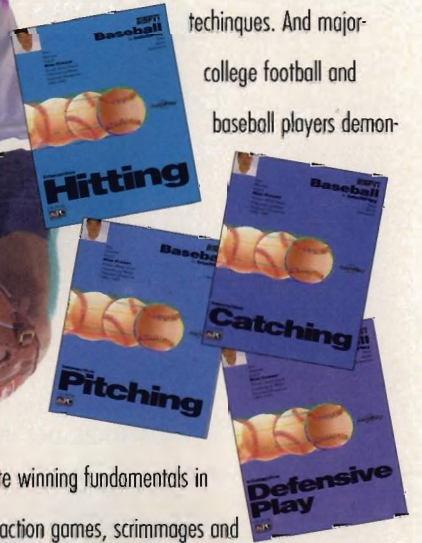
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# PRODUCTIVITY CHOICE

*This 600-dpi printer has the Windows Printing System built in, produces superb output, and is a snap to use.*

Clifton Karnes

## LEXMARK WINWRITER 600 PRINTER

In the dot-matrix-only days, printers were boring. Most people had to have at least one printer, but these contraptions were disturbingly loud, and their output was only serviceable at best. The laser printer changed all that. When the laser printer was invented about ten years ago, people could produce output that really looked great. Laser printers cranked out pages with a resolution of 300 × 300 dpi (dots per inch), and the type and graphics looked *black*, instead of a worn-out gray. Although 300 dpi looked terrific at first, it began to get a little boring, too. After a few years, some people noticed that 300-dpi graphics didn't really look *that* great, and text—especially at small point sizes—was a trifle rough.

In the last two years, however, many printer companies have upped the resolution ante with printers that print at 600 × 600 dpi—which is not double but four times the resolution of 300-dpi printers. The thrill is back—printers are exciting again!

This is where our story about the Lexmark WinWriter 600 begins. It's the newest offering in the 600-dpi class, and it comes with something extra: It is the first device with Microsoft at Work built in.

The WinWriter 600 has three goals: to make using a printer easy, to produce great-looking output, and to be cost-effective. The easy-to-use part starts right when you open the box. All you need to do to get this printer's hard-

ware up and running is pull a single tab from the toner cartridge, which is already installed in the machine, and attach the paper trays. Next, you install the Microsoft at Work software—and you're ready to go! This is the easiest printer to set up I've ever used.

On the outside, the WinWriter 600 is a dark beige box with a very small footprint. The printer comes with an internal 200-sheet paper feeder and a single-sheet manual paper feeder at the rear for documents and envelopes. Jutting out from the front of the printer is a paper exit tray. The manual paper feeder, single-sheet tray, and exit tray are all dark brown.

Most printers have a front panel that looks like a weapons-control array from "Star Trek: The Next Generation." The WinWriter's front control panel, on the other hand, is simplicity itself. As you'll see in a minute, the printer doesn't need a traditional control panel because you can control almost every aspect of the printer from your computer. The panel sports an on-off switch (thank you, Lexmark, for putting this on the *front*

of the printer), a pause-resume toggle, and a cancel button. And you'll notice something unusual in the upper left area above the on-off switch: the Windows logo. This little mark indicates the presence of the Windows Printing System.

In terms of options, the WinWriter comes with 2MB of RAM (upgradable to 8MB), the Microsoft TrueType Font Pak (which includes about 40 fonts), and a print cartridge rated at 4000 pages (with 5-percent coverage).

As previously mentioned, built into the WinWriter is the Windows Printing System (the printer component of Microsoft at Work). The Windows Printing System, which was initially released by Microsoft last year as an upgrade for the Hewlett-Packard line of printers, is a software-and-hardware package that allows you to configure your printer from your computer and monitor its progress while it's printing. Let's begin our discussion by talking about some of the options that the Windows Printing System offers.

The main printer setup win-





dow for the Windows Printing System is deceptively simple. Here, you can set the number of copies you want to print, the paper source, and the size and orientation (portrait or landscape) of pages. Nothing too exciting yet. Push the Options button, however, and the fun begins.

In the Options dialog box, you'll find a selection for double-sided printing. If you choose this option, the software walks you through the process of printing on both sides of a page. Here's how it works. First the WinWriter prints the odd-numbered pages; then it tells you how to reinsert these pages into the printer so it can print the even-numbered pages on the back of the odd-numbered ones. This is pretty cool, to say the least.

You'll also see an option in this same dialog box for turning Power Saver on or off. The Power Saver feature puts the printer in a low-power state if it isn't used for a period of time. This saves electricity without your having to turn the printer on and off between printing sessions. The last option in this dialog box is for scaling, which is a useful option if you're printing graphics.

A graphics setup dialog box lets you adjust several key features. You can control the dots per inch (300 or 600), turn on or off PQET (Printer Quality Enhancement Technology, which offers edge-smoothing like Hewlett-Packard's Resolution Enhancement Technology), and adjust the darkness of the printed graphics. A large area of this dialog box has options for using gray scale, which you can adjust to either solid black-

and-white, patterned grays, or diffuse grays.

In addition, you can control the brightness and the contrast of images. As if these options weren't enough, there's a sample window that shows you how your choices will affect the printed page.

A final section of the WinWriter's setup lets you configure just how the WinWriter software displays itself. It can show you the status while you're printing, tell you audibly about the status, and show you a progress bar, an animated diagram, or both. At first, you'll want all of these options selected so that you can really see what WinWriter and the Windows Printing System can do.

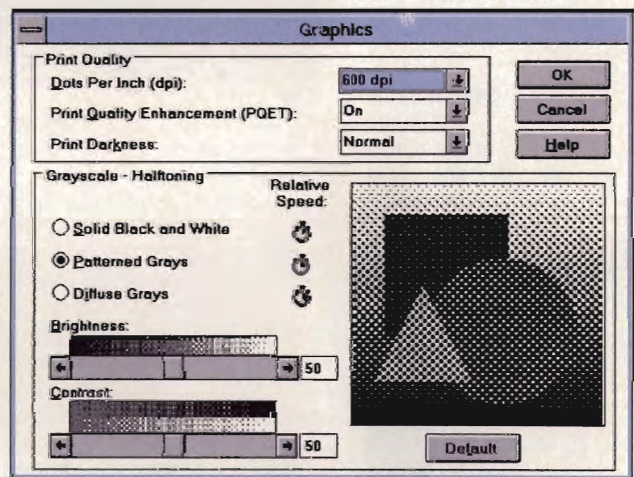
Now, to do some printing. When you choose Print from the File menu of a Windows application, the Windows Printing System printer status window appears. This window has a toolbar with buttons that let you stop, resume, and delete the print job.

Below the toolbar, you'll see the name of the document that's currently printing, the estimated amount of printing time left, and the estimated time that the print job will finish. Below this, in the main window, is a cutaway view of the WinWriter that shows each sheet of paper as it travels through the printer. Below this there's a progress bar. If you have the WinWriter's sound option turned on, you'll be treated to announcements when the printing begins and ends.

If your WinWriter should jam, the Windows Printing System will tell you where the jam is and provide instructions about how to get the paper out of the machine.

After a couple of print jobs, you'll notice that this printer is fast. It's rated at eight pages per minute at 600 dpi and ten pages per minute at 300 dpi. What's more impressive than these numbers, however, is how fast the first page comes out of this machine: After choosing Print, you'll have to wait only a couple of seconds to see your page, even at 600 dpi.

**IBM PC or compatible (80386 compatible), 4MB RAM, DOS 5 or higher, Windows 3.1 or Windows for Workgroups 3.11—\$1,399**



Features are great, but with printers, the bottom line is print quality. How does the WinWriter 600 rate? Its output is hard to beat. Pages printed at 600 dpi are simply beautiful—they rival those printed by 1000-dpi machines. The text is crisp, even at tiny point sizes, and large type doesn't show any jaggies—even on tough letters like S and W. The Windows Printing System not only extends the power and speed of this printer, but also makes it very easy to use. As a bonus, the WinWriter costs hundreds less than a Hewlett-Packard 4. This printer gets an unqualified recommendation. □

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Robert Bixby

## NEW NEWS

The many worlds of telecommunications are becoming one world. Over time, we are seeing fewer differences among the various methods of communication—less division, more synergy.

You can send faxes using your personal communicator and your cellular telephone, for example. The person receiving the fax might also be using a cellular telephone, a modem, a laptop, and OCR software to turn the fax into a computer text file. If I want to talk to my son in California, I need only send a message on his beeper, and he will call me back within minutes. My friend in Ann Arbor, Michigan, doesn't even have an answering machine, but I can reach her via the Internet anytime.

Everything is becoming attached to everything else. It is becoming a small (not to mention claustrophobic) world.

Many of the biggest stories on Wall Street have to do with telecommunications. Viacom purchases Paramount. Time Life merges with Warner Communications to form megamonolith Time Warner. Bell Atlantic attempts to merge with TCI in an effort to "wire the world" (a deal that eventually falls through, perhaps in part because of FCC attempts to keep cable prices low).

A few things are virtually assured. Most of the nation will soon be "wired" with fiber optics. Optical transmissions so dramatically broaden the bandwidth that your cable access will include things like movies on demand, a virtually unlimited range of entertainment and information services, and commercials galore. But what is of interest to computer users is that fiber-optic cable will also provide a more efficient and useful means of distributing software (television programs,

music, and movies are now called software as well, by the way). You'll be able to download the latest virtual-reality game in seconds, play it as often as you like on a pay-per-play basis, and then be done with it. You'll never have to worry about installation disks or hardware compatibility because the bytes will come down the cable and the computer hardware will be as standardized as televisions.

But beyond these basic predictions, any vision we can form of the future is probably wrong. The concepts of entertainment are certain to go through severe paradigm shifts over the coming years. Movies as we know them may cease to exist. They may come to resemble something like Access Software's *Under a Killing Moon*, in which you can experience the movie from the inside, following leads and red herrings at will, or just explore an alien environment in realtime—an alien environment populated by big-name stars living out a plot devised by the likes of Elmore Leonard or Danielle Steel. If you're into music, you can jam elements of your favorite music videos (or even your favorite musicians) into a production created just for yourself. If you're into current events, join a salon discussing issues of concern.

One thing that is definitely not assured at this point is whether you will be able to afford access. Should the government provide assistance or tax credits for people who can't afford access otherwise? It's easy to imagine a future world without paper dictionaries or encyclopedias (or even libraries) in which cable access is a child's only means to conduct research or study for school. To paraphrase Ken Kesey, you're either on the net or off the net. If you're off the net, a world of opportunities

and experiences might be closed to you.

This column will be about the online experience present and future. I'm counting on you to write to me and let me know your thoughts, your ideas, and your hopes. What do you think the future of online will hold? Does the government have a role to play in standardizing or providing access to the online world? (Vice President Al Gore seems to think so.) Is there any validity to the argument that the government, by its very presence, quashes innovation and creativity? And if so, how will this manifest itself when it comes to the so-called information superhighway?

But don't stop there. I'm also on the lookout for exciting things that are online now: discussion groups, databases, shareware, and so on. If you've downloaded a file that's particularly useful and you want to tell the world about it or if you've picked up a telecommunications program that does it all for you, let me know so I can tell others.

I'm looking for innovative ways to make use of what's available now, too. How are you using the powers of online communications to meet people, make money, and solve problems? There may be thousands of people waiting to hear how you do it so they can give it a try, too.

If you have an idea for a subject for this column, drop me a line. And if you have a question about telecommunications, this is the place to ask.

Write to me (or any of the editors) at COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. My fax number is (910) 275-9837; my CompuServe ID is 75300, 3671; and my AOL handle is RBixby. I'd love to hear what you have to say. □

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# DISCOVERY CHOICE

*Children will be fascinated by African animals and music as they develop basic skills in this natural learning adventure.*

Peter Scisco

## ZURK'S LEARNING SAFARI

The Serengeti in Tanzania isn't the first place parents look for high-tech learning experiences to share with their kids. But it's an ideal location; children are fascinated by wild animals. Now you can take them on a wilderness excursion like no other. Zurk's Learning Safari, from Soleil Software, brings the creatures of Africa to young discoverers, teaching basic skills in a natural environment.

Zurk, an electronic elf, leads the way through various activities, from a simple adventure to challenging jigsaw puzzles. Throughout, the African theme embellishes the program with interesting pictures, music, and possibilities.

At the opening screen, where a lion cub is perched on the arm of an easy chair with a bespectacled lion father reading from a storybook, kids and parents select any of the program's six activities: Zurk's Magic Box, Zurk's Puzzles, Alphabet Soup, Animal Picture Book, Hide and Seek, and Maya's Adventure.

The simplest activity, Zurk's Magic Box teaches shape recognition. Even very young children can open the box by matching two shapes that appear on its front. If, for example, a large crescent and a small circle decorate the box, your child must click on the box, cycling through the smaller shapes until a match appears. After making the match, your child is rewarded with a brief animated sequence featuring Zurk.

Zurk's Puzzles will entertain the youngest children as well



as their older siblings. The simplest puzzle, an elephant, shows lines that indicate the shape of the pieces that are to fit in specific places, much like the beginning wooden and cardboard puzzles sold in toy stores. A child drags a piece onto the puzzle, and it snaps to the screen when it's on the correct spot.

The pig puzzle, which doesn't assist with shape lines, will challenge older kids, and the most ambitious puzzle solvers can tackle the landscape puzzle. This puzzle begins with basic shapes like squares, circles, and hearts, and then uses oddly shaped pieces that encourage real logical thinking.

Rounding out the puzzle games are a letter recognition puzzle (put the alphabet on a crocodile's back) and a counting (to ten) puzzle, both suitable for kids ages 4-6.

The same ages will have fun building letter recognition skills with Alphabet Soup. In this game, they match letters

that float in a bowl of soup with the same letters that appear in a border around the edge of the screen. Zurk makes an appearance here, running around the border and disappearing beneath one of the letter tiles.

To make Zurk reappear, children must select the floating letter that matches the tile hiding him. If they're successful, Zurk lets out a gleeful yelp before running and hiding under another letter. The game continues until the child has matched all of the letters in the alphabet. Wrong answers aren't punished—but Zurk won't emerge until the correct answer is chosen.

When a letter is selected, it rises from the bowl, transforms into an animal, and then changes back into the letter. Audio-equipped computers pronounce the letter, speak the name of the animal, and then pronounce the letter again. Such audio reinforcement is instrumental in helping kids memorize letters.

The soup bowl uses uppercase letters; the alphabet puzzle, lowercase. Parents can't switch from upper- to lowercase, so children have to move between the games for practice with both cases.

Animal Picture Book contains drawings of each of the 31 animals featured throughout the program. Not an alphabet book with animals from A to Z, the book attempts to strengthen early reading skills. Kids also become familiar with many of the animals indigenous to the African continent and can hear the animals' names pronounced by clicking on the pictures.

The last two activities in Zurk's Learning Safari are more ambitious and will appeal to kids up to age 7. In Hide and Seek, kids hide ten animals in a Serengeti landscape. As they hide the animals, they learn (with their parents' helpful direction) how animals use camouflage to protect themselves. A green turtle may hide among green lily pads on a pond, while a gray lizard may become a shadow against a gray rock. Siblings can be encouraged to play together, one hiding animals and the other finding them.

The second half of this game works in the opposite direction: The computer hides the creatures, and the kids must find them. This is like an electronic version of the popular hidden-picture puzzles in many kids' magazines.

Hide and Seek opens itself to many different ways to play, and it gives parents a chance to talk about other subjects away from the computer. It's a good way to start conversations about prey and predators as well as the wild-

life of Africa, for instance.

Maya's Adventure rounds out the program's activities. Children help Maya, a lost lion cub, find her family. Kids use the mouse to move the lion cub around the screen. Maya seeks assistance from her animal friends by poking at them with her paw. On three of the panels (the entire adventure takes place on six panels, but only three are interactive), kids must find the right animal friend and then follow that friend to the next panel. At the end of the adventure, Maya is reunited with her mother and father.

Throughout, Zurk's Learning Safari is lovingly illustrated. Both the animated sequences and the background pictures are rendered in fine detail. The narration, pronunciations, and sound effects do much to enhance the learning and playing experience.

Special attention must be given to the music, which is inspired by African instruments. For that alone, Zurk's Learning Safari deserves praise. Purists may wish for exacting African tunes, but Zurk's Western accommodation helps to introduce children (and parents) to the polyrhythmic sounds they might not otherwise hear. Too few American kids get a chance to appreciate the musical heritage of another culture.

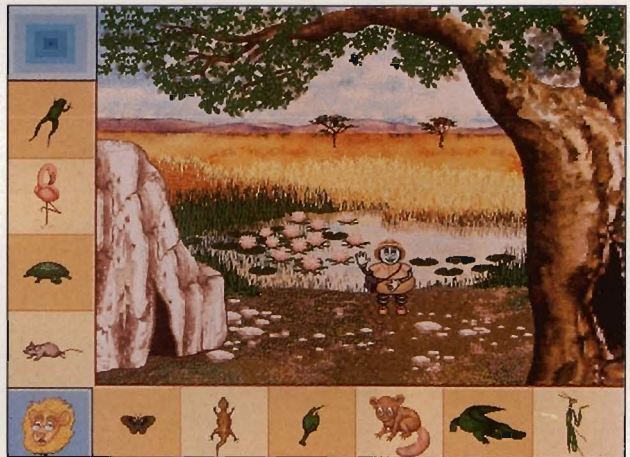
The game's sound effects are generally well designed and used to great effect, from Zurk's high-pitched giggles to letter pronunciations. However, in a program that features so many animals, it's curious that animal sounds are not included in the audio repertoire. Perhaps the idea is that such an inclusion would distract early learners

from the lessons that form the core of the program.

Zurk's Learning Safari also gets a good score for its brief manual, which introduces each game with a rhyme and suggests activities for parents and kids that can be enjoyed at or away from the computer.

A few technical notes bear mentioning. Online help is not available; the conventional use of the F1 key to summon help is likely to cause a sys-

**IBM PC or compatible (16-MHz 80386 or faster), 2MB RAM, VESA-compatible 256-color VGA, hard drive with 8MB free, mouse; supports most**



tem crash. Potential buyers should also be aware that the game requires a VESA-compatible video card with 512K of video RAM. Most contemporary cards will meet this specification, and Soleil provides VESA drivers with the program. But if you own a machine that's more than two years old, you should check your manual to make sure you have what's required.

On balance, Zurk's Learning Safari is a fine example of state-of-the-art preschool software. Parents in the hunt for early reading and discovery software can add this to their trophy room of captivating teaching tools. □

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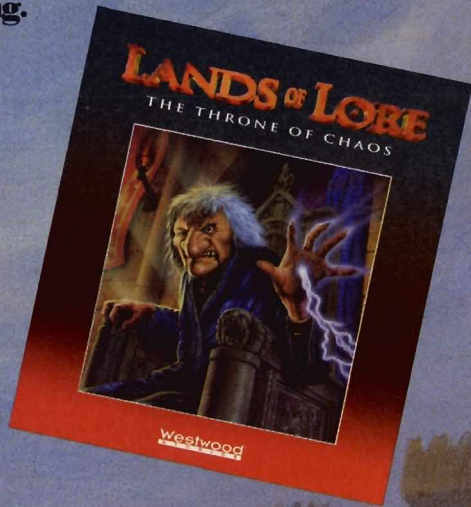
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# GAME INSIDER

Peter Olafson



## AD&D, R.I.P.?

It will end where it began, with a game set in the Forgotten Realms. The relationship between Strategic Simulations, Inc. and TSR, which produced about 30 computer games over a period of eight years, will draw to a close with the Christmas release of a role-playing game with the working title of *Menzoberranzan*.

A joint statement announcing the decision didn't offer any explanation beyond that "the time has come for both companies to pursue their own interests." However, a source indicated that the split was the product of a shared sense that each company had drawn what it could from their affiliation.

It's an amicable separation,

**Goodbye to SSI's  
AD & D: TSR  
and SSI will go  
their separate  
ways at the end  
of 1994.**



and it doesn't mean SSI and TSR won't work together in the future. (In other words, TSR could conceivably terminate but stay resident.)

Both companies are already at work on their independent futures. TSR is assembling a software development team with hopes of releasing new games under its own label in 1995, and it will continue to license properties to outside game developers. SSI has an in-house team eager to get underway on an ambitious new RPG project which isn't expected to surface until 1995.

Of course, the TSR alliance isn't over yet. SSI's AD&D plans for the remainder of 1994 also call for release of *Ravenloft: Strahd's Possession* and the entry-level, videogamelike RPG *Al-Qadim: The Genie's Curse* (both of which should be out now), as well as *Dark Sun II: Wake of the Ravager* (which should be out this summer).

Also on tap from SSI is *War-game Construction Set II*, a game using tanks from 1918 to 1991, which should be out by the time you read this. The New Age fantasy RPG called *Alien Logic*, based on the tabletop game *SkyRealms of Jorune*, is slated for June. *Panzer General*, an SVGA war game, should ship around July. Sports buffs will want to watch for *All-Star Hockey*, due in September, while strategists should look for *Secret Missions*, a space simulation in the style of *Renegade Legion: Interceptor*, late in the year.

Beyond that, SSI is linking up with Germany's Blue Byte again for the imminent release of *The Settlers* (retitled *Serf City: Life is Feudal for the U.S.*). The game is a joy: A fully developed nation swarms with Lemming-sized people building a wide range of structures, chopping up trees and boulders, processing materials, carting off finished goods, mining, fishing, farming, and fighting with the neighbors. It's like an animated, medieval take on a *Where's Waldo?* scene.

Shopping overseas. SSI isn't the only U.S. label bringing software over the Pond. Consider *MicroLeague Interactive*, those not-just-sports folks who recently released U.S. versions of *Body Blows* and *Alien Breed* (both from England's Team 17). It has hooked up with Germany's Starbyte label and is slated to bring over at least six games

this year: *Bazooka Sue*, *Big Sea*, *Hannibal*, *Hoogy*, *Rings of Medusa Gold*, and *Space Job*. *Hannibal*, the first to appear, is an elaborate and handsome historical sim based on the Carthaginian leader's attempt to conquer Rome.

And while we're on the subject, look for the *Breach*-like *Sabre Team*, the clever arcade game *Soccer Kid*, and the impressively lit RPG *ShadowWorlds* to turn up as a result of *MicroLeague's* affiliation with England's *Krisalis*.

*Domark* is set to release English developer Mike Singleton's *Lords of Midnight* in June. Like his earlier games (*Midwinter*, *Flames of Freedom*, and *Ashes of Empire*), this realtime fantasy RPG is vast in scope. Unlike the earlier games in the series, it permits you to bounce between four parties roaming a Comanche-like texture-mapped, fractally generated landscape.

*PenUltima? Origin's Ultima VIII*: Pagan represents the biggest change in the long-running role-playing series since *Ultima VI* introduced the *Avatar* to a real-world environment back in 1990.

For one thing, it's the first solo *Ultima* (if you don't count the *Underworld* games), with your pals *Iolo*, *Dupre*, and *Shamino* nowhere to be found. Also, the camera has moved in for a closeup of the action this time, with the *Avatar* more than 2½ times larger on the screen than in *Ultima VII*. That, in combination with the large number of moves your character can perform, lends itself to a better sensation of "being there."

And while not so large in area as its predecessors, Pagan is rendered in enormous detail—there's said to be ten times more artwork in this version. At this rate of advancement, how far are we from virtual-reality *Ultima*? □



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# ENTERTAINMENT CHOICE

*Beware: This lavish adult thriller could evoke nightmares as you work through its adventure.*

Scott A. May

## GABRIEL KNIGHT: SINS OF THE FATHERS

Early computer games relied heavily on movies for creativity and direction, often ending up as pale reflections of their celluloid inspirations. Times are changing, however, and it won't be surprising if filmmakers begin looking to entertainment software for big, fresh ideas. Sierra On-Line's Gabriel Knight: Sins of the Fathers is a prime candidate for such creative role reversal.

Writer and director Jane Jensen shines in her first solo project, a solid follow-up to last year's successful collaboration with Roberta Williams in King's Quest VI: Heir Today, Gone Tomorrow. Jensen's dark, sensuous style stands in stark contrast to Williams's light fantasy—a distinction that will delight most adventure fans and disturb others.

A parental warning label accompanies the game, cautioning that much of its material is inappropriate for young players. Indeed, the product contains a fair amount of ritualistic violence, partial nudity, and profanity. As is not the case with many other adult games, however, such explicit content is neither gratuitous nor inconsequential to the story. Sierra is to be commended for publishing an original thriller aimed at intelligent, mature audiences.

Immediately, a necromantic mood is established by virtue of the setting: the enigmatic, multicultural milieu of New Orleans. There, you step into the troubled life of Gabriel Knight, a young writer researching a book on voodoo.



Gabe is plagued by terrifying, violent nightmares; his psychological well-being is tested as he becomes embroiled in a string of brutal homicides known locally as the Voodoo Murders. Subsequent investigation reveals horrific secrets in his family's past. As Gabe, you learn you're the last in a long line of *Schatten Jäger*, or Shadow Hunters, whose fate is to fight dark, supernatural powers. Suddenly, both the nightmares and the murders take on new significance, as you race to piece together clues before it's too late.

Included is a short, hand-drawn graphic novella designed to evoke vague, but compelling, story ambiance. It tells a tragic tale of love, betrayal, and ancient evil. Written by Jensen and illustrated by Terese Nielsen, it captures the imagination, compelling players to seek the modern connection between this Faustian tale and the game's modern hero. Nielsen's dark, disturbing visions carry over to many of the game's hand-

drawn backdrops, drawn from a gloomy palette of deep red, blue, and black. Gabe's recurring nightmare sequences are particularly well designed and smoothly animated, rendered at a higher-resolution VGA (640 × 480) than the bulk of the game's imagery (320 × 200).

Sierra continues to improve its mouse-driven icon interface, utilizing several new additions here with great success. Controlling your on-screen character is simply a matter of changing the mouse pointer to an icon representing various actions: a boot (walk), a Mardi Gras mask (look), a hand (pick up), gears (operate), and so on.

New to the Sierra interface is support for both two- and three-button mice, allowing you to move even faster through the available icon commands. A pop-up icon bar allows access to your inventory and hand-held tape recorder, an interesting innovation that automatically tapes conversations held in interrogation mode. A separate inven-

tory of labeled cassettes lets you review the indexed topics of prior conversations. It's a fun gadget and an invaluable tool for tracking clues and re-viewing character dialogue.

The game contains an intriguing number of realtime interactive puzzles. Most bizarre are the voodoo and drum code interfaces, where you must learn to interpret and construct messages from cryptic symbols and drumbeats. Such diversions add variety to gameplay and depth to the story line. Most puzzles follow standard adventure protocol, requiring you to find and use objects gathered from numerous locations. The game's adult rating also applies to its difficulty level—it's decidedly not for beginners. With few exceptions, puzzle solutions are forthright and logical, although anytime magic comes into play, you can expect a fair number of unusual twists.

Size-wise, the game spreads itself over dozens of exciting locations. It contains several paths to the story's conclusion—some direct, others far richer in atmosphere and character development.

Like most current Sierra ad-



CD-ROM version

ventures, Gabriel Knight runs equally well under either DOS or Windows. An enhanced CD-ROM edition adds optional character speech throughout the game. Though not a necessary ingredient for full enjoyment of the story, the professional-quality speech further enriches an already expressive script. Experience the all-talking version, and you'll be spoiled for anything less. Another bonus for CD gamers is the 20-minute video for Windows, The Making of Gabriel Knight, a fascinating look behind the production, including interviews with Jensen and many of the game's principal performers.

Beyond speech, however, it's discouraging to note no other audio enhancements. Given the nature of the story and its exotic locales, true audio-CD background music would've been a simple, yet dynamic, addition. At best, the program provides enhanced ten-channel sound for music devices compatible with Windows Extended MIDI.

Among the voice talents recruited for the CD version are Tim Curry in the title role and Mark Hamill as Detective Moseley. Curry affects a deep Southern drawl thicker than week-old gumbo and twice as spicy. Disconcerting at first—particularly to those unfamiliar with this unique regional accent—Curry's strong vocal characterization tends to grow on you. Other notable cast members include Michael Dorn (best known as Worf on "Star Trek: The Next Generation") as Dr. John, Leah Remini (of "Evening Shade") as the wisecracking Grace, and Hollywood veteran Efrem Zimbalist Jr. as Wolfgang. The voice you hear most often is that of

Tony winner Virginia Capers, whose narration absolutely drips with slow, zesty Creole flavor. Emmy winner Stuart M. Rosen directs the large ensemble of actors, as he did on Sierra's bestselling King's Quest VI CD.

The CD edition also offers a choice between full (33MB), medium (20MB), and tiny (1MB) hard disk installation, plus an additional 4MB of



high-resolution segues and cut scenes. The more of the game you install to disk, the more smoothly it will run at the publisher's minimum system configuration. The story's deliberate pace, on the other hand, allows those with an 80486-based system to run the program almost entirely from CD with no compromise in speed. Internal game controls allow you to fine-tune animation speed and detail to best suit your machine.

It would be exaggerating to claim Gabriel Knight: Sins of the Fathers redefines its particular genre. In terms of intelligent and original adult entertainment, however, Jensen and company display creativity and style that's bound to make Hollywood sit up and take notice. □

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# GAMEPLAY

Denny Atkin



## TOMCAT UNLEASHED

"Contacts 75, 20" warns the E-2C Hawkeye early-warning aircraft. I jerk the stick to the left and turn my Tomcat on the vector. "Bogey locked!" the GIB confirms. I center the targeting reticle on the heads-up display, select an AIM-7 Sparrow missile, and squeeze the trigger. "Fox 2," I calmly call out as I watch the missile's trail stream away from my F-14. Suddenly a report comes in from the Hawkeye: "Su-27 hit by AIM-7." Feeling a bit proud of myself, I get ready to check with the GIB to see if there are any other targets in the area. "Launch! Launch!" he screams before I can open my mouth, and I drop chaff and

**F-14 Fleet Defender opens a new era of quality for MicroProse flight simulations.**



head for the deck. Looks like our target had four buddies—I tell my wing man to clear my tail and then I radio to the *Forrestal* asking for Ready 1 assistance. Looks like it's going to be a long afternoon.

F-14 Fleet Defender is so action packed that it makes *Top Gun* seem more like *Remains of the Day*. Earlier MicroProse flight simulators were heavy on arcade elements and light on realism. They generally featured "you against the world" scenarios, where you were just about the only allied plane in the sky and entire air

forces would go into the air to get you. Flight models weren't very realistic, and there were terrible technical inaccuracies, such as land-based F-15E and F-117A fighters operating off of aircraft carriers. They were fun, but as games, not as simulations of real-life air combat.

MicroProse has made a quantum leap in realism with F-14 Fleet Defender. You now fly as part of a combat package and always have a wing man on your side. There are dozens of other aircraft in the skies, enemy and allied, each with its own mission that may not involve you at all. The flight models and weapons performance seem dead-on accurate to this aviation buff.

The game is set in the mid 1980s, with both historical (the attack on Libya) and World War III scenarios. You pilot the two-seat, twin-engine Grumman F-14 Tomcat, the fighter that *Maverick* and *Goose* flew in *Top Gun*. The F-14 is an exciting plane to fly. Designed in the late 1960s, it predates the superpowerful engines and fly-by-wire controls of the more commonly simulated F-16 and F/A-18. Because you're not in a superplane, you get a better feeling of flying than in the "electric jets." You can jump to the back seat to operate the radar or just let the computer handle the GIB (Guy In Back) functions.

Fleet Defender's graphics, in and out of the cockpit, are spectacular. The F-14s are rendered with incredible detail—watching the big elevons twist as you turn the plane, you feel as if you're watching a slightly fuzzy video of a real fighter jet. The planes even have authentic squadron markings on their tails. The sky is beautiful—when you're flying below storm clouds, everything's murky and low-contrast, but

zoom above them and your view is suddenly sharp and bright.

There's a wide variety of missions to fly, all of them air-to-air. The Tomcat is an interceptor, so you'll fly cover for the air-to-mud jockeys. Enemy AI is very good at the highest levels; the computer-controlled planes are deadly when they start using the vertical. The game is extremely authentic and challenging, but the realism is adjustable so that beginners won't be overwhelmed.

The only things lacking are modern play, a mission planner, and a replay mode. Since the game has graphics that surpass *Strike Commander's* and realism that approaches *Falcon 3.0's*, many sim fans will be willing to overlook those omissions. This is just the first sim from a new MicroProse, one that simulation fans will want to keep a close eye on.

**Castles Too.** My other favorite addiction this month has been the new CD-ROM version of *Castles II: Siege & Conquest*, from Interplay. You're a medieval baron out to build an empire and eventually accede to the throne. You build diplomatic alliances and conquer weaker enemies in an effort to expand your power. To fortify your territories, you can build castles in them, and this is half the fun—you design your own castle and then allocate resources to its construction.

The CD-ROM edition adds over 30 minutes of BBC documentary footage on castle history and construction techniques; the full-motion video used here looks pretty good. Some classic film footage is interspersed through the game; and more than five hours of digital speech, including a spoken tutorial, have been added. Finally, there are ten new historical castles which you can use or study for tips in designing your own. □

the VW Bug is now a Mercedes with all the options."

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# TAKE CONTROL

**D**id Luke Skywalker destroy the Death Star by hitting the Return key? Did Pappy Boyington become the Marines' top World War II ace by mastering the cursor keypad? Did Nigel Mansell become a top-ranked Indy car driver by learning to steer with a mouse? Of course not. So why are you still playing PC games using the keyboard and mouse? Grab a joystick, yoke, or game pad and take control!

You can turn your businesslike PC into one of the hottest game machines this side of an Air Force flight simulator, but to do so you'll need a controller that sizzles. Luckily, today's PC game controllers bear little resemblance to the fragile rubber-and-plastic digital joysticks of Atari VCS days. Whether you're looking for a simple game pad to play arcade games like Doom or a 3-D control device to explore virtual reality universes, you'll find a wealth of available choices.

## **Any Port in a Storm?**

There are a few things to consider as you get ready to select a controller. If you're going to

add a game controller to your system, you'll need a joystick port on your PC. Many systems now ship with a joystick port included as part of a multifunction card or sound card. However, those ports generally don't work well on fast systems, and some don't support the extra lines necessary for using a second joystick or a joystick with multiple buttons and a throttle. Your best bet is to buy a dedicated speed-adjustable game card; you'll find that top-quality offerings from Advanced Gravis, CH Products, and ThrustMaster generally sell for about \$25 on the street.

## **Playing on Your Lap**

Until recently, most laptop computer users were stuck with using the keyboard for game control if they didn't have a docking station with a joystick adapter plugged into an expansion slot. Now there are two solutions for gaming on the road. (Both of these will also work with desktop PCs, but a dedicated game card is a better choice there.)

Colorado Spectrum's Notebook Gameport connects to the serial port of your laptop and

**By Denny Atkin**

includes a pass-through for your mouse. It fully supports two sets of joystick lines, so you can use four-button sticks, throttles, and rudder pedals. Colorado Spectrum is depending on developers to add support for the Notebook Gameport to their games, so you'll want to check to make sure that your favorite simulations support it. I used it with F-15 Strike Eagle III on a Gateway HandBook486, and it worked splendidly.

Genovation's Parallel Game Port also supports two sets of joystick lines, but it connects to your parallel port. Instead of relying on developer support, Genovation has created its own drivers for dozens of games. This approach means drivers are available for some old, but still popular, games that had no hope of being updated by the publisher for laptop compatibility.

### Total Control

Demanding game players are no longer satisfied with a simple two-button joystick. In order to avoid having to reach for the keyboard in the midst of the action, they seek out one of the new top-of-the-line multifunction sticks. These use the extra data lines that are assigned to a second joystick to add more buttons, throttle control, and even rudder control.

QuickShot's Super Warrior is a good choice if you're looking for an inexpensive full-function joystick for flight simulations. It sports four fire buttons, a throttle control dial, a gimbaled stick mount, suction cups for desk mounting, and a cushioned rubber "BioGrip" panel on the back of the control stick. Like most of the QuickShot controllers, the Super Warrior has a turbo fire switch that, when selected, will make the fire buttons send rapid pulses to the computer when you hold them down. This is great for saving wear and tear on your trigger finger in games that don't have their own automatic fire functions.

Suncom's FX2000 has the most far-out design of any of the controllers I looked at—this stick would look right at home on the control panel of a Martian War Machine. It's billed as "the ultimate flight control stick." Well, not on this planet. It has only two fire buttons and a very limited stick throw range. There's a throttle control dial on the front of the stick, but it's mounted so that you rotate it left to right instead of front to back, which doesn't feel natural. Also, the throttle feels like a leftover

volume control from a transistor radio—it even clicks when you move it from the off position. The FX2000 does have switchable autofire and suction cup mounts. Unfortunately, the FX2000 sacrifices functionality for form.

A much better effort from Suncom is the superb FlightMAX Advanced Flight Control console. This hefty controller includes a very comfortable stick with two fire buttons. You can use a switch to select whether to use the throttle control on the left or right side of the stick, a feature that makes this the premier multifunction stick for lefties. Suncom's Saturn Ring stick mount



Laptop control: Colorado Spectrum's Notebook Gameport and Genovation's Parallel Game Port.



Stick to it: The Suncom FlightMAX, CH FlightStick Pro, Suncom FX2000, Gravis Analog Pro, and CH Jetstick.

gives the stick equal tension in all directions, making it as easy to move the stick northeast, for example, as to move it west. A unique feature is a slider on the front of the stick that acts as a rudder control, a fantastic addition that comes in very handy for flight simulator landings. Unfortunately, FlightMAX has only two fire buttons, which keeps it from being the premier choice for combat flight simulations.

Fire buttons aren't lacking on the Gravis Analog Pro, which sports five of them (two perform the same function, as PCs can only support four button sig-

nals). There are three buttons on the stick handle, and two more on the base; these can be assigned to any button signal. The handle is padded with foam, making it extremely comfortable. Unfortunately, the handle may be a bit small for some adult hands—it needed to be about an inch taller to fit my hand well. There's a throttle control on the left side of the base, but it's easily confused with the button function selectors, and it's difficult to adjust during game action. You can disable the throttle if you need to use a second joystick, a nice touch. The Analog Pro has a unique adjustable-tension centering feature—you can select how hard you have to push the joystick to move it off-center, or you can disable the centering completely.

Gravis is about to release its next-generation joystick, the Phoenix Flight & Weapons Control System. Although it wasn't available for testing as this feature was being written, it certainly sounds impressive. The stick will sport analog and digital throttle and rudder control, as well as 47 different button function. Gravis says its configuration programming will make setting up the button functions a snap. Check this one out before you make a final purchasing decision—not only is it packed with functionality, but it has a truly innovative design. It looks more like it belongs on the weapons control panel of a Klingon Battlecruiser than on your computer desk.

The CH Products Flight-Stick Pro is based on the company's original Flight-Stick, long popular with dedicated flight simulation fans. CH Products has removed the annoying clicker from the throttle control and increased the number of fire buttons to four. There's a directional control on the top of the stick—a four-position conical switch known to players as a "coolie hat" or "Madonna button." This switch is used in many simulations to change the view direction out of the aircraft. Although it's similar to the switch pioneered on the ThrustMaster FCS, it's not electrically compatible with that switch, so it won't work with some older games. However, drivers are available for popular games such as Falcon 3.0 and Microsoft Flight Simulator to enable the view switch. All four buttons and the view switch are mounted on the top of the stick handle, making for a top-heavy stick; I'd rather have seen some of the buttons mounted on the stick handle, as with the ThrustMaster sticks. Even so, with its



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smooth gimbaled mount, comfortable trigger rest, handy throttle dial, and view switch, this is the joystick I use most.

If you're on a tight budget, you should check out the new CH Products Jetstick, which has only two buttons and no throttle but has a quality gimbaled mount for smooth movement, as well as an extremely comfortable grip. Another good budget alternative is QuickShot Warrior 5, a two-button stick with turbo fire that's available at a rock-bottom price.

### The ThrustMaster Solution

ThrustMaster offers a high-end joystick, but that's only part of the company's game control solution. A full ThrustMaster setup—consisting of the Pro Flight Control System (PFCS), Mark II Weapons Control System (WCS), and Rudder Control System (RCS)—gives you HOTAS (Hands On Throttle And Stick) control, which lets you put the keyboard aside and immerse yourself in the virtual reality of your game.

The PFCS is a heavy-duty version of the original FCS stick. The design is based on the actual control stick used in the Air Force's F-4 Phantom II jet fighter. Four buttons are mounted along the stick handle, making them easier to reach during simulated combat than those on the FlightStick Pro. There's also a view switch on the top of the stick. The Pro version of the FCS differs from the original in that it has a heavy metal base and very strong springs. It takes some real force to move the stick from side to side, just as in a real aircraft; this keeps you from overcontrolling in games. You should try this stick before buying it; if the force needed bothers you, you might want to go for the standard FCS. The FCS has a plastic base and is easier to move from side to side, but it's otherwise identical to the PFCS. Many players who've tried the PFCS swear by its stiff, realistic response and can't go back to a standard joystick. The only real glitch with the ThrustMaster joysticks is that they don't include trim adjustments, relying instead on your software's calibration capabilities to adjust centering.

The Mark II WCS is a programmable throttle control that sports five buttons and a three-position rocker switch. The original WCS was factory

programmed with commands for a variety of flight simulations; when new programs came out, you had to replace a chip in the controller to add support for those. The Mark II WCS is fully programmable, solving that problem. You simply download an appropriate setup file from your PC for the simulation you're about to play. These setup files list keyboard commands that will be sent to the program when you press various buttons or switches. Setups are included for most popular simulations—Falcon 3.0, X-Wing, Comanche, and others—and new simulations such as F-14 Fleet

game. With the Mark II WCS, you'll never have to search the keyboard during combat again—it's a must-have for flight sim players.

Dedicated sim fans will want to complete their setups with the RCS pedals. These sturdy aluminum-and-plastic rudder pedals have a two-foot-wide spread and can make all the difference during low-speed combat and touchy landings. With all three controllers attached to make for a complete HOTAS setup, the experience is so realistic that you might not feel comfortable playing without a crash helmet.

### The Yoke's on You

For some games, such as commercial aviation simulations or driving games, a joystick just doesn't seem like a natural control. For these you'll want to check out a control yoke. Like the yokes found in aircraft, these resemble steering wheels, but you can also push and pull them for vertical control.

CH Products' sturdy Virtual Pilot yoke would look right at home on the control panel of a Cessna. This heavy-gauge plastic yoke clamps to your desk and sports realistic trim controls and a T-shaped throttle at the top of the main box. Not the most glamorous of the yokes examined here, it makes up for lack of flash in authentic design and quality of construction—this yoke is built to last.

A little flashier is Suncom's G-Force, an all-black yoke that looks like something you'd find in an ultramodern bomber or airliner. It's easy to find a spot to mount this yoke on your desk, as it includes both suction cups and clamps. The throttle isn't as nice as the one on the Virtual Pilot—it's a slider

on the front of the control wheel—but the wheel itself is a bit more comfortable to use, especially in applications where you'll be pressing the fire buttons a lot. Also, there's a directional lock on the column that will keep you from being able to move it forward or backward, for use in driving games.

QuickShot's AeroAce 5 is definitely the most visually interesting of the yoke controllers—it looks like it's straight out of *Star Wars*. It's the only yoke here that features a turbo fire feature on the fire buttons. It has a gimmicky, but sort of neat, artificial horizon on the front of the yoke that's marginally useful for figuring out when



The joy of control: The Quickshot Super Warrior, Thrustmaster Mark II WCS and Pro FCS, and QuickShot Warrior 5.



Yoking around: The QuickShot AeroAce 5, CH Virtual Pilot, and Suncom G-Force.

Defender are shipping with Mark II WCS definition files on the program disk. If your sim isn't supported, you can create your own definition files; you can also alter the predefined files if you don't like the default setup. The Mark II WCS also lets you reprogram the buttons and view control on ThrustMaster joysticks, allowing you to add support for the extra buttons and the coolie hat to programs without that functionality built-in. If your program supports throttle control, the Mark II WCS can act as a standard analog throttle. If not, it can operate in a digital mode where it sends keyboard throttle control commands to the

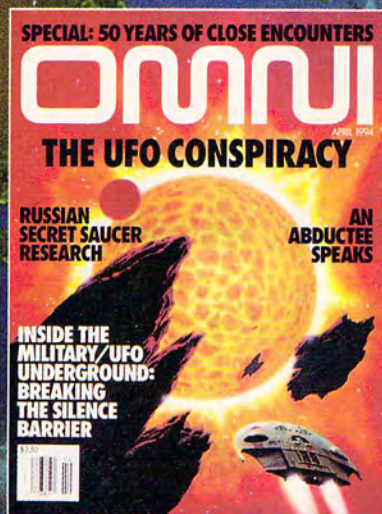
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Come over to my pad: The QuickShot StarFighter 5, Gravis PC GamePad, and Suncom Command Control.

you've centered the controls. There's no throttle control at all, and no clamps—you're forced to use suction cups, which may not work well on your computer desk. Not as comfortable to use as the Suncom and CH Products offerings, the AeroAce 5 will appeal primarily to kids who think it looks really cool.

Finally, really serious driving aficionados will want to check out ThrustMaster's Formula T1 control. Constructed of aluminum and heavy-gauge ABS plastic, this realistic controller includes a full-size steering wheel and shift lever, along with floor-mounted brake and gas pedals.



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QuickShot  
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(510) 490-7968

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### Come Up to My Pad

If you've spent much time on video game consoles such as the Genesis or CD32, you may have gotten accustomed to joy pad controllers. These are now available for the PC as well. Although they're not well suited to simulations and driving games, they're the controllers of choice for fast-action

arcade games where your hands can quickly tire when using a full-sized stick.

QuickShot's StarFighter 5 is a good basic controller, with a turbo fire feature and two fire buttons. Suncom's Command Control pad is similar, but includes five buttons: Two are standard fire buttons, one acts as if you were pressing both primary buttons together, and two are turbo fire buttons. The premium choice is the Gravis PC GamePad, which includes four fire buttons, single-shot or turbo fire, and a small handle which screws into the game pad and turns it into a tiny joystick. Lefties take note: The PC GamePad can be switched for left- or right-handed operation.

### Input Alternatives

In a category by itself is Logitech's new CyberMan, a six-axis controller that can not only be moved forward, backward, left, and right, but can also be twisted to the side or moved up and down, giving you full movement in three-dimensional space. It connects to a serial port and can work with or replace a mouse (it doesn't work very well as a mouse, though). My favorite feature is feedback—the game can cause the CyberMan to vibrate in response to your actions. Few games support CyberMan now, but that should change soon.

### Take Off, Eh?

As you can see, there are tons of options available to the PC gamer. Your choices will depend on the games you're playing, as well as on personal preferences. But be sure to check your applications to see whether they support esoterica such as extra buttons, throttles, or rudder pedals before spending hundreds of dollars on these extras. □

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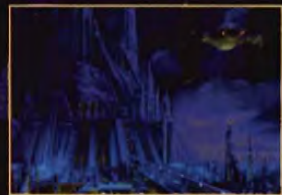
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## MEGAHERTZ XJ1144

Modems keep getting smaller, but none are as small as the PCMCIA modem cards that fit into many notebook, subnotebook, and palmtop computers—not to mention the new PDAs (Personal Digital Assistants). These days, almost every notebook computer comes with one or more PCMCIA slots, so buying a PCMCIA modem means you should be able to use it later if you switch to another notebook computer. (The PCMCIA standard isn't 100-percent solid, so ask about compatibility before you buy.)

Megahertz is currently the leader in PCMCIA modems. The reasons for the company's success are threefold: five-year warranties, toll-free support, and patented XJACK technology. Other PCMCIA modems make you use a special cable, which connects to the modem on one end and a standard phone cable on the other end. With the XJACK, you simply press the side of the card, and a sturdy phone jack connector pops out, allowing you to plug a phone cable directly into the modem. When finished, you press the XJACK back into the card, where it stays until it's needed again.

For this review I tested the XJ1144 fax/data modem, which includes an XJACK. (The CC3144, which does not include an XJACK, is available for \$30 less.) It handles both data and fax transmissions at 14,400 bps (bits per second), supports V.42 and V.42bis for 57,600-bps data throughput, and works with notebook computers from AST, Dell, Sharp, Toshiba,



The Megahertz XJ1144's patented XJACK phone connector makes it one of the most portable modem solutions available.



Corel Ventura 4.2 is only an incremental update, but Corel has stuffed the package full of accessory fonts and utilities.

and others. (Call 800-LAP-TOPS, extension 6789, for an up-to-date list.) The unit ships with the DOS-based communications program WordPerfect Communications, the DOS-based fax program WordPerfect Express-Fax, and the Windows-based

fax program Eclipse Fax SE (a full-featured, though slimmed-down, version of the powerful Eclipse Fax).

The XJ1144 worked flawlessly in my HP OmniBook 300, though to optimize the battery life, I took the modem out when I

wasn't using it. The card draws 725 mW when operating, but that drops to 275 mW in standby mode and 77 mW in sleep mode—all of which are higher than with some competing PCMCIA fax/data modems.

Overall, I found the XJ1144 to be a well-built and reliable modem that should last for many years. Add the convenience of the XJACK and the outstanding five-year warranty, and I would recommend it to anyone looking for a PCMCIA fax/data modem.

DAVID ENGLISH

Megahertz  
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Circle Reader Service Number 434

## COREL VENTURA 4.2

Corel Ventura 4.2 is the first release of that desktop publishing program since Corel acquired the stagnating Ventura Publisher software last year. The updated package includes not only a new version of the program but also hundreds of megabytes of the kinds of goodies we've come to expect with Corel products.

Because this is an interim update (consisting mostly of bug fixes), Corel Ventura breaks no new desktop publishing ground. Still, it's a worthy choice when you're publishing long documents like books and magazines. Those not convinced to choose Ventura over the more expensive PageMaker or QuarkXPress simply because of the program's improvements may instead be lured by Corel's impressive bundle of extras.

These include many of the same riches that made CorelDRAW! such a hit. The

\$199 CD-ROM version contains more than 600 fonts in both Adobe Type 1 and TrueType formats; over 10,000 pieces of EPS clip art; and a CD-ROM sampler with 100 photos culled from Corel's Photo CD collection. Those items alone make for a tempting package; the bonus is Ventura.

Of all Ventura's merits, three stand out. First is Ventura Scan, which easily acquires images from any scanner and brings them directly into a document. Next, Ventura Separator performs prepress color corrections and separations for both spot and process colors—an important capability for professional publishing. Finally, Corel has incorporated support for Adobe Acrobat (a set of applications designed to simplify document exchange and output) and includes Acrobat Reader and Adobe Type Manager 2.6. A document modified using Acrobat may be viewed on any platform, regardless of its native operating system, and printed on any printer. Note, however, that while Corel Ventura includes direct support for Acrobat features such as bookmarks, links, and tags, and it includes Acrobat Reader, it doesn't include the Acrobat Distiller program necessary for actually creating portable document files.

If you're formatting information from database software, you'll appreciate the included Database Publisher, which extracts information from existing database files and converts them for use in Ventura. Finally, a design gallery features 75 style sheets and templates to help you get started in page layout.

There's really only one major flaw with this package:

Ventura is still tougher to learn and use than its competitors, despite Corel's inclusion of good training and reference materials. Current Ventura Publisher users should definitely spring for the upgrade, which features an abundance of add-ons and some useful software up-

Falling squarely into the edutainment category, 3-D Dinosaur Adventure packs a wealth of dino media onto a single CD. With its virtual-reality dinosaur-theme-park setting, 3-D Dinosaur Adventure opens doors to the Triassic, Jurassic, and Cretaceous Periods and offers

These vary in length and subject, but all are entertaining. Some are humorous, a few even moving, and most will leave you wondering, "How'd they do that?"

Still more activities fill the park: an eye-popping 3-D dinosaur museum (two pairs of 3-D glasses are included), a couple of well-done dinosaur quiz games, the amusing Create-A-Saurus (design the world's first wood-paneled velociraptor!), and a strange virtual-reality game called Save the Dinosaurs.

Overall, 3-D Dinosaur Adventure is a superb package. Wonderfully rancorous sound effects abound, and the software is a snap to operate. It's the perfect diversion for kids of all ages.

RICK BROIDA



*The Tyrannosaurus rex is frightening enough in two dimensions—wait until you see the 3-D animated version.*

dates. Others may want to sit tight, as CorelDRAW! 5.0 is due in May, and it will incorporate Ventura as part of the application suite.

RICK BROIDA

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## 3-D DINOSAUR ADVENTURE

Talk about a comeback! After 65 million years of extinction, dinosaurs are again in the limelight, touring the multimedia circuit and starring in Knowledge Adventure's terrific multimedia program, 3-D Dinosaur Adventure.

numerous dino activities in each.

The meat of the disc is the Dinosaur Reference area, an interactive encyclopedia covering 150 million years of paleontology. Visitors can access different time periods by clicking on either a globe or a time line, or by letting the narrator read his way from subject to subject. Colorful, detailed illustrations accompany each passage.

For younger users, there's the Dinosaur Storybook, a short but nicely illustrated history of the giant critters. Like the encyclopedia, the Storybook is read aloud. A simple click of the mouse flips pages.

A major attraction is the movie theater, which features 30 "live action" films.

Knowledge Adventure  
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## ARCHON ULTRA

This is the most enjoyable review I've done in a long time—not only because Archon Ultra is great but also because it gave me an excuse to drag my dust-covered Commodore 64 out of the closet and boot up my ten-year-old copy of the original Archon. (This brought back a flood of happy memories, and it made me wonder how I ever managed to wait for games to load from floppy disks.)

In case you don't remember Archon, it's an action/strategy game that plays like a combination of chess and gladiatorial combat. The pieces of the Light Side and the Dark Side face off on the Archon board, which looks somewhat like a chessboard, but with a few big dif-



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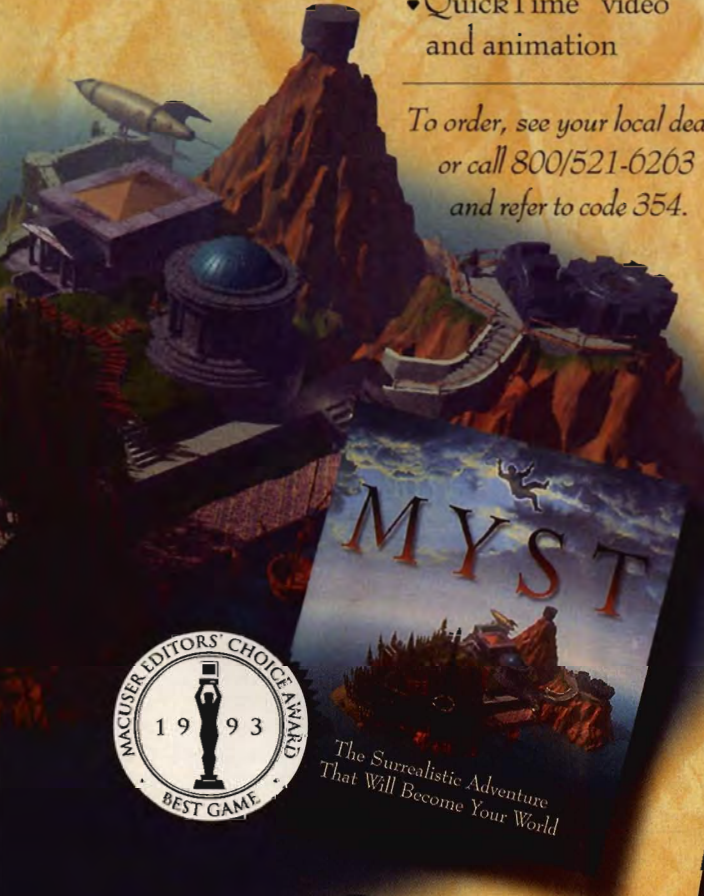
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ferences: It's 9 x 9 squares instead of 8 x 8, there are five special Power Point squares, and some of the squares cycle from dark to light and back again. Square colors are extremely important, because a light piece fighting on a light square is much stronger than a light piece fighting on a dark square, and vice versa. To win the game, you must destroy all of the other side's pieces or conquer the five Power Points.

Whenever opposing pieces move onto the same square, they engage in real-time combat on one of three different battlefields (the darker the square, the gloomier the field). Each of the 16 different pieces in the game has two powers to use during combat, as opposed to only one in the original Archon. The Light Side's Phoenix, for example, can explode into a fireball and shoot feathers that act as homing missiles, while the Dark Side's Dragon breathes fire as well as poisonous gas clouds. Learning how to exploit the strengths and weaknesses of the different pieces is what makes Archon Ultra so darned entertaining.

While Archon Ultra naturally has a one-player mode, the computer opponent isn't too bright, and it's not much fun playing such a predictable opponent. Archon Ultra truly shines in the two-player mode. And unlike the original, Archon Ultra allows you to play human opponents by modem.

Archon Ultra's graphics and animation are topnotch, but the sound support is annoyingly lacking. Only three cards are supported: Sound Blaster, Sound Blaster Pro, and Gravis Ultra-sound. If your board

doesn't have Sound Blaster emulation, you're out of luck, and even if it does, there's no guarantee it will work properly. Pray with me that SSI will take steps to support more boards in future revisions of the game.

Put simply, Archon Ultra is one of the best action/strat-

gracefully between the worlds of 24-bit painting and technical illustration. It automatically converts bitmapped art into structured curves, and it allows you to paint on object-oriented drawings with full-color bitmaps.

You don't have to love Canvas just for its looks—the pro-

tools, external tools like stars, spirals, custom gradient fills, concentric circles, and fractals help the artistically challenged create better-looking drawings. Each of these tools is a separate module and can be installed or unloaded to let you configure the system to fit your needs. Most illustration programs need copious amounts of memory—often at least 8MB. But by installing only the tools you need, you can actually run Canvas in only 2MB (4MB is recommended, though).

You can manipulate objects using a host of effects such as stretching, distortion, rotation, and flipping. The extrude tool can turn a 2-D object into a 3-D shape. The perspective tool does limited 3-D tricks, by making objects appear to push into the foreground or recede into space.

You can assign dynamically linked Smart Lines to the objects. These allow you to move some objects in a drawing while leaving others in place. The Smart Lines between the objects will stretch and redraw to fit. This is great for flow charts, organizational charts, and circuit diagrams. Mechanical artists and architects will appreciate the automatic dimensioning tools, which help find measurements and determine the scaling of objects.

Rounding out the package are a number of special features like macros, OLE and network support, highly customizable preferences, and the ability to create slide-show presentations.

The essential test of any illustration program is getting the art out to the real world. In addition to printing files on PostScript- or Windows-supported printers, Canvas can create color separa-



Plan your strategies on Archon Ultra's 3-D chesslike board—then fight it out on a chaotic battlefield.

egy games you'll ever play. It manages to capture all of the playability of the original Archon, while adding enough new gameplay features to hold the attention of 1990s gamers.

ZACH MESTON

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## CANVAS 3.51

When using your PC to create an illustration, you generally have to decide whether to draw with dots, using a bitmapped paint program, or with lines, using a structured drawing program; you're rarely given the option to do both. Not so with Deneba's Canvas 3.51, though, which combines both drawing styles in a powerful, flexible, and useful manner.

Canvas lets you move

program is literate as well. In addition to its art features, Canvas is a capable midrange desktop publishing and typesetting solution. You'll find spell-checking, leading, fractional kerning, scaling, and envelope-printing features. You can create multiple text columns, and Canvas will wrap text around objects and along curves. It's not a fully capable word processor, missing formatting options like hyphens, but it's a better text layout solution than some dedicated publishing packages.

Canvas is built around a core of powerful structured drawing primitives such as lines, Bézier curves, rectangles, and circles. The object tools make it easy to work on sections of complicated drawings: You can lock or hide objects, and you can work with an unlimited number of object layers.

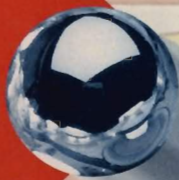
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tions using a variety of color-mixing options. It can load and save files in EPS, BMP, PCX, TIF, WMF, and a host of other bitmapped and structured formats. Conspicuous by their absence are filters for word processor documents—Canvas lacks any sort of text import feature, a surprising omission considering its sophisticated layout capabilities. To bring in text, you must cut and paste through the Clipboard or type it in manually.

Canvas costs about half as much as its competitors in the illustration field, and it offers an unbelievable \$99.95 competitive upgrade price. This puts its power easily within the range of artists looking to broaden their range and output. It doesn't have all the features or the incredible potpourri of accessories of competitors such as CorelDRAW!, but it offers more than the basics in both the drawing and painting areas, and it does an outstanding job of blending those capabilities. Canvas should satisfy the needs of many PC artists who are ready for a greater level of professional punch without the punch of the professional price.

DANIEL GREENBERG

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## FONTMINDER 2.0

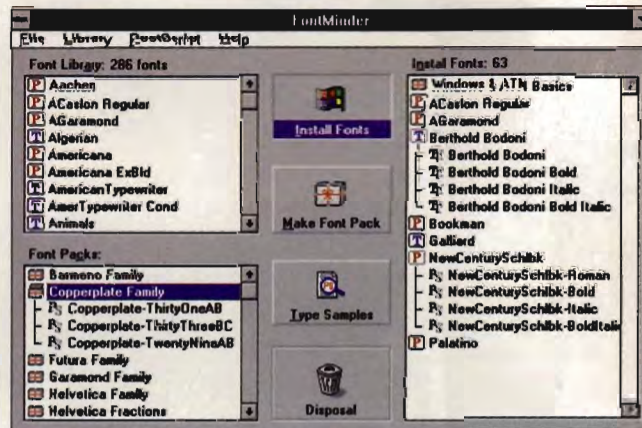
Keeping track of large numbers of TrueType and Type 1 fonts with Windows' Control Panel and Adobe Type Manager is definitely more complicated than it should be. That is, unless you own FontMinder from ARES.

This simple utility, now in its second version, enables you to load, unload, move,

copy, delete, rename, and sample all your TrueType and Type 1 fonts with a single font manager. Loading fonts is simply a matter of dragging an icon from one window to another. Unloading them is just as easy. If you have ATM 2.5 or higher, you won't have to restart Win-

downloading of those fonts from the computer, saving time and printer memory.

If you have large font libraries on removable media, such as CD-ROMs or SyQuest disks, FontMinder enables you to sample fonts onscreen and in print before you install them, again sav-



FontMinder 2.0 makes keeping track of large numbers of TrueType and Adobe Type 1 fonts a much simpler task.

dows for font changes to take effect. FontMinder doesn't replace ATM or the Windows font utility, but you'll rarely have to use either of them directly, since FontMinder uses both.

The program maintains its own master library of fonts arranged into families. You can install whole families, individual faces, or custom font packs you create to quickly load groups of fonts. Packs contain only references to fonts rather than the fonts themselves, and they're exportable. Service bureaus that use FontMinder can use your font packs to ensure the right fonts are loaded for your job.

When used with PostScript printers, FontMinder automatically edits the Windows initiator for downloading Type 1 fonts. It also determines printer-resident PostScript fonts and prevents

ing you time when looking for just the right font.

FontMinder manages up to 4000 fonts. You may not have that many, but you probably have more on your system than you think—having a few hundred fonts isn't uncommon. The font management you can perform with FontMinder will speed up your system, free resources, and shorten those endless font menus.

PHILLIP MORGAN

ARES  
(415) 578-9090  
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## BRAM STOKER'S DRACULA

Ten years ago, my eyes would bug out if I bought a game and there was actually more than one disk (wow!) inside the box. Now

adays, my eyes bug out if I get a game with (d'oh!) only one disk inside the box. Such is the case with Bram Stoker's Dracula, a mediocre movie tie-in.

Your goal in this arcadish Dracula is to take out the chief bloodsucker by wandering around three locations (a cemetery, Carfax Abbey, and Dracula's castle) and throwing holy wafers into glowing red coffins (huh?). While you're wandering around, the hideous creatures attacking you must be destroyed with your handy pistol or knife. There are also locked doors that need to be unlocked with specific keys, usually near coffins. And that's about it.

The game's first flaw is the lack of an automapping system or compass to help you get your bearings. The manual brags about the game's "three huge levels," but what good are they when you're stuck stumbling around the first level because every location looks the same?

The other flaw is that the gameplay is dull. Walk around, find a key, shoot a zombie, and walk around some more. No neat puzzles, no variety of weapons—just boredom . . . and frustration at how easily Dracula's minions can kill you.

I could put a stake through the heart of Bram Stoker's Dracula, but I'll resist the temptation and simply say that this Dracula isn't much fun. The designers managed to imitate the look of Wolfenstein 3-D, but they forgot to add the gameplay and the excitement.

ZACH MESTON

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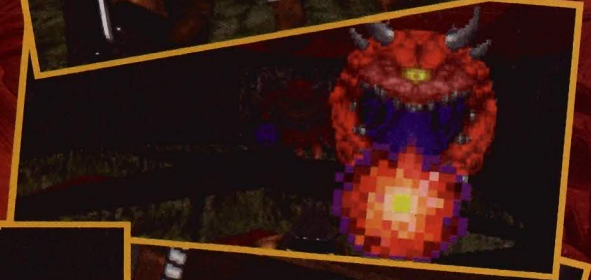
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Requires a 386DX PC compatible or better; hard disk drive; VGA graphics; 4 Megabytes of memory. A 486 is recommended. Multiplayer options require a network which uses the IPX protocol, a modem, or serial link. Digitized sound effects require a 100% Sound Blaster™ compatible card, Gravis Ultra Sound™, or Pro Audio Spectrum™-16. DOOM is a trademark of id Software, ©1993. Other trademarks are the property of their respective companies.

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## REVIEWS DRACULA UNLEASHED

Viacom's Dracula Unleashed proves as irresistible as the call of the undead prince himself. This CD-ROM adaptation of the gothic horror story draws you in quickly, and like every hapless and unwitting hero caught in the web of the nosferatu (vampire), you prove to be pivotal in stopping the evil count.

The hero you control is investigating the death of his brother. He comes to London only to learn that his brother was killed while attacking Dracula ten years earlier. Along with Jonathan Harker and Professor Van Helsing, he was rescuing Mina Harker from the clutches of the undead. The grisly murders around London show that the count has somehow come back, and it's up to you and your

friends to stop him again. You move around London, accumulating objects and watching the story unfold. The interface is pure point-and-click: Click on the horse carriage to travel, click on the front door to enter a location, and so on. Interaction exists only in selecting which video sequence you'll be shown next.

Though the game isn't too difficult, Dracula Unleashed can sometimes be frustrating because of its structure. Events are carefully scripted, and you're saddled with a time limit—you have only five days to piece together the goings-on and kill Dracula. More important, you must often make sure that a certain object is in your hand before you enter a scene to elicit the proper response from other characters. Don't go off to kill the vampire without your stake and mallet in hand! Because the plot progression requires that you do the right things in the right or-

der, saving games often is an absolute necessity. Each day will end in a grisly and permanent fashion if you fail to perform a necessary task, and you may find yourself backtracking through your old saved games to find out what you've missed. Pay attention to all the dialogue, since it contains clues about what you need to do. For example, if by the end of the first day, a woman that has turned into a vampire has killed you, you know that you must somehow prevent her from becoming a vampire during that day.

Dracula Unleashed boasts 96 minutes of full-motion video, which occupies a good percentage of your VGA or SVGA display. Video was smooth on my double-speed CD-ROM drive, but owners of older single-speed drives should have no problem, either. You'll need 4MB of RAM and a 20-MHz 386SX or better to play the game, and a sound

card is virtually a must. The soundtrack is moody and ominous, and I'm happy to report that the actors, while no competition for Daniel Day-Lewis or Meryl Streep, are adequate and often likable. The production values never falter, and they actually remind me of a solid PBS performance. The scenes are enjoyable to watch. A bit of warning, though: Some scenes are positively gory, with dripping blood, severed heads, and other typical vampire fare.

A marked improvement over ICOM's initial multimedia releases (the Sherlock Holmes games), Dracula Unleashed gives you a chance to rewrite the Bram Stoker tale using well-implemented technology that would have seemed quite magical even to Dracula himself.

BERNARD YEE

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## REVIEWS

### SIMFARM

Maxis bills SimFarm as SimCity's country cousin, and there's an obvious family resemblance. SimFarm has colorful overhead-perspective graphics, mouse-operated tools for hands-on fun, and lots of information screens for feedback. It does not, however, quite live up to the reputation of its illustrious relative. As carefully crafted and engaging as it might be, SimFarm lacks some of the magic that made SimCity an instant hit.

In SimFarm, you start out with a plot of land and some cash. You can buy a variety of farm tools, such as tractors, planters, sprayers, and harvesters; structures like barns, silos, sheds, and water towers; and livestock such as pigs, sheep, cows, and horses. The real action, however, is in planting, tending, and selling cash crops. There are 24 different kinds of crops that you can raise, from mundane grains like wheat and oats to vegetable crops like lettuce, tomatoes, and onions. You can also plant apple and orange trees, or even flowers. You decide what to plant based on weather conditions, hardiness of the crop, and market prices.

Once the seed is planted, you must make sure the crop gets the right amount of water (by building irrigation and drainage ditches), and you must spray periodically to combat weeds, insects, and fungus blight. If the weather cooperates and you bring in a good harvest, you can sell it immediately or store it until the price is right. The sophisticated farmer can even buy futures to lock in the price before the harvest. Of course, there may not be

a harvest at all, thanks to disasters such as locusts, drought, flooding, frost, and windstorms. If your crop is wiped out, you may find yourself going to the bank to scrape up enough capital to try again. That adds interest payments to the list of potential calamities.



Tornadoes, drought, flooding, frost, and locust infestations are among the disasters your SimFarm crops might face.

SimFarm lets you try farming in any area of the U.S. or in your own custom-tailored environment. It also includes a number of preconstructed farm scenarios for you to run. There's a lot to do and try in this open-ended simulation. As with other Maxis products, there's no real game goal here, except to expand your operation. My children (aged 10 and 12) were totally fascinated with the operation of the farm and with tending the animals. It seems to me that SimFarm doesn't give you the feeling you get with SimCity that the game has a life of its own—it's a bit more *simplistic*.

SHELDON LEE MON

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### PHARMASSIST

Here's a health question to ponder: Your doctor prescribes the drug Tagamet to treat your peptic ulcer. Are there any side effects or drug interactions? What happens if you miss a dose? Is there a less expensive gener-

mon ailment. In addition to its massive database of general drug information and classification, the program also features full-color graphics depicting actual capsules, tablets, and more.

The intuitive push-button Windows design makes program navigation a breeze. Full printing capability allows you to create hardcopies of frequently used information. Of course, the program is meant only as a reference supplement, not as a replacement for professional medical advice. But because the health and well-being of your family are fundamental concerns, PharmAssist could easily be the most important piece of software on your computer.

SCOTT A. MAY

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### MASTERCLIPS

Need a flag of Japan to dress up your brochure? Or maybe you need a map of your state showing all the counties for your civic club? Masterclips includes these and nearly 6000 other pieces of clip art to dress up your memos, advertising, or business correspondence, or to help create dynamic presentations.

Masterclips is a collection of clip art with dozens of categories. Each clip art file is in CGM format, which is importable into most DOS and Windows programs that import art; I had no trouble importing images into Microsoft Word for Windows, Quattro Pro for Windows, and PageMaker. Masterclips includes a list of over five dozen applications that will accept CGM-format clip art.

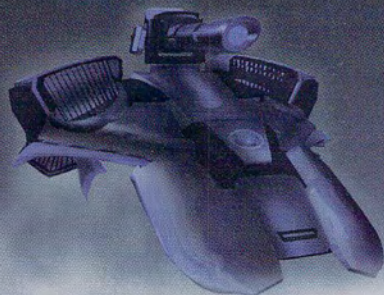
ic brand available?

These are just a few of the myriad questions raised about thousands of prescription and over-the-counter drugs. You could pester your friendly neighborhood pharmacist—if you have one—or wade through the pages of a complex reference manual. Or you could load PharmAssist, a new Windows-based guide to health and medicine, and find the answers you need in a matter of seconds.

This outstanding interactive resource guide contains hundreds of full-color illustrations and expert information about medication and family health. Among the topics covered in depth are overdose symptoms, drug interactions, medicine application, first aid, travel vaccines, drug abuse, and com-



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Almost all the clip art included is in color and varies in quality and complexity. Most of the graphics are good-to-excellent in quality. These are business graphics, but students and home users will find many items they can use to dress up a report or a personal letter.

Masterclips comes on either one CD-ROM or 34 3½-inch high-density floppies. The documentation included is adequate and contains a black-and-white picture of each of the clip art images. Two utilities are also provided to assist you: a Windows clip art browser and a color-to-monochrome converter. Both of these are useful and nice extras, although perhaps not as well designed as they could be.

Masterclips permits the use of its art on any hardcopy output—including advertising, letters, flyers, and so forth—as long as the art is not part of a piece that is sold, such as a book. But the company will make arrangements for commercial uses.

Masterclips is a complete business clip art package that should be useful for anyone needing to spruce up his or her output with professional illustrations.

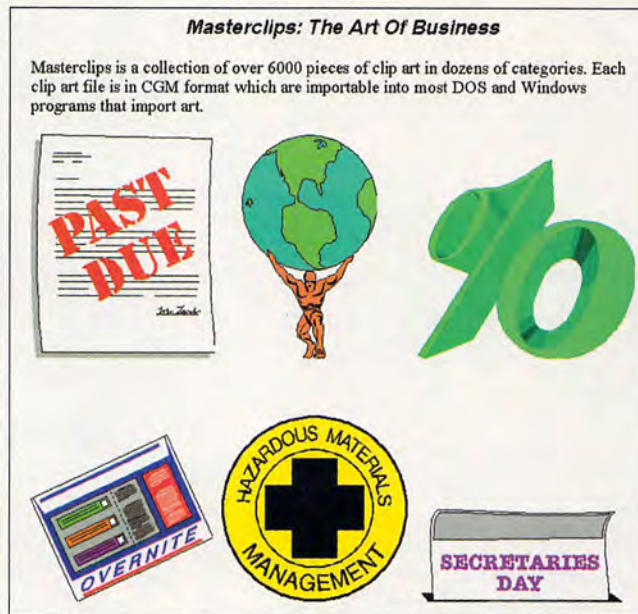
STEPHEN LEVY

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## STAR TREK: 25TH ANNIVERSARY CD-ROM EDITION

Interplay's reissue of Star Trek: 25th Anniversary on CD-ROM proves you can't have too much of a good thing. It's a terrific game made even better by the ad-



The Masterclips collection packs nearly 6000 pieces of clip art, filling a CD-ROM or 34 high-density floppy disks.



Interplay's Star Trek game takes on new life with the addition of the voices of the original crew of the Enterprise.

dition of some very familiar sound effects.

Indeed, Star Trek: 25th Anniversary has found its voice. Or voices, to be precise. William Shatner, Leonard Nimoy, DeForest Kelley, and the rest of the original crew lend their talents to this CD-ROM edition, voicing every bit of their on-screen counterparts' dialogue. They've turned the game equivalent of a silent

movie into a talkie.

The results are tickling, especially to Star Trek fans. In much the same way that John Williams's music brings Rebel Assault to life, so do the actors' voices and original-series sound effects propel Star Trek: 25th Anniversary to warp speed. It's as though, for once, we actually get to play a part in the Star Trek universe that so enchants us.

Little else has changed in Star Trek: 25th Anniversary, save for a new ending. While owners of the original version may be reluctant to shell out more cash for more or less the same game, true fans should recognize the CD-ROM edition for what it is: a collector's item and a uniquely interactive Star Trek adventure.

RICK BROIDA

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## ELECTRIC READING LAND

Folks routinely spot Elvis boarding a UFO, but how many parents would think to look for Jimi Hendrix in an early reading program? The phonics-based activities in Electric Reading Land help kids master a basic set of words, which they use to construct a storybook that will recharge an ailing space station. Learning the words means playing three word-building games: Jimi's Phonics Toy, Dino Beach, and Dragon Park.

Jimi's Phonics Toy is a great place for the very youngest kids to begin. This open-ended exploration allows kids to combine beginning consonant sounds with ending sounds. Children can make actual or non-sense words, without penalty. The program won't create profane words. At the same time, it doesn't recognize all possible combinations, such as *y* and *ip*.

Dino Beach starts kids off with a picture-word matching game. Auditory reinforcement breaks the words into their phonetic components. When the picture of a jet appears, for example, the

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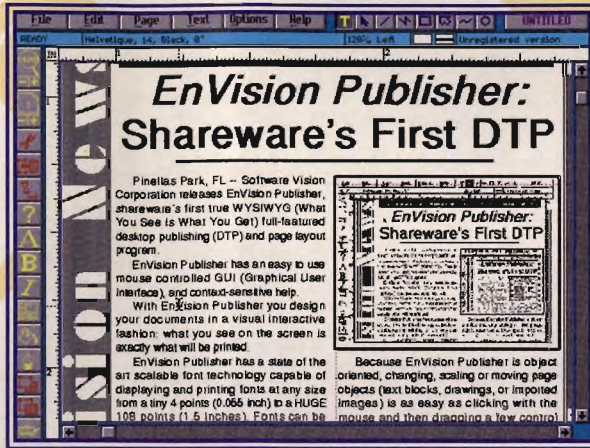
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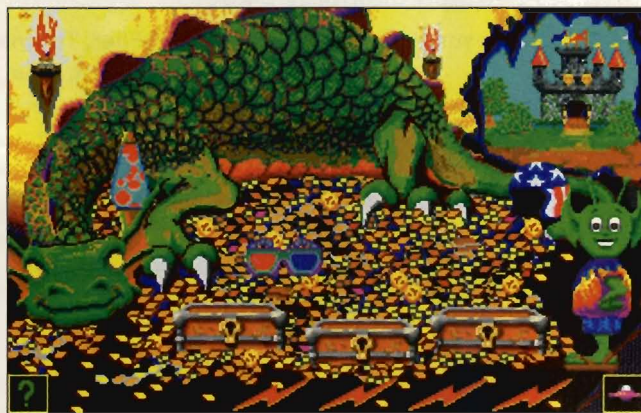
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## REVIEWS

word *jet* is broken into *j* and *et*, then spoken aloud. The pictures soon give way to letters, and kids must pick the correct combination of letters (and sounds) to solve the puzzles.

Dragon Park, featuring a dragon named Santana who sounds suspiciously like Jack Nicholson, adds the element of sorting to the word-building skills. Kids must place words into separate boxes according to the spoken directions. At this point, kids are recognizing whole words and are able to distinguish the phonetic components used to create them.

Electric Reading Land isn't as detailed in its animation and graphics as other programs in this genre. Nonetheless, the characters will captivate young children, and the educational component is sound and well designed. A sound card is required for Electric Reading



Kids play word-sorting games with Santana, the dragon of Wordstock Castle, in *Electric Reading Land*.

Land to be truly effective.

As kids learn words in the Dragon Park and Dino Beach games, they gain the word power necessary to complete the storybook and repair the damaged space station. Parents will want to go along for the ride in order to explore the hidden references to the 1960s, from Nixon to *Easy Rider*. Not to mention a bit of "Purple Haze."

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## VIDEO JAM

If Steven Spielberg were a kid today, he'd probably be using a computer and a camcorder to make movies, rather than the 8-mm camera he started with. And no doubt he'd be watching mu-

sic videos for ideas and encouragement. Kids love movies and music, and Video Jam brings both together in a clever and creative program for ages 8 and up.

Video Jam uses a real studio as its inspiration. Kids must first select the music for their video, then add actors, scenery, and props. They can fine-tune their creations with special effects and movements, all to the beat of the music.

Creating a cartoon video is a lot simpler in this program than in real life, and all the right elements are here. Given some time, creative license, and encouragement, kids will astonish their parents with some jammin' videos that are as much fun to watch as they are to make.

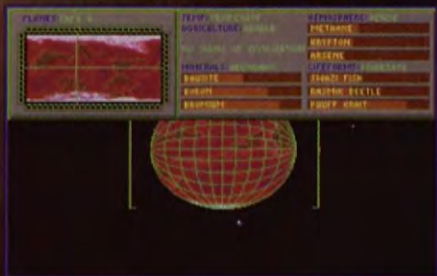
The program includes 52 synthesized songs covering a variety of genres, from rock to rap and from western classical to international. Audiophiles may wish for sampled MIDI tunes, but the synthesized music appeals

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to kids and suits a greater number of sound cards, without requiring special audio equipment. The only drawback is that there's no way to import your own music.

As many as 7 of the 46 cartoon characters, ranging from hip cats to huggable dinos, can be used in each video. Each character has an individual dance move. Kids can enliven the dance moves with special effects and transitions, which can be previewed before making them a final part of the video.

While not as complex as a multimedia computer studio, Video Jam provides simple and exacting controls for music video editing. Actors can be made to appear at specific times in the music. Using special effects, kids can morph-transition one character into another. Beginning video directors can combine the program's collection of props with particular actors and backgrounds in order to tell stories.

Each video can be saved to the program's video library (stored on the computer's hard disk) or saved to a floppy disk. Kids can share their video creations with friends by passing along the floppy disk, which includes a program that will play the video, even if Video Jam isn't installed on the other computer (the player computer must meet the basic requirements of Video Jam).

Creativity tools for kids are some of the most fascinating and potentially rewarding embodiments of computer technology. Video Jam will let your kids make an impressive directorial debut.

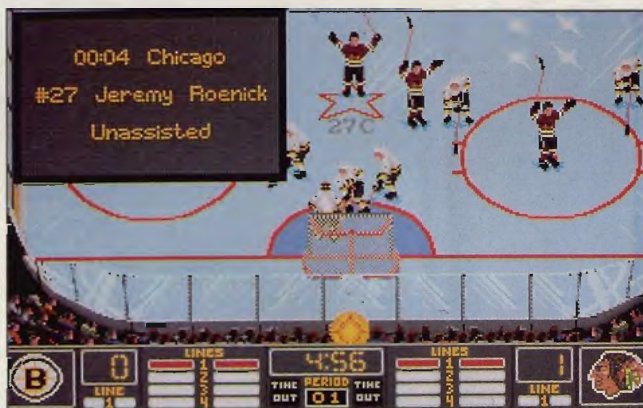
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Video Jam lets your kids create music videos which they can save to floppy and share with friends.



Electronic Arts scores a goal with the sensational PC conversion of its best-selling NHL Hockey videogame.

## NHL HOCKEY

Electronic Arts Sports body-checks the competition for a breakout score with NHL Hockey, the sensational PC conversion of EA's best-selling cartridge game. Packed with in-depth statistics, managerial options, and more hard-hitting action than you can slam a puck at, this one's a hardcore hockey fan's dream come true.

Licensed by both the NHL and NHL Players Association, the game has 24 actual team names, colors, and logos. Real-life 28-man rosters feature such modern legends of the game as Patrick Roy, Adam Oates, Paul

Coffey, Mario Lemieux, and Pavel Bure. Each player is rated in 15 skill attributes—from mobility and speed to shot power and aggressiveness—based on your choice of 1992-93 season or playoff stats. Play options include one- or two-player head-to-head or cooperative exhibition games, as well as a full 84-game season, complete with playoffs and Stanley Cup final. Scheduled hockey games can match the 1992-93 season or be randomly assigned by the computer.

Line editing couldn't be easier using the game's drag-and-drop graphic interface. Pull-down menus let

you check player stats to devise the ultimate forward, defensive, penalty kill, and power play lines. Multiplayer leagues add exciting new dimensions, such as scouting reports and player trades. A sophisticated league database system allows individual team managers to import, export, merge, and update league stats as the season progresses.

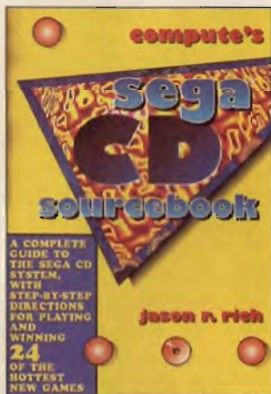
Hit the ice with the most realistic hockey action seen on the PC. The rink is viewed vertically, from a three-quarter angle, with smooth eight-way scrolling across more than six full screens. This perspective allows larger-than-average characters and expressive animation—everything from high-sticking and slashing to poke checks and slap shots. Control methods include joystick (preferred), mouse, and keyboard. Joystick response is fast and tight, with a short-throw stick—such as the Gravis PC GamePad—highly recommended. Periods can be set to 5, 10, or 20 minutes, and you can save and resume games in progress. Pause the game at any time to enter the press box to review stats, change lines, or study instant replays. VCR-style controls offer excellent forward and reverse single-frame replays. In league play, you can also save replays as highlight films. Single-game stat categories include five team, eight player, and three goalie performance ratings.

Hockey purists will notice a few shortcomings in the game's arcade action. Foremost is the limited puck handling of your onscreen characters, who are confined to simple passing and aimed shots. Executing a one-time (a tricky pass-shot combina-

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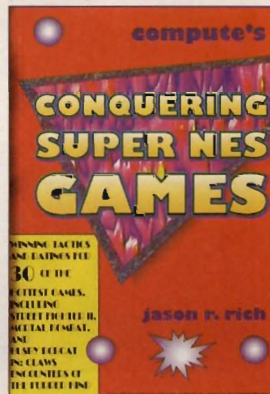


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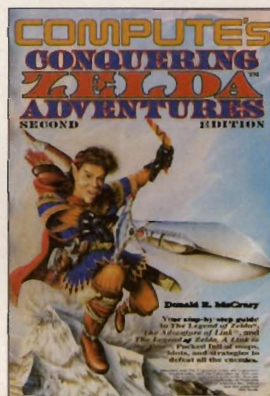


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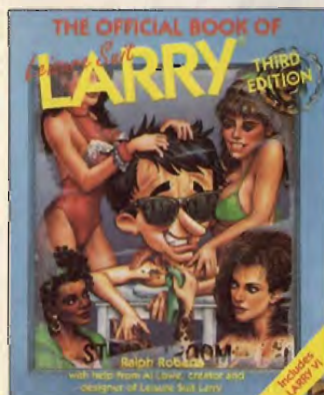


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tion) is as close as the game lets you come to making a skilled offensive move. There's no way to control the strength or loft of your hit, nor the ability to enact such moves as a drop pass, give-and-go, and snap pass. Also missing are penalty shots, direct goalie control, and closeup views of puck drops. Low-resolution 320 x 200 VGA graphics produce somewhat blocky character features, although overall graphic quality is high. Sound is also well incorporated, including digitized speech, crowd response, referee calls, and more than 70 samples of organ music.

NHL Hockey pulls off an impressive hat trick, delivering frenetic action, stats galore, and challenging league play. Hopefully, this game provides only a taste of sports titles yet to come from EA Sports.

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VGA and Windows accelerated video cards. But it doesn't get along well with memory managers other than DOS's HIMEM/EMM386 combo and simply refuses to work with QEMM's Stealth mode, which many power users can't afford to give up.

Quick Restart worked well enough on simple systems, but it sometimes froze when restarting a machine loaded with drivers, TSRs, and several fussy applications—the kind of system many of us actually use. It's also a tricky program to install and set up, requiring informed decisions about the details of a system and its CONFIG.SYS and AUTOEXEC.BAT files. Unfortunately, if you're advanced enough to know how to configure Quick Restart, there's a good chance that it won't work on your system. It's a great idea, and almost—but not quite—a great product.

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By Dane Spotts



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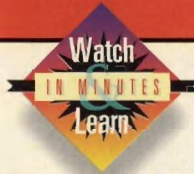
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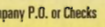
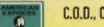
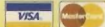
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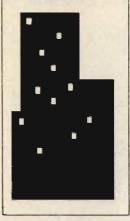
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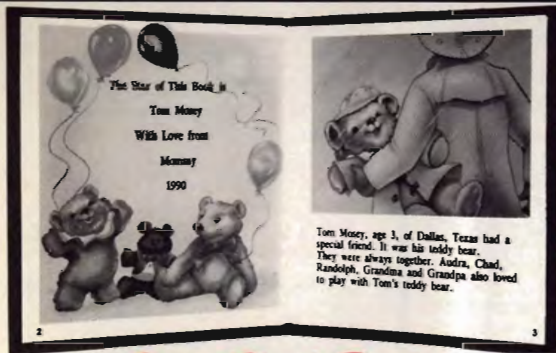
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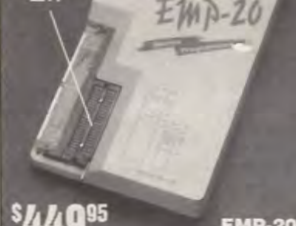
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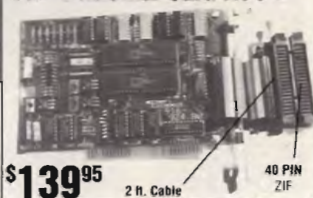
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# NEWS & NOTES

(continued from page 136)

tuitive plain-English voice commands. VoiceCompanion integrates IBM's award-winning ICSS command-and-control (continuous-speech recognition technology), which allows you to speak in a normal, continuous stream rather than with the distinct pauses required by other technologies. The software is scheduled to be in stores the second quarter of 1994 for a suggested retail price of \$295. A sound card is required. To find out more, contact Kolvox Communications, 120 Eglinton Avenue East, Suite 1100, Toronto, Ontario M4P 1E2 Canada; (416) 322-9531, (416) 322-7427 (fax).

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In the works from Silicon Alley are two new interactive novels, Vita and The Blue Danube, and another three-part series, Warrior Spirit, all with serious (more adult) themes that use video and realistic animation.

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# NEWS & NOTES

Jill Champion Booth

## Objets d'Corel

It's like browsing through a museum—only this art gallery is published on a single CD-ROM. The appropriately named Corel GALLERY is a collection of 10,000 professionally designed clip art images (with some 6000 of them in color) in more than 50 categories, including celebrities, political figures, animals, cars, boats, borders for your stationery—you name it. The CD-ROM is compatible with most word-processing and DTP packages and is so easy to use: Thumb through the accompanying 343-page book of detailed drawings, select the image you want to preview, and then drag and drop the image into place exactly where you want it—into any OLE-compatible application—or export the image to any of several industry-standard file formats.

At a suggested retail price of \$59, this clip art gallery is a bargain indeed. Contact Corel at the Corel Building, 1600 Carling Avenue, Ottawa, Ontario K1Z 8R7 Canada; (613) 728-8200, (613) 761-9176 (fax).

## Win a Mansion

Who hasn't dreamed of owning a stately mansion? Or of winning a wheelbarrowload of cash? Now that the national penchant for big prizes has arrived in cyberspace, you could win a mansion or a half million in cash—by answering trivia questions online. The grand-prize winner of COMPUTEQUEST's Win a Mansion contest will choose between a 200-year-old mansion valued at \$1 million and \$500,000 in cash; 98 finalists will win cash prizes ranging

from \$500 to \$50,000.

The game plan? Via modem (using an 800 number) and using the contest's communications program, you answer trivia questions from one of three categories (you are allowed to choose): sports, entertainment, and general knowledge. Since the Win a Mansion contest uses multiple-choice questions, "it's like playing Jeopardy! with the right answer staring you in the face," says Win a Mansion's creator, Bill Powderly.

Better hurry, though—the deadline for this remarkable contest is closing in fast: You have until December 31, 1994, and the contest is limited to 60,000 entrants.

To receive an entry packet that includes a game demonstration disk, complete rules, and an entry application, send your name, address, and phone number; the type of computer you'll use online (DOS or Macintosh); disk size (3½ or 5¼); and a check or money order for \$7 to cover shipping and processing to Win a Mansion, 604 Corporate Drive West, Langhorne, Pennsylvania 19047; (215) 579-7888.

## Test Your Test Taking

Planning to take any of the major college entrance exams? The SAT/PSAT, LSAT, GMAT, or GRE? Then look to ReviewWare from the Princeton Review, a company known for its standardized-test prep courses and books. This new program is more than just a book on disk: You can take a sample test (on your computer) that's as close to the real thing as you can get. ReviewWare will also predict your score for the actual test and diagnose areas for improvement. This software is packaged in book-and-disk editions of the Princeton Review Test Guides, which include

complete overviews of each test and proven techniques for scoring well. Published by Villard Books (part of Random House), the book-and-disk sets are priced at \$29.95 each. Each Test Guide carries the subtitle *With Diagnostic Tests on Disk*. Contact Random House, 400 Hahn Road, Westminister, Maryland 21157; (800) 726-0600. (Look for an online feature on SAT programs in the COMPUTE area of America Online.)

## Novell Scores Another Coup

In order to solidify its position as a Microsoft rival, Novell has acquired both WordPerfect Corporation and Borland International's spreadsheet operation (pending regulatory approval).

Primarily a network operating system company, Novell made headlines in 1991 when it purchased Digital Research and put the Novell stamp on what had until then been called DR DOS. Novell DOS 7.0 is now available.

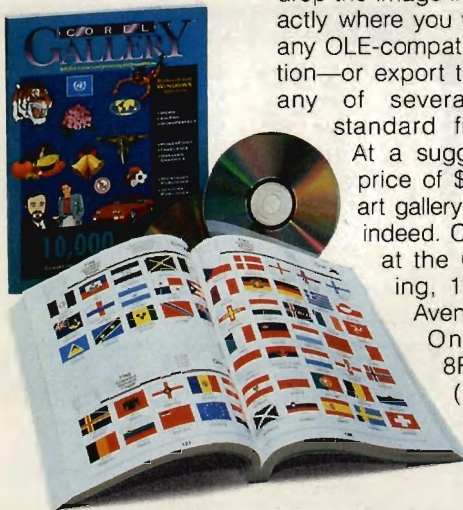
The WordPerfect purchase was a stock swap, sending \$1.4 billion worth of Novell stock into the pockets of John Ashton and Bruce Bastian, former owners of WordPerfect. Borland sold its spreadsheet, Quattro Pro, to Novell for \$145 million in cash.

## Can We Talk?

Commanding your computer by voice is no longer just a sci-fi gimmick. Kolvox Communications, a leading developer of speech recognition solutions, is working with IBM to integrate IBM technology into a new generation of speaker-independent voice interfaces for word processing. The Windows-based VoiceCompanion for WordPerfect enables even newcomers to the software to perform *all* WordPerfect functions by simply talking to the computer using in-

(continued on page 133)

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**Video Games & Computer Entertainment**

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## COLORADO ADMITS TEAM MANAGED BY COMPUTER

With no general manager in sight, the team was forced to admit for the last year they've been managed by a powerful computer program: Front Page Sports Baseball. This program has a manage-only mode that's great for trying out strategy, playing head-to-head with other players or against the computer. Arcade play lets you control as

much as you want of pitching, batting, fielding and base running at Basic, Standard or Advanced skill levels. Skill levels can be assigned independently for each activity. During the season you can play all the games you want, however you want to play them, switching from manage-only mode to joystick jockey at will.

## WIND 10, PITCHERS 0

In an amazing game combining the effects of high winds and high altitude, Colorado and Oakland traded home runs, combining for a total of 10 round trippers. Eight more fly balls were caught at the warning track. It could only happen in a game like Front Page Sports Baseball, where temperature, humidity, altitude, wind and rain

are part of the game. You get all the unpredictability of Mother Nature. You also get all the opportunity to display your own skills. Ball flight is based on a real physics model so where and how far balls are hit is a true combination of pitch speed and the swing of the bat. The better you are, the better your team does.

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## FOR SOME IT'S BACK TO MINORS

*Team Roster - Chicago Bruins*

Main Association Team Go Show Help

**Defensive lineup vs. LHP**  
Accumulated career stats

Batter	Infield	Outfield
P Morgan, Mike R	1B Grace, Mark	LF May, Derrick
C Wilkins, Rick	2B Sandberg, Ryne	CF Wilson, Willie
3B Sanchez, Reg	3B Buechele, Steve	RF Sosa, Sammy
SS Sanchez, Reg L		

Unassigned Pitcher

PF PLAYERS	AB	R	H	HR	RBI	SB
1B Grace, Mark	323	155	521	26	153	11
3B Buechele, Steve	272	153	460	53	123	15
C Luke, Steve	225	41	120	11	27	5
LF May, Derrick	225	128	465	62	137	10
SS Sanchez, Reg	262	105	341	35	97	0
2B Sandberg, Ryne	309	117	416	67	151	9
RF Sosa, Sammy	261	159	398	92	135	35
1B Dizziano, Jose	287	151	551	74	130	1
C Wilkins, Rick	303	136	416	78	139	30
CF Wilson, Willie	258	105	221	29	57	1

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