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# COMPUTE

FEBRUARY 1993

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# COMPUTE

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### TREASURE HUNT

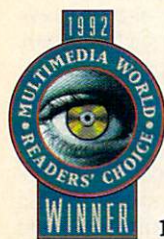
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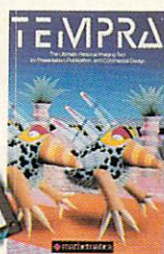
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# EDITORIAL LICENSE

Clifton Karnes

**If Windows is in your future, it pays to know something about the future of Windows.**

The Windows Developers Conference, held this past October in Santa Clara, California, showed the shape of Windows to come. As you may already know, Windows is fast becoming a family of products that share a common core of features and functions, and that idea was one of the focuses of the conference.

In Microsoft's recent ads, you see what looks like three interconnected cough drops, each representing a member of the Windows family. The first family member is Windows 3.1, the next is Windows for Workgroups, and the last is Windows NT. And you've probably heard about other flavors of Windows, too—like Modular Windows, Win32s, and OLE 2.0—and wondered where these fit in the family tree.

First, Windows 3.1 is the most recent version of the operating system that's gaining popularity now. It was released last spring and is becoming the interface of choice for the majority of PC users—including COMPUTE's readers.

Windows for Workgroups is a superset of Windows 3.1 that was released last October. In addition to all of 3.1's features, WFW adds extensions for working with other Windows users over a network. It also adds improved versions of 3.1's File Manager and Clipboard plus new programs that offer scheduling, mail, and file sharing.

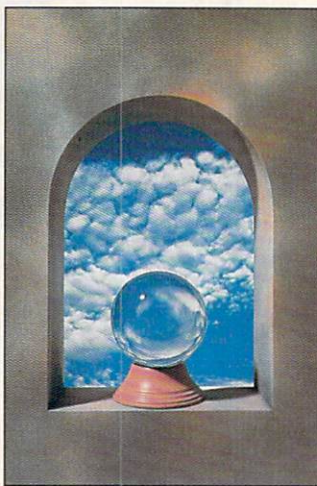
Both Windows 3.1 and WFW are 16-bit versions of Windows. With the exception of one 32-bit magic trick, both operating systems move data 16 bits at a time even on the latest 486 screamer.

Windows NT, however, is a full 32-bit operating system with tons of features to make it lightning fast and network-

ready. With networking built in, Windows NT has something in common with WFW.

As I mentioned earlier, both Windows 3.1 and WFW are 16-bit operating systems, but a special trick lets these environments run some 32-bit code in the form of virtual device drivers, or VxDs.

Microsoft has taken advantage of this feature to create Win32s. Win32s is a subset of Windows NT that will run on Windows 3.1 or WFW using 32-bit VxDs. This gives developers and users a chance to take advantage of a measure of NT-style 32-bit computing



but in Windows 3.1 or WFW.

Modular Windows is simply a subset of Windows 3.1 that's burned in ROM so that it can be used with home video systems or personal digital assistants. Modular Windows is the foundation of Tandy's new VIS home entertainment system.

This Windows family has a common interface and downward compatibility, and soon, all members (except perhaps Modular Windows) will have something else in common: OLE 2.0.

One of the most exciting things at the Developers Conference was Microsoft's an-

nouncement of OLE 2.0, a way of creating compound documents that will be a part of the common interface of Windows 3.1, WFW, Win32s, and Windows NT.

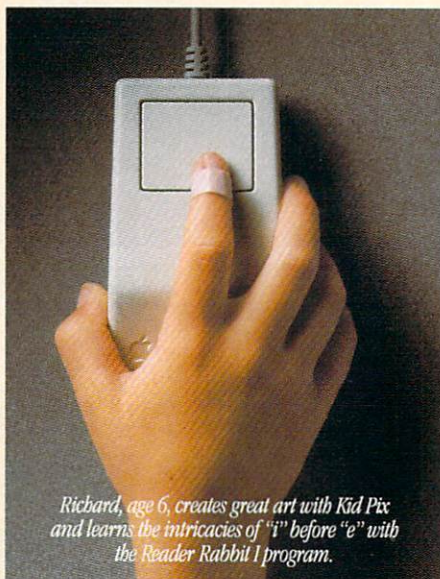
Windows 3.1 supports OLE 1.0, so you may already have an idea of what OLE's about. OLE makes it possible to create documents that contain parts of other documents. For example, a word processor file might contain a section of a spreadsheet, an illustration from a draw program (for the company's logo, for example), and a photograph in the form of a bitmap. With OLE 1.0, you can combine these elements into a compound document and, by double-clicking on an OLE element, call the object's creator with the object loaded and ready to edit.

OLE 2.0, however, takes this one major step further. When you double-click on an OLE object, your host application *becomes* the creator.

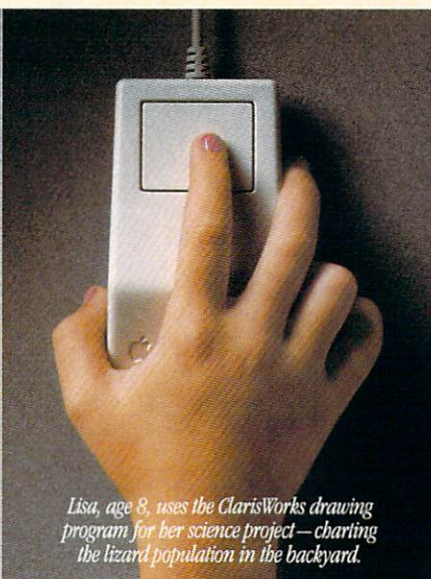
Let's assume you have a graphic created with CorelDRAW! that's embedded inside a Word for Windows word processor document. If you double-click on the Corel graphic, Word for Windows *becomes* CorelDRAW!. The menu bar changes to Corel's menu bar, and Corel's tool palette pops onto your screen. You can edit the Corel graphic without thinking twice about it.

The second major new benefit of OLE 2.0 is that you can create compound documents by dragging objects from one application to another.

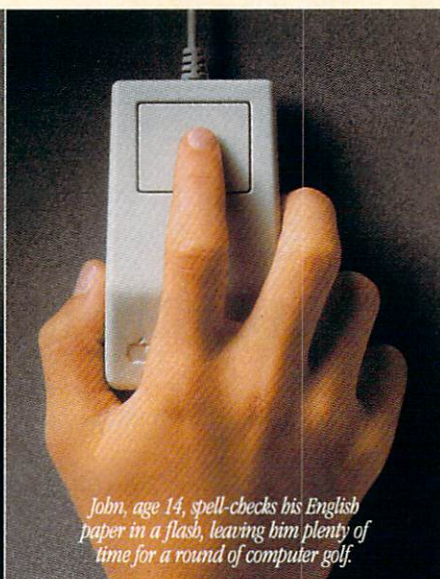
That's the rundown on the Windows family and one of the most interesting aspects of its common interface—OLE 2.0. Stay tuned to COMPUTE in 1993 for more details on these exciting Windows developments and for how-to help in making them useful and productive for you. □



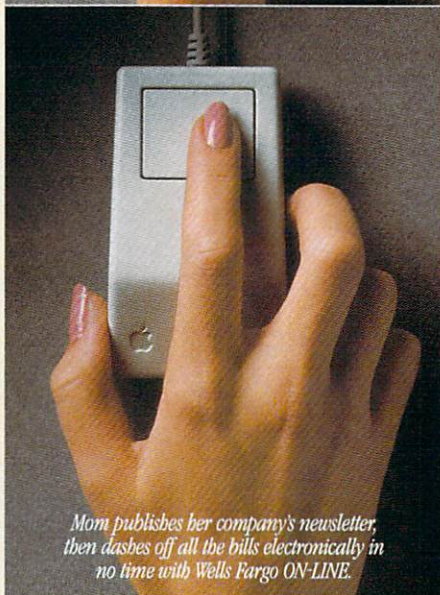
*Richard, age 6, creates great art with Kid Pix and learns the intricacies of "i" before "e" with the Reader Rabbit I program.*



*Lisa, age 8, uses the ClarisWorks drawing program for her science project—charting the lizard population in the backyard.*



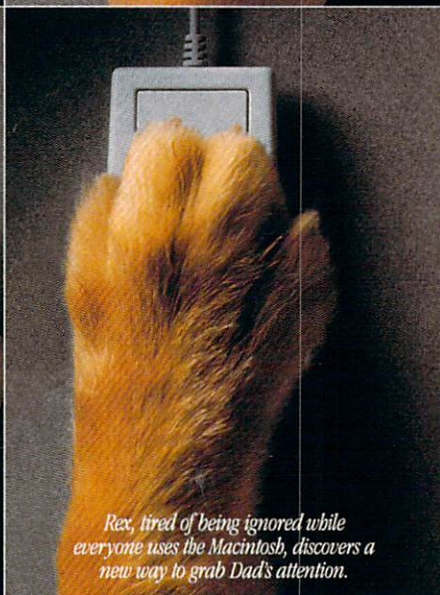
*John, age 14, spell-checks his English paper in a flash, leaving him plenty of time for a round of computer golf.*



*Mom publishes her company's newsletter, then dashes off all the bills electronically in no time with Wells Fargo ON-LINE.*



*Dad, home early to catch Richard's baseball game, connects to his computer at the office to finish up the day's work.*




*Rex, tired of being ignored while everyone uses the Macintosh, discovers a new way to grab Dad's attention.*

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# TEST LAB

Edited by Mike Hudnall

**W**ith a remarkable array of input options and powerful tools, today's paint programs make it easier than ever to harness your creative energies, transforming your artistic vision into an attractive finished product, perhaps even a work of art.

This month's Test Lab focuses on five DOS packages and five Windows packages that range in price from \$129 to \$795.

Some of these packages clearly target beginners and casual dabblers, while others offer the power and features demanded by professionals. Some of these paint programs have been around for a while, and if you're pleased with the features in the latest version of one of them, you may decide to stick with it because it's familiar. On the other hand, if you feel you've outgrown your present paint program, there's plenty of information here to help you choose an abler one.

Input options will figure high on many people's lists, and seven of these programs offer scanner support. Image-In Scan & Paint 3.1 works with Kodak PhotoCD images and printers, and six of the programs offer screen capture capabilities. Because a mouse doesn't offer the precision many artists look for, you'll find support for styluses and tablets with some of the packages.

Support for various file formats—images you can import from or export to the applications you use on a regular basis—may also affect your choice. Take a look at the grid of paint program features to see just which formats a particular package supports.

The tools you'll use to modify images or create your works of art may well be your primary consideration in choosing a paint program. Some of them are pretty amazing. One offers a custom brush tool, another helps you paint in the style of Van Gogh, and still another includes sophis-

ticated photo-retouching tools. Here, too, the features grid assists by presenting information about paint tools, special effects, filter functions, image control, and more.

Keep in mind, however, that these programs sometimes differ in their terminology and approach so much that it's difficult to draw comparisons. For a more detailed look at how each program works and what the particular strengths of a program are, look to the reviews. Here you'll also find valuable information about documentation, ease of use, add-ins, and other matters that can't be covered adequately in a list of features.

Pay careful attention to the hardware requirements for these paint packages. As hardware has become more powerful and sophisticated, system requirements have also increased. Memory requirements in our lineup vary from 512K all the way to a whopping 6MB, and the manufacturers recommend even more. The minimum of disk space required varies from 2.5MB to 10MB, and you'll need a 24-bit video adapter and high-resolution monitor if you want to display the 16.7 million colors that six of these paint packages let you use. Make sure that your video adapter is supported by the package you want. Also, many of these programs rec-

ommend at least a 386 microprocessor, and there's no doubt that a 486 system will speed the performance of Windows apps. In fact, these sophisticated paint packages may offer you just the excuse you've been looking for to upgrade to a more powerful system.

Finally, while both paint programs and draw programs come under the larger rubric of illustration software, there are some important differences to consider before you buy. As managing editor David English pointed out in his introduction to the Test Lab on draw software (September 1992), "Paint programs are your best choice if you work with scanners and photorealistic images. Draw programs are best if the form of the image is more complex than its color or if you plan to print at high resolutions."

Whatever your artistic aspirations and requirements, Test Lab can help you understand this software category and make a more informed buying decision.

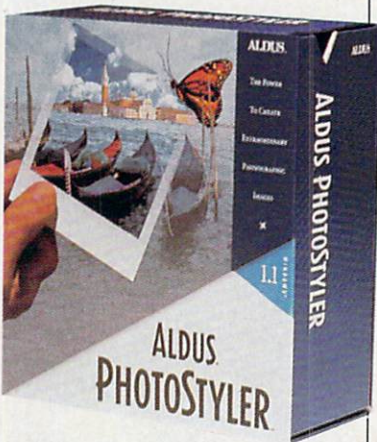
MIKE HUDNALL

## ALDUS PHOTOSTYLER 1.1

Remember the excitement of opening a birthday or holiday package containing an art set? Few gifts brighten a child's face so much. Aldus PhotoStyler 1.1 is

**Aldus PhotoStyler 1.1**  
**IBM PC or compatible (80386 compatible), 2MB RAM (4MB recommended), any Windows-compatible adapter (high-resolution 256-color or 24-bit adapter recommended), hard drive with 4MB free (80MB hard drive recommended), Windows 3.0 or higher, mouse—\$795**

**ALDUS**  
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**(206) 628-2320**



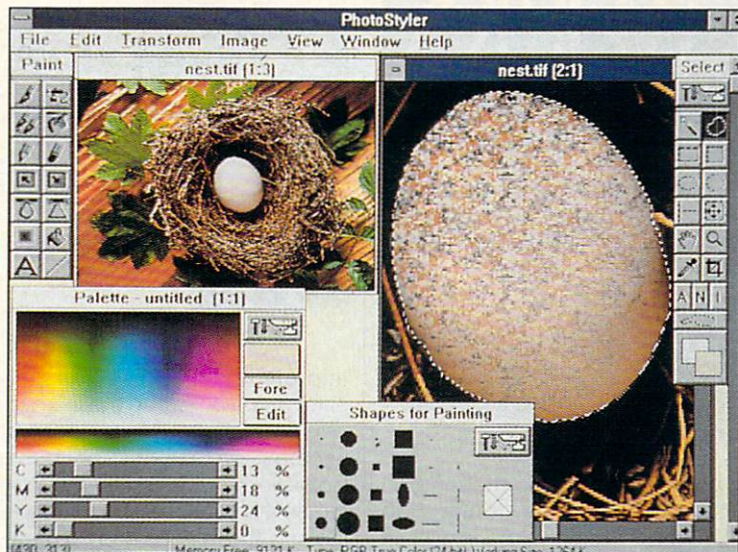
a powerful art set for your computer; paints, pencils, and tools of all kinds give you incredible control over any kind of artwork. You can create images from scratch, or you can start with scanned images and modify as you please.

The programming artists who assembled this package have left no milieu unexplored. As a tool for creating artwork, PhotoStyler works well, and it's superbly suited for modifying and enhancing existing electronic images such as scanned photographs.

Back to the drawing board: PhotoStyler's array of paint tools may seem unremarkable on the surface, but when you explore the customization possibilities for each tool, you realize what splendid tools they are. For example, in addition to choosing the shape of your paintbrush, you can select the rate of the flow of the paint and the transparency of the paint. Also, when painting over previously painted areas, you can choose to have the paint applied only to areas that are lighter or darker than the paint color. Options also permit you to isolate and change only the hue, color, or brightness components of the underlying pixels.

One of PhotoStyler's finest features is the Magic Wand color selection tool. When you click on a pixel with the Magic Wand, that pixel and all adjoining pixels of a similar color are selected. This is a speedy way to select large areas—such as the background—of a picture for recoloring. Besides its ability to repaint images, PhotoStyler has a full set of color correction and enhancement tools that provide control over either the whole image or selected regions.

PhotoStyler offers an array of filters designed to help you enhance your artwork in various ways. With these filters, you can sharpen, soften, blur, or emboss your image. You can add a ripple effect or a whirlpool effect. And with the filters, as with most options in PhotoStyler, the tools are available for



you to define your own effect.

PhotoStyler has sophisticated options for combining and merging images, making the program one of the most complete image manipulation tools around. The program can read almost any standard graphics file format and includes driver software for a handful of scanners, but the popular hand-held models are not included. Nevertheless, PhotoStyler will have no trouble reading and modifying images once they're captured through the scanner maker's proprietary software.

With so many options and possibilities, PhotoStyler can seem overwhelming. The documentation, however, will put you at ease. In typical Aldus fashion, a fine tutorial in the Getting Started book helps you clear the initial hurdles. The reference manual includes detailed explanations of the hows and whys of image manipulation. Keep the book at hand, however, because the online reference falls a little flat compared to the help services provided in other Aldus software.

Despite its down-to-earth documentation, PhotoStyler has too much horsepower for anyone who just wants to do a little computer-aided painting. PhotoStyler

is designed to handle the problems of a sophisticated user, and it won't disappoint even the most demanding professional.

TONY ROBERTS

Circle Reader Service Number 371

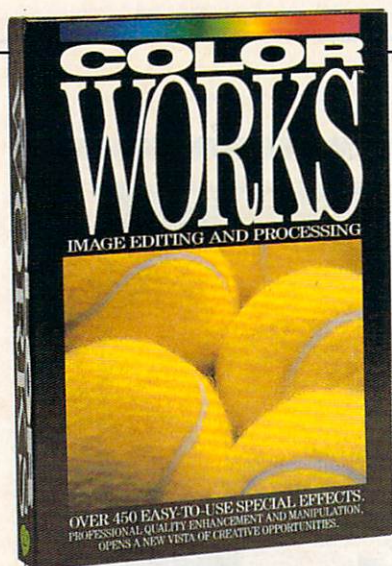
## COLORWORKS 1.0

If you want real power in DOS image processing with the ability to professionally create, edit, merge, and process black-and-white and color images with over 450 separate tools for drawing, image editing, and applying special effects, then ColorWorks 1.0 from SPG could very well be for you.

Instead of an expensive Windows-compatible program costing hundreds of dollars, SPG offers a DOS package for only \$149 retail that still provides all the power of many high-end programs. This is a power program meant for serious image manipulation. While it lacks some of the polish and glitter of Windows applications, it compensates by supplying you with greater flexibility.

Giving up the Windows interface means that you have added power and speed. For example, all of the drawing tools in ColorWorks are completely configura-

# TEST LAB



ble on the fly. This means you have the option of configuring and reconfiguring the tools while you edit images, selecting the brush stroke, color, pattern, special effect, or combination of effects you want a tool to use as many times as you like while working on a drawing.

And there are plenty of tools available for reconfiguring. The 13 basic drawing tools include line, free draw, rectangle, triangle, parallelogram, ellipse, curve, fill, font, circle, polygon, a zoom/edit pixel editor, and a cut-and-paste tool. The ColorWorks cut-and-paste tool allows you to rotate, paint/drag, scale, stretch/shrink, flip, cut, copy, image-merge, and superimpose an area of your screen image (called the canvas).

Want more flexibility? Whenever you load a file in ColorWorks, the cut-and-paste tool is active. Thus, you can apply the effects described above before positioning and pasting your loaded images where you want them on the canvas. And the program allows an unlimited number of images onscreen at the same time for editing and creating unique pieces of work.

Several of the major graphics file formats find support in this program: BMP, TIF, PCX, Targa, and ColorWorks' own SPG image file formats. I like the SPG format because it allows you to save images with various irregular shapes

**ColorWorks 1.0**  
**IBM PC or compatible, 640K RAM**  
**(3MB recommended for some**  
**modes), VGA, hard drive, mouse—**  
**\$149**

**SPG**  
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**Miami, FL 33015**  
**(305) 362-6602**

and areas defined as transparent. When you reload these images onto your canvas, the transparent areas are see-through. Using ColorWorks, you could, in effect, create a library of clip art containing only the images and no backgrounds—just like having a supply of electronic decals to slap on whatever images you wished.

ColorWorks also lets you create black-and-white and color EPS files. The 23 special-effect functions include undo, reflection, grid, blend, graduation, dupe, cycle draw, antialiasing (gives smooth edges to lines, curves, circles, and fonts), shade, tint, color strip, tile, sharpen, shear, negative, filter (over 30 filters included), redo, RGB guard, and RGB swap. ColorWorks also

includes powerful shape- and color-masking functions.

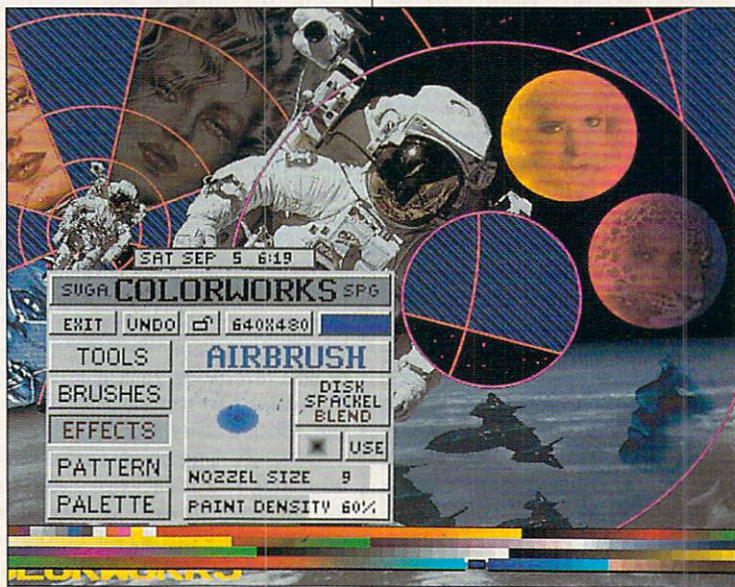
All special effects include precise controls for their application to your canvas. You get printer support through several black-and-white and color print drivers, including PostScript.

An exceptionally powerful paint and image-editing program, ColorWorks worked well except on my 486 with the 8514 video adapter, since that display is not yet supported. I recommend ColorWorks to those who need flexible and powerful image manipulation beyond what the Windows applications offer. If you find yourself in that group and you're willing to put forth the extra effort to learn a program with a number of options and plenty of flexibility, then ColorWorks is an excellent choice.

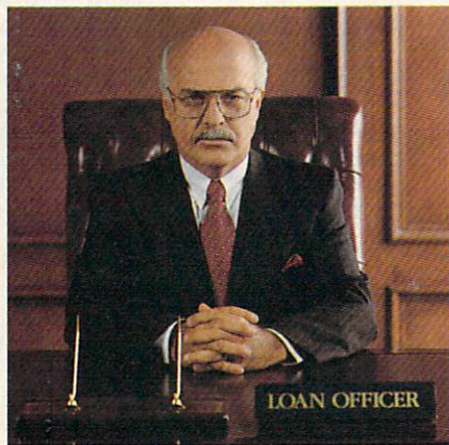
RALPH ROBERTS

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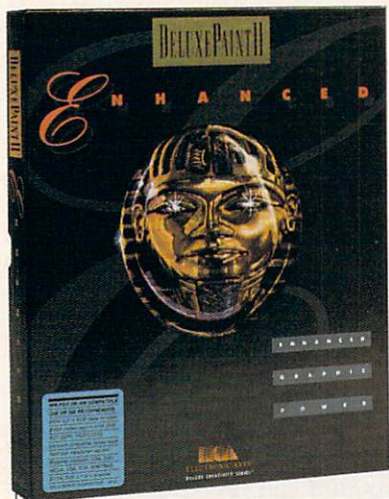
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# TEST LAB



## DELUXEPAINT II ENHANCED

I still feel nostalgic for my first car, a beige and black 1966 Plymouth Fury V8 convertible that was showing its age in 1972 but could pass those upstart little imports like they were standing still. I feel the same affection for Dan Silva's original DeluxePaint, the first piece of software I ever bought. The Plymouth has long since gone to auto heaven, but DeluxePaint, now in its seventh year and called DeluxePaint II Enhanced, is still around and still faster than most of the competition. Though I've tried just about every paint program in the world, I still turn to DeluxePaint when I want to get a job done quickly.

Like most paint programs today (many of which have copied DeluxePaint's tool set), this program offers a wide variety of icon-based painting tools in a bar down the side of the screen. These tools include a color palette and the usual line and shape makers. You'll also find area fill; a versatile, resizable airbrush; a magnifying glass; a text tool; a grid for exact alignment; and a mirroring feature.

Pull-down menus along the top of the screen offer file-handling and screen mode controls (you can switch screen modes on the fly); brush options such as flip,

**DeluxePaint II Enhanced**  
**IBM PC or compatible (80286**  
**compatible recommended); 640K**  
**RAM; Hercules, CGA, EGA, VGA, or**  
**EVGA (EVGA requires 512K EMS);**  
**hard drive; mouse—\$129.95**

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rotate, distort, and bend; and such painterly effects as smear, blend, and smooth. The program's comprehensive palette controls allow you to mix all of VGA's 256 colors; there's also a spare screen for thumbnail sketches and the ability to create pictures larger than the screen. Everything about DeluxePaint's interface is well designed and easy to understand.

The secret to DeluxePaint's speed and power is its custom brush tool. Using the custom brush tool, all that you have to do is draw a box around any part of your work, and it becomes a brush. You can draw with it, erase it, resize it, stretch it, rotate it, warp it, skew it, change its colors, make it partially transparent, outline it, and more.

Custom brushes can be used

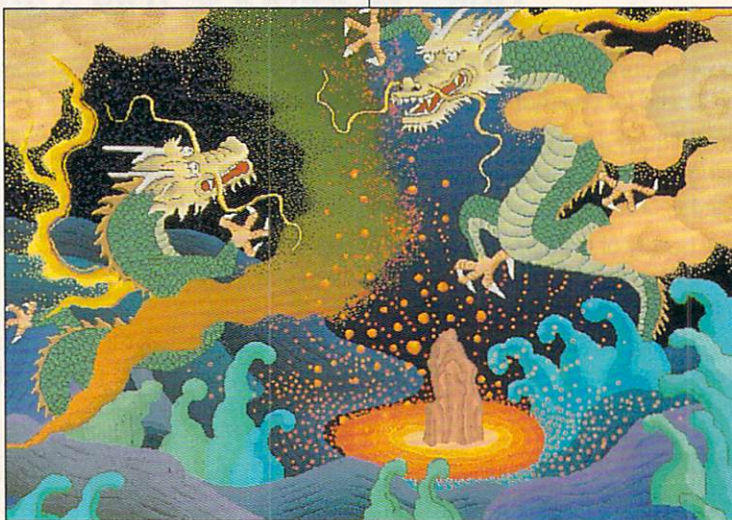
in conjunction with most of the other tools, too, so you can create effects that no other paint program can achieve. For example, you can actually use a face to draw a circle. You can't really understand how much time the custom brush feature will save you until you try it for yourself.

The other DeluxePaint feature that I find truly unique is perspective (one of the program's image-control tools). This is a complex but powerful system that allows you to tilt any brush or screen to create the illusion of spatial depth. Once you master the intricacies of manipulating a brush's x-, y-, and z-coordinates with the numeric keypad, you can do tricks like designing rooms that extend back into infinity or wrapping labels around boxes.

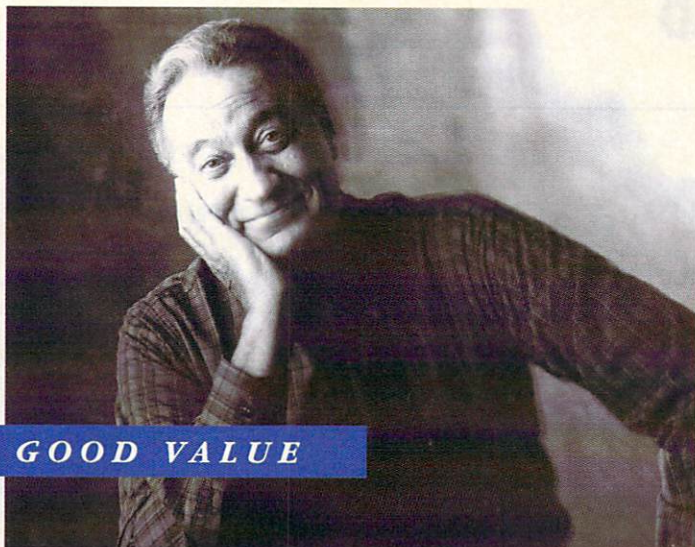
There are plenty of features that artists want but DeluxePaint doesn't have, and probably never will. These include the ability to edit 16- and 24-bit images; the inclusion of photo-retouching tools like contrast and gamma correction; and support for Super VGA, expanded memory, and Windows. What DeluxePaint II Enhanced does offer is a fast, elegant, time-tested, and powerful system for painting images onscreen.

STEVEN ANZOVIN

Circle Reader Service Number 373



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# TEST LAB

## DR. HALO IV PAINT AND IMAGING PAK

Dr. Halo is without a doubt one of the best-known names in PC painting. Around since 1984, this program boasts nearly 3 million users. It's a workhorse for many users who own no other graphics software, and now Dr. Halo has been released in a new version, Dr. Halo IV Paint and Imaging Pak.

There's plenty that's useful about Dr. Halo IV Paint and Imaging Pak. The package now includes five programs: the paint program Dr. Halo itself, which looks very much like the previous versions; the Viewer, a display and file conversion utility that gives Dr. Halo access to more image file formats than before; the Font Editor, which allows you to redesign bitmapped fonts to your specifications; the Grab utility, a screen-grabbing program; and Presents, a slide-show program for Dr. Halo images.

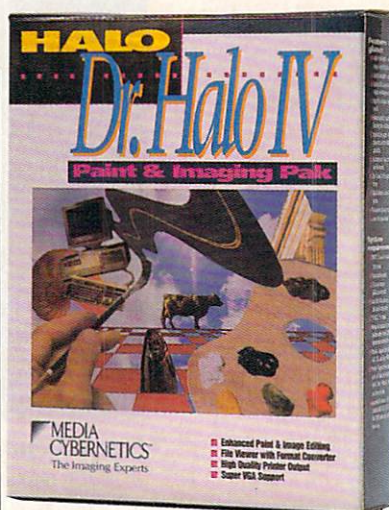
With its own conventions, icons, and ways of working, Dr. Halo, the core of the package, differs from other paint programs. For example, you choose tools and options entirely from dozens of icons—there are no drop-down menus—

**Dr. Halo IV Paint and Imaging Pak IBM PC or compatible (80386 compatible recommended); 640K RAM (2MB extended or expanded memory for the Viewer); CGA, EGA, VGA, or SVGA; hard drive with 1MB free (3MB to install all programs); mouse recommended—\$140**

**MEDIA CYBERNETICS  
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Silver Spring, MD 20910  
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(301) 495-3305**

but the meaning of some of the icons isn't always obvious. Even such a simple function as color selection didn't work quite as I expected it to. To change the painting color, you first have to select the pencil tool. Luckily, the manual is clear and includes some basic tutorials, but you'll still need to experiment until you're sure what each tool does.

Dr. Halo performs most of the usual paint program operations, such as drawing lines and circles, filling with colors, and selecting areas for block operations like flip and rotate—and it does them fast. You won't find some of the program's unusual options in



other paint programs, such as the ability to automatically draw a representation of a 3-D box.

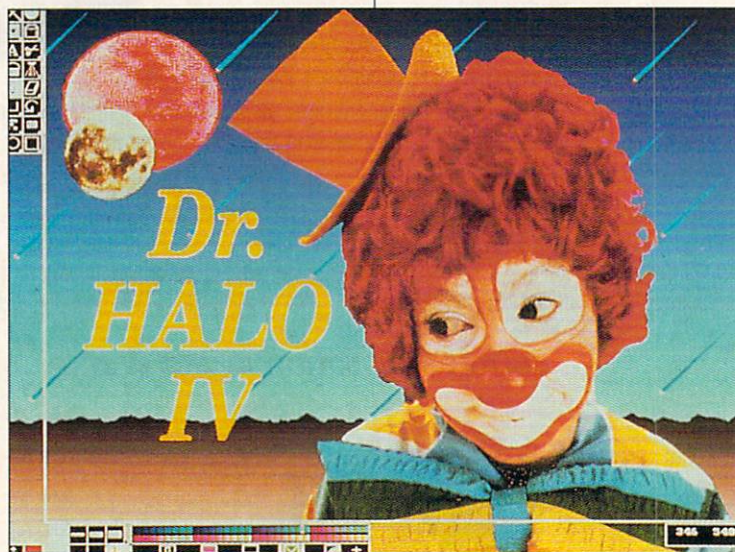
However, Dr. Halo also has some odd omissions, at least by today's standards for paint programs. For example, there are no brushes in different shapes, and you have access to only four line thicknesses.

The other program in the Dr. Halo package that you'll use often is the Viewer. The Viewer not only converts file formats to and from Dr. Halo's own CUT format but also performs some basic image processing. You can crop, merge, and adjust the colors of TIF, BMP, and PCX images. Unfortunately, you can't jump directly from Dr. Halo to the Viewer or to any of the three other programs (except for Grab, which is a TSR).

Should Dr. Halo IV be your first paint program? Probably not. The program's cryptic, quirky interface and lack of integration between modules make it unnecessarily hard for paint novices to master. But if you're one of those 3 million Dr. Halo users who feel comfortable with the program's idiosyncrasies and occasional oversights, then Dr. Halo IV Paint and Imaging Pak is a real bargain. It greatly extends the original capabilities of Dr. Halo while retaining this classic's speed and power.

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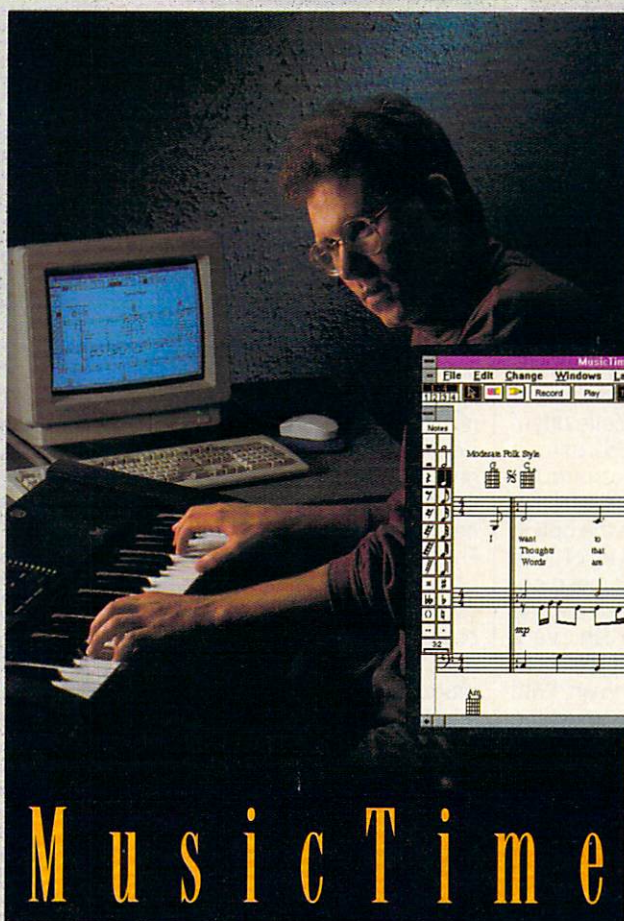
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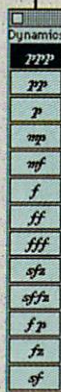


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# TEST LAB

## FRactal Design PAINTER 1.2 FOR WINDOWS

The woods are full of paint and draw programs, but if you have artistic talent and seek an exceptional program, Fractal Design Painter 1.2 for Windows may be just what you're looking for. The scope and options are extraordinary.

Never mind the usual toolbox—rotate and grab and fill and the usual. Painter has those, but they're trivial in the face of the program's other features. When you create an image, the brush palette offers the options of an airbrush, a brush, pencils, chalk, charcoal, felt pens, crayons, and special brushes. You even have the option of painting in the style of Van Gogh or Seurat. Each of these options has variants; for example, the brush can be a hairy brush, graduated brush, water brush, watercolor brush, or Japanese brush. With each of these, you can adjust the size and angle of the brush tip and make the edges of the stroke flat or soft or intermediate.

**Fractal Design Painter 1.2 for Windows**  
IBM PC or compatible (80386 compatible), 6MB RAM (8MB recommended), SVGA, hard drive, Windows 3.0 or higher; supports math coprocessor, mouse, and Wacom and Calcomp tablets—\$399

**FRactal Design**  
335 Spreckels Dr.  
Aptos, CA 95003  
(408) 688-8800

Not content with that variety, the developers created an array of application methods potentially bewildering to the novice. You can choose among such options as grainy edge flat buildup, grainy hard, wet, soft buildup, and more. Further, you can select the depth of penetration into the paper of your palette and the concentration of the color. In the watercolor variants, if you don't like what you've produced, you can wet the brush and soften it. For other effects, you can create a frisket, which is a mask to shield certain areas during painting or retouching.



The color palette offers 15 color families, which differ according to the selected brush, just as the colors available for pastel differ from those for oils. You can alter these default colors in their hue, saturation, and value.

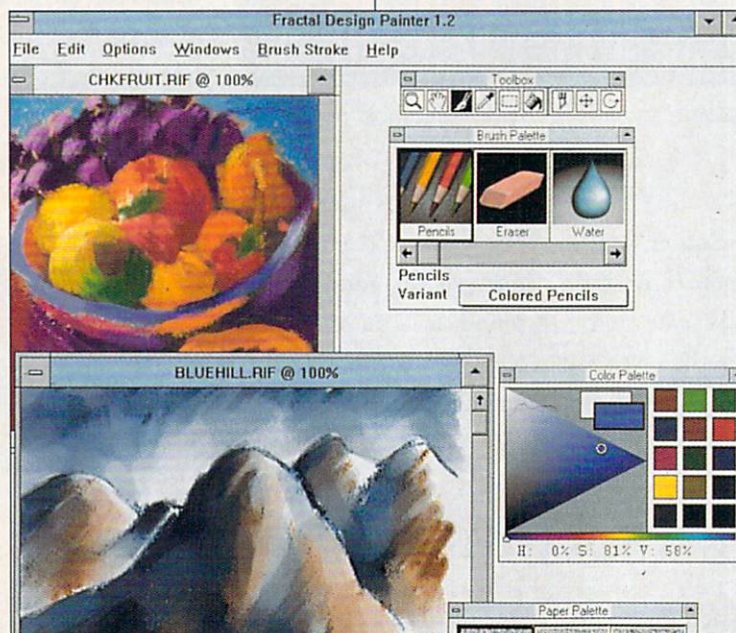
And there's more. You have the option of viewing your finished artistry in a different mode. If you've painted in watercolor, you can clone it in oil, or you can see it à la Van Gogh or Seurat. Artists might well find the mouse a poor substitute for a paintbrush. Painter recognizes this and provides support for such equipment as the Wacom pressure-sensitive stylus.

The program is rather slow on a 16-MHz 386SX with 8MB of RAM. And Painter consumes plenty of RAM and disk space. While it requires only 2.5MB of free disk space for installation, Fractal Design recommends 20MB for creating images. I wish the program included more extensive documentation. The user's guide includes no sample images, and no true tutorials are provided.

Though I'm not a fine artist and though I lack access to a color printer, I was nonetheless most impressed with Painter as an exceptional program, striking in the depth and breadth of its potential for creative artistry. If you are a fine artist or have aspirations in that direction, Painter deserves your attention.

CHARLES IDOL

Circle Reader Service Number 375





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# TEST LAB



## IMAGE-IN SCAN & PAINT 3.1

Given the remarkable progress in personal computer graphics over the last couple of years and the impressive crop of draw and paint programs to choose from, you should carefully consider just what you want to do with such a program. Image-In Scan & Paint 3.1 has much to offer, including the ability to import Kodak PhotoCD images.

The program takes good advantage of Windows 3.1's features, and it's perceptibly faster than other image-editing software running under Windows. When you create an image, you can choose color, gray-scale, or bilevel (black-and-white); if you change your mind later, it's possible to convert from one type to another. The program's toolbox offers a wide range of tools. Shape and thickness options are available whether you're using a pen, a brush, or an airbrush. You can create lines, open or closed Bézier curves, rectangles, circles, or ellipses. There's also a text capability, with more than 20 fonts provided. For convenience, the right mouse button provides fast access to the options for each tool.

When you're ready to edit, a pointer tool lets you select an area of the image in the shape of

**Image-In Scan & Paint 3.1**  
**IBM PC or compatible (80386 compatible), 2MB RAM (4MB recommended), any Windows-compatible adapter (VGA or SVGA recommended), hard drive with 6MB free, Windows 3.0 or higher; pressure-sensitive tablet recommended—\$149**

**IMAGE-IN**  
**406 E. 79th St.**  
**Minneapolis, MN 55420**  
**(800) 345-3540**  
**(612) 888-3633**

a rectangle, a circle, an ellipse, a polygon, or a free form. Once you've defined an area, you may choose to have your modifications apply to that area or to the rest of the image. Fill and eyedropper tools help you make color modifications. For effects, you can filter the image to sharpen it or blur it. Images can be manipulated with the flip, rotate, and stretch/shrink commands; and adjustments can be made for brightness, contrast, and color balance.

You have your choice of 11 formats, including the popular TIF, PCX, and EPS, for saving your work and for exporting to other ap-

plications. For conservation of disk space, the TIF format offers a compressed mode. Those same formats are also supported in importing images. With very little difficulty, I imported a gray-scale image produced by a hand scanner, converted it to RGB, and tinted areas to produce an acceptable color image.

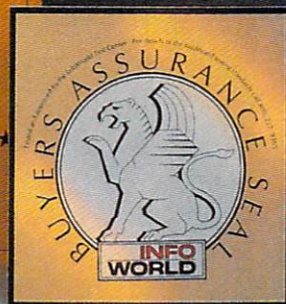
Scan & Paint provides direct support for a large number of scanners. When you set up the program, you can install the driver for your scanner and later call the scanner from the toolbox. The scanned image is brought directly into the program, where you may modify and edit it as you choose. The program also provides support for loading Kodak PhotoCD images and for fast printing to the Kodak XLT7720 series printers.

Regrettably, the documentation is in the form of a reference guide rather than a user's guide, with no tutorials provided. It requires a fair amount of digging on the part of the new user to discover just what the program offers. Still, power and a modest price make Scan & Paint a program that many consumers will want to consider.

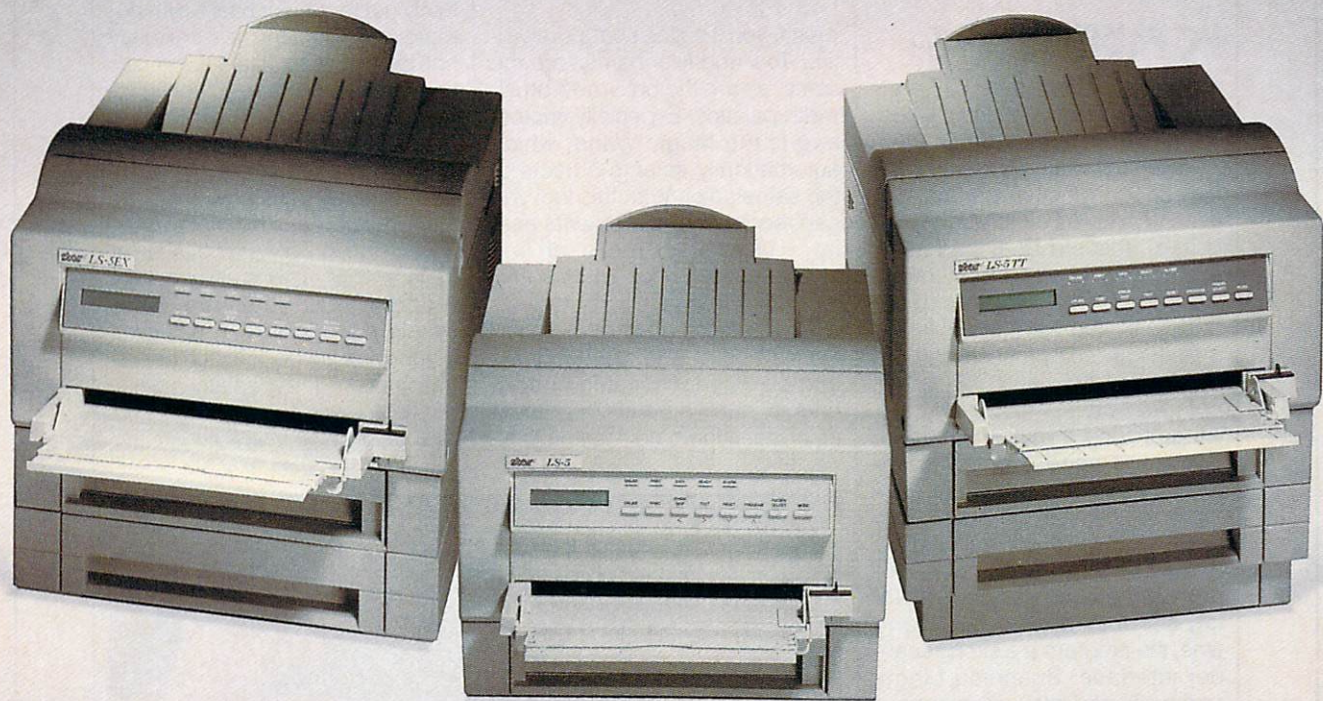
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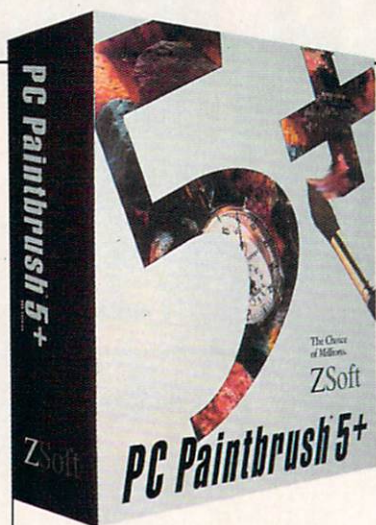
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# TEST LAB



## PC PAINTBRUSH 5+

At its modest price, PC Paintbrush 5+ can be a good value, depending on your needs.

When compared to some similarly priced Windows products (or even Windows Paintbrush, which is free), this old DOS performer seems a little long in the tooth. It lacks 24-bit color support and supports a limited number of file formats (PCX, compressed and uncompressed TIF, and GIF), so it's not really conducive to full-color image editing. If you don't run Windows and need a good monochrome and gray-scale image editor, however, this is a good start.

Where Paintbrush really excels is in its extensive scanner support. Since ZSoft has been building scanner drivers for a long time, the program is a strong scanner interface. Scanning black-and-white and gray-scale images with my ScanJet IIc, I got excellent results. Paintbrush didn't handle the scanner's 24-bit color capabilities well, however. There is also strong printer and graphics adapter support, which is not found in many other products in this price range. Literally hundreds of VGA and SVGA boards are supported by Paintbrush.

Paintbrush comes with an extensive array of image-editing tools, including some found in ZSoft's higher-end image-editing packages, such as PhotoFinish. In fact, if you're familiar with PhotoFinish or Publisher's Paint-

**PC Paintbrush 5+**  
IBM PC or compatible; 640K RAM  
(an additional 246K disk cache  
recommended); Hercules, CGA, EGA,  
VGA, EVGA, SVGA; hard drive with  
3MB free; drawing device—\$149

**ZSOFT**  
450 Franklin Rd., Ste. 100  
Marietta, Georgia 30067  
(800) 444-4780  
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brush, you'll notice some similarities. Tool and filter names are the same, as are the color and brush width palettes. Especially impressive is the Magic Wand, which automatically selects objects of the same color. With this tool you can recolor multiple objects easily. I used it to make all the clouds in a sky scene grayer and more foreboding.

In all, the program comes with over 20 paint and retouch tools and some sophisticated special effects, such as emboss, mosaic, and motion blur. Automatic fil-

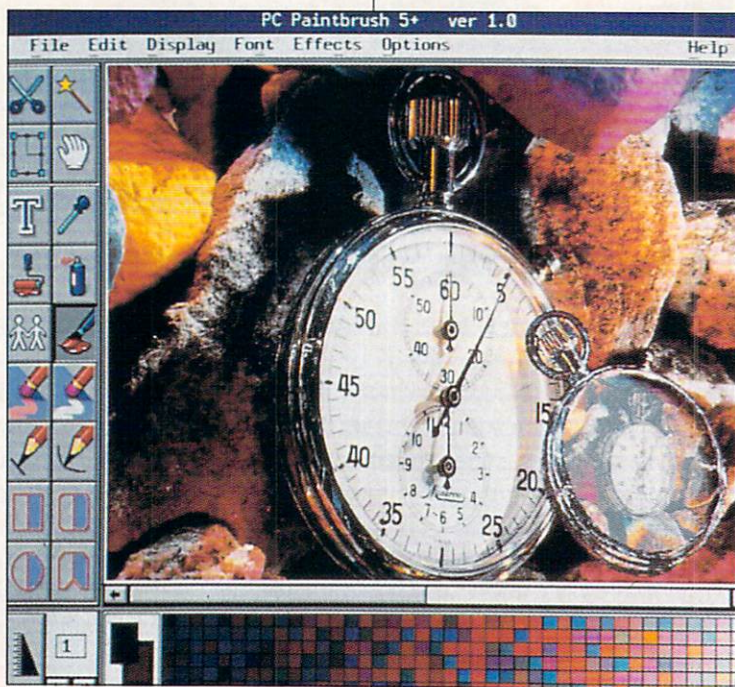
ters—sharpen, smear, smudge, spot removal, and others—allow you to work on selected portions or the entire image at once.

Paintbrush runs on systems with 640K RAM; it uses empty disk space as virtual memory to hold large images. However, until I did some reconfiguring, eliminating several device drivers, I got a lot of out-of-memory errors. The worst part is that as often as not the system locked up, forcing me to reboot. This program is certainly not for power users with numerous TSRs. And it's certainly not for Windows users, who can find more power and a prettier interface somewhere else.

When I started working with computer graphics several years ago, Paintbrush was my first bitmap editor and scanning software. And it served me well for quite a while. This is an excellent program for beginners. You should not consider it, however, if you plan to do a lot of photograph editing, especially color.

WILLIAM D. HARREL

Circle Reader Service Number 377



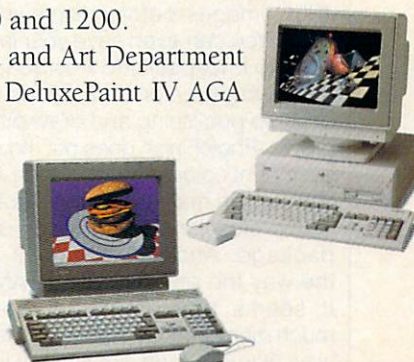
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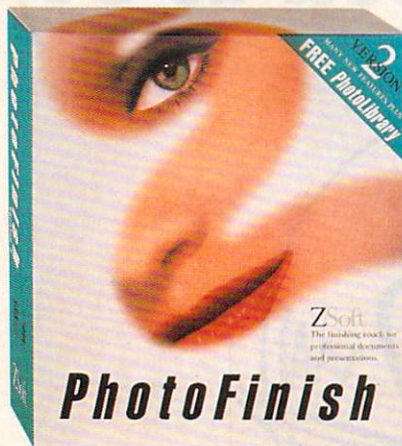


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# TEST LAB



## PHOTOFINISH 2.0

For \$500 less than most high-end electronic darkrooms, PhotoFinish 2.0 gives you about 90 percent of the features and 200 percent of the ease of use.

PhotoFinish supports an impressive list of scanners. However, you must load the driver in config.sys, which eats up RAM and could conflict with other TSRs. Most of today's Windows scanning software uses a dll or drv driver that loads when the scanner is activated and moves out of the way when it's not needed.

The program's automatic filters—sharpen, blend, smudge, and so on—work great, as do the 20+ paint and special-effect tools. Most major bitmap file formats are supported, and there is even a filter that automatically decompresses industry-standard JPEG images before displaying them. You can even save your images to Encapsulated PostScript format to get color separations in desktop publishing and draw programs. PhotoFinish does not, however, print color separations on its own, which makes it less suitable as a professional photo touch-up package. Another drawback is the way the program uses RAM. It seems that no matter how much memory is available (this review was done on a system with 20MB), there is entirely too much disk accessing going on, which

**PhotoFinish 2.0**  
**IBM PC or compatible, 2MB RAM**  
**(2MB-18MB for higher modes), any**  
**Windows-compatible adapter**  
**(support includes XGA, 16-bit high**  
**color, and 24-bit true color), hard**  
**drive with 5MB free, Windows 3.0 or**  
**higher, drawing device—\$199**

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significantly slows down screen redraws when you're working on big images.

Version 2.0 comes with a nifty image viewer that loads thumbnails of all the images in a subdirectory for easy selection. And there is an extensive library of prescanned 24-bit images you can use in your layouts and presentations, virtually free of copyright restrictions, which is great if you don't have a scanner (or even if you do). Another plus for version 2.0 is the addition of monitor, scanner, and printer calibration. This feature, originally part of ZSoft's full-featured Publisher's Paintbrush, allows you to optimize your input and output devices

to get even closer to true WYSIWYG. (This isn't easy when dealing with color. You need all the help you can get.)

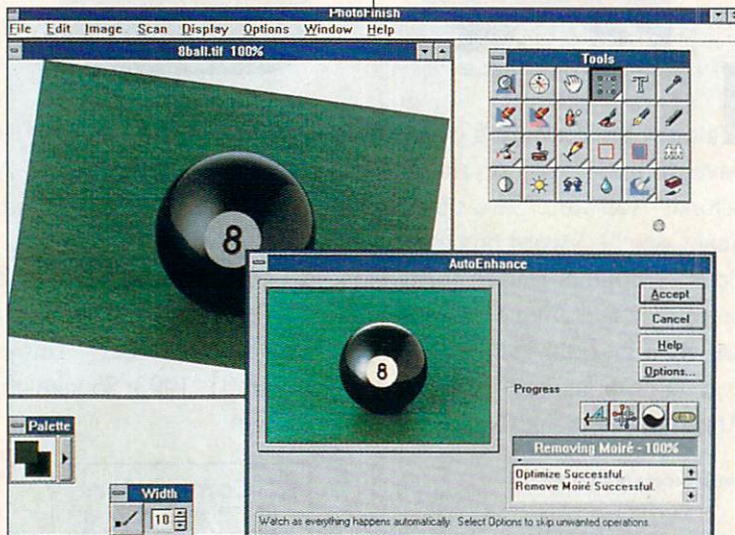
Even the full-featured products don't have some of this program's features, such as automatic deskewing and image stitching (automatically stitching multiple scans together). One feature that few programs of any type have is ZSoft's Local Undo. It allows you to undo changes to selected areas of a drawing, rather than having to reverse all of your work—a lifesaver if you're making extensive edits.

I found the documentation for PhotoFinish to be thorough and easy to use. The tutorial walks you through touching up both a gray-scale and a full-color photograph. The program is straightforward and easy to learn, but if you should ever need technical support, it's easy to get through, and the technicians are well trained. My calls were answered promptly, and my questions were answered quite satisfactorily.

Unlike PC Paintbrush, which is definitely a beginner's package, PhotoFinish may be the only paint and image-editing program you'll ever need.

WILLIAM D. HARREL

Circle Reader Service Number 378





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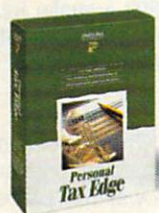
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Personal Tax Edge requires an IBM® or compatible PC with 640K, DOS 2.11 or later and 4.5MB hard drive space. Personal Tax Edge for Windows requires an IBM® or compatible PC running Microsoft® Windows™ 3.0 or later in standard or enhanced mode and 6MB hard drive space. Mouse supported but not required. Works with all monitors and printers. Copyright © 1992 Parsons Technology, Inc. All rights reserved. Personal Tax Edge is a trademark of Parsons Technology, Inc. All trademarks or service marks designated as such are marks or registered marks of their respective owners. Personal Tax Edge will ship in mid-January.

**Circle Reader Service Number 164**

# TEST LAB

## PICTURE PUBLISHER 3.1

Picture Publisher 3.1 (now dropped to \$495 from the \$795 that 3.0 cost) is an image editor rather than strictly a paint program. While it has many of the standard paint tools for drawing, filling, and color control, it's primarily oriented toward enhancing an already existing image instead of creating one. For example, you could take a flat but colorful drawing generated in another program and—through blends, gradients, textures, and other special effects—give it a three-dimensional, more photorealistic look.

Picture Publisher gives you complete control over images—either scanned in or imported via such standard file formats as BMP, GIF, PCX, Photo CD, Targa, and TIF. The program supports EPS and DCS formats only as exports.

Looking for a clean, uncluttered, easy-to-use interface? Picture Publisher has it. On the bottom line of the window, helpful hints appear about the currently selected tool or option.

Editing several images at once is easy with Picture Publisher. Each has its own resizable window. You may cut and paste between these images or between them and other Windows applications, or you can have several views of the same picture! A linking option causes changes made in one window to be reflected in all other open copies of the image.

Picture Publisher supports everything from 1-bit black-and-white line drawings to 256 levels of gray scale to 24-bit true color images. You'll find features for sharpening, smoothing, and so forth.

For picking a specific color from an image, Picture Publisher furnishes an eyedropper tool. Called a color probe, it lets you choose just one point for an exact color match or draw a rectangle and get an average of all the colors within the bounded area.

**Picture Publisher 3.1**  
IBM PC or compatible (80386 compatible recommended), 4MB RAM (8MB recommended), VGA (256-color SVGA or 24-bit color recommended), hard drive with 10MB free, Windows 3.0 or higher, drawing device—\$495

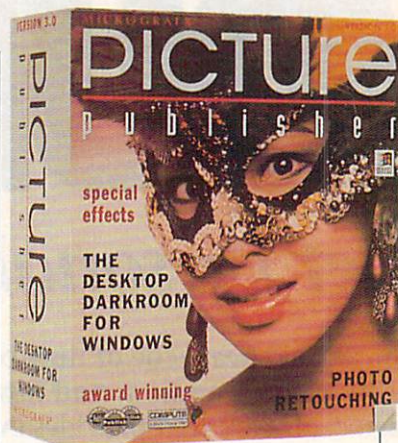
**MICROGRAF X**  
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Richardson, TX 75081  
(800) 733-3729

The use of text is as powerful as whatever fonts are installed in Windows. You place text as a mask, allowing you easily to resize, fill, and rotate it for stunning effects.

Speaking of masks, Picture Publisher has strong mask features. You can isolate areas of an image for retouching and other special effects, or select areas for copying or cutting—all with masks.

Color control is also excellent. You can adjust local areas or the entire image for color contrast, hue, brightness, and saturation. Picture Publisher supports the three basic color systems: RGB, HLS, and CMYK.

Various special effects let you get as weird as you like in twirling,



crystallizing, waving, or running Hurricane Andrew through your picture (try the Wind special effect for that one; it works nicely).

Service and support by Micrografx are good. The documentation, while extensive and well written, still does not cover everything possible about this very complex program. However, 24-hour technical support is available.

Other reviewers have said Picture Publisher is the best image-editing program available. I'll just say, "I switched." If you need the powerful features found in Picture Publisher, you may switch, too. That's my recommendation.

RALPH ROBERTS

Circle Reader Service Number 379



# SMART. AFFORDABLE LASER PRINTING FROM PANASONIC.



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

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



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Circle Reader Service Number 104

# TEST LAB



## TEMPRA PRO 3.0

TEMPRA PRO 3.0 is a powerful paint and imaging program that provides a remarkable degree of color control. And since this program runs under DOS, even computer artists who "don't do Windows" have access to its abundant set of tools that can create not only drawings but multimedia presentations as well.

While TEMPRA PRO directly accepts input from a handful of scanners as well as video-digitizing boards, the program provides ample ways to apply paint by hand. And if your hand isn't that steady, TEMPRA PRO includes the tools to help you out.

For example, you can create masks to isolate sections of your artwork and either paint those sections or protect them from change. And if the shapes are the way you like them but the colors are not, TEMPRA PRO provides an outstanding set of color protection controls.

From the Color Protect Palette, you can isolate individual colors or ranges of color and protect them from change. The swap feature allows you to select a single color and protect all others, making it possible for you to recolor an image one shade at a time. In addition, your color protection selections can be turned into a mask that you can save to disk and reuse.

Although TEMPRA PRO works on any AT-class computer with any VGA monitor, your creative

**TEMPRA PRO 3.0**  
IBM PC or compatible (80286 compatible), 640K RAM, VGA or SVGA (supports 16- and 24-bit adapters), hard drive with 6MB free, mouse—\$695 (includes TEMPRA SHOW)

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sessions will benefit from a faster processor and more sophisticated display system up to and including 24-bit systems. Even with a 486 processor, you'll find yourself waiting for some drawing functions. If you have at least a 386SX processor, though, you can boost performance through Mathematica's add-on Turbo Charge feature (available separately for \$295), which allows TEMPRA PRO to run two to five times its normal speed.

TEMPRA PRO supports a long list of color and black-and-white printers and comes with its own print program that allows you to adjust images as they're going to the printer. From TEMPRA PRINT PRO you can crop images, adjust the dot size and brightness, and

scale the image. Printing can be activated from within TEMPRA PRO itself or from the command line.

Another Mathematica utility of some note is TEMPRA SHOW, a multimedia authoring system. TEMPRA SHOW is a presentation program in which the user describes the events that constitute the presentation. Events can include audio, full-motion video, animation, text, and special effects. Although TEMPRA SHOW is a separate product that lists for \$199, Mathematica has bundled it with TEMPRA PRO.

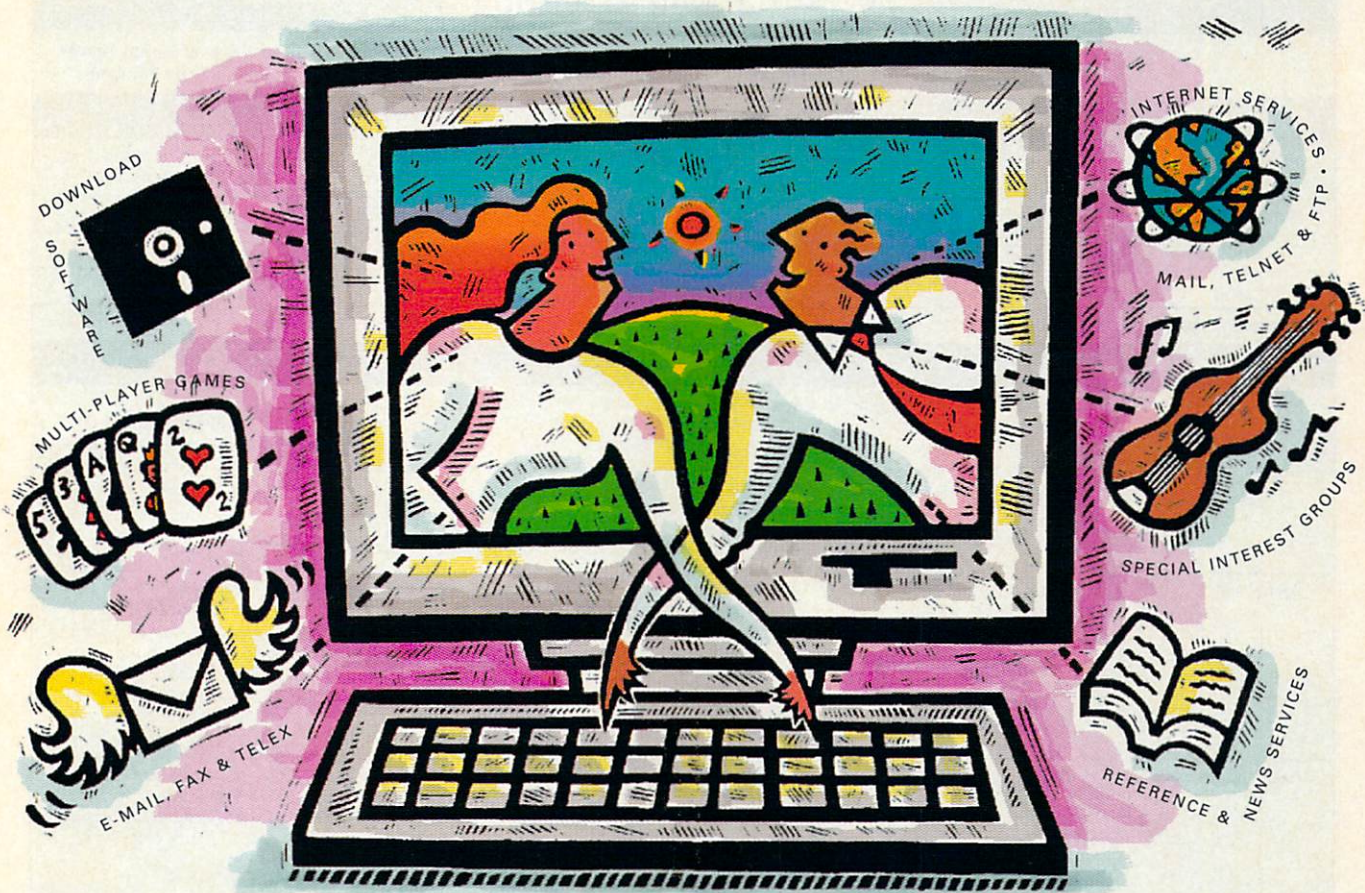
Thanks to the step-by-step instructions for each of the commands provided in the manual, I found TEMPRA PRO fairly easy to use. Despite its thoroughness, however, the manual is a visual disappointment. The camera-ready copy for the manual, including screen representations and illustrations, was produced on a 300-dpi laser printer. By using low-resolution black-and-white illustrations, Mathematica missed a chance to showcase the program's vibrancy and fully illustrate some of its outstanding color capabilities.

TONY ROBERTS

Circle Reader Service Number 380



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# TEST LAB

## PAINT SOFTWARE FEATURES

	Aldus PhotoStyler 1.1	ColorWorks 1.0	DeluxePaint II Enhanced	Dr. Halo IV Paint and Imaging Pak	Fractal Design Painter 1.2 for Windows
<b>GENERAL</b>					
Maximum image size	32,000 × 32,000 pixels	limited by disk and memory	1024 × 768 pixels	limited by memory	limited to available disk space
Maximum number of colors	16.7 million <sup>1</sup>	16.7 million <sup>1</sup>	256	256	16.7 million <sup>1</sup>
Color models	CMYK, HLS, HSB, RGB	CMYK, RGB	RGB, HSV	RGB	HSV, RGB
Online help	yes	no	no	no	yes
Disk space required	4MB	4MB	3MB	3MB	2.5MB
<b>EDITING TOOLS</b>					
Paint tools	airbrush, blur, brush, bucket fill, clone, darken, eraser, gradient fill, lighten, line, pencil, sharpen, smudge, text	Bezier curve, boundary fill, circle, ellipse, flood fill, free draw pen, line, parabola curve, smart fill, spline curve (up to 100 points), parallelogram, pixel level zoom editor, polygon, text, triangle	airbrush, circle, clear curve, custom brush, ellipse, fill, freehand brush, line, polygon, rectangle, text, undo	airbrush, circle, clear, fill, line, pencil, rectangle, rubber stamp, selection, text	airbrush, artist, brush, chalk, charcoal, crayon, eraser, felt pen, pen, pencil, water, watercolor
Special effects	custom, cylinder, pinch, punch, ripple, sphere, whirlpool	airbrush, antialias, blend, color strip, cycle draw, dupe, gradients, negative, RGB swap, redo, shade, sharpen, shear, tile, tint	color cycling, color pickup, gradients, grid, magnify, outline, patterns	color pickup, gradients, dashed lines	apply surface texture, apply screen, autoclone, grainy edge flat buildup, grainy hard, wet, soft buildup, oil and watercolor modes, Van Gogh style, Seurat style, and many more
Filter functions	add noise, average, blur, despeckle, edge enhancement, emboss, find edge, find edge and invert, Gaussian blur, maximum, median, minimum, mosaic, motion blur, sharpen, trace contour, user-defined	blast, burlap, demon, double edge, eclipse, edge, edge detect, emboss, haze, motion blur, mutate, nuclear, parchment, pastel, rough, sandblast, shake, slate, solar, stone, sundown, texturize, unlocus	shade, smear, smooth, antialias, colorize, translucent (tint)	contrast, gamma, RGB adjustment	brightness, contrast (See special effects; supports PhotoStyler and Gallery Effects plug-ins.)
Image control	brightness and contrast, convert format, distort, equalization, flip horizontal, flip vertical, gray/color correction, negative, perspective, posterization, resample, resize, rotate, shift, skew	color mask, copy, cut, flip left/right, flip up/down, hardware zoom emulator, image merge (five types), move, paint/drag, RGB mask, rotate, scale, shape mask, stretch/shrink, superimpose	flip, merge, perspective, remap colors, resize, rotate, stencil (masking), warp	flip, mask, merge, rotate, Boolean operators	clip, clone (many variations), grab, mask, rotate, zoom
<b>INPUT/OUTPUT</b>					
File formats supported	BMP, EPS, GIF, PCX, TGA, TIF	BMP, EPS, PCX, SPG, TGA, TIF	LBM, MAC, MSP, PCX, TIF, VMG	BMP, BUT, CUT, IMG, MSP, PCX, TGA, TIF	BMP, PCT, PCX, RIF, TIF, TGA
Scanner support	yes	no	no	yes	no
Screen capture capabilities	no	no	yes	yes	no
Color separation capabilities	yes	no	no	no	no
<b>TEXT TOOLS</b>					
Number of fonts supplied	none	28	20	54	none
Type of fonts	any Windows screen font	bitmapped	Digi-Font typefaces <sup>2</sup>	bitmapped	NA
Special text effects	NA	blend, shadow, fill	bold, italic, underline	resize, rotate	NA
<sup>1</sup> Requires 24-bit video adapter to view this number of colors.					
<sup>2</sup> The Hewlett-Packard downloadable LaserJet font format is now also supported.					

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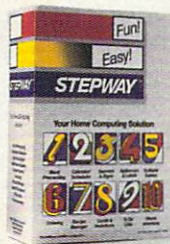
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## PAINT SOFTWARE FEATURES

	Image-In Scan & Paint 3.1 <sup>1</sup>	PC Paintbrush 5+	PhotoFinish 2.0	Picture Publisher 3.1	TEMPRA PRO 3.0
<b>GENERAL</b>					
Maximum image size	NA	limited by memory	limited by memory	limited by caching space on hard drive	8192 × 8192 pixels
Maximum number of colors	16.7 million <sup>2</sup>	256	16.7 million <sup>2</sup>	16.7 million <sup>2</sup>	16.7 million <sup>2</sup>
Color models	CMYK, HSV, RGB	HLS, RGB	HLS, RGB	CMYK, HLS, Pantone, RGB	CMYK, HLS, HSV, RGB
Online help	yes	yes	yes	yes	no
Disk space required	6MB	3MB	5MB	10MB	6MB
<b>EDITING TOOLS</b>					
Paint tools	airbrush, brush, drawing, eraser, eyedropper, hand (paste control), magnifier, pen, pointer (rectangle, point-to-point, ellipse, free form), scroll	airbrush, color replacer, clone, curve, eraser, eyedropper, line, magic wand, paint roller, paintbrush, spray can	airbrush, charcoal, color replacer, clone, curve, eraser, eyedropper, fountain pen, line, magic wand, paint roller, paintbrush, spray can	airbrush, clone, color probe, color tint fill, elliptical, eraser, freehand draw, gradient fill, paint, pencil, rectangular draw, smart fill, smear, texture, texture fill	airbrush, arc, curve, ellipse/circle, line, pen, polygon, rectangle/square, spline, TEMPRA WAND
Special effects	none <sup>3</sup>	emboss, gradient, mosaic, motion blur	apply texture, black hole, crystallize, edge, detect, emboss, facet, fisheye lens, mosaic, motion blur, outline, pixelate, twist	crystallize, emboss, engrave, facet, graphic pen, highlight, mosaic, motion blur, noise reduction, pixelize, polar to rectangular, rectangular to polar, smooth edges, splatter, stucco, three-dimensional, swirl, wave wind	color cycle animation, color protect, color spread, perspective, pattern, clone, color compress (8-bit only)
Filter functions	blur, brighten, gallery effects, negative, color balance, sharpen	blend, brighten, contrast, sharpen, smudge, tile, tint	add noise, blend, blur, diffuse, maximum, minimum, posterize, remove spots, remove moiré, sharpen	darken, edge detection, lighten, sharpen, smooth, stitch	antialias, brighten, emboss, pixelate, sharpen, soften, stain, tint, wash
Image control	convert, flip, resample, rescale, resize, rotate, stretch, shrink, slant	resize, rotate, perspective	clip, mask, resize, perspective crop, rotate	automask, color shield, copy, copy to, cut, delete, elliptical mask, freehand mask, invert, mask transform, mask point editing, mirror, paste, paste from, rectangular mask, rotate, size smart mask	clip polygon, clip regular, fill, mask, mirror, pen editor, quick load, quick save, rotate left 90 degrees, rotate right 90 degrees, text, turnover, zoom
<b>INPUT OUTPUT</b>					
File formats supported	BMP, EPS, GIF, IMG, JPG, MSP, PCX, PNT, RAW, TIF, TGA	GIF, PCX, TIF	BMP, GIF, JPG, MSP, PCX, TGA, TIF	BMP, DCS, EPS, GIF, JPG, PCX, Photo CD, TGA, TIF	BMP, EPS, GIF, HRS, PCC, PCX, PXL, IMG, TGA, TIF, VST, WIN, -IM, !IM
Scanner support	yes	yes	yes	yes	yes
Screen capture capabilities	no	yes	yes	yes (with board)	yes (with board)
Color separation capabilities	no <sup>3</sup>	no	no	yes	no
<b>TEXT TOOLS</b>					
Number of fonts supplied	22	24	none <sup>4</sup>	none <sup>4</sup>	3
Type of fonts	NA	bitmap and outline	Type 1 and TrueType	ATM and Type 1	Bitstream
Special text effects	bold, italic, normal, strike through, underline	gradient, shadow	none	resize, fill, rotate	drop shadow, blended drop shadow
<sup>1</sup> Information on Image-In Color and Image-In Color Professional available from the manufacturer.			<sup>3</sup> These are available with Image-In Color Professional.		
<sup>2</sup> Requires 24-bit adapter to view this number of colors.			<sup>4</sup> Uses fonts on system.		





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Software Carousel. Even RAM resident utilities, graphics programs and network software. And Software Carousel works on all types of PCs. So you can have the kind of multi-application capability you want, without buying anything new.

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# NEWS & NOTES

Jill Champion

## The BMW of Notebooks

New from Texas Instruments comes the fastest color traveler around: the new 486-based TravelMate 4000 WinDX2/40 Color notebook—"the ultimate portable speed machine," with a 40-MHz processor. It's the fastest, lightest, and most powerful 486-based color notebook computer available in a 5.6-pound package. This ultimate speed machine features 8MB of memory and a 200MB hard drive. It also includes the new Microsoft BallPoint with the QuickPort easy snap-on and snap-off connection that eliminates the need for a cable. The TravelMate's 9.4-inch-diagonal full-color screen displays 256 colors simultaneously at full VGA 640 x 480 resolution.

Preinstalled Windows 3.1 software powers up in less than 30 seconds. Also preinstalled is MS-DOS 5.0. To help get the most out of Windows, standard configurations include a portable pointing device, an oversized cursor, Windows power-conservation software, and custom utilities for quick entry to and exit from Windows.

Another advantage to the TravelMate: You can fly coast to coast with this machine's

486 power and have battery life to spare. The TI BatteryPro power-management system provides long battery life, and for added convenience and preparation time, BatteryPro shows you your remaining battery life at a glance.

Expansion options include lightweight, snap-on modules for Ethernet or Token Ring LANs as well as SCSI-compatible devices. TI also offers an optional 14,400-bps V.32bis modem with 9600-bps send/receive fax capability, which plugs into an internal slot in the TravelMate.

Scheduled to be on the market in January 1993, suggested retail price for the TravelMate 4000 WinDX2/40 is \$4,499. If you would like to get more information, contact Texas Instruments Peripheral Products, P.O. Box 202230, Austin, Texas 78720-2230; (800) 527-3500.

## Classics for a Song

Five LucasArts original adventure games are now available as a collection set titled LucasArts' Classic Adventures—and at a very attractive price of \$59.95 for the set. The collection includes Maniac Mansion, the game that pioneered the point-and-click type of interface now adopted by most major publishers of graphic adventure games; Zak McKracken and the Alien Mindbenders, which centers around a journalist who writes for a supermarket tabloid; Indiana Jones and the Last Crusade, based on the 1989 blockbuster film; Loom, a mystery set in mythical times; and The Secret of Monkey Island, the humorous tale of a pirate wannabe.

Hint books for each game are also included in the package.

Why is LucasArts offering such a steal on five of its biggest moneymakers? "So new gamers can discover some original, classic favorites," according to Kelly Flock, head of LucasArts Games. "We want to introduce first-time PC owners to the world of entertainment software by making our classic graphic adventures easily accessible to new enthusiasts."

For more information, contact LucasArts Games, P.O. Box 10307, San Rafael, California 94912; (415) 721-3300.

## A New Chapter in Books

Books aren't what they used to be. With the introduction of its new Digital Book System, Franklin Electronics takes book publishing into the twenty-first century. Touted as one of the most powerful handheld reference devices ever made, the Digital Book could ultimately change the way reference materials are "printed" and accessed in the future.

Franklin's Digital Book, tiny enough to fit in a shirt pocket, is based on a ROM chip that's capable of storing 45 million pieces of data—the equivalent of every word in a stack of ten Bibles. The entire system, with lithium batteries and memory cards installed, weighs a mere 4.6 ounces.

Up to two ROM "books," each the size of a matchbook, can snap into the back of the hand-held system at the same time for instant access and cross-referencing between the two.

According to the Association of American Publishers, 90 percent of all printed material is already in digital form—manuscripts originate on PCs, where they're also stored and edited and then printed onto paper. Says Carol Risher, Director of New Technology for the Association, "Because those pages are in digital form, all are candidates for

Dream laptop from TI offers color, high-capacity hard drive, BallPoint, and 8MB of RAM.



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the Digital Book System."

The possibilities are endless for future Digital Books—particularly in the area of consumer information—such as buyer's guides that include the names of local stores carrying the products you want, electronic maps that display point-to-point mileage and can even choose the fastest route between two cities, and every kind of reference book conceivable, from weather data to encyclopedias.

For now, Franklin's Digital Book System is packaged with two books—The Merriam-Webster Dictionary Plus, which provides spellings, definitions, and synonyms, and Word Games, a collection of ten diversions for word lovers—and is available for \$199 from Radio Shack and Sharp Image stores. By next year, Digital Books will be available in an additional 10,000 retail outlets nationwide.

Two other Digital Books available separately are The Video Companion, a guide to the top movies currently available on video, retailing for \$59.95, and The Medical Letter Handbook of Adverse Drug Interactions, a tool created especially for medical professionals and students that allows you to check interactions for up to 20 drugs at one time, retailing for \$99.00.

Franklin plans to add 50 more Digital Books to its library in 1993, and it will license other companies to create them, which means a substantial number of titles in a variety of professional areas will be on the market. For more information, contact Franklin Electronic Publishers, 122 Burrs Road, Mt. Holly, New Jersey 08060; (609) 261-4800.

### Do-It-Yourself Trading

With the changing of the presidential guard and expectations for at least a temporary

upswing in the economy, now might be the time to look into some do-it-yourself trading with one of the recently updated versions of AIQ's stock market software. The new product versions improve both ease of use and timeliness of high-quality stock market information, making it easier for individual investors—those who don't trade every day—to better determine the best time to enter and exit the market in order to avoid buying high and selling low.

MarketExpert, ideal for novices and those interested in tracking only the market—how the market is moving and which way it's likely to go in the short to intermediate term—is based on AIQ's expert analysis, which combines over 400 rules and 32 technical indicators with 17 pieces of daily market data. StockExpert gives a more detailed technical analysis of stocks as well as market timing, which allows more advanced users to concurrently track movement of both the market and individual equities and index equity options, helping investors decide which issues to buy, when to buy, and when to sell. Both programs utilize AIQ's Expert Rating, which signals when a stock is likely to change direction in price, so novice and intermediate investors can determine when to take a position in a stock.

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For more information, contact AIQ, 916 Southwood Boulevard, Building #3, P.O. Drawer 7530, Incline Village, Nevada 89432; (800) 332-2999.

### No More Pooped Parties

Two nifty programs from Ninga Software take the anxiety out of planning functions, where details can become work overload—especially when your time is too valuable to waste searching for endless pieces of paper. Thanks to Party Planner from Ninga Software, guest lists, RSVPs, entertainment, catering, budgeting, and the rest of those particulars all come under neat organization whether you're planning a corporate or a personal affair, either formal or relaxed. Party Planner gives you up-to-the-minute reports of where your money is being spent, who's invited, who's attending, and every other bit of minutia involved.

The Meal Planner relieves some of the frustration of hosting dinners—even regular family meals when you don't have time to prepare. In addition to offering creative suggestions on what to serve, the database allows you to include your own favorite recipes and to print a shopping list of all the ingredients needed for each. Party Planner and Meal Planner each retail for \$49.95. For more information, contact Ninga Software, #330, 736 Eighth Avenue SW, Calgary, Alberta, Canada T2P 1H4; (800) 265-5555.

*Companies or public relations firms with items of interest suitable for "News & Notes" should send information along with a color slide or color transparency to News & Notes, Attn: Jill Champion, COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.* □

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## Disreputable Characters

I'm 11 years old and have enjoyed programming for several months on my IBM PC. One of the games that I programmed in BASICA has user-defined characters. The game works perfectly in BASICA, but after the program is compiled in QuickBASIC, the computer locks up and the screen goes black. Is there a way of preventing that from happening?

MALCOM MCCAFFERY  
SACKVILLE, NS

*Sounds like you've created a machine language subroutine using a CALL statement that interferes with QuickBASIC's memory management, but it's hard to tell without seeing the program itself. You probably BLOADED the routine into an absolute address. If you're loading that subroutine into an area that QuickBASIC uses, you're asking for trouble.*

*A better solution is to write the routine in machine language and load it in as a separate module, using LINK to resolve the address for you. Also, if you're using an EGA, VGA, or higher-resolution graphics card, make sure you use the approved video interrupt INT 10h, function 11h character generator routines.*

## C-ing is Believing

I'm an avid reader of your magazine and like to create programs for DOS 8086-based machines. I'm currently learning C in college and, once the class is over, would like to continue developing my own programs, possibly some shareware. Which C should I purchase? I want the flexibility to write programs for both the DOS and Windows environments.

What's the difference between the Borland C++ & Application Frameworks and Tur-

bo C++ for Windows besides price? Do I need to purchase both? I'm confused as to why Borland doesn't just sell one C++ product that provides everything you need. If I purchase Turbo C++ for Windows, will I be able to do the things that Borland C++ & Application Frameworks does? I've noticed that Microsoft C 6.0 with Windows SDK and QuickC for Windows are set up in a similar fashion.

GLEN R. WHELOCK  
UTICA, NY

*What's the difference between a Geo Metro and a Cadillac? Why does GM sell both? Because people have different needs and different amounts of money to spend. The Turbo and Quick lines of products were introduced to provide low-cost ways for beginners and light programmers to write in their favorite languages. The other products cost more and do more, so they're favored by professional developers. Pros use either Borland C++ & Application Frameworks or Microsoft C/C++, not the lower-end packages.*

*On the question of whether Microsoft or Borland languages are superior, COMPUTE staffers and contributing editors agree that you can't go wrong with either package. Borland C++ & Application Frameworks comes with a Windows-hosted development environment and may be available at your college at a sharp discount for students. Turbo C++ for Windows doesn't generate DOS programs, so it's out of the running for your purposes. Likewise, only the high-end Microsoft offering, C/C++ (now at version 7.0 for C but only 1.0 for C++), creates both Windows and DOS applications. On the other hand, Turbo C++ actually runs as a Windows program. Microsoft's program-*

*ming language doesn't. In Microsoft's favor is the home court advantage and 30 pounds or so of superlative documentation.*

## Spaced Out

Clark Harper ("Feedback," July 1992) has another option for entering filenames and directory names with spaces in them: character 255. Where a space appears in a filename or directory name, hold down the Alt key and type 255 on the numeric keypad. When you release the Alt key, a space will appear, but DOS will recognize it as a character and not the end of the name.

JOHN WILLIAM FORSYTH  
FISH HOEK, RSA

*Thanks to you and all the others who wrote in with the Alt+255 solution.*

## All the Rage

The letter from Mr. Horowitz in your September 1992 issue provides me with an excellent opportunity to vent some frustrations. You may recall that he had a 40MB drive but only had access to 32MB. I had the identical problem, and I couldn't wait to read the reply. Unfortunately, I couldn't understand it. Let me ask some questions about your answer.

1. You wrote, "Begin by completely backing up everything on your hard disk, using DOS's Backup program . . ." Which DOS?

2. "Make sure a copy of your backup program and command.com are on the floppy." Do you mean command.com from your current DOS?

3. "Next, boot from your floppy disk and run Fdisk." Do I boot from my DOS 3.3 floppy or my DOS 5.0 floppy?

And finally, at what point do I install DOS 5.0?

THOMAS FOCONE  
PLAINVIEW, NY

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## FEEDBACK

We apologize if our reply was less than clear. First, from our reading of Mr. Horowitz's letter, we understood that he had already installed DOS 5.0, so the version of DOS wasn't a question on our minds. You would be best served if you installed DOS 5.0 before performing any of the steps in our reply. If you performed the steps using DOS 3.3, you would still be limited to 32MB of disk space per partition. You could (as another reader pointed out) use Fdisk to partition the other 8MB as drive D and thereby have access to the whole disk under DOS 3.3, but it has been our experience that 40MB of hard disk space in a single partition is more useful and flexible than 32MB and 8MB in two partitions. We recommend that you upgrade your DOS, back up your disk, and repartition to get access to the unused 8MB.

### Forked Tree

My hard disk is almost full: it's stocked with many different programs and games. When I execute the DOS Dir command, it shows 10MB free. When I use Chkdisk, it tells me I have around 93MB of user files. When I use Dtree, it says I have around 80MB in files. Where are the missing megabytes?

Also, I have been considering buying one of those systems that double your disk capacity. Which do you recommend?

HORMAZD ROMER  
WOODBIDGE, ON

We suspect that you've been led astray by the difference between the size of a file and the amount of space it takes up on your disk. Hard disks store files in sectors. If a file takes up less than a sector, it still uses up the whole sector. If you have a hard disk that uses 2048 bytes per sector (a fairly common size), then a file will take up a minimum of 2K on the disk, no matter how small it is in reality. A worst-case scenario would be if you had a 32MB disk and you placed 16,000 1-byte files on it—you would use up the entire hard disk to store only 16K of files. Most files are larger than a single byte, of course, but if a file is 11K, it will still take up 12K of disk space. Batch files are the worst offenders, since they're often shorter than 100 bytes, and our "Tips & Tools" column often features ways to gather many useful batch files into a single large batch file so disk space is used more efficiently.

In answer to your second question, we would unhesitatingly recommend *Stacker*. We've had the opportunity to

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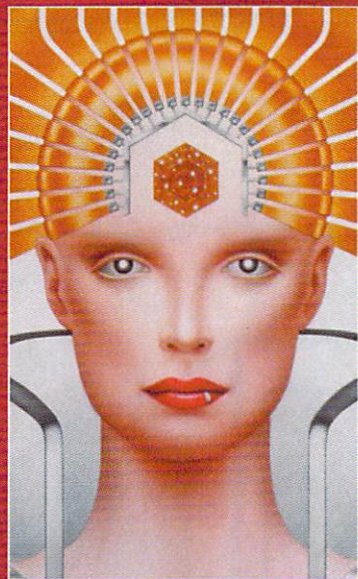
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## Neither Micro nor Soft

This is to complain about an attitude you people seem to have that has surfaced again. Does Microsoft own a controlling interest in your magazine? I feel like I'm paying for an advertising brochure for Windows and Microsoft. The latest example is the "Programming Power" column in the September 1992 issue. Mr. Campbell lists Microsoft versions of BASIC, but what about PowerBASIC2 and its predecessor, Turbo Basic? I have both PowerBASIC and QuickBASIC 4.5, and PowerBASIC is superior in every way.

JAY KETHLEY  
HOUSTON, TX

Thank you for the opportunity to reply to the many letters we receive that hint at ties between *COMPUTE* and IBM or between *COMPUTE* and Microsoft. *COMPUTE* is owned by General Media International, a privately held company that publishes many other magazines, including *Omni* and *Penthouse*. Neither IBM nor Microsoft has any connection with *COMPUTE*. We've had the opportunity to mention PowerBASIC and True BASIC many times in this column and will continue to mention them. They each have many fans, and they're both fine languages. You'll note that Mr. Campbell gave a balanced look at the BASICs offered by Microsoft and wasn't enthusiastic about many of them.

## Patter Familias

I have become tired of all the advertisements you include in *COMPUTE* that are for "adults-only" services. By carrying these advertisements, you contradict family values.

KOBY SMITH  
ROLLA, MISSOURI

Thanks for sharing your concerns. We strive to make our magazine of value and interest to all age groups.

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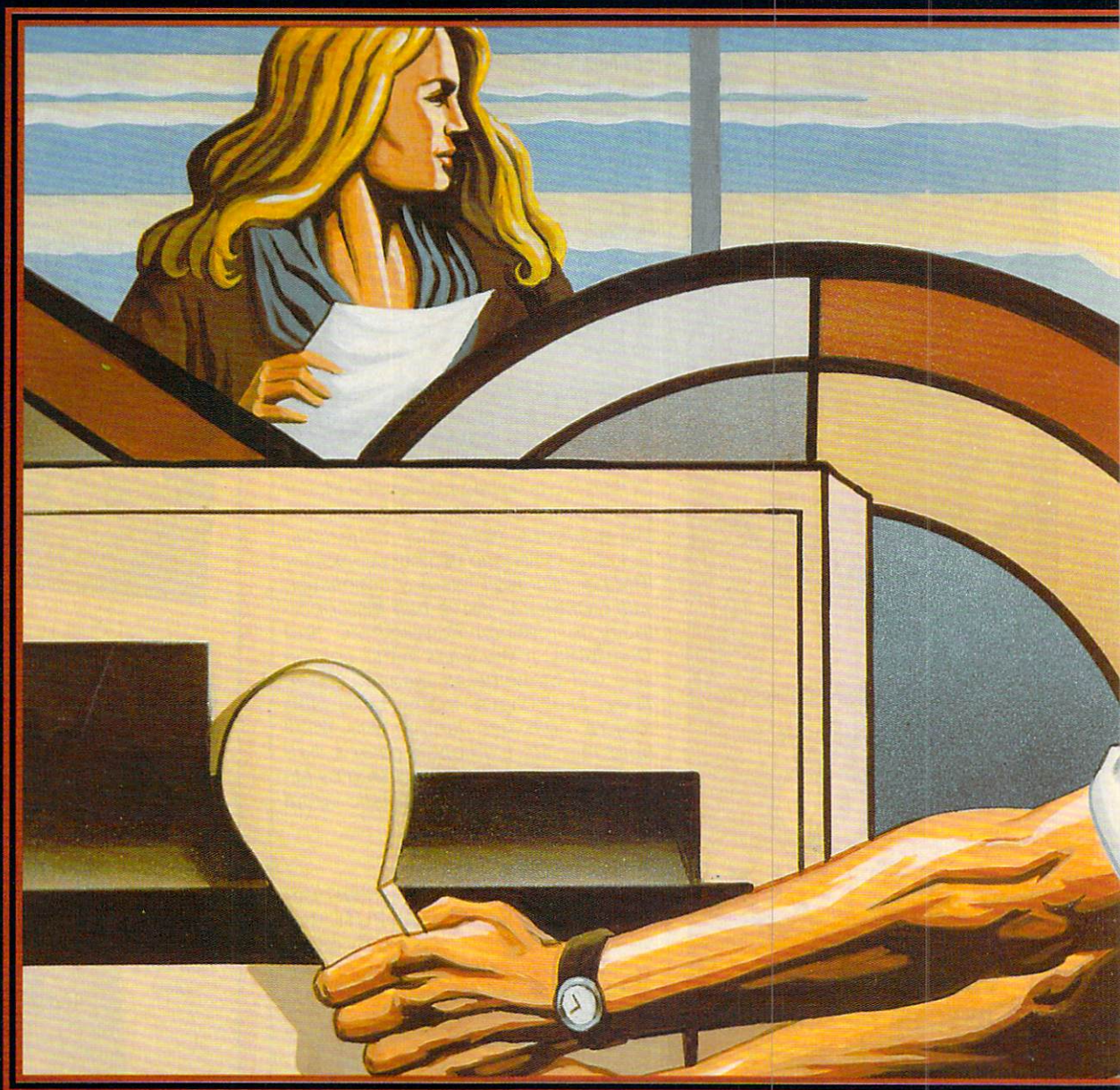
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To make Windows really smoke, you need top-flight



# THE ULTIMATE WI

It goes without saying that you need a bold, powerful computer to run Windows at its best. The folks at Microsoft have endeavored to make Windows hospitable to nearly all PC hardware, and there are tricks and techniques to make it run better on any machine, but the only way to make Windows really shine is with the latest CPU, a quick hard drive with lots of free space, megabytes of RAM, and a speedy yet colorful video system. This leaves

BY DAN GOOKIN

ht hardware. Here's our guide to choosing the best.



# WINDOWS MACHINE

you not only wanting more but also faced with dozens of options and choices for upgrading your current PC, as well as any future PC you plan to purchase.

Configuring an ideal PC for Windows wouldn't be such a great problem if it weren't for two things. First, newer and better hardware appears daily. Subtle improvements are made in microprocessor and video technology, most of which are directly beneficial to Windows.

ILLUSTRATION BY J.T. MORROW

This means you have more and more choices every day, and some of yesterday's best picks are rapidly becoming obsolete.

The second problem is money. Fancy new hardware is expensive. In a few years it will come down in price, but by then newer and better hardware will be available—and even more expensive. So while you can make the choice quite easily, the options you prefer may not be in your budget. And even if they are, is it wise to spend that much money on something when the price will eventually drop and other better and more expensive items will eventually appear?

Welcome to the buyer's dilemma. If money were no object, then creating the ultimate Windows machine would be a snap: Jog down to your local computer store and purchase the most expensive model. It's a no-sweat, no-brainer purchase. Yet, while this will get you a hot Windows PC, it's not a very smart way to spend your money. For example, you may be spending too much money on a fancy video system when that money would be better spent on a larger hard drive or more RAM. As with all computer purchases, how you spend your money depends on how you're going to use your Windows computer.

## Four Basic Parts

Windows eats hardware for breakfast, and its four major food groups must be supplied in proportion to its appetite. Up front, there's the microprocessor, or CPU (which also includes the math coprocessor). Windows' basic lust for speed is satiated only by a fast CPU. Second, there's RAM, or memory. Windows devours RAM, gulping it down in megabyte-sized chunks. Third is the hard drive, which must be fast and contain plenty of room for Windows and its massive programs. Finally, there's the video system, where Windows shows its stuff. Since Windows is a visual environment, a PC's video system can make or break Windows, no matter how good the other three items are.

Together, the CPU, RAM, hard drive, and video system are the four pillars upon which you can build the supreme Windows computer. (Actually, these are the four major elements of any computer, so you could say that the ultimate Windows PC is also the ultimate PC. However, soup-ing up a computer in this manner to run only WordPerfect, 1-2-3, or an order-entry system would be an extreme waste of money.) Other items

are important, such as a mouse, sound card, modem, and so forth, but they aren't as crucial as the basic four.

## CPU and Math Coprocessor

The heart of any computer is the CPU, or microprocessor. Windows requires an 80386-family CPU in order to run in the enhanced mode, Windows' top operating mode. Windows can run on an 80286-equipped PC, but then it's restricted to operating in the limited standard mode, where fancy features such as multitasking DOS programs isn't an available option. Fortunately, the 80386 family of CPUs is extensive and contains many brothers, sisters, and cousins bound to fill the role of Windows CPU.

The accompanying chart, "CPUs Capable of Handling Windows," lists CPUs capable of meeting Windows' demands. Topping the list is the current generation of PC microprocessors, the 80486 family. That's followed by the 80386 family and then the 80286. Quite frankly, you don't want an 80286 to run Windows. The 80486, at the top of the scale, is your ideal Windows microprocessor.

CPUs are judged by two factors: computing power and chip speed. These attributes apply to all the CPUs in the chart. Computing power is measured by a microprocessor's bit width.

That indicates the size of the numbers and the amount of memory the CPU can play with. The larger the bit width, the better the CPU. Early CPUs had a bit width of 8. Today's 80486 desk burners churn out numbers 32-bits wide. When Windows sees 32 bits, it gets very happy. Anything less, and you're making Windows tighten its belt, cramping its style.

One important aspect about a CPU's bit width is that there are both internal and external values. The internal value refers to the way the microprocessor handles values inside—the way it thinks in its "head." For example, just about any 80386 or 80486 CPU can juggle 32-bit numbers internally with one hand tied behind its back. The SX-suffixed CPUs, on the other hand, have a 16-bit width externally. This means that although they can handle the 32-bit numbers internally, they must slice them in half to slide them out the door. This slows the chip's performance, but it gives us the advantage of a less expensive chip.

The second factor used in judging a CPU is its chip speed. This is raw horsepower. Microprocessors calculate many thousands of times per second—sometimes millions of times per second. That speed is measured in millions of cycles per second, a value scientists have described as mega-

### CPUs Capable of Handling Windows

*Be aware that dealers will always advertise the higher speed.*

**80486DX** A "pure" 80486 chip. This CPU computes using 32 bits internally and externally. The chip's speed (measured in MHz) is the actual speed of the chip.

**80486DX2** This CPU computes at 32 bits internally and externally, just like the DX. The difference is the 2, which means this chip uses special tricks to run at twice its normal speed. For example, a 33-/66-MHz 80486DX2 runs at 66 MHz internally and 33 MHz externally. This chip is more economical than an 80486DX running at 66 MHz (which is a faster chip).

**80486SX** This CPU computes internally at 32 bits but at only 16 bits externally. This means its performance will be somewhat less than the full 80486DX or DX2 chip. Also, the 80486SX lacks an internal math coprocessor, which must be purchased at an extra cost. While the 80486SX is initially a less expensive CPU, the added cost of the 80487 math coprocessor chip to make it

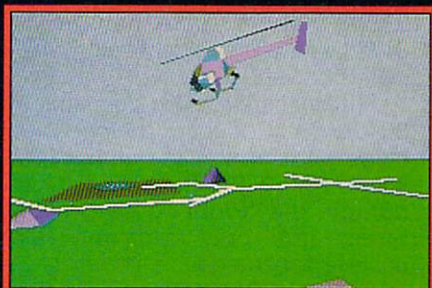
compatible with the full 80486DX makes this chip a poor choice.

**80386DX** This is the fastest 80386-family chip available. Like the 80486, it runs at 32 bits internally and externally. This chip is also a bit slower than an 80486 chip running at the same speed, and it requires a math coprocessor (80387) chip to be fully software compatible with the 80486DX.

**80386SX** This CPU runs at 32 bits internally but at only 16 bits externally. This makes it the least powerful CPU recommended for running Windows in the enhanced mode. On the upside, this is also the least expensive chip of the lot and the only CPU you're likely to find in most laptops (thanks to this chip's low power consumption).

**80286** The 80286 CPU sits on the bottom rung of Windows power requirements. Windows runs on computers with this microprocessor, but not very well. In fact, with an 80286 chip installed, you're limited to running Windows in the standard mode.

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hertz (MHz). This value is straightforward: The more MHz, the faster the CPU. The typical speed of a PC's microprocessor is about 33 MHz. Older computers may sport slower speeds, sometimes 20 or 25 MHz, which was as far as the technology could push things a few years back. Today's CPUs can run at 33, 40, 50, 66 MHz—and faster. Obviously, the faster speed is better, but there are two warnings attached to this. The first concerns comparisons between the MHz values of 80386 and 80486 microprocessors. The 80486 is a later-generation chip and runs faster than a comparable 80386 chip. For example, an 80486 running at 33 MHz runs much faster than an 80386 also running at 33 MHz. In fact, an 80486 running at 25 MHz may be faster than an 80386 running at 33 MHz. While the 80386 may be less expensive, the 80486's advances in technology make it a faster chip.

The second warning concerns the 80486 clock-doubling chips. These chips will end with the number 2 or sometimes /2. By using special technology, the doubling chip sometimes—and only internally—can achieve speeds double its rating. For example, an 80486DX2 may claim a speed of 66 MHz—which would make it one screaming chip! However, the 2 indicates that this is a clock-doubling chip; the actual speed of the chip is really just 33 MHz. The advantage here, of course, is that an 80486DX2 that can sometimes run at 66 MHz would be much less expensive than a 66-MHz 80486DX. However, the 80486DX would be much faster, since it would always run at full speed.

Finally, there is a technical issue of the CPU's internal cache. This differs from a disk cache, which is a special area of your computer's memory set aside to improve disk operations. A microprocessor's cache is a special area on the chip that improves the speed of the microprocessor. (It works like a disk cache, but it does not require any of your PC's memory. The cache is stored on the chip or on a special companion chip.) Some CPUs will have no internal cache. Others may have a 1K, 8K, 64K, or larger cache. The larger the cache, the more performance you'll see from the chip. In some cases you may be able to upgrade the cache yourself; other times, the cache is an internal part of the microprocessor and cannot be changed. (Internal is better, by the way.)

This aspect of the CPU is something you may have little control over. Usually, only the big boys offer the

## Buying a Windows Laptop

Windows on a laptop is no longer such a curious thing. On my last visit to the computer store (hunting for a laptop, incidentally), I was greeted with two dozen laptop computers, each of which was running Windows—some of them in color. Flash aside, the four basic hardware groups are also important when considering the ultimate Windows laptop, but to a lesser degree. For example, you may only get a 25-MHz 80386SX or SL in your laptop. The reason is power consumption. Higher-power CPUs draw a lot more battery power than the low-power 80386 models.

If possible, look for Intel's SL chips or similar microprocessors from other manufacturers, which are designed to have a special power-down mode that conserves juice when the laptop is inactive. If possible, make sure the laptop conforms to the Advanced Power Management (APM) specification.

RAM and hard drive capacity are limited on a laptop to available storage space. Most laptops can be upgraded to 4MB of RAM. Laptop hard drives are typically puny, though you may find the occasional 80MB or larger model. (And with programs like Stacker, you can convert that 80MB into a potential 160MB of storage.)

Finally, for video, most laptops come with built-in VGA or Super

VGA, though they display the image on a less-than-perfect LCD screen. If you want to bite the bullet and go into debt, then you can opt for a color LCD screen. Some of them do show color comparable to many desktop systems, but they are still very, very expensive. If you decide to go monochrome, take a good look at the laptop's rendition of Windows. Are there smears on the screen? Do colors bleed up and down or left and right? Do some colors cause flicker?

Another laptop item you need is a mouse. Some of the newer laptops have built-in thumbball mice. If the laptop lacks a companion mouse, then you can purchase one of the special clip-on trackball mice, such as Logitech's Trackman Portable or the Microsoft BallPoint mouse. These add width to the laptop, but not as much as a full-size mouse and mouse pad would.

Finally, don't neglect Windows' special options for laptop computers, such as color schemes or the mouse tails, which let you find the mouse more quickly. If you have plenty of money, then you can purchase the ultimate Windows laptop and really make fellow plane passengers jealous. But if I were you, I'd spend the cash on making my desktop model Windows happy and keep the Windows laptop just one notch above tolerable.

high-speed microprocessors with beefy caches, and they do so for a premium price. Overall, the best CPU to get for Windows is the fastest available 80486DX chip. As this issue goes to press, that's the 80486DX running at 50 MHz. (A 66-MHz model is rumored to be in the works, and the next-generation CPU, the Pentium, is also just around the corner.) The second-best CPU would be the clock-doubling 80486DX2 running at 66 MHz. It's a better choice than the 33-MHz 80486DX, which doesn't have the higher speed as an option.

On the economical front, the best chip worth having is the 80386DX. I recommend this above the 80486SX, which is essentially a slow 80486 without a math coprocessor. While the 80386DX also lacks a math coprocessor, its optional coprocessor chip (the 80387) is less expensive than the comparable chip for the 80486SX (the 80487). (Refer to "The Math Coprocessor Equation," elsewhere in this article.)

Laptop owners may be stuck with the 80386SX, primarily because of its low power consumption. For a desktop computer, however, I don't recommend the 80386SX at all; consider the 80386DX or save up some cash and go for the fastest 80486 chip you can afford.

## The CPU Tally

Best Windows CPU: 80486DX at 50 MHz or 80486DX2 at 66 MHz

Very good: 80486DX at 33 MHz or 80486DX2 at 50 MHz

Economical: 80386DX at 33, 25, or 20 MHz

Unsatisfactory: 80486SX, 80286

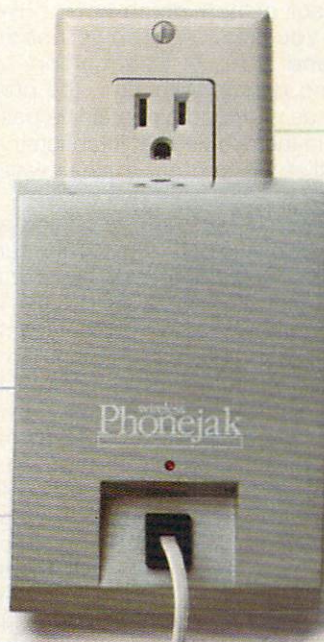
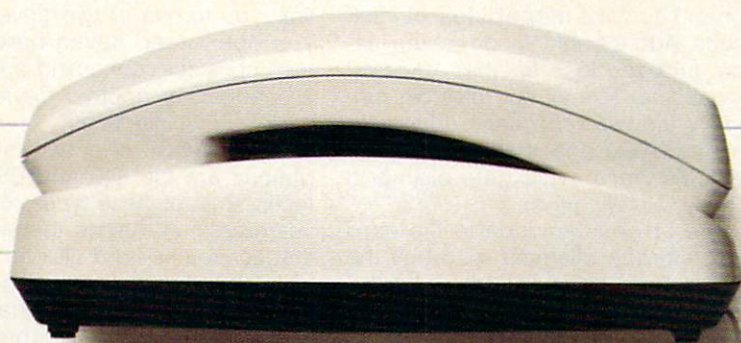
## Memory

An 80386 or 80486 CPU can rule over four gigabytes of memory. That's 4096 megabytes, which is about 4092MB more than the typical PC contains. Even so, most PCs only have room for 8MB of RAM on the motherboard, sometimes 16MB or 32MB, given various expansion options. With all that

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memory, Windows claims it only needs 2MB to start in the enhanced mode. Of course, if you believe that, then there are some real deals on swampland in Florida if you're interested . . .

No matter how fast your microprocessor or how much hard drive space you have, Windows needs acres and acres of free memory to frolic and dance. Without it, the program is as cramped as an airline passenger in the middle seat in coach trying to slice up and eat a steak while maintaining a civil composure.

Realistically speaking, you need at least 4MB of memory to properly run Windows. However, Windows runs even better with 8MB. And 16MB? If your computer has room for that much RAM and you can afford to put it in, then why not? In fact, I'll make a blunt, flat rule about Windows memory consumption needs and how to fill them: Buy as much memory as you can afford for your PC or as much as will fully populate the motherboard. For example, the typical 80486 desktop-model PC may have room for 8MB of RAM. Buy it. Install it. Use it. If you have room for more RAM, buy it. Overall, memory is the least expensive thing you can add to your PC, and Windows will love it.

Another important point to consider is the type of memory you add. Specifically, Windows needs extended memory. This is the native memory you add to your 80386 or 80486 PC. Do not run any software drivers or special programs that convert the extended memory into expanded memory—no, no, no! Windows needs only extended memory; expanded memory is wasted when you run Windows.

As far as technical specifics go, make sure you buy memory of the proper speed and type for your PC. For example, if the manufacturer suggests buying 80-ns RAM chips, buy 80-ns chips. Don't save money by getting less expensive chips. The reason is that one slow chip in your PC will cause every other RAM chip to slow down to that speed. This isn't how you make Windows run fast on your PC. Other technical information about the chips is of a more specific nature; make sure you always have what the manufacturer suggests and nothing less.

Economically speaking, 2MB is the least amount of memory you need to run Windows in the enhanced mode. But why suffer? At present prices, another 2MB of memory is cheap (especially if you buy it by mail order from a memory chip specialty house). However, I recommend at least 8MB

of memory for Windows. With 16MB, you'll be going first class.

### **The Memory Tally**

Best memory for Windows: 16MB or more—as much as your motherboard will hold/you can afford.

Very good: 8MB

Economical: 4MB

Unsatisfactory: Anything less

### **Hard Drive Size, Speed, and Type**

Windows and its applications have a rapacious appetite for hard drive storage. By itself, Windows occupies some 10 or 12 megabytes of disk space. Add a single Windows application, and you lose another 10 or 12 megabytes. This all but rules out running Windows on a hard drive with only a 20MB capacity. Even a 40MB or 60MB hard drive gets cramped quickly with Windows.

The obvious solution to the hard drive storage dilemma is to buy the largest hard drive you can afford. I recommend anything over 200MB. If you need a formula, figure on a basic 40MB, plus 15MB for each of your applications (either Windows or DOS based). Double that figure and buy a hard drive of that capacity—or larger. Suppose you use Windows, Excel, WordPerfect for Windows, ProComm, plus a few utilities. That's 40MB + (4 × 15MB), which equals 100MB. Double that, and you get 200MB. Better still, since most people have more than four applications, consider a 320MB drive as the bare minimum for the ultimate Windows PC.

Capacity shouldn't be the only factor in selecting the ultimate Windows machine's hard drive. There are two other gauges you can use to measure a hard drive's willingness to behave with Windows: speed and interface. A hard drive's speed is judged by its average access time, measured in milliseconds (ms). This is the average time it takes the hard drive mechanism to reach out and fetch some data on the disk. The smaller the value, the faster the hard drive. Values of 20 ms or less indicate a fast, zippy, perfectly-suited-for-Windows hard drive. Anything less than 40 ms is OK, but avoid greater values.

The final factor used in selecting a hard drive is its interface, or the mechanism that controls the hard drive, sometimes called the hard drive controller. The best controller to get for Windows is the SCSI (pronounced "scuzzy," Small Computer System Interface) controller—but only if you select a top-quality SCSI interface

card, preferably one with an on-board microprocessor or large cache. And if you get the 32-bit EISA SCSI, then you're going just about as fast as you can go (refer to "Expansion Slots," elsewhere in this article).

Some may disagree with my selection of SCSI as part of the ultimate Windows machine's hard drive interface. However, any quick look at the top-of-the-line hard drives will prove my point: The hottest, fastest, and largest-capacity drives are all SCSI. Another advantage to SCSI is that you can connect up to seven hard drives to a single controller. Other controllers limit you to one or two drives. And if you don't need seven hard drives, then consider connecting a CD-ROM, a scanner, or another device to the flexible SCSI interface.

After SCSI, the two next-best options are the IDE and ESDI interfaces. Both of these types of hard drives are smart, having the electronics that control the hard disk on the drive unit itself. Some older workhorse PCs probably use the ESDI interface; modern PCs and nearly all laptops sport IDE drives. The problem with both of these is a lack of availability of drives at the higher capacities. But if SCSI is too eccentric for you, IDE drives in particular are a good second choice.

At the bottom of the heap are the older PC drives, identified as RLL, MFM, or some other interesting acronym. These drives have been supplanted by the newer standards mentioned above, and you should avoid using them. If your goal is to upgrade your PC to the ultimate Windows machine, then a new SCSI or IDE hard drive and controller is a good place to start spending your upgrade cash.

If you're trying to save money—and you're a cost-conscious buyer—then note that though large capacity drives are more expensive, the cost per megabyte is much less than with lower-capacity drives. And if there's one thing you can never overestimate, it's the amount of disk storage you'll need, especially under Windows.

### **The Hard Drive Tally**

Best hard drive size for Windows: 320MB

Very good: 200MB

Economical: 80MB

Unsatisfactory: 40MB or less

Best hard drive speed: 20 ms or faster

Very good: Anything faster than 40 ms

Unsatisfactory: 40 ms or slower

Values of 20 ms or less indicate a fast, zippy, perfectly-suited-for-Windows



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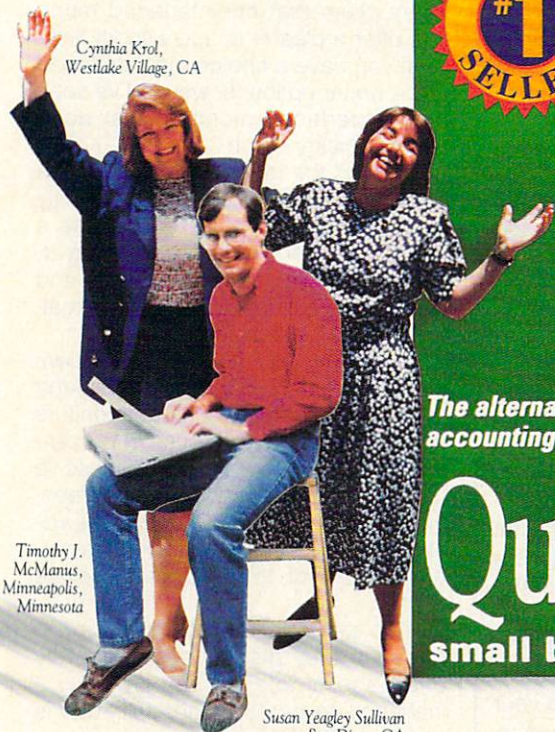
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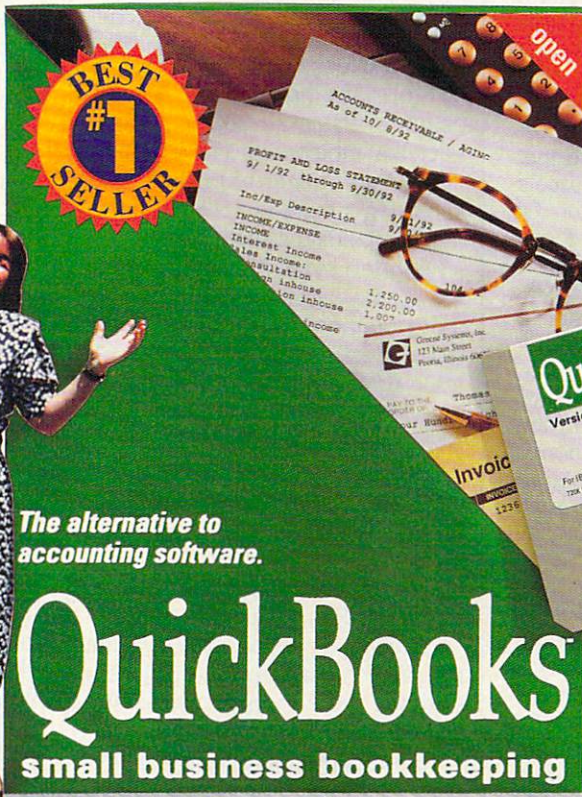
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hard drive. Anything less than 40 ms is OK, but avoid greater values.

Best type of hard drive: EISA SCSI  
Very good: IDE, ESDI  
Unsatisfactory: Anything else

## Video Card and Monitor

One area of tremendous improvement over the past several years is in PC graphics. Gone are the days of ugly fuzzy text and primitive two-color graphics screens. Today's Super VGA offers colors, resolution, and splash to dazzle the most discerning graphics artist's eye. Not only that, but a technology called local bus (or direct bus) is enabling PC makers to directly connect the PC's eye (the video system) to the PC's brain (the microprocessor) for the absolutely fastest and best video system possible.

A PC's video system really consists of two elements: the video adapter card, which is an expansion card that plugs into one of your computer's expansion slots, and the monitor. Of the two, the adapter card is more important, since it sets the resolution and number of colors and determines what type of monitor you connect to the PC. Once you select the adapter card, you can find a suitable monitor, though some people will erroneously pick out specialty monitors and then hunt for video adapters to drive them.

There are many high-end video standards for the PC, so it's quite possible to spend a great deal of money to get the highest possible resolution with the most colors. Though they sound like part of the ultimate solution, adapter cards such as the XGA or the old PGA are really best suited for graphic artists with deep pockets (a rare combination) or CAD engineers who use a specific application that pushes the high-end video card to its limits. For everyone else, the Super VGA standard will suffice.

Super VGA is an extension of IBM's VGA video standard included with most PS/2 computers. It's called super because of its extra colors, resolutions, and graphics modes that the standard VGA graphics adapter lacks. Better SVGA cards offer 1MB or more of video memory. A resolution of at least 1024 x 768 pixels with 256 colors is considered good; 1280 x 1024 resolution is tops (anything higher, and you're starting to wander into graphic-artist land).

The best SVGA standard is the local bus or VESA standard. This is a video system that's integrated with your computer's microprocessor. The local bus is actually a direct line of

## Cost-Effective Upgrades

Where do you start if your goal is to upgrade to the ultimate Windows machine? Right away, I can tell you that upgrading a PC a piece at a time is much more expensive than buying a new model—just like buying a car a piece at a time would cost two times the sticker price (which is the theory behind which chop shops operate). And chase away those thoughts of selling your PC used; there's no value in it! Consider donating the old clunker to a school or nonprofit organization instead. However, if you want to upgrade, here are the items I suggest purchasing, in the order they'd be most effective.

More memory. This always helps, even on an 80286 system. Pack that motherboard full of RAM!

A larger, faster hard drive and controller. If that's out of your reach, consider adding a second drive.

A video system upgrade. I list this third because the improvements more memory and a better hard drive have to offer will be immediately noticeable, whereas newer graphics hardware just makes poky old Windows look better.

A CPU upgrade. This isn't an option for most of us. Newer computers have CPU upgrade paths; older systems are stuck in the mud. Some 80286-to-80386SX options exist, such as the SotaPop or Cumulus 80386SX upgrade kit. A better solution might be a motherboard swap, which also updates the support circuitry the microprocessor relies upon.

Other items, peripherals, sound cards, CD-ROM, and so on. Save these upgrades for last; spend your money on the items above, in order, before you consider the fun stuff.

As far as spending money is concerned, consider what it is you do under Windows. If you notice your software going out to disk a lot and you subsequently wait for the disk drive to catch up, put more money into a faster disk drive and less into RAM. If the disk drive is fine, then shift more funds into RAM or a fancy video system. In the end, you may not have the ultimate Windows machine, but you'll definitely end up closer to it than when you started.

communications to the computer's brain, allowing for the fastest possible video. (Other local bus items, such as hard drives, will probably be available in the near future.) Keep in mind that a VESA, local, or direct bus video system should still be SVGA compatible.

Selecting the ultimate Windows machine's video monitor isn't that hard once you've chosen a graphics adapter card. The typical monitor has a tube that measures 14 inches diagonally, with 15-inch and larger monitors available. The advantage of the larger monitor is that you can see more information on the screen—especially with the higher graphics resolutions possible on SVGA systems.

Monitors have several technical descriptions attached to them. The most important of these for shopping purposes is whether the monitor is interlaced or noninterlaced. Many users claim that noninterlaced monitors offer a clearer image without flicker. If you have a choice, noninterlaced is the better option; however, I've seen many interlaced monitors that don't seem to flicker much.

Most of the other descriptions of a monitor are technical and serve only to boggle the mind. I prefer to see a monitor in person before buying it, since the dot pitch, refresh rate, and other technical descriptions don't really describe the image you see.

Specialty monitors for Windows include larger 19-inch and portrait and landscape models. The huge monitors are usually selected for use in presentations. While it would be impressive to view Windows on a 19-inch screen, you'd probably have to wear lead-shielded eye shades and sunblock with an SPF of 15 if you sat too close to it!

The portrait monitors are nice because they display approximately one page of information, typically 9 inches wide by 15 inches tall. This is ideal for desktop publishing where viewing a page's "real size" is especially important.

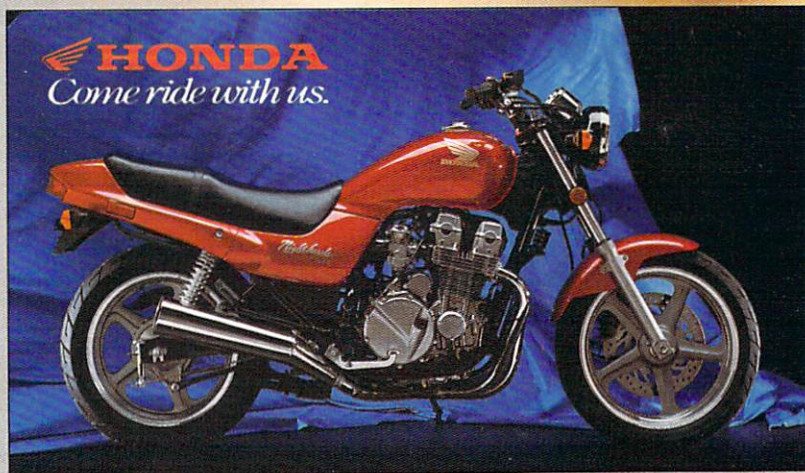
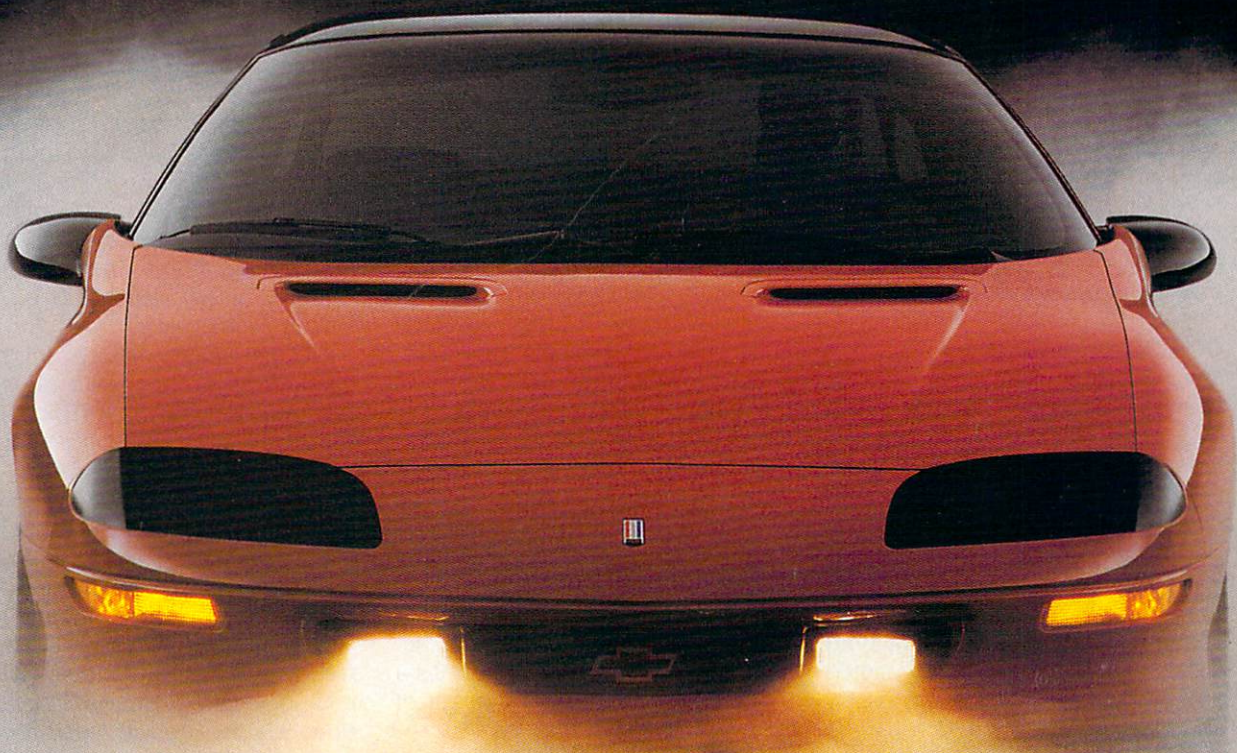
The landscape monitor is a portrait monitor lying on its side (some even rotate between landscape and portrait positions). Landscape monitors are best for showing horizontal information, such as long spreadsheets or some types of graphics.

Picking a specialty monitor for Windows may involve buying a custom interface card; it definitely will require a special type of video driver. In fact, Windows is extremely flexible when it comes to weird monitors and video drivers. Some setups, such as the Colorgraphic Super Dual VGA

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card, allow you to run several SVGA adapters and several monitors on a single Windows machine. While this may qualify as the ultimate Windows machine, sticking with SVGA and a good 15-inch monitor will suffice for most of us.

### The Video Tally

Best video for Windows: Local bus SVGA, 1MB or more video memory  
Very good: SVGA, 1MB or more video memory  
Economical: SVGA or VGA  
Unsatisfactory: EGA, CGA, Hercules,

oddball standards

### Luxury Items Worthy of Consideration

Why limit yourself only to a fast CPU, a large hard drive, mountains of memory, and vivacious video when creating

## Mail-Order Machines to Fit the Bill

The ultimate Windows machine is . . . just about anyone's guess. Truthfully, just about any manufacture can configure the ultimate Windows machine. You need to know the contents of the box and the phone number of your favorite dealer (the cash comes later). All told, the following system or one very similar qualifies as the ultimate Windows machine.

CPU: 50-MHz 80486DX  
Memory: 16MB  
Hard drive: 320MB, 20 ms, EISA SCSI  
Video: Local bus SVGA, 1MB video memory, 15-inch monitor  
Other stuff: Both 3 $\frac{1}{2}$ - and 5 $\frac{1}{4}$ -inch drives, mouse, DOS 5.0, Windows 3.1

This is the base system. Anything extra—CD-ROM, sound card, printer, scanner, and software—must be added as an extra; the idea here is to buy the basic powerhouse. To meet these requirements, I called several top mail-order vendors to see what they had available and for how much. Please note that the prices listed here are as of October 1992; current prices and configurations will doubtless be different.

### Dell Computers

(800-426-5150)

Dell's ultimate Windows graphics workhorse is the 450DE-2, DGX. It's powered by a 486DX chip running at 50 MHz, and it contains Dell's own DGX direct video. The 450DE-2 is an EISA machine, complete with the required 16MB of RAM and a 330MB SCSI card. The monitor is a 15-inch flat screen, noninterlaced model. Dell also tosses in a Microsoft mouse, DOS, Windows, and one year of on-site service. The price for the complete package: \$5,489 plus local tax and shipping.

The Dell salesperson suggested that we might want to go with the ATI Ultra card in place of the direct

video. He explained that the DGX system is really designed for high-end CAD operations, though it will certainly smoke on any Windows application. If we elected to use the ATI Ultra card, the unit's price would drop to \$4,689.

### Gateway 2000

(800-523-2000)

The Gateway 2000 66-MHz 80486DX2 EISA machine easily qualifies as an ultimate Windows machine. The system to fit our bill comes with a 66-MHz 486DX2, EISA bus, local bus VESA video (the Ultra Store 24X), local bus SCSI hard drive at 500MB, and 16MB of RAM. A 15-inch CrystalScan 1572FS flat screen monitor, mouse, DOS, Windows, and your selection of Windows or DOS application software finishes the picture. All of that lists for \$4,240, plus a shipping and handling charge of \$95.

### CompuAdd

(800-925-7811)

CompuAdd doesn't have an EISA machine, nor does it offer SCSI hard drives. But the rest of the system does stack up rather nicely: an 80486DX2 running at 50 MHz, 16MB of RAM, two 200MB IDE hard drives for a total of 400MB disk space, local bus video, and a 15-inch monitor for \$2,925. There is no tax charge, and shipping is UPS ground rate.

Extra goodies offered by CompuAdd are abundant. The salesperson suggested a tape backup unit, surge protection or uninterruptible power supply, plus an optional fax/modem card. The fax/modem deal was particularly sweet: only \$109 for the Intel SatisFAXtion card, which includes preinstalled software.

### IBM Direct

(800-426-2968)

IBM Direct doesn't sell all of IBM's machines. Specifically, the high-end 80486 and MCA systems aren't avail-

able, which somewhat limits your selection of an ultimate Windows machine.

The beefiest system IBM Direct has available is the PS/2 model 35. That's an ISA PS/2 with a 20-MHz 80386 microprocessor, 2MB of RAM, and a 40MB hard drive. VGA is built into the PS/2 system. The entire price is \$1,495, which also includes DOS. A mouse is \$80 extra.

Needless to say, this system barely qualifies as anyone's ultimate machine, but it's what IBM Direct offers. Upgrade options are available, including CPU upgrades. The salesperson also reminded me that IBM offers a one-year warranty with 24-hour support and on-site service. If it's your dream to have the letters IBM on your desktop, this is your mail-order Windows system. However, for only a few hundred dollars more, much more capable machines are available. (And you can always check out the local IBM dealership for its 80486 line.)

### Swan

(800-446-2498)

Swan offers both EISA and ISA machines, but when I requested EISA, the salesperson recommended I get the ISA machine instead. The ISA machine is the only model equipped with local bus video, which Swan calls direct bus. The EISA model would have to be equipped with a 1MB video card, which Swan admits would be much slower—and less desirable for Windows—than the local bus option on the ISA machine.

The ultimate Swan Windows machine is the model 66DB. That's a 66-MHz 80486DX2 with 16MB of RAM, a 310MB SCSI hard drive, a 15-inch noninterlaced monitor, a mouse, and Windows. The system comes in at \$5,625, which includes shipping (add tax only if you live in Pennsylvania). Swan also offers a gracious two-year warranty and on-site service.

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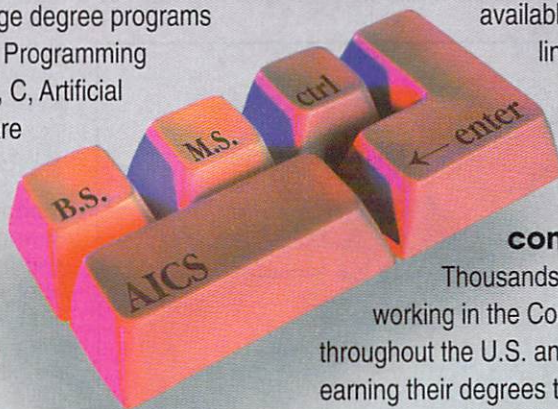
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the ultimate Windows machine? Many would argue that the ultimate Windows machine must also be a multimedia computer. They may even stretch it to include some type of desktop TV or video editing. Others may claim you need a fax/modem or a tape backup system to round out the ultimate PC. While all of these items contribute to an ultimate Windows machine, they're not as central as the basic four. In fact, few of the high-end systems from the national mail-order vendors (see "Mail-Order Machines to Fit the Bill," elsewhere in this article) include or even offer such options, so they remain luxury extras.

The first and most obvious addition to any Windows PC is multimedia. That's a buzzword for expanding a computer by use of sound, music, a CD-ROM drive, and sometimes desktop video. While the concept may remain fuzzy, Windows is capable of supporting sound and MIDI, the Musical Instrument Digital Interface, right out of the box. So the software is there. Additional multimedia software usually comes with the multimedia PC or a multimedia upgrade kit, which can be purchased separately.

The typical multimedia upgrade kit includes a sound card, speakers, a

CD-ROM drive and its interface (usually SCSI), and software. (The MIDI kit, plus any MIDI-compatible electronic musical instruments, are usually extra.) The price of these kits varies from about \$400 to over \$1,000 for sophisticated 16-bit setups. If you buy all of the parts separately, the cost will be more.

A modem or fax/modem card is another option worth considering for the ultimate Windows machine. Modems allow you to hook up your PC to the phone line and access online services, national databases, or remote computers such as the office computer, your home computer, a laptop, and so on. The topflight modems run at the blazing speed of 14,400 bits per second (bps), with lesser models flying by at 9600 bps. Entry-level models buzz by relatively slowly at speeds of 2400 bps and 1200 bps. Modems come in both internal and external models.

Better than stand-alone modems are fax/modem cards. These plug into your computer and give you both computer communications as well as standard level III fax capabilities. Using your computer and a phone line, you can both send and receive faxes while in Windows. Higher-end

models come with on-board micro-processors that allow you to send and receive faxes without impeding the PC's overall performance. Special software that runs under Windows allows you to send a fax in the same way you send a document to your printer.

A tape backup system is a boon to any PC. Rather than mess with a stack of floppy disks, you can use the tape backup to archive your entire hard drive onto a single inexpensive data cartridge. Special software that runs under Windows makes this painless and much more convenient than backing up with floppies alone.

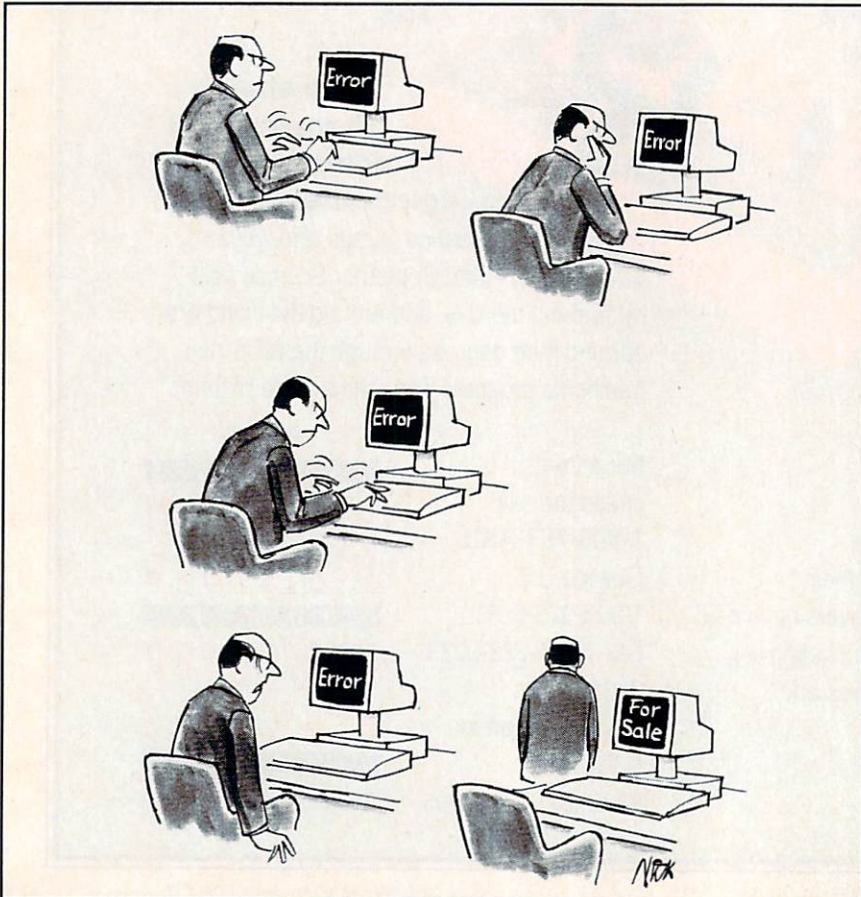
Finally, you should consider some type of surge protection—especially in areas of unreliable power or where lightning strikes are common. Varying degrees of power protection can help insulate the valuable components inside your PC against electronic havoc. On the high end of the scale, adding an uninterruptible power supply is considered a must for any PC whose contents you value.

### Ultimate Standards

Other items in the ultimate Windows machine are more or less accepted features on any PC: a floppy drive, either 3½- or 5¼-inch or both; a serial and a parallel (printer) port, or maybe two of each; a mouse and a mouse port—which are required for Windows even though the box says they're only recommended.

Creating the supreme machine for Windows can be challenging and fun. Paying for it is more challenging but less fun. Leading-edge technology—what Windows requires to run at its best—is something you can never really have; as technology advances, the power of your machine begins to slip through your fingers. So while planning and building are fun, the ultimate Windows machine you create winds up being for today and not quite for tomorrow.

In the end, the real question is how to spend your money. Do you really need the latest screamer with tons of power to run Windows? Not really. While the fastest CPU, gobs of memory, a large and speedy hard drive, and decent video are important, you don't need everything and the kitchen sink to create a worthy, powerful Windows PC. By spending your money wisely and applying it in the proper amounts toward the proper areas of your PC, you can create a robust, muscle-laden Windows machine without going bankrupt or losing any sleep over creeping technology. □



# It makes J-8s cry and MiGs fighting mad.

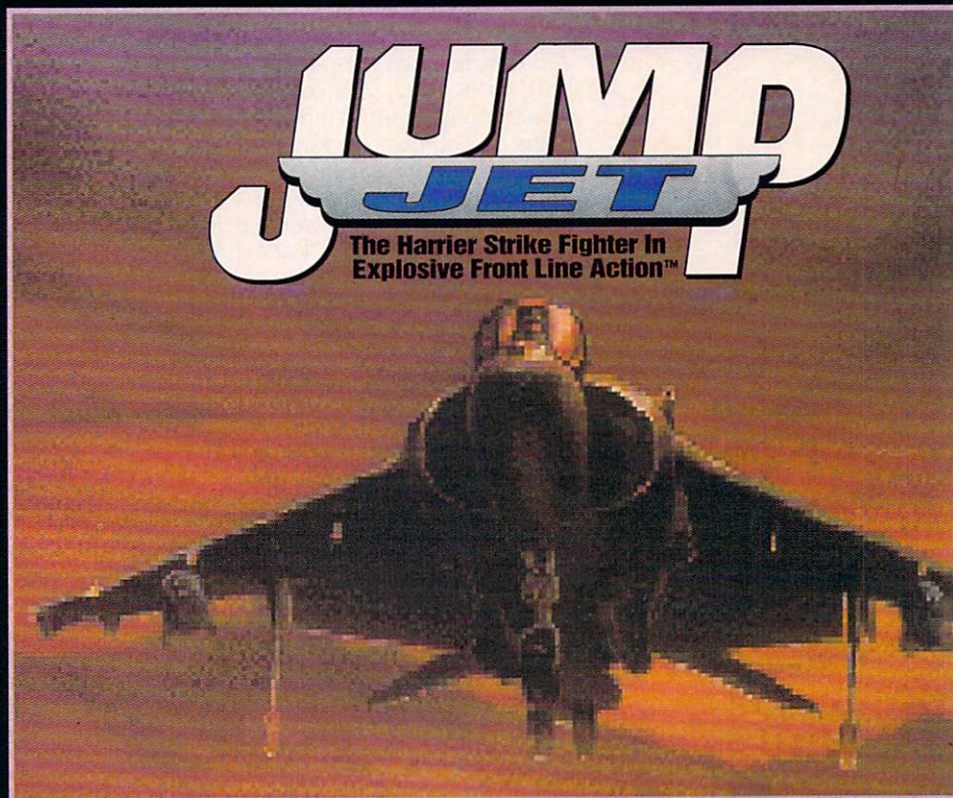
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# WINDOWS WORKSHOP

Clifton Karnes

## TAPE BACKUP FOR WINDOWS

Windows has really upped the hardware ante. Most of us would agree that Windows helps us get more work done more quickly and with less effort, but all this high-powered productivity demands some pretty hot hardware. Let's face it—to really run Windows right, you need at least a 386DX with 4MB of RAM, Super VGA graphics, and a 200MB hard disk (or a 100MB Stacked hard disk).

Make no mistake about it: If you run Windows, you need a tape backup.



It's this last point that I'm going to talk more about—hard disk space. Windows programs demand megabytes and megabytes of hard disk real estate. It's not at all unusual for a Windows app to require 7MB–10MB. Before you know it, you have a hard disk full of applications and data files—a hard disk you should back up. But how? If you're lucky enough to have a 400MB hard drive, you'll soon discover that you'll need nearly 300 high-density floppies to back up that sucker. With large hard disks, floppies are just not an option. So what do you use? In a word, tape.

Windows makes tape backup an essential. But choosing the best backup system can be tricky. First, you'll need one that provides high capacity—at least 200MB per tape. Second, you'll want a system that's fast. Third, you'll want a system that has a Windows

backup program—so you can work while you back up. And the last consideration, of course, is price. This system should be under \$500.

Is all this too much to ask? I would have thought so before I tried Irwin's AccuTrak Plus (Maynard Electronics, 36 Skyline Drive, Lake Mary, Florida 32746; 407-263-3500; \$349; high-speed controller, \$179). This superb tape system comes in internal and external versions and can be used with your current floppy controller or with a special high-speed controller. The system stores as much as 250MB on a tape (with compression), and it comes with the easiest-to-use backup program I've ever seen—EzTape for Windows.

I opted to test the internal model with the high-speed controller. To install the unit, I simply put the controller card in an open slot, inserted the tape drive in an open drive bay, and installed the EzTape for Windows software.

To get going, I pushed a tape in the drive and cranked up EzTape. The EzTape screen looks a lot like the Windows File Manager, displaying a directory tree on the left and a file listing on the right. Above the tree and file windows is a toolbar with buttons for Disk, Library, Tape, Mark, Unmark, Backup, Restore, and Scan.

Disk, Library, and Tape are the three sources you can choose. The default is Disk, showing the files on your hard disk. To back up, you simply mark anything from a single file to your entire hard disk.

After selecting the files, you click on Backup, and you're presented with a dialog box that includes the name of the backup set, any password you'd like to assign to the backup set, and options to reset the archive bit (the default), ver-

ify after backup, add to library, encrypt the backup file, and choose the level of compression (none, level 1, or level 2).

The only default I changed was the compression level. The default is none, which would only store about 120MB on my 200MB hard disk. I knew I'd need level 2 to push the tape's storage to 200MB.

After changing the compression, I clicked on OK and listened to the tape whir. It took about 50 minutes to back up about 170MB of data. The backup really did multitask. I worked in Microsoft Word for most of this period and didn't have any problems.

After making the backup, I labeled the tape and decided that I'd restore some files to test the system the next day. Little did I know that a malevolent program would trash some essential data on my hard disk and make my first attempt at restoring more than just an exercise.

The next day, I was running a beta copy of a program I was testing, and after a crash I noticed that Ascend, the personal information manager I use, wasn't working. As it turned out, half a dozen files in my Ascend directory had been mangled by the beta program. Yikes!

I cranked up EzTape and inserted the backup I'd made the day before. I still hadn't read the manual, but it seemed logical to click on the tape button, which I did. After a few moments of whirring and flashing lights, EzTape showed me a tree and file listing of the backup files on the tape. I moved to my Ascend directory and marked it. Next, I clicked on Restore, and in less than a minute, my entire Ascend directory had been restored. Everything worked perfectly. EzTape and the AccuTrak had saved the day—and my bacon. □



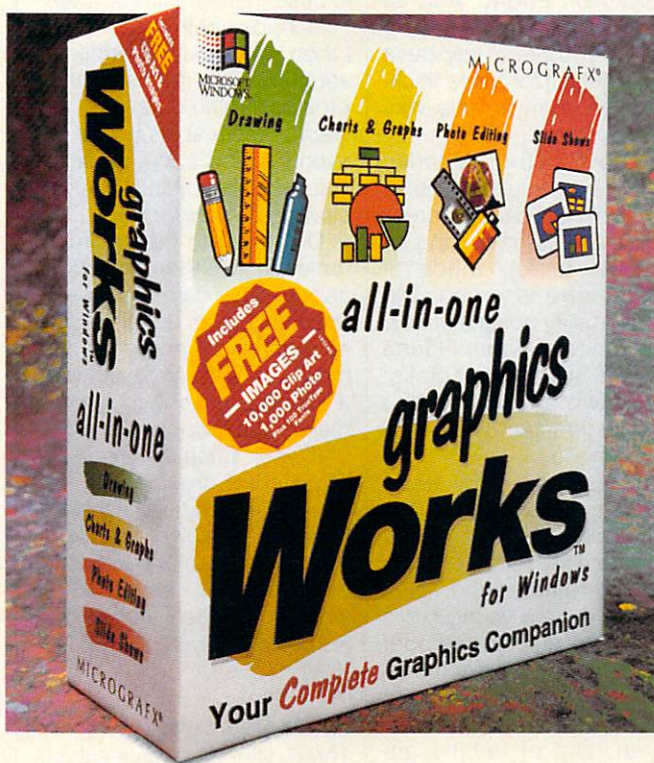
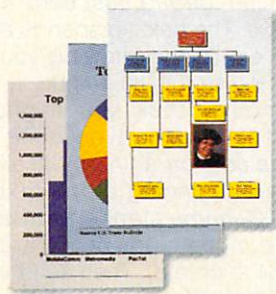
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# TIPS & TOOLS

Edited by Richard C. Leinecker

**Surviving disaster  
with your data intact,  
entering Debug  
scripts the easy way,  
wildcards  
and directories**

## Protect Your Backups

My staff of 12 programmers dutifully handed in their backup disks on Friday, August 21, 1992, before leaving work. I put them in my desk drawer and left for home thinking the company's data was safe and sound.

At about 5:00 on Monday morning, we caught the north eye wall of Hurricane Andrew. Before the wind-measuring instruments broke, winds of 192 mph were recorded. The concrete utility poles that carry electricity to South Florida snapped like toothpicks. When dawn arrived, I didn't see a single intact roof in my neighborhood.

After assessing our damage, I decided to walk the two miles to the office. Planes from the nearby municipal airport littered the fields as if they were a young boy's toys thrown during a temper tantrum. Our building came into view, and my worst fears were realized—it was destroyed. Out of habit I unlocked the door and walked to the pile of rubble that was my desk. So much for my backup disks.

The good news is that all of the equipment had been removed on Saturday afternoon in preparation for Hurricane Andrew. Thankfully, our computers survived, and we didn't lose any data. But I've learned some lessons that will stay with me as long as the memories of the flattened houses in my neighborhood.

Backup disks that are near the equipment are only useful if a file is accidentally deleted or corrupted or if the hard drive crashes. In the event of a serious catastrophe, you're done for. Even another room in the same building isn't necessarily safe.

Here's what I've implemented at work: I keep a set of backups in my new desk in

case files are deleted or hard drive problems arise. I bring a duplicate set home with me, in case there's a fire or (heaven forbid) another hurricane. I then send another duplicate set home with the company's president, who puts them in a fireproof safe at his house. I'm even thinking about getting a safe-deposit box at a bank for storage of backups.

Don't let luck be the crucial factor in whether your business or other computing enterprise succeeds or fails. A little bit of foresight and effort can make the difference between a minor inconvenience and a major catastrophe.

If your business requires any kind of crucial data that cannot be lost, heed my warnings. Make multiple backups and keep them in multiple locations. You never know when you'll need them.

RICHARD C. LEINECKER  
MIAMI, FL

## Easier Debugging

Three different people submitted similar tips for making entry of the Debug programs found in the "Tips & Tools" column much easier. Their letters have been combined into a single tip.

Instead of typing the hex codes directly into Debug, create a file using a text editor or word processor. If you use a word processor, make sure that you save the data as an ASCII file.

Type the Debug codes beginning right after the line that says File not found. Note that the hyphen prompt is produced by the computer and should not be in your text file. Each line of data will look like this in your text file.

**e 100 BE 82 00 BF 41 01 31 ED**

After all of the lines of data are typed in, check to make sure you've entered every-

thing accurately. The next lines in your file should look like this.

**RCX  
56  
W  
Q**

Be sure to press Enter after typing the Q at the end. The number 56 in the second line will vary from program to program. It's a hex value representing the number of bytes in the program. Once you have your script file saved to disk, type *debug filename < textfile* (where *filename* stands for the name of the program you are compiling and *textfile* stands for the name of the file you typed with your text editor). If your prepared file is named test.txt and the com file that you're creating is called test.com, you'd type the line *debug test.com < test.txt*. The next tip spends a little extra time showing you how to use this technique.

Another trick you might want to try is to type *n filename.com* on a line by itself at the beginning of the text file (*filename* stands for the name of the program you are about to create). Then send it to Debug by typing *debug < textfile*. The first line tells Debug that you're creating a new program and gives its name. Debug does the rest.

EDWIN LEE  
WILLOWDALE, ON  
THOMAS S. FREEMAN  
PACIFIC PALISADES, CA  
KENNETH B. DAVIES  
BELLINGHAM, WA

## Wild Directories

I often find myself wanting to change directories with wildcards. It's usually shorter to type *t\** than *thisdir*, and it's sometimes convenient when you forget the exact name of a directory. Here's a short program that lets you change directories with wildcards. Just

type *cdw directory* (where *directory* is the name of a directory including wild-cards), and it'll change to any valid directory on your current drive.

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

**debug cdw.com**

*File not found*

-e 100 be 80 00 ac 0a c0 74 3c

-e 108 ac 3c 0d 74 37 3c 20 74

-e 110 f7 8b d6 4a ac 3c 0d 74

-e 118 04 3c 20 75 f7 c6 44 ff

-e 120 00 b4 4e b9 10 00 cd 21

-e 128 72 1a b4 2f cd 21 83 c3

-e 130 15 f6 07 10 74 12 83 c3

-e 138 09 80 3f 2e 74 0a 8b d3

-e 140 b4 3b cd 21 b4 4c cd 21

-e 148 b4 4f cd 21 72 f6 eb da

-RCX

CX 0000

:50

-W

*Writing 0050 bytes*

-Q

If you'd like to try the method mentioned in the previous tip, create a text file called *cdw.txt* that looks like this.

e 100 be 80 00 ac 0a c0 74 3c

e 108 ac 3c 0d 74 37 3c 20 74

e 110 f7 8b d6 4a ac 3c 0d 74

e 118 04 3c 20 75 f7 c6 44 ff

e 120 00 b4 4e b9 10 00 cd 21

e 128 72 1a b4 2f cd 21 83 c3

e 130 15 f6 07 10 74 12 83 c3

e 138 09 80 3f 2e 74 0a 8b d3

e 140 b4 3b cd 21 b4 4c cd 21

e 148 b4 4f cd 21 72 f6 eb da

RCX

50

W

Q

Then, from the command line, type *debug cdw.com < cdw.txt*. The com file



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Need a network at home?

See page 91

Want to speed up Windows?

See page 55

Don't like mice?

See page 251

What do you do when your computer won't boot?

See page 1

Need help organizing your hard drive?

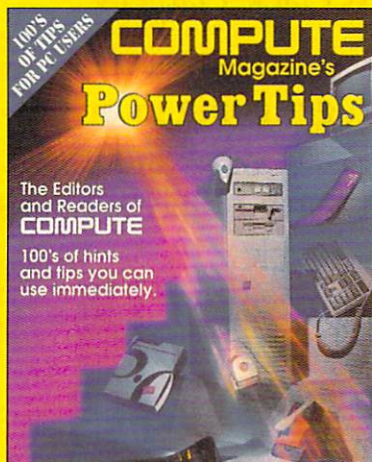
See page 35

What is TrueType and what does it mean for you?

See page 104

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## TIPS & TOOLS

will be automatically created. If you run Checksum on this com file, the result should be 062.

RICHARD C. LEINECKER  
MIAMI, FL

### Long Lost WordPerfect File

If you're like me, you've got a million files in your WordPerfect directory. When your boss asks you to find a memo you wrote a year ago, it's hard to remember what you named it. It can be like finding a needle in a haystack. Fortunately, there's a solution with WordPerfect.

Log to the directory where the document is most likely stored. List the files by pressing F5. When prompted for the directory, type in the path of the directory you wish to search (for example, c:\wp51\docs). Once the files are listed, look at the bottom of the screen for the available options. Select 9 (Find) and then 4 (Entire Doc). When prompted for Word Pattern, type in a word (in all lowercase characters) which would be unique enough to identify the document once a match has been made.

You might type something like *overtime* if you're looking for the memo that covered working overtime hours. WordPerfect will scan all of the files for the pattern you gave it. When it's done, it'll show you a list of files that contain the specified string. You can print the list on your printer by pressing Shift+F7.

SUSAN KELLEY  
MOBILE, AL

### Better Zipping

As I read Gordon Newstrom's tip in the August issue of COMPUTE about PKZIP and PKUNZIP, several improvements came to mind.

Rather than delete all of the files in the directory after zipping them, use the -m option. This verifies the files in the archive and then deletes them from the directory automatically. If an error exists in the archive file, PKZIP won't delete the files.

Another very useful option is -u. This updates the archive file with only the files that have changed. You can even combine it with the -m option by adding the command line switch -mu.

An option that'll speed up the actual compression is -ea. This will use the method called imploding. It's much faster and doesn't use much more disk space than the shrinking method.

One last suggestion is the -rp option, which recurses subdirectories. By using this option, you can include all

embedded subdirectories in one archive. You'll need to couple this with the -d for PKUNZIP. The -d option with PKUNZIP creates recursed subdirectories upon extraction.

With a little planning and ingenuity, you can customize PKZIP and PKUNZIP to do almost anything. All of the switches can be easily added to Mr. Newstrom's batch file.

CLARK WAGGONER  
SAPULPA, OK

### Personnel Space

I have a number of computers, all of which must share peripherals like printers. I often have to use LapLink to transfer files from one computer to another, as hard disk availability varies across machines (it's also the simplest way to back up document and graphics files). For years I had to remove my computers from the desk to change the connections in the back, but I finally got smart. I left about 18 inches of space behind my computer desk so I can stand behind the computers and alter connections as needed. The hard part is not using this inviting space for storing old magazines and surplus office supplies.

Instead of backing up my whole hard disk, I tend to back up only the files I have been working on. I'm much more likely to lose a single file or directory because of carelessness than to lose the entire hard disk. Therefore, this kind of backup makes more sense, as long as I am diligent.

Another simple change speeds up printing from Windows. I have a laser printer that can print in PCL or PostScript mode. Generally, I've found that printing in PCL mode is much faster than printing in PostScript, and with Windows 3.1 drivers and TrueType, there's virtually no reason to use PostScript anymore. The only times PostScript is useful are when I want to vary the screen frequency of a gray-scale printout and when I want to print PostScript patterns from CorelDRAW! These uses of PostScript are so rare that I leave Windows and my printer set for PCL printing by default.

WAYNE PALMER  
NEW YORK, NY

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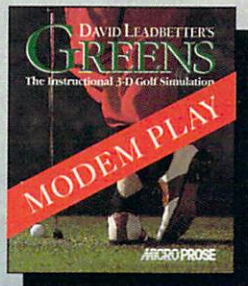
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Circle Reader Service Number 254

# HARDWARE CLINIC

Mark Minasi

## INTERRUPTS MADE EASY

I've noticed that the subject of interrupts has come up a lot in the PC literature lately. If you're messing with Windows, networks, or printing (or any combination of the three), you've perhaps heard people talk about interrupt conflicts, IRQs, and the like. This month, I'll explain in plain English what interrupts are and what kinds of trouble they can cause.

There are actually two very different kinds of interrupts, software and hardware. In this article, I'll deal with hardware interrupts.

Interrupts solve a basic problem faced by any computer peripheral: how to get the CPU's attention. Let's take the example of a basic peripheral—the keyboard. The keyboard connects to the PC via a chip on the PC's motherboard, a keyboard controller. Whenever you press a key, the keyboard sends the keyboard controller a scan code, which the keyboard controller then offers to the CPU.

When I say, "offers," that's just what I mean. The keyboard controller has only enough storage space to hold a single keystroke. Therefore, the keyboard controller must get rid of each received keystroke quickly before the next one arrives. It gets rid of each keystroke by giving it to the CPU, which puts it in the system's keyboard buffer.

That's where the trouble appears. You see, the CPU is normally busy doing things; it's not simply at the beck and call of the keyboard controller. How, then, does the keyboard controller (a) get the CPU's attention and (b) do it quickly?

### Interrupts Versus Polling

Peripherals have needed to get the attention of the CPU

since the first computer. There are two approaches to making sure that the CPU gives that attention—interrupts and polling. In a polled system, the CPU periodically drops whatever it's doing and asks the keyboard controller, "Do you have a keystroke for me?" (Remember that drops-whatever-it's-doing part; it'll be important later.) The keyboard controller either says yes and hands over the keystroke or says no. In either case, the CPU then returns to what it was doing. After some time has passed, it again checks the keyboard controller.

Think of a CPU polling a keyboard as being somewhat similar to the situation you'd have if you had a phone without a bell. With such a phone, you'd have to periodically put the receiver to your ear and ask, "Is anyone trying to call me?" It would be a pain, but it would simplify the requirements of the telephone hardware; the phone company wouldn't have to design a ringer into the system.

With an interrupt-based system, on the other hand, the CPU must be designed to accept interrupts. That means that one or more of the wires extending from the CPU chip itself will accept an input signal from another circuit on the motherboard, a signal that says, "Come pay attention to me." The keyboard controller then is connected to one of those interrupt wires, and it places a signal on that wire when it has a keystroke the CPU must handle. The CPU senses the interrupt and puts its current work aside, signaling the keyboard controller that it's ready to accept that chip's keystroke. Let me continue my telephone analogy at this point. As you've no doubt surmised, the interrupt signal is like the telephone's bell in my phone analogy. You can work continuously at your

desk without having to worry about whether anyone's trying to reach you or not.

Let's summarize what we know so far. A CPU communicates with a peripheral either through polling or interrupts. Polling requires less support hardware, but it requires that the CPU spend a lot of time checking with the polled peripherals to see if they have need of the CPU's attention.

### Which Is Better?

It seems obvious. Interrupt-based input/output handling is more than polling, in terms of the CPU's time. And aren't we always looking for faster performance from our PCs?

That's true, but polling has a place in the microcomputer world. For example, the Apple II polled its keyboard. And despite the fact that the parallel port has an interrupt line assigned to it, your PC polls the parallel port, in all probability.

Why? The story starts in 1981, with the first PCs. They were sold with optional serial and parallel ports, and the first parallel ports were made, of course, by IBM. The PC architecture that IBM settled on made heavy use of interrupts, and the parallel port was assigned its own interrupt line, interrupt line number 7 (IRQ7). Unfortunately, some of the parallel ports in the first batch had nonfunctional interrupts, the legend goes, and so IBM rewrote the original PC BIOS so that the PC sent data to the parallel port via polling, not interrupts. Once the initial PCs shipped with a BIOS that supported polling of the parallel ports, all software that followed it—until OS/2 and Windows, as you'll learn in a bit—polled the parallel port, ignoring the IRQ7 that was assigned to the parallel port.

Under a polled system, the PC sends a character to the

**What are interrupts, and what kind of trouble can they cause?**

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printer and then says to the printer, "Did you print that character yet? How about now? How about now?" and so on until the printer finally says, "Yes, I printed that character." The PC then sends the printer the next character, starts polling to find out if the parallel port is finished with that character, and so on.

Under an interrupt-driven system, the PC would just send the printer a character and then go back to work on whatever it was doing. When the printer is ready for the next character, it taps the PC on the shoulder and says, "I'm ready for the next character."

The interrupt-driven system sounds more efficient—but is it really? Think about how DOS works—it's a single-tasking operating system. If the PC is in the process of printing, then that's all it's doing. In the last paragraph when I referred to its going back to work on whatever it was doing, I omitted the fact that there's nothing else to do, as most DOS programs are unable to multitask and DOS offers very little in the way of background printing support. So in the final analysis, it really doesn't matter much whether your printer port uses polling or interrupts.

I also neglected to mention a benefit of polling. A PC-to-printer cable doesn't need to have as many wires in it if the interface uses polling rather than interrupts. Some of the 25 wires that go into the standard PC-to-printer cable are only there to support interrupts, so they're unnecessary for most DOS-based systems. That's how some vendors have managed to cut prices on printer cables; they just leave out the superfluous wires.

The fact that the printer interrupt IRQ7 is largely unused is useful for another reason. Interrupts are scarce commodities, and if the parallel port

won't use IRQ7, there are plenty of boards that can use it! Many companies have installed local area networks in the past four years, and many LAN interface boards require an interrupt. IRQ7 has served well in this function.

## Windows and OS/2 Printing

So you've seen that many printer cable manufacturers save money by leaving a few unnecessary wires out and that stealing the parallel port's IRQ is the most forgivable of sins, as the computer isn't using it anyway, and it makes adding some nifty board like a LAN or a Sound Blaster possible. That was fine under single-tasking DOS. But what about OS/2 and Windows, which are multitasking operating systems? Well, um, there's a problem there.

It should be obvious that an interrupt-driven printer interface would be a real asset to any multitasking system. If one program was printing and another was doing calculations, then the operating system could dump a few bytes to the printer from the first program and then do a few calculations for the second program. When the printer signaled that it was ready, the CPU could give the printer a few more bytes, return to its calculations, and so on. It's like getting the benefits of a mainframe from your desktop PC.

You can probably see the problem by now. There are many PCs out there whose owners have given their IRQ7s away, so when Windows tries to print, nothing happens. Worse yet, when Windows tries to print, the network locks up (if the LAN board was on IRQ7), or the Sound Blaster starts emitting static. In the worst case, the system crashes.

Most PCs have two basic kinds of bus slots—8-bit bus

slots and 16-bit bus slots. Let's consider the 8-bit slots, as they're the ones that have the tightest crunch for interrupts. The 8-bit slots support six interrupts numbered 1 through 7. Interrupts 0 and 1 aren't available in bus slots because they're already taken up by the system's timer, which gets interrupt 0, and the keyboard controller, which gets interrupt 1. Interrupt 2 is free on XT-type systems, but it's required on 286 and higher systems to serve as a gateway to the extra interrupts provided by a 16-bit slot. Interrupt 3 is the interrupt for either COM2 or COM4. Since both serial ports are assigned to the same interrupt, they'll only work reliably if you have one or the other. Interrupt 4 is for either COM1 or COM3. Interrupt 5 is usually free on 286 and higher systems, as it's reserved for LPT2 and most of us don't have a second parallel port. Interrupt 6 is used by the floppy drive, and interrupt 7 by LPT1, the first parallel port, as I've mentioned earlier. Use those assignments as a guideline when assigning interrupts to new circuit boards.

What if you have one of those printer cables that don't contain the wires for interrupt support? You'll see trouble there, as well. That inexpensive printer cable that has served you for years may be the root cause of any Windows printing problems that you may be experiencing.

So if your printer prints under DOS but not under Windows, then one thing you should investigate is whether or not your parallel port has a free and clear title to IRQ7. Another thing to try is another printer cable; borrow one from a Windows workstation that's printing OK and put it on your system. If you can print with this cable, then you're OK on the interrupts, and you just need a better cable. □



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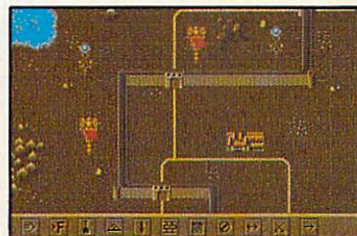
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# INTRODOS

Tony Roberts

## FORMATTING MADE EASY

Formatting disks is one of computing's most annoying tasks, but with the help of a couple of undocumented commands, the process can be made more tolerable.

I find disk formatting vexing because the makers of formatting software are so determined to protect us from our own foolishness that they make us answer several questions confirming that we really want to perform the format.

OK, I'll concede that it's wise to have some safeguards against accidentally formatting your hard disk, but there ought to be a less painful way to format a box of floppies. Well, there is—they just didn't tell us about it.

MS-DOS 4.01 and MS-DOS 5.0 include some undocumented switches that can eliminate the prompts that instruct you to place a new disk in the drive and ask if you want to format another disk.

(Warning: These commands also eliminate the prompts that remind you that you're about to wipe out your hard disk. Be sure you know what you're doing before you try these commands. Read on for some safeguards.)

The switches are `/autotest` and `/backup`. Type `format a: /autotest`, for example, to jump right in and format whatever disk is in drive A. You won't see the disk statistics, and you won't be asked if you want to format another disk.

The `/backup` switch is similar to, but slightly more verbose than, the `/autotest` switch. Type `format a: /backup` to begin formatting immediately. When the format is complete, the program will prompt you for a label and will display the disk statistics before returning you to the DOS prompt.

These undocumented switches can speed up your disk formatting by cutting down on the prompts displayed, but can you take advantage of this without risking the accidental erasure of important data? With a little care, yes.

First, if you're using DOS 5.0, you'll find that even with these switches, the Format command will collect the information that's needed by the Unformat command. This can help you recover if you accidentally format the wrong disk.

Second, you should reserve these commands for mass formatting projects. When you format a new box of disks, for example, you know that there's no valuable data on the disks, so it makes sense to proceed as quickly as possible.

Finally, you should limit these fast-format switches to batch files so you can test to make sure the Format command won't be used on a hard disk.

Take a look at the batch file below, called `multifmt.bat`. This program is designed to format several disks in the same drive with a minimum of operator intervention. After things get rolling, you need to press a key only when you swap disks.

To protect your hard disk, the program verifies that you've specified either the A or B drive as your target. If the drive designation checks out, the format proceeds immediately. Otherwise you get a message reminding you to specify a valid disk drive.

At the end of the process, you're summoned with a beep. At that point, insert a new disk and press a key to continue formatting, or press `Ctrl+Break` to get out of the program.

By default, the `/autotest` and `/backup` switches format

the target disk at its maximum capacity. If you want to format double density disks in a high density drive, be sure to add the appropriate size specification switches. For example, type `multifmt b: /f:720` to format 720KB disks in a 1.44MB drive.

To really speed things along, you can use the documented `/u` switch to tell the Format command not to worry about saving Unformat information. This switch is appropriate with brand new disks, but it may not be suitable for disks you're reusing.

I like to keep several formatted floppies on hand so I don't have to interrupt my work for formatting chores. I find it convenient to run `multifmt.bat` whenever I take time to straighten up the office. When the program beeps, I insert a new disk, press a key, and return to my cleanup. By the time my desk is clear, I have a fresh stack of formatted disks to carry me through the next week.

```
rem multifmt.bat
@echo off
for %%f in (a:
A: b: B:) do if (%%f)==(%%1) goto
continue
goto help
:continue
format %%1 /autotest %%2 %%3 %%4
echo Change disks to continue
formatting or press Ctrl-Break to
quit.
rem The following echo command
produces three beeps. To create
it, use
rem a text editor that allows you to
enter a Ctrl-G character (ASCII 7)
rem to create the beep. (This line
can be omitted if you prefer.)
echo <Ctrl-G><Ctrl-G><Ctrl-G>
pause
goto continue
:help
echo Usage: MULTIFMT drive:
[optional parameters]
echo You must specify a
drive name. Only drives A or B
are valid. □
```

Format floppies  
fast with  
undocumented  
commands.

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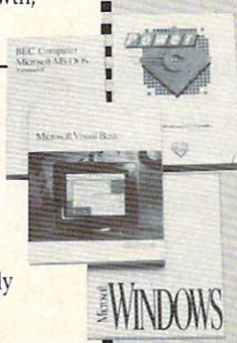
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What programmers in C, BASIC, or Pascal will appreciate most is that the structure of a database can be changed with impunity and that adding data entry routines is trivial. In traditional languages, adding or subtracting fields to a random-access file structure requires vast recoding and must be avoided.

You can create a complete database browser with a mousing, menuing interface in well under 100 lines—including a custom data entry screen with error checking. Let's look at code from a program I wrote in under 15 minutes.

This code makes a box at the bottom of the screen that's 36 columns wide; has a shadowed, double border; and can be dragged anywhere onscreen with a mouse: `DEFINE WINDOW Buttons FROM; 20, 12 TO 22, 56 FLOAT; SHADOW DOUBLE.`

Later commands such as `ACTIVATE` will use the box's name (Buttons in this case). The semicolon continues lines.

Later, this code displays the box and makes it active: `ACTIVATE WINDOW Buttons.` Now you can drag the box, and all of its contents will remain neatly inside.

This code creates a row of

buttons within the box.

```
@ 0, 2 GET ButtonCmd PICTURE;  
'@*HN  
\<Next;\<Previous;?\<Quit';  
DEFAULT 0 VALID ValidButton()
```

The row of buttons is located at row 0, column 2 in the Buttons box. `PICTURE` is a terse but logical and easy-to-use minilanguage. The `@*` means buttons will be created. `H` means it's a horizontal row; use `V` for a vertical row. `N` means pushing a button won't halt data entry.

Identifiers such as `Next` will appear in the buttons; semicolons separate buttons. Preceding any letter in the button text with the two-character `\<` sequence makes that an accelerator—meaning you can press that key to activate the button. The `?\` sequence means that the button is activated when you press the Esc key. In our example, `Quit` can be activated with `Q` or `Esc`. `ButtonCmd` is the name of the variable in which the value of the button you click on will be placed; its default value is 0, `\<Next` in this case.

`ValidButton()` is a user-written routine that's evaluated when a button is clicked on. Because the row was defined in a floating window, you can drag the window, and all the buttons will stay in it.

A custom data entry screen with a row of push buttons requires fewer than 24 lines.

```
DEFINE WINDOW Customer  
FROM;  
3, 8 TO 13, 60;  
FLOAT SHADOW DOUBLE  
USE Test  
ACTIVATE WINDOW Customer;  
NOSHOW  
@ 1, 3 SAY 'Name'  
@ 1, 14 GET TEST.Name  
@ 3, 3 SAY 'Address'  
@ 3, 14 GET TEST.Address
```

```
@ 5, 3 SAY 'Price'  
@ 5, 14 GET TEST.Price  
@ 7, 3 SAY 'Phone'  
@ 7, 14 GET TEST.Phone  
ACTIVATE WINDOW Buttons  
@ 0, 2 GET act PICTURE;  
'@*HN \<Previ-  
ous;\<Next;?\<Quit';  
DEFAULT 0 VALID ValidButton()  
READ
```

`USE Test` opens up the database called `test.dbf`. The `@ . . . SAY` lines display labels in the window at the specified positions. Data is entered at the `@ . . . GET` lines, and data entry is triggered by `READ`. Move between fields using the keyboard or the mouse.

`ValidButton()` is called to handle the push-button actions. Each button is treated as if it were an index into a numeric array, so `Next` returns 1, `Previous` returns 2, and `Quit` returns 3. All `ValidButton()` needs is about 20 lines worth of CASE statements that call built-in xBASE routines such as `TOP` to move to the beginning of the file or `BOF()` to sense if the end of the file has been reached. `ValidButton()` is called continuously until `Quit` is clicked on. The `Quit` case executes a command such as `CANCEL`, which returns control to the calling program or to DOS if it's an exe.

That's it: the beginning of a program that with two more pages of code can become a self-contained database management system with a modern user interface and error-checking logic for data entry.

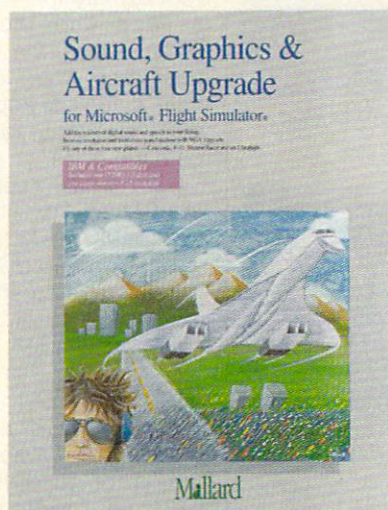
With FoxPro, you'll need a \$500 product called the Distribution Kit to create exe files. So is it really worth \$1,000 to use FoxPro? Without a doubt. Being able to create a slick, working prototype in just a few minutes could mean that you'll make that \$1,000 back—on your first job. □

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Circle Reader Service Number 119

# SHAREPAK

Steve Draper

## FAMILY VALUES

This month, COMPUTE's SharePak brings you three programs for the entire family. We've included Commander Keen, the big winner at the shareware industry awards; Magic Crayon, an outstanding educational program for the kids; and BENny, a slick batch file enhancer. If you're looking for programs that are guaranteed to be values, give the SharePak a try. If you're not completely satisfied, just return it for a full refund.

February's SharePak features something for everyone in the family.



Check out the award-winning Commander Keen.



Magic Crayon teaches colors and shapes.

### Commander Keen

Commander Keen was the first real commercial-quality game to be released in the shareware market, and it has proven itself to be one of the highest-quality releases of all time. In fact, at the first annual shareware industry awards last fall, Commander Keen took the award as the best shareware product of the past ten years. It's hard to ignore credentials like that.

Commander Keen features ultrahigh-speed EGA graph-

ics and superb sound effects. The animation and scrolling are updated at nearly 40 frames per second—even faster than motion picture-quality cartoons, which are filmed at only 24 frames per second.

You play the role of Billy Blaze, an eight-year-old genius who builds an interstellar ship from various household objects. At the first sign of trouble, Billy dons his brother's football helmet and becomes Commander Keen.

Armed with only a pogo stick and ray gun, Keen travels to Mars to face the Vorticons, who are planning an invasion of Earth. Shortly after he arrives, the Vorticons steal vital parts off Keen's ship and hide them in their cities. Keen must explore the Vorticon cities and find the missing parts. Along the way, you must help Keen overcome many diabolical traps and the weird, deadly creatures that roam the cities.

Commander Keen requires an IBM PC or compatible with 520K RAM available. You'll also need EGA or VGA graphics and a hard drive. A joystick is optional. The registration price is \$15.

### Magic Crayon

Magic Crayon is a collection of three colorful and musical games for children 3 to 12 years old. Children will have hours of fun with these challenging games and learn about the basic principles of color and shape at the same time.

The first game is Coloring Book. Its object is simple—color the sections of the picture, using any colors you want. This game teaches kids about colors and lets them explore their artistic capabilities. The second game is Color Shading. Here, you can use any colors you want to color various objects

in order to find the hidden shape. This game teaches visual perception and visual discrimination, skills that are important in geometry and geography. The final game is Color Memory, an excellent game for building memory and concentration skills. First, you'll see a colored picture for 30 seconds. Try to memorize the exact colors of this picture. Then, when the colors disappear, your goal is to color in all the sections of the picture, using the exact colors of the original.

Other features of Magic Crayon include two levels of difficulty, easy menu operation, online help, mouse support, scorekeeping, and dot-matrix printer support.

Magic Crayon requires an IBM PC or compatible with 256K RAM, an EGA or VGA display, and a Microsoft or compatible mouse. The registration price is \$18.

### BENny

BENny is a batch file enhancer or stand-alone tool that's easy to use and adds both color and utility to your batch files. It contains several straightforward commands that can be used from the command line or from a text file.

Batch files are, as a rule, pretty dull to look at—just some white text on a black background. BENny breaks all the rules. Now, your batch files will explode with color, action, and sound. It takes just a few simple commands. BENny includes commands for windows, selectors, text, and more. For example, one simple command can give you windows with single- or double-line borders, shadows, or an exploding feature.

BENny runs on any IBM PC or compatible with a color monitor. The registration price is \$5. □

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**APR 90:** *Pianoman*, play and record music on your keyboard; *Tune Trivia*, test your music trivia; *Morse Code Trainer*, increase your Morse code proficiency; *RealSound Sampler*, create digitized sounds. (#CDSK0490)

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# VIRUS SCARE

BY PHILIP CHIEN

**Fearsome creatures lurk within the code of benign software. But what are viruses, and how dangerous are they, really?**

*Virus.* The mere mention of the word throws computer users into a panic. But most people don't feel there is anything they can do besides panic and hope that a virus never comes their way.

Viruses can damage software or destroy important files. Any computer user who shares information with other computers should be aware of what viruses are and how to avoid becoming infected. Knowledge—not paranoia—is the most important too, in fighting viruses.

## A HAIRY ANIMAL

What is a computer virus? A virus is a program that attaches itself to another program. The virus replicates itself and spreads to other programs. As

programs are shared, the virus spreads geometrically, infecting more and more computers. At some point, the virus activates and performs its damage. This damage can range from a simple prank to erasure of all of the files on the computer's hard drive. In all cases, viruses are programs that were written by an outlaw—a hacker who specifically sets out to damage other people's computers.

Viruses aren't the only things that can destroy your data. Also, be aware of bugs, time bombs, and Trojan Horses.



## To Kill a Virus

To identify, isolate, and destroy viruses—and then to repair the damage that they do—requires antivirus writers to think like virus writers. It's interesting to see the steps a software company goes through to create an effective virus killer. At PC Expo in New York, I had the opportunity to speak with Fifth Generation Systems about the procedures it went through to make sure Untouchable was safe, secure, and deadly. The key, said Jerusalem-based developer Yuval Rakavy, was to create an antivirus system that would still be undefeatable if a virus writer had every byte of code in the program.

All antivirus products depend first and foremost upon a scanning program that identifies the signature code of existing viruses. This works very well for non-self-mutating viruses that existed at the time the scanner was written, but most scanners are powerless against new viruses (the National Computer Security Association estimates that six new viruses are written every day) and against the new self-mutating viruses that essentially rewrite themselves each time they replicate. In creating Untouchable, Fifth Generation Systems included a

scanner as a first line of defense and provided it with the ability to detect self-mutating viruses. The scanner can even detect viruses within archived files.

Many antivirus programs are shipped with a supplemental TSR that runs continuously, watching for certain activities that are typical of viruses, such as system calls to write to the disk. But because the activities they identify are also common activities of normal programs, TSRs set off many false alarms. TSRs are also very vulnerable because they reside in memory, which is even easier to alter than disk files. So Fifth Generation Systems decided not to create a standard TSR but a supplemental scanner that examines the code in every program run and every floppy disk accessed by the computer.

The third leg of Untouchable is its integrity-checking system. On the hard disk and on a separate floppy disk, Untouchable keeps a checksum of all of your programs. By having Untouchable keep a record of these checksums on a separate bootable floppy, Fifth Generation Systems plans to make it impossible for viruses to escape detection, since all executable file infectors must alter program code in order to

replicate themselves. The integrity checker examines the whole system each time it's booted up. Every 14 days, the integrity checker checks all executable files against their checksums online. Then every 21 days, the user is required to boot from the floppy containing the offline database, and the integrity checker will then check for stealth viruses. It will identify changed program files, including updated program files.

Finally, Untouchable uses this checksum to repair any damage that may have been caused. "It's as safe as restoring from a backup," says Vicky Gore, senior product marketing manager. If Untouchable cannot repair the damage 100 percent, it will refuse to recover the file.

What's next in virus technology? Viruses can be written that piggyback on other viruses and are set to activate only when the original virus is removed and its damage is repaired. Untouchable is designed to cope with this situation.

Are there any existing viruses that piggyback on others? "At this point, that's pretty theoretical, but it's a possibility," Ms. Gore says. "That's part of the game—to be able to think about where virus writers are going and to be able to protect users from them."

—ROBERT BIXBY

Bugs, or simple errors in program code, can be intentional or accidental. A bug can be purposely put into a program as a limitation, or it can be something that the programmer overlooked in the original programming. While a bug could conceivably erase all of the data on your computer, it doesn't spread to other programs like a virus. Usually, bugs simply crash the program that's running and do no further damage.

A time bomb is a routine within a program that "explodes" after a given period. Time bombs can be installed on purpose and often are installed with the user's knowledge. For example, licensed programs that are only permitted to be used for a particular period might contain a time bomb that makes the program erase itself after a given date or a set number of times the program is used. Like bugs, time bombs are usually limited to the programs where they reside—they don't infect other software. But occasionally, a maliciously created time bomb causes damage that is quite extensive.

A Trojan Horse is a disguised program. To all outward appearances, it's an ordinary program, but the program is actually a cover, with the true damage-causing routines hidden underneath. So, when you run the program, you might think you are trying out a shareware disk optimizer. Only after the Trojan Horse has run will you discover that your hard disk has been scrambled.

### Stalking the Beast

Viruses are spread when software is transferred from computer to computer. Shareware and illegal, pirated copies of programs have gotten a bad reputation as vectors for viral infection, but it's possible for a commercial, sealed-in-the-box program to have a virus.

Sealed commercial programs are least likely to have viruses, simply because their distribution is more tightly controlled. A commercial program is generated by its author and duplicated by the publisher or subcontracted to a duplication house. Once duplicated, the program is

sealed and distributed. It's possible for the dealer to infect the program accidentally if that copy is used for demonstrations. But commercial publishers, as a rule, are extremely cautious about the integrity of their products, especially since the company's reputation could be destroyed if a virus is distributed with its software—to say nothing of the product liability considerations.

Shareware and pirate programs are duplicated, distributed, and duplicated again—often passing through several levels of users. A virus could find its way into a program at any of these stages. With so many distribution levels, it's difficult to track a virus back to its source.

As a general (although by no means absolute) rule, commercial distributors of shareware programs and major online services check all submitted programs for viruses before permitting users to obtain them.

Conceivably, you could receive a virus each time you get a new program, and it's possible your system could already be infected. You

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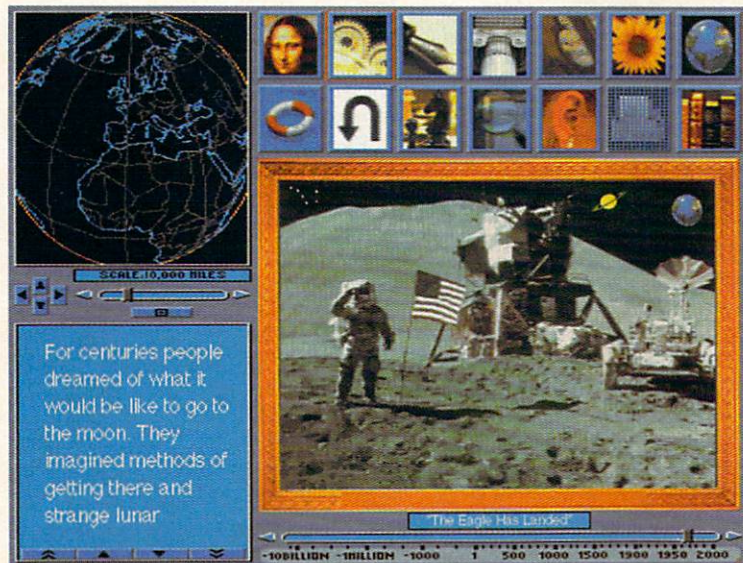
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## The State of the Virus

Here, in brief, is the virus story:

There are two general types of computer viruses: boot sector viruses and executable file infectors. Boot sector viruses occupy part or all of your boot disk's boot sector. They are spread primarily by booting your computer with a floppy in the drive and the drive door closed. If the floppy in the drive is infected, attempting to boot your computer from the infected floppy will infect your hard disk partition table, which will in turn infect any subsequent floppy you insert into the drive.

Much more pernicious and hard to guard against are the executable file infector viruses. These viruses attach themselves to program files (like exe and com files) and spread each time the program is run. Often, these programs also install themselves as TSRs and infect every program that is run.

### How Widespread Are Viruses?

According to Robert C. Bales, executive director of the National Computer Security Association (10 South Courthouse Avenue, Carlisle, Pennsylvania 17013; 717-258-1816), a survey showed that among North American corporations with more than 200 PCs (for a total installed base of 618,000 PCs), 63 percent had experienced a virus attack. Nine percent characterized the attack as "a disaster," with disaster defined as "20 or more machines affected and out of service for four hours or more." These companies reported average losses of \$7,000.

### Know Your Symptoms

How can you know if you are infected? Here are the most common viruses (provided by Fifth Generation Systems).

**Stoned.** Also known as Donald Duck, Hawaii, Marijuana, New Zealand, Sex Revolution, and Stoned II, the Stoned virus is a boot sector virus. Once the computer is infected, Stoned goes to work relocating and overwriting your boot sector and partition table and writing itself to any floppies that you insert. On startup, your computer will display the message *Your PC is now Stoned*. More of a nuisance than a danger, Stoned can be hazardous primarily to very small hard disks whose FAT can be partially overwritten by Stoned's program code.

**Jerusalem.** Also known as Friday the 13th, Jerusalem B, PLO, and Russian, the Jerusalem virus is an executable file infector that increases exe file size by about 1800 bytes. The virus loads itself into memory, where it monitors your computer activity and infects your executable files each time they are run. A frequently run file may eventually grow too large to load. The virus causes divide overflow errors and snaillike system performance (within 30 minutes of infection, your computer's speed will drop to one-tenth its normal speed). If this is your first inkling of a problem, count yourself lucky: If the virus goes undetected and uncorrected, the next time the 13th of a month falls on Friday, you'll find yourself with no executable files on your hard disk and with a collection of damaged overlay files.

**Disk Killer.** Also known as Ogre and Disk Ogre, the Disk Killer virus is a boot sector infector, but its behavior makes Stoned look benign by comparison. Within 48 hours of infection, Disk Killer begins destroying the information on your hard disk. The only preliminary symptoms are a loss of 3K on floppy disks or 8K on hard disks, and cross-linked files. By the time you see the virus's message, *Disk Killer . . . Warning! Don't turn off the power or remove the diskette while Disk Killer is processing!*, it's too late. Disk Killer has begun to work.

**Joshi.** Also known as Happy Birthday Joshi, Joshi is a boot sector infector and a stealth virus. Joshi overwrites your floppies' boot sectors and your hard disk's boot sector and partition table with its own code. It's a fairly clever virus in that it knows when you are trying to detect it with a scanner, and it will make things look as if nothing is wrong with your boot sector or partition table—hence the name *stealth*. It writes to your 1.2MB floppies as if they were 360K floppies. The information it writes will remain accessible until you remove Joshi. Then that information will only be accessible if you change the 1.2MB media descriptor byte to make the disk look like a 360K disk. On January 5, Joshi will display the message *type Happy Birthday Joshi!* and lock up your computer until you do so.

**Cascade.** Also known as 1701, 1704, Fall, or Falling Letters, Cas-

cade is one of the more famous executable file infector viruses. It infects com files, increasing their size by about 1700 bytes. It loads itself as a TSR and infects any com files you run. It causes characters to cascade down a VGA or CGA screen.

**Dark Avenger.** Also known as 1989, Bulgaria, or Sophia, the Dark Avenger executable file infector virus is as scary as its name. It attaches itself to com, exe, and overlay files, adding about 1800 bytes to their size. It loads itself as a TSR and spreads its infection almost every time you access your disk. Every sixteenth time Dark Avenger runs, it overwrites a sector at random (which can cause cross-linking and damage to your FAT). On a large hard disk, the virus can run rampant for some time before it's detected. By then, large areas of your hard disk will be filled with worthless data. Infected files might contain ASCII messages such as *Eddie lives . . . somewhere in time. Diana P. and This program was written in the city of Sophia (C) 1988 - 1989 Dark Avenger.*

**Sunday.** An executable file infector, Sunday attaches itself to com, exe, and overlay files, increasing their size by about 1500 bytes. Each time you run a program, the program is infected. If the virus encounters a system clock setting of Sunday, it will display this message: *Today is Sunday! Why do you work so hard? All work and no play make you a dull boy! Come on! Let's go out and have some fun.* The virus then deletes any files you run.

**Brain.** Also known as Pakistani and Pakistani Brain, Brain is a boot sector infector. It moves and overwrites the boot sector of a floppy disk. When the computer is booted from a floppy, the viral code loads as a TSR and begins infecting executable files as they are run. If the floppy disk has no volume label, Brain will give it the label (C)Brain. If you examine the boot sector of the infected floppy from an uninfected machine, you will see this message: *Welcome to the Dungeon (C) 1986 Basit & Amjad (pvt) Ltd. Brain Computer Service. 730 Nizam Block Allama Iqbal Town Lahore-Pakistan. Phone: 43079,442348,28053. Beware of this virus . . . contact us for vaccination.* Infected floppies may have cross-linked files and bad areas in the FAT. The two copies of the FAT will be different.

—ROBERT BIXBY

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Circle reader service number 207

## Virus Paranoia

One year ago, the name Michelangelo panicked hundreds of thousands of computer owners. With the fires of hysteria fanned by news broadcasts and eager computer salespeople, thousands of antivirus programs were sold. Michelangelo's trigger date came and went with barely a whimper. A couple of computers turned out to be infected, and a few users found out that they had made lucky investments—successfully eliminating viruses, including Michelangelo, before they activated. But for the most part, users wondered what the commotion was all about.

Most of the media reports described the potential damage by viruses in great detail but overstated the danger, implying that any computer could be infected and damaged by this one particular virus. The few stories that informed users that only certain people might be affected were lost in the flood of sensationalist stories.

The fake virus is an offshoot of virus paranoia. A disgruntled employee might purposely erase his or her computer's drives, claiming that a virus destroyed the system. A careful examination of the computer's remaining contents can often determine whether or not there was actually a virus that affected the computer.

A good backup program is just as important as a virus detector, and using both programs should be a regular habit. However, users aren't as conscious of the potential damages from not backing up their computers. While your hard disk is always at risk from a virus attack, it's also at risk for accidental erasure. If your hard drive was erased by a virus, you should be aware that your backup probably also includes the same virus and must be carefully disinfected with an antivirus program to prevent your data from being erased again.

No matter how good a virus detector you have, you still need a good set of backups.

The earliest viruses were relatively simple routines, and virus detectors could easily disinfect computers. Unfortunately, as antivirus programs became popular, authors wrote more sophisticated viruses that could hide from detectors. Stealth viruses are viruses that are specifically designed to avoid antivirus programs that search for viruses by known patterns.

The latest tools for virus programmers are utilities that create self-mutating viruses. These viruses change themselves each time they duplicate. While self-mutating viruses are more difficult to detect, a sophisticated virus-detector vaccine system can prevent them from harming your system.

The important thing to realize is that the virus-antivirus war will never end. A brand-new antivirus program will only detect the viruses it's been designed to detect and patterns for similar types of viruses—including ones that haven't been written yet. But as virus writers get their hands on antivirus programs, they'll write new viruses specifically designed to outwit and bypass those programs. Fortunately, most antivirus software publishers offer low-cost updates to their packages, and update routines are often available for free from online services and bulletin boards.

It's quite possible for you to accidentally hide a virus from your own antivirus programs. Compressed files use sophisticated routines to save disk and file space, making them especially efficient for modem transfers. Unfortunately, compressed code is more difficult to examine, and most virus detectors cannot detect viruses within compressed files. Once any files are uncompressed, they should be inspected by an antivirus program before you run them.

While you can use the best antivirus programs to protect your own computer, how can you protect data that you transfer to and from other people's computers? Whenever you give files to another user, you should always format the disk and then copy only the needed files to that disk. If the user returns the disk, you should treat it as if it were infected. Any files received from others should be carefully examined before use.

Viruses are a problem, and it's unlikely that they will disappear any time in the near future. But as with human viruses, there are sensible precautions you should take to prevent yourself from getting infected. In other words—always be sure to practice safe computing. □

can get a virus from a downloaded program via a modem or from a floppy disk. On the other hand, a data file (text, graphics, database) cannot be infected because those files are only accessed when another program reads their data. (The Macintosh operating system is a rare exception—Mac data files can be infected by viruses due to the way the Mac stores data and resource forks.)

As a general rule, a virus only works on a particular type of computer. A Macintosh virus won't do anything to an MS-DOS machine or vice versa. Since viruses are programs, they have to run on that computer's operating system. However, it's possible for another computer to act as a carrier, permitting viruses to be transferred.

The best method of avoiding viruses is through awareness. Understanding how viruses are spread and being aware of viruses each time you obtain a new program are the best ways to prevent a virus from infecting your system. It's still possible for a virus to slip through, however.

There are many good antivirus utilities—programs that specifically look for viruses and warn you when a virus attempts to infect your computer or to activate. Some antivirus programs will even erase a virus if they

find one and attempt to restore your program to its original state. Commercial virus protection software ranges in cost from \$19 to over \$500.

A typical virus protection program runs from your autoexec.bat file and examines your computer's hard drive each time it's booted. Each time a new program is installed on your computer, the new program is checked to ensure that it's clean. As a general rule, viruses are detected by looking for known viruses and monitoring suspicious activity. Suspicious activity can include programs unexpectedly changing their size, routines monitoring the computer's clock (very often, viruses are set to trigger on a predetermined date), or routines trying to format your hard drive. Any of these can conceivably be part of a legitimate program, and antivirus programs vary in their ability to filter out viruses.

### Always Check Your Sources

You should be careful where you obtain an antivirus program. If you obtain a shareware program or a copy of an existing program, you should be certain that it doesn't have its own viruses hidden within. There have been programs distributed as virus detectors that are actually Trojan Horses which install viruses.

## Making the World Unsafe for Viruses

PC/Assure—\$269.00  
Centel Federal Systems  
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Reston, VA 22091-1506  
(800) 843-1132  
Requirements: IBM PC or compatible, 640K RAM

Anti-Virus—\$129.00  
PC Tools—\$179.00  
Central Point Software  
15220 NW Greenbrier Pkwy.,  
Ste. 200  
Beaverton, OR 97006  
(503) 690-8090  
Requirements: IBM PC or compatible, hard drive

Virex for the PC—\$99.95  
Datawatch  
P.O. Box 51489  
Durham, NC 27717  
(919) 490-1277 (voice)  
(919) 419-1602 (BBS)  
Requirements: IBM PC or compatible, 512K RAM

Vaccine—\$129.00  
VacWindows—\$129.00  
The Davidsohn Group  
20 Exchange Pl., 27th Floor  
New York, NY 10005  
(800) 999-6031  
Requirements: IBM PC or compatible, 256K RAM (Vaccine), 1MB RAM and Windows (VacWindows)

VirusSafe—\$99.00  
Executive Systems  
XTree  
4115 Broad St., Ste. B1  
San Luis Obispo, CA 93401  
(805) 541-0604  
Requirements: IBM PC or compatible, 512K RAM

Untouchable—\$99.00  
Fifth Generation Systems  
P.O. Box 83560  
Baton Rouge, LA 70884-3560  
(800) 873-4384  
(504) 291-7221  
Requirements: IBM PC or compatible, 512K RAM, hard drive

WATCHDOG Armor—\$445.00  
WATCHDOG PC Data  
Security—\$295.00  
Fischer International Systems  
4073 Mercantile Ave.  
Naples, FL 33942  
(800) 237-4510  
Requirements: IBM PC or compatible, 128K RAM, hard drive

VirusCURE PLUS—\$99.95  
International Microcomputer  
Software (IMSI)  
1938 Fourth St.  
San Rafael, CA 94901  
(800) 833-4674  
Requirements: IBM PC or compatible, 256K RAM

Virus-Pro—\$99.95  
International Security Technology  
515 Madison Ave., Ste. 3200  
New York, NY 10022  
(212) 557-0900  
Requirements: IBM PC or compatible, 640K RAM

Virus Checker—free on BBSs,  
\$5.00 from Leithauser Research  
Virus Stopper—\$10.00  
shareware registration  
Leithauser Research  
4649 Van Kleeck Dr.  
New Smyrna Beach, FL 32169  
(904) 423-0705  
Requirements: IBM PC or compatible

Virus Buster—\$129.00  
Leprechaun Software International  
P.O. Box 66903  
Marietta, GA 30066-0106  
(800) 521-8849  
(404) 971-8900  
Requirements: IBM PC or compatible, 256K RAM, hard disk with 700K free

Clean-Up—\$35.00  
shareware registration  
Sentry—\$25.00  
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Viruscan—\$25.00  
shareware registration  
Vshield—\$25.00  
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McAfee Associates  
3350 Scott Blvd., Bldg. 14  
Santa Clara, CA 95054-3107  
(408) 988-3832 (voice)  
(408) 988-4004 (BBS)  
Requirements: IBM PC or compatible, 320K RAM

Dr. Solomon's Anti-Virus Toolkit—  
\$149.95, then \$65.00/year for  
quarterly upgrades  
Virus Immunization Program—  
\$195.00/year for monthly upgrades  
Ontrack Computer Systems  
6321 Bury Dr.  
Eden Prairie, MN 55346  
(800) 752-1333  
Requirements: IBM PC or compatible, 512K RAM

VirusCide Plus—\$49.00  
Parsons Technology  
1 Parsons Dr.  
P.O. Box 100  
Hiawatha, IA 52233-0100  
(800) 223-6925  
Requirements: IBM PC or compatible, 512K RAM, hard disk with 240K free

Virus Prevention Plus—\$124.95  
PC Guardian  
1133 E. Francisco Blvd., Ste. D  
San Rafael, CA 94901  
(800) 288-8126  
Requirements: IBM PC or compatible, 512K RAM

Vi-Spy—\$149.95  
RG Software Systems  
6900 E. Camelback Rd., Ste. 630  
Scottsdale, AZ 85251  
(602) 423-8000  
Requirements: IBM PC or compatible, 128K RAM

The Norton Antivirus—\$129.00  
Symantec  
10201 Torre Ave.  
Cupertino, CA 95014-2132  
(800) 441-7234  
Requirements: IBM PC or compatible, 448K RAM

AntiVirusPlus—\$99.95  
TCP Techmar Computer Products  
98-11 Queens Blvd., Ste. 2C  
Rego Park, NY 11374  
(800) 922-0015  
(718) 997-6666  
(718) 520-0170 (fax)  
Requirements: IBM PC or compatible, 256K RAM

PC-cillin—\$139.00  
PC Rx (a software-only version of  
PC-cillin)—\$69.00  
Trend Micro Devices  
2421 W. 205th St., Ste. D-100  
Torrance, CA 90501  
(800) 228-5651  
Requirements: IBM PC or compatible, 9K RAM, one 25-pin parallel port (for PC-cillin)

# PRODUCTIVITY CHOICE

Get in on what could be tomorrow's standards with these new, original drawing tools.

William Harrel

## INTELLIDRAW 1.0

What do you get when you combine a draw program with rudimentary CAD and presentation features? IntelliDraw, the exciting new Aldus addition to the Windows draw-program market. But IntelliDraw is not just another vector graphics program. Sure, it sports a standard draw-program interface with Bézier drawing and editing, but it's also equipped with sophisticated technical drawing and simple animation.

Whether you need to create simple drawings to embellish reports or draw up plans to redesign the office floor plan, IntelliDraw will make your job easier and more fun.

It's a snap to install the program: Just fire up the installation program, and you're done. It is not, however, as easy to learn. IntelliDraw is powerful; you'll have to spend some time with it to master all of its rich, innovative features. Some of the pain of learning the program is assuaged with a well-done 90-minute training video that covers almost all the important features. After watching it, I understood IntelliDraw's sheer power and couldn't wait to get started. If you're serious about mastering it, however, you'll want to watch the video more than once—it covers a lot of territory.

Like most high-end draw programs, IntelliDraw supports multiple layer control, or layering. This feature lets you place objects or groups of objects on separate layers so that you can show and hide them or work on them separately. Layering is a must



when you are creating complex drawings. A palette of action buttons lets you lock objects on a page or link them to other objects as well as group and ungroup objects. The action buttons let you perform a number of functions simply; other programs require you to wade through endless dialog boxes to achieve the same results.

Unlike other draw programs, IntelliDraw lets you add as many pages to a project as you like, which is handy for creating multiple views of the same drawing for proposals and reports or for creating animations with the program's Flip Book option. And, memory permitting, you can work on an unlimited number of documents at once.

IntelliDraw's Toolbox is full of easy-to-use drawing tools, such as the Connector tool, which allows you to draw lines that automatically snap to and connect objects. Connections can be locked, stretched, rotated, or drawn at right angles. The program also introduces two new drawing tools, the Symmetricon and Connectigon. The Symmetricon creates symmetric

objects with a variable number of reflection points. In other words, if you set the reflection points to 4, when you draw in one direction, the object mirrors at three other points. There's no easier way to draw multireflected shapes, such as stars or pinwheels. The Connectigon is a polygon tool that automatically connects points of the object being drawn to points on other objects, allowing you to create complex shapes from multiple polygons. When stretched, attached polygons move together so you can sculpture shapes.

Another impressive feature is Auto Align. A pair of crosshairs follows your mouse as you draw, like automatic intersecting rulers. The crosshairs act as guides and run the length of the document window, allowing you to align the object being drawn to other objects. Auto Align also lets you arrange existing objects in relation to one another. When two or more objects are exactly centered, the guides form a cross over them. Unlike other draw pro-



grams (which use grids and an alignment dialog box to accomplish this), IntelliDraw doesn't make you turn off Auto Align to place objects freely, nor do you have to open a dialog box to align them. The crosshairs constantly inform you where an object is in relation to other objects in your drawing.

Keep Aligned locks objects into position in relation to other objects. Aligned, linked, and connected objects keep their relationship to their counterparts, no matter how you manipulate separate objects in the drawing. If, for example, you move a wall in a floor plan, the other walls, hallways, and doors stay connected and resize accordingly. This ability to automatically redraw connected objects makes IntelliDraw ideal for drawing simple CADlike diagrams, and layering allows you to get relatively complex. You can even assign measurement lines and figures that automatically adjust themselves when you resize elements in the drawing.

Yet another slick feature is the user-defined symbol library, to which you can add and delete objects. You can also edit symbols once they're defined. Symbols are linked. If you use the same symbol several times throughout your document, you can edit it once in the symbol library, and IntelliDraw will update every occurrence in the document. This is not, however, DDE or OLE and will not work across several drawings.

There's also a collection of intelligent clip art. You can add drawers to file cabinets or change the shapes of trees simply by double-clicking on them. For example, you

can change a pine to an oak with a couple of mouse clicks. Change a chair into a sofa by stretching it. No—you don't get a distorted, elongated chair, as you do with other clip art. This intelligent clip art actually converts the chair to a sofa.

Of course, IntelliDraw isn't perfect. Primarily because of the program's power, it's not always easy to locate functions. Many functions are original to IntelliDraw, such as creating duplicates (complete with connections) by pressing Ctrl and dragging with your mouse. Therefore many functions aren't necessarily familiar or intuitive. Unfortunately, there are some common functions equally difficult to locate—how IntelliDraw fits text on a path, for instance. Most programs have a simple command for this function. But IntelliDraw requires several steps that entail ungrouping a text block and then choosing a couple of other commands to achieve the same effect. In fact, this particular function was so obscure that I had to call Aldus for help. There is, however, a floating Info window (similar to some other programs' status line) that not only tells you the name of the tool or menu item the mouse cursor is pointing to, but which also suggests what you can use the item for.

An important drawback to mention is IntelliDraw's lack of support for color separations. Creating camera-ready art for multicolored documents could be a problem. You can, however, print separate layers, which will give you spot color separations.

Since IntelliDraw is supported by Silicon Beach, a subsidiary of Aldus, the technical support policy is different from

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the support policies of other Aldus products, such as PageMaker and FreeHand. The company's usual support policy is 90 days free and then paid support through subscription or a 900 number. IntelliDraw support, however, is free for an unlimited period. This is good news because this program will take you some time to learn.

Color separation and complexity issues aside, IntelliDraw is a great, innovative draw program, especially for just \$299. It fits neatly into most applications, except for commercial prepress. And there's an identical Mac equivalent, so it's easy to distribute drawings across platforms or on a network. IntelliDraw is a solid performer. Spend some time to grasp its power, and it will pay you back double. □

**IBM PC or compatible (80286 required, 80386 recommended), 4MB RAM, EGA or VGA, Windows 3.0 or higher, hard drive, mouse, Adobe Type Manager 2.0 (not required with Windows 3.1 or higher)—\$299**

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# ART WORKS

Robert Bixby

## CANDID SNAPSHOTS

What are your alternatives when you want to get images into your desktop publishing system? The hand scanner is the first option to explore. In fact, if the hand scanner has one single purpose for which it was clearly designed, it was scanning photos into a computer. (Here's a tip: Buy a small sheet of window glass or thick clear plastic, such as a clear report cover. Cover your photo with it as you scan it with a hand scanner. Using the glass or plastic results in a much smoother scan and reduces the possibility of scratching the picture.)

COMPUTE has covered both color and gray-scale hand scanners in reviews and Test Lab, so most regular readers are thoroughly familiar with these options.

Another alternative is the flatbed scanner. These scanners have been available so long that they've begun to appear regularly among resellers' wares. You can find a wide selection of good quality discontinued flatbed scanners

**Taking snapshots with your computer has never been easier.**



for about the same price as new hand scanners.

Watch out for outdated features lists when looking over this hardware (you'll probably want gray scale as a minimum capability; if you can get color or OCR with the scanner, you'll value either of these).

Recently, I had the pleasure of reviewing three pieces of imaging hardware. First, and by far the most expensive and capable, was the Canon CJ-10 color scanner, printer, and copier. It's based on the Canon color copier. If you make color copies, it's likely that you've seen this unit in action. It's essentially a 400-dpi color ink-jet printer bound to a high-resolution color scanner.

To turn the color copier into a desktop computer peripheral, Canon added a control module on which the copier stands and a SCSI interface card for your computer. Using Aldus PhotoStyler, you can scan in images, edit the images with a full range of tools, and then print the images.

One drawback to the system is that it uses special paper. This seems like an unfortunate limitation for a machine that costs almost \$8,000. If, however, you are doing color proofs and standard-width (8½-inch) paper is adequate for your purposes, I think the printer does a better job than the Tektronix Phaser, which is currently a standard in color proofing. And the Tektronix doesn't scan. It only prints.

But what if you don't want to capture an existing photograph, but you do want to get started in the art of electronic photography? Electronic cameras have arrived. Canon makes the Xapshot, and Logitech makes the Fotoman. If you aren't interested in conventional photography and you don't mind being tied to your computer, you might consider purchasing a black-and-white

television camera (Damark has advertised a surveillance camera for around \$200) or using your camcorder camera in combination with Digital Vision's long and growing line of image capture boards for the PC. Another option is Electrim. Electrim recently sent me two cameras for capturing images. The EDC-1000 digital camera captures gray-scale images of 192 x 330 pixels (\$400). The EDC-1000C captures color images of 751 x 488 pixels (\$950). As you will guess from the number of pixels involved, the 1000C will not work with a standard VGA card, although Electrim is working on more flexible software that will enable the color camera to be used with standard VGA systems at reduced resolution. Electrim also manufactures a high-resolution 753 x 488 pixel gray-scale camera, the EDC-1000HR (\$850), which also requires Super VGA for full performance but will operate at lower resolution with standard VGA.

There is nothing fancy about the systems. All you get are a camera head (a tiny black box about half the size of a bar of soap), a cable, a card, and image-capture software. More sophisticated image-editing software is available from Electrim for the EDC-1000 for an additional \$150. If you're interested (as I am) in capturing three-dimensional, real-world images making use of lighting techniques, these cameras will serve you very well. The high-resolution systems require at least 800 x 600 resolution at 256 colors. Electrim markets a Genoa Super VGA board for \$190 that will fill the bill. Lenses are sold separately (\$50 for a 16 mm, \$60 for an 8 mm, and \$180 for a 12-75 mm zoom lens). For more information, contact Electrim, P.O. Box 2074, Princeton, New Jersey 08543; (609) 683-5546. □

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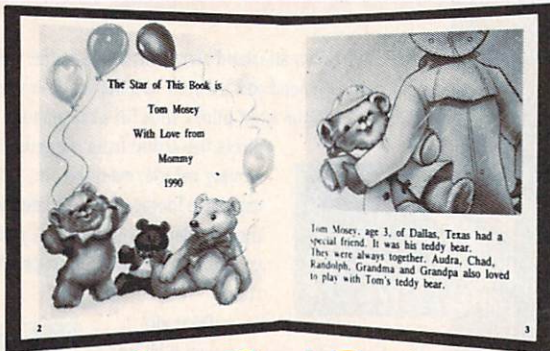
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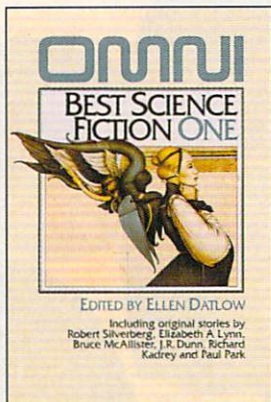
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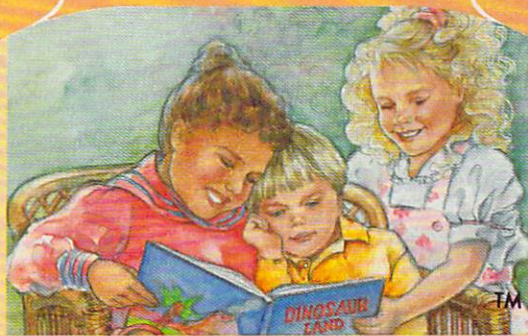
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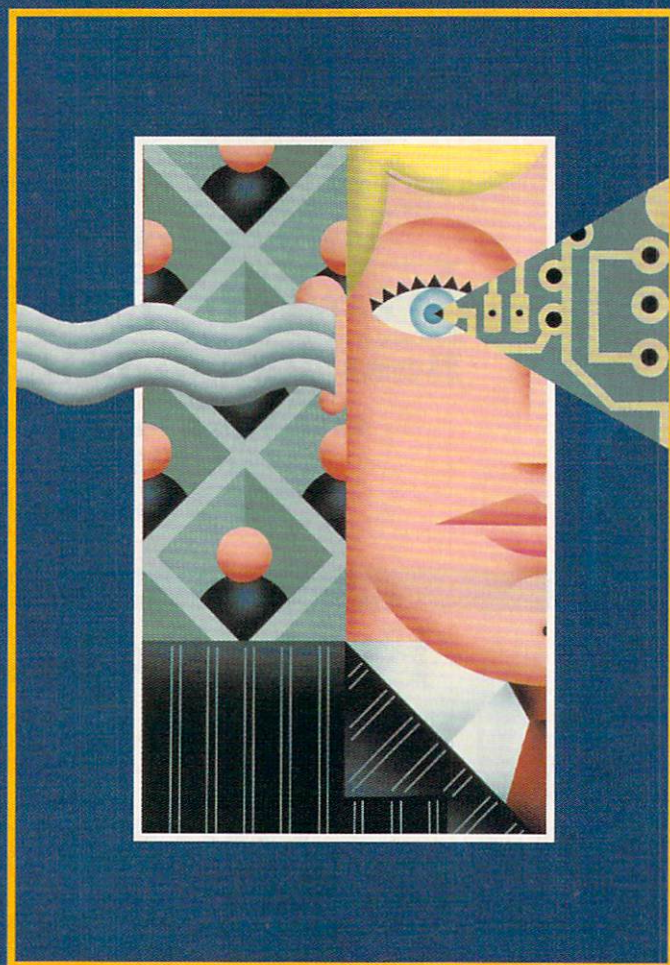


ILLUSTRATION BY JOSÉ CRUZ

**DROP-KICKED INTO IT, YOU HAVE TO START WITH A PLAN.**

## **ON YOUR OWN**

Back in the seventies and eighties, starting a business from home had an aura of mystery and glamour. Bright, young entrepreneurs taking on the stodgy corporate world. The two Steves starting Apple Computer from their garage. Ben & Jerry's. That sort of thing.

Nowadays, with America's corporations downsizing and the economy slowing to a crawl, starting a home-based business has become more of a necessity than an adventure for millions of reluctant entrepreneurs. Today's home business owners are less likely to be high-tech whiz kids chasing the American Dream than fortysomething out-of-work former corporate employees with mortgages and kids. While they may

**ARTICLE BY ROSALIND RESNICK**

fantasize of one day getting rich, for the most part they're content just getting by. Often, the transition from office-based employee to home-based entrepreneur is a difficult one. Apart from the marketing, capital, and cash flow problems endemic to any startup business, there's also the potential for loneliness and isolation.

But a growing number of people are stepping off the corporate track and starting businesses from home—people as diverse as Atlanta greeting card designer Lee Grey, Kentucky freelance writer Peter Lloyd, and California horse breeders Ken and Eugenie "Oogie" McGuire.

Grey, 31, formerly a software engineer, put his consulting projects on hold in June to devote his full attention to his fledgling business. Lloyd, 45, quit his job at an ad agency nearly three years ago to start a freelance writing business that includes radio voice-overs and commercials for car dealers. The McGuires, a husband-and-wife business team, still toil at full-time day jobs while building their business on the side.

And what about you? Are you still sitting on the sidelines, afraid of leaving your dead-end job to leap into the unknown? Or has your boss already made that decision for you?

Here's a guide to starting your own business from home:

1. Choose a business. There are hundreds of businesses you can start from home—everything from desktop publishing and computer consulting to running a mail-order company. The key is to find the business that's right for you, the one that will turn your own unique blend of skills, experience, and interests into a profitable company selling products or services the marketplace demands.

It's also important to find out if working from home on your own is right for you. If you're the sort of person who needs a boss looking over your shoulder, then working from home may not be right for you. Supportive friends and family members are also important—especially when you're starting out and clients aren't yet banging down your door.

Lloyd says that after he quit his ad agency job, he got lots of calls from headhunters trying to lure him back to the office-based world. Fortunately, he says, his wife wouldn't hear of it.

"She said, 'Now, don't you dare take that job,'" Lloyd recalls.

2. Consider the legal implications. Do you need a permit or an occu-

## Common Sense

Thinking of starting a business from home? Often, the little things mean the difference between success and failure.

Here are some tips from Chuck and Sue DeFiore of DeFiore Home Business Solutions, a consulting firm in Rancho Cordova, California, that specializes in advising small and home-based businesses.

1. Read, read, and read some more. That's the only way to keep learning about your business—and yourself. Become a compulsive reader, reading things other people ignore. Don't stop reading when you think you've run across something that has nothing to do with your business.

2. Pick a business name that describes what you do. A name that doesn't tell what products or services you offer can hurt your efforts to get your business off the ground. Avoid using just initials until you get as big as, say, AT&T. Also, when the time comes to create a logo, leave the abstract symbols to the faceless multinationals. Your logo should say what you do.

3. Sock away some money for a rainy day. Few businesses are profitable from day one. That's why it's important to have at least six months' living expenses in reserve before you quit your job and take the plunge.

pational license? Will you be required to register your business, get a tax ID number from the Internal Revenue Service, or file articles of incorporation? Check your local zoning laws, too. Many communities frown on home businesses in residential neighborhoods but make exceptions for professionals such as doctors, lawyers, artists, and writers. As a rule, retail stores and manufacturing operations run from home are taboo.

3. Make a business plan. Most people wouldn't think of setting out to visit Aunt May in Iowa without a road map, but many entrepreneurs set out in their new ventures without even the sketchiest business plan. That's often a mistake because a well-written business plan can establish your company's goals and help you achieve them. When writing your plan, ask yourself what business you're really in, how market conditions can

affect your business prospects, and how you intend to marshal the human, financial, and technological resources at your disposal.

"Drafting a business plan was vital," Oogie McGuire says. "We're looking at such a long time frame from starting our business to being profitable that, without the business plan, I wouldn't be able to judge if we were going in the right direction."

When it comes to writing a business plan, there are plenty of helpful files available online in places such as CompuServe's Working from Home Forum. There are also a number of off-the-shelf software programs that walk you through the steps of creating a professional-looking business plan. These include How to Write Your Own Business Plan, BizPlanBuilder, Entrepreneur Magazine's Developing a Successful Business Plan, and Tim Berry's Business Plan Toolkit 4.0.

How to Write Your Own Business Plan consists of four sections. First, a questionnaire containing approximately 200 questions covering every phase of business operation helps the user understand what a business will require and whether it's likely to succeed. The second part of the software is aimed at projecting profits and losses to determine where the break-even point will be. This part of the software allows you to play what-if, so you can see the effect of unexpected events.

The third area walks you through writing your business plan. It includes sections such as Mission Statement, Competition, and Research and Development. The fourth section contains a sample business plan.

How to Write Your Own Business Plan was created by Max Fallek, a member of the Small Business Administration National Advisory Council and author of *How to Set Up Your Own Small Business*.

BizPlanBuilder is a set of templates to be used in your own word processor and spreadsheet. The business plan itself is prewritten in the form of modules, many of which are applicable in most situations. There are built-in comments providing ideas, suggestions, and questions to help you decide what information to include in your business plan. All you have to do to create the actual business plan is to fill in the relevant details and values in the files where XXX appears in the examples. The file format is a generic one that can be imported into most word processors. The financial spreadsheets help you make projections based on your best



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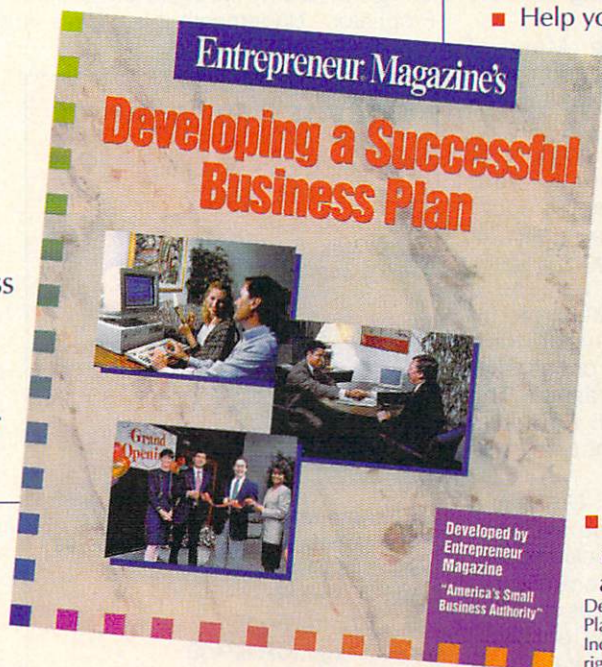
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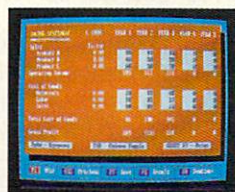
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guesses about how your business will grow. To supplement these libraries of text files and spreadsheets, the manual includes a reference that explains many of the terms used and the strategies you should employ.

Business Plan Toolkit 4.0 follows the pattern of providing worksheets for use with your figures, but its approach to the actual writing of the plan is a little different. Instead of providing a boilerplate business plan to be edited, Palo Alto Software provides a business plan processor—sort of a cross between a database input form and a word processor—that lets you use your own language in your business plan while making sure the words are in the right place.

4. Line up financing. Many of today's big businesses started out on a shoestring. While banks often hesitate to loan money to small, untested businesses, there are other sources at your disposal—your savings, your credit cards, the equity in your home, your retirement plan, or even your parents' nest egg.

Your suppliers can also be a source of credit. The McGuires, for example, bought many of their Arabians at rock-bottom prices after the horse market had crashed. The sellers were more than happy to provide generous payment terms with little money down.

5. Invest in technology. Unlike in a corporate office, there's no secretary to type your memos, no bookkeeper to keep tabs on your accounts receivable. That's why it makes sense to leverage your efforts by enlisting technology to do these clerical chores for you. Most likely, you'll need a computer, some kind of word-processing and financial software, an answering machine, a telephone with speed dial, a fax machine, possibly a modem, and a copier. While that may sound like a tall order, with PCs and fax machines plunging in price, you can probably get everything you need for under \$2,000. (See "Quest for Perfection" in the June 1992 issue of COMPUTE for more information about assembling the perfect PC for various home business applications.)

Oogie McGuire says she tracks her business with an Excel spreadsheet and a specialized database program that keeps tabs on her horses' health records and expenses. "I know to the penny how much it costs per horse to produce," she says.

6. Polish your image. Professional-looking business cards and stationery often separate the successful companies from the wannabes. Remember: Being small doesn't mean

you have to look small-time. Luckily, there are numerous desktop publishing programs on the market that make creating good-looking letterheads a snap. (Check out "First and Lasting Impressions" in the May 1992 issue of COMPUTE for pointers on putting together your own business documents and designs.) And if graphic artistry is not your forte, you can always hire a professional to do the job for you.

Grey, the greeting card designer, helps promote his colorful, computer-generated cards with a business card that reads, "Grey Matter," in boldface type, followed by the words, "A Huge Conglomerate in the Mind of Its Sole Proprietor." Underneath this phrase is

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Business Plan—\$125.00  
American Institute of  
Small Business  
7515 Wayzata Blvd., Ste. 201  
Minneapolis, MN 55426  
(800) 328-2906

a showy black ink blot.

7. Set up your office. It's important to set aside a place where you can work in peace and your business proposals won't accidentally get tossed out with yesterday's newspapers. A good-size desk, a comfortable chair, a file cabinet, and a well-stocked bookcase are all important aspects of a successful home business. You'll get more work done if your surroundings look businesslike.

8. Decide on a work schedule. One of the advantages of being your own

boss is that you can set your own hours. Even so, it's important to set up a daily work schedule to give yourself some discipline. And if your clients are large companies, you may find yourself working business hours in order to accommodate them.

Actually, many home business owners don't run into trouble because they work odd hours or too few hours but rather because they work too many hours. Working long and hard can be a key to success, but if you don't pay attention to your personal need for rest and recreation, you might become a drudge. Drudges get the work done, but they often lose their creative edge, along with the self-confidence and energy needed to take on challenges. With your PC only a few steps away, it's tempting to spend all day (and all night and all weekend) toiling away. Remember to take breaks.

9. Market your services. No matter how terrific your business plan is, the world generally won't beat a path to your door unless you get out and do some marketing. While you may not have the money to take out a big ad in the *Wall Street Journal*, you can get yourself noticed by lecturing about your specialty to local business groups and networking within your industry.

If you have a modem, consider logging on to CompuServe and joining the Computer Consultant's Forum and the Working from Home Forum. McGuire says she's even used CompuServe to meet potential buyers for her horses and mules.

10. Plan for the future. While much of your time will be taken up with the day-to-day concerns of running your business, it's important to have a long-range plan. That will probably mean expanding your business (unless you're committed to staying small), either through hiring employees and moving into office or warehouse space outside your home, teaming up with another company in a joint venture, or selling stock and going public. You may also want to consider selling your business someday.

While nothing you do will necessarily guarantee the success of your home business, following the ten steps listed above will give you a fighting chance. The most important thing to remember, seasoned business owners say, is that you shouldn't give up. No matter who you are or how many things you do right, there's nothing you can do to stop a market from shrinking or a major client from filing for bankruptcy. Even Apple Computer wasn't built in a day. □



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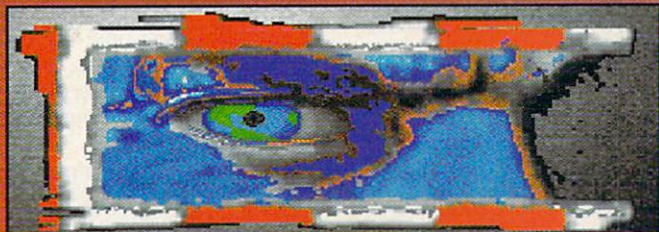
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Circle Reader Service Number 204

# PERSONAL PRODUCTIVITY

Daniel Janal

## WARRANTIES

You're racing toward a deadline when your monitor blanks out, your hard disk crashes, and your fax card is on the fritz. Who's going to pay?

That depends on what your warranty says. A warranty is an obligation to repair something or replace it for free for a fixed period of time. Warranties are part of every computer and software sale. But if you read them closely, you'll find that warranties are very unique and individual. There is no universal code of law or conduct that covers computer parts, supplies, and maintenance contracts or service agreements.

Except in a few states, customers have no specific minimum rights to warranties or maintenance contracts. The Uniform Commercial Code makes some protections for the consumer, such as that the goods must be of an acceptable standard, but the manufacturer can disclaim that provision.

"You'll always find the UCC disclaimed. Instead you'll find a limited warranty, a money-back warranty, or a store warranty. You get a limited warranty and little else," said New York area attorney Lance Rose, who wrote the book *SYSLAW*, a guide to the law for bulletin board operators.

Your rights vary from seller to seller. Here are some questions you might ask the dealer about the warranty.

- How long is the fixed period of time?
- Who will pay for the delivery and return of the product?
- Will the work be done at your place or theirs?
- How long will repairs take?
- What are you supposed to do in the meantime?

According to Rose, to be a fully informed consumer, you should know the answers to

these questions. If you don't know the answers, you might find out the hard way.

"Buy from someone who offers a money-back guarantee or who offers to replace something if it is defective within a reasonable period of time, such as 30-60 days," says Rose. "Also, make sure the seller pays for shipping and that there is no restocking fee."

If the company doesn't honor its claims, you can complain to the Federal Trade Commission or to local or state agencies.

The best way to protect yourself from all warranty problems, according to Rose, is to pay with plastic. "If you have a legitimate dispute, call your credit card company and refuse to pay when you get billed," he says. The credit card company has a resolution process that manufacturers will abide by. "It is the best possible remedy you have."

When you buy your equipment, the salesperson might ask you to buy a maintenance contract. A maintenance contract is an operational understanding between seller and buyer. "You don't have any implied warranties. This is a straight contract. You get what it says, and you don't get what it doesn't say. If you want your equipment back in a month after taking it in for repairs, you need to have that written into the contract," Rose advises. "You have to look closely at the terms of the deal. You cannot presume anything. You have to look at whether repairs are done on site, by mail in, or by some other method. Will they give you a loaner? Reimburse you for shipping costs? How will they ship? How long will it take to repair? You need to know."

A software maintenance contract should spell out such details as how many hours of tech-

nical support you will receive and who will provide service.

"You should check out providers of maintenance and find out if the people are experienced," Rose said. "Maintenance can be done well, or it can be done badly."

"Take into account how long you plan to use it," he says. "For a lot of equipment, a maintenance contract for a year or two might be too long because you can buy a new piece for a price that's in the same range as the contract price."

As computer prices fall, computer manufacturers are using service and warranties as selling points.

For instance, Gecco Computers offers a two-year warranty on all parts, even monitors. It also offers two-year on-site service on all its sales. Dell Computer has a one-year warranty and an optional four-year extension. IBM offers a three-year warranty for its new family of premium PS/2 computers, three years of on-site service, and a four-hour average response time. Its older PS/2 computers carry a one-year warranty.

Whatever the warranty states, follow these rules.

1. Keep your boxes so you can safely ship the product back to the manufacturer or to a repair facility.
2. Check the parts immediately upon receiving them to see if they work properly.
3. Keep all paperwork, such as receipts, warranties, and contracts.
4. Make sure you have all claims from the manufacturer or store representative in writing.
5. Pay by credit card because the credit card companies will hold payment and investigate claims.
6. Deal with established companies who will be around long enough to honor their warranties to the letter. □

**Be sure you know what you're getting when you sign up for a service contract.**

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# DISCOVERY CHOICE

Gain a new appreciation for history with this detail-rich text adventure.

David Sears

## TIME RIDERS IN AMERICAN HISTORY

How many dishes did the average Puritan woman have to wash after Sunday dinner? Who held the higher rank, Sitting Bull or Crazy Horse? Enquiring minds want to know, because the despicable Thanatopsis Dread has stolen a communications satellite and now beams warped, tabloidesque newscasts down to an unsuspecting public. "Teenage mutant babysitter gets hit with pie in face before taking oath as first U.S. president!" Dread's trying to rewrite history. He seeks nothing less than world domination. This is Time Riders in American History, and your mission is to discover the truth and tell the world before Dread succeeds.

You are a team leader—one with a lot of work ahead. You know the occupation of the first president wasn't babysitter; it was general. But how do you tell the world? And when you know a newscast is fishy, where do you look for the truth if you can't quite put your finger on it?

The last time many of us studied history, we probably studied it along with 50 other equally uninterested college freshmen or high-school seniors. Who cared what happened when? We looked the future dead in the eye and pinned our hopes on ideal jobs. The past could remain unread or forgotten. Besides, didn't we know enough facts already?

George Orwell didn't think so, and if you've read his work, you might agree that a



sense of history would serve both his characters and our own American society well. Sit down with Time Riders for just a few hours and fill in the gaps. Don't expect a smooth trip—the surprising potholes in your memory can jar you wide awake.

Never mind that The Learning Company targets kids 10–17 as potential game players; the data here belongs to us all. Before you finish a mission, you'll know who invented the phonograph from who invented the telephone. You'll know that Puritan families shared a single pewter plate at dinner and had only one chair in their homes. You'll even know that Sitting Bull outranked Crazy Horse. If you already know all these things, your kids may not. Let them have a turn at Time Riders, and they'll play for hours, gaining an appreciation for an often shunned subject.

You'll have a lot of work cut out for you if you choose to play. Your team of crime solvers includes a time line savant named Amanda and a mapmonger named Josh, both of whom prove very helpful in collating historical data so that you can make an informed choice (or at least an

educated guess) regarding past events. The real time traveler of the group—a feline droid called KAT (short for Knowledge Access unit)—will actually visit the past to snare a few interviews with the people of the day.

After each dreadful newscast, you visit Amanda's room; she keeps her Time-Line unit there. Make a logical first choice from the descriptions of four eras that the machine displays. Obviously, some knowledge of American history helps at this point, but a close reading of the descriptions will help most novice historians select the proper era. Once you've made your selection, you'll have to choose a period and then a specific year. This way, you reduce the game's span of more than 400 years (1492–1905) to a specific moment in time. If Amanda agrees with your selections, she sends you to Josh for some historical orienteering. If she doesn't, you may try your luck with the Time-Line unit again.

Certain of his topology, Josh can help you find the exact spot an event occurred, no matter when. Using his GeoFax machine, you scroll

across a relief map of North America. Where was the O.K. Corral? Where exactly was the battle of the Little Bighorn? Click on the Overlay button to drop a net of data over the otherwise unhelpful images—plains suddenly become the homes of Indian nations; stretches of the Wild West resolve into constituent states. Every clue helps when you must locate a pin in a very large hayfield—in this case, a whole country. When you pick your spot, head to the TimeTube to dispatch KAT to the past for interviews. Don't worry if Josh cautions against your choice of event locations; before KAT leaves, you may reconsider them. Time Riders doesn't follow a point system. Instead, naturally, you work against time. Too many mistakes on your part, and Thanatopsis Dread takes the world.

Once in the workroom, you just pull the launch lever to send KAT on her way to the past. When she returns, she flops over and folds up—a disturbing effect at first. But she does this only to project her recorded holographic interviews. These interviews grant you an insider's perspective on history. And rather than presenting mere facts to read, the holographs make you feel almost as if you were gossiping with your neighbors.

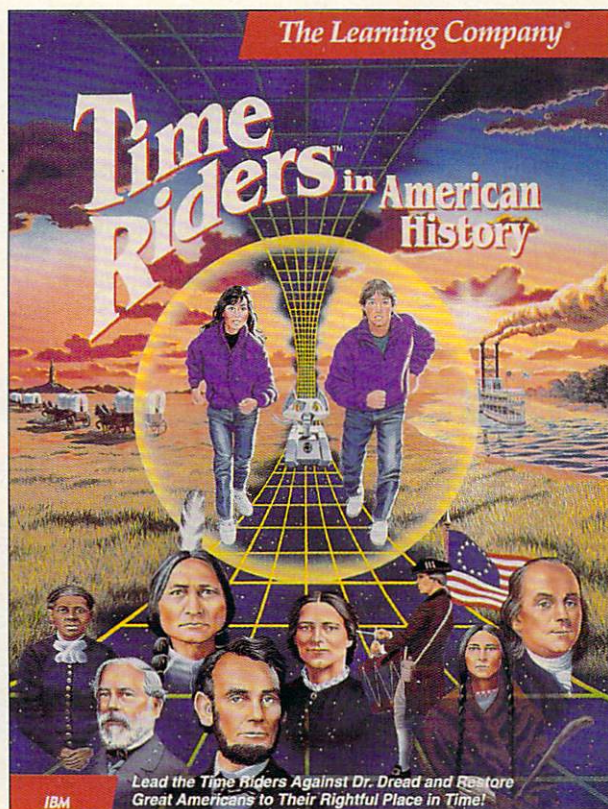
As soon as you've gathered enough details to successfully operate the Biodata machine, you can choose your man (or woman). The list of historical figures ranges from settlers to Chinese immigrants to Apache warriors. If you didn't know that you were after George Washington, you might need every clue KAT's interviews could

provide just to limit your options to a manageable few.

To further narrow the field, you might adjust the Biodata parameters to screen for gender and occupation. A search for a female social reformer consumes considerably less time than a sweep of all the biographical entries—time you must conserve in order to make the necessary data uplink with Dread's news satellite. Miss the window, and you'll have to wait for tomorrow's news to try again.

Time Riders acquaints you with more than just major events. The weirder parts of history lurk there, too, like this entry found under the era heading 1824–1854: "Dangerous hogs ran wild in most cities. Hogreeves walked two by two scouting hogs. Used rattles and brute strength to shoo hogs away." Rattles? Brute strength? Who were these mighty men, these hog wrestlers? Did any of them suffer fatal injuries on the job? Time Riders turns up these data gems, but gameplay may never reveal enough information to satisfy a piqued interest. Not quite a hypertext game, Time Riders fails on only one count: It moves where it will, not necessarily where you need to go. On the other hand, nothing prevents you from consulting a respectable encyclopedia for further information, and a "read through" option could easily deflate the fun here.

The colorful Biodata portraits of the historically significant make a fine addition to the game's detailed maps, and the browse function puts an abridged life story for each figure at your fingertips. Confident you can match the correct date and place with



the correct face? Skip the interviews and save some time; go to the Biodata machine and choose your person. After the uplink, you'll know for certain. Dread's skewed headline goes through, or your accurate one airs. To borrow from Poor Richard (you'll run into him more than once in the game), "Haste makes waste." Any discrepancies in date, place, and person cause Dread to gloat.

Best of all, Time Riders doesn't exclude minority groups. It does an exemplary job of including historically significant women, African-Americans, and Native Americans. This is one well-rounded text adventure worth the time of any enquiring mind. □

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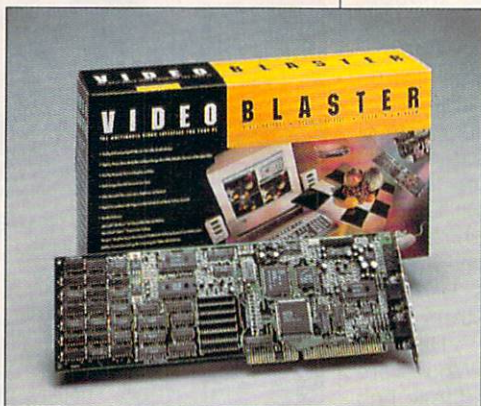
# MULTIMEDIA PC

David English

## CUT AND PASTE VIDEO MOVIES

Wouldn't it be great if you could hook your VCR or camcorder to your PC and bring video directly into Windows? Wouldn't it be even better if you could save that video to your hard drive and then cut and paste the video into your Windows documents just as easily you can cut and paste words and numbers into your word processor and spreadsheet files?

With the Video Blaster and AVI, you can capture a video movie, save it, and embed it in your Windows documents.



Sound far-fetched? Not anymore. You can do this now by combining Microsoft's new AVI software package with a Video Blaster card (Creative Labs, 1901 McCarthy Boulevard, Milpitas, California 95035; 408-428-6600; \$495). It's so easy that you'll soon have video movies with your kids waving to you as they say "Good morning, Dad" or "Keep up the good work, Mom." You could even send a Word for Windows file to your sister in Alaska with your New Year's greeting at the top of the page.

I wrote last month about Microsoft's new AVI (Audio Video Interleaved) software package. It should be shipping under the name *Microsoft Video for Windows* by the time you read this. AVI lets you run full-motion video in Windows 3.1 with no ad-

ditional hardware—other than a sound card if you want to hear the video's synchronized sound. On the downside, AVI movies run at 15 frames per second (rather than the 30 fps that's standard for most video), your videos usually run in a 160-pixel-by-120-pixel size window (just one-eighth of a standard screen), and the files can be extremely large (even compressed, a 30-second video can use up four or five megabytes on your hard drive). If AVI goes over as well as QuickTime, a similar technology on

the Macintosh, we'll soon see disk- and CD-ROM-based programs with lots of AVI files you can play with.

But what about making your own video movies? With a Video Blaster and a video camera, you can capture your own

full-motion video and, using the AVI utilities, save it to your hard drive as an AVI file. You can then use your standard Windows tools, such as Media Player, to work with your new video file. You should also be able to cut and paste your videos into any OLE-compliant Windows application.

Even without AVI, you can use the Video Blaster to save individual video frames in BMP, Targa, TIF, PCX, MMP, and EPS formats and display (though not save) a full-motion video in any size—from icon to full screen. A captured image can have as many as 2 million colors, but it can't be any larger than 640 pixels x 480 pixels. You can freeze, crop, resize, zoom, and scale single-frame images, as well as adjust their hue, saturation, brightness,

and contrast. A JPEG (Joint Photographic Expert Group) compression kit lets you compress your captured images to a fraction of their original size.

You also get a generous selection of DOS and Windows utilities that let you test your Video Blaster's setup, adjust its settings, and switch among its three video sources (these can be any combination of composite-video sources, including VCR, video camera, videodisc, and broadcast video) and four audio sources (microphone and line-in from the Video Blaster card, and FM and line-2 from a Sound Blaster or other sound card). You can mix the four audio sources with the software-based stereo audio mixer. And to get you started using your video in multimedia presentations, the package includes Macromedia Action, Temptra Show, Temptra GIF, and a handy utility, called MMPlay, that lets you combine animation with live video.

The Video Blaster card takes up a single 16-bit slot and requires Windows 3.1 and a VGA or Super VGA card with a feature connector. Not all VGA and Super VGA cards have a feature connector, so be sure to check with your dealer or with Creative Labs to be sure your card is compatible. (Media Vision is working on a similar AVI-compatible video card, called the Pro MovieSpectrum, which won't require a feature connector.)

In the future, you can expect to see inexpensive video cards with built-in compression chips that will dramatically speed up your AVI files. These chips will allow you to expand the size of your video windows to half or full screen and switch to the preferred speed of 30 frames per second. This compression technology will enable us to overcome the next big hurdle in the transformation of the PC into a multimedia workstation. □



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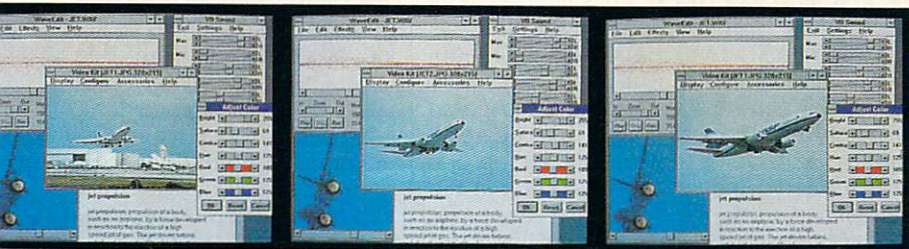
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# ENTERTAINMENT CHOICE

*You'll marvel at the fluid animation and cinematic effects you see as you make your way through this acclaimed action-adventure game.*

Alfred C. Giovetti

## OUT OF THIS WORLD

The spatters of rain on the wind-screen obscure the view of the small road leading to the door to the underground linear accelerator laboratory. The driver of the car shields his eyes from the explosion of white light as lightning blasts the ground too near the car for comfort. As the man's hearing clears from the roar of thunder, he begins to hear the screech of brakes that bring the sleek blue sports car to a halt near the aboveground entrance.

The entrance opens quickly as the electronic surveillance identifies the would-be intruder as one Professor Lester Chaykin, a brilliant, young, crimson-haired scientist who is returning to complete work on experiment 23. He moves quickly to the desk and fires the particle down the mile-long tube which terminates in the chamber above the desk. As the particle travels down the chamber, lightning strikes and penetrates the tube. The lightning and particle mix and race to the chamber. Immediately upon impact, the chamber, the desk, the man, and some other items disappear from our world, traveling a dimensional rift to appear 20 feet below the surface of a lake in Another World.

Thus begins Eric Chahi's second hit computer game, which was two years in the making. The first, *Future Wars*, skyrocketed the small, French-owned Delphine Software into international fame in its partnership with Interplay Productions. This new success, *Out of This World*, was



first released in Europe under the title of *Another World* and has already won nothing but accolades and awards. It's an action-adventure game that requires thought in addition to quick reactions.

As with *Future Wars*, the most striking thing about *Out of This World* is its use of cinematic techniques such as zoom, panorama, closeup, and scaling shots. The opening scene is well orchestrated and similar to the beginning of a movie, with all the elements necessary to set the scene and build suspense. The scene where Chaykin arrives on the planet uses multiplane animation of up to six planes, similar to Disney animated films.

There are several levels of action, with the protagonist in the foreground plane, a carnivorous beast tracking the hero in one plane of the background, and even the moon on the farthest plane. *Out of This World* comes very close to being interactive cinema—quite an accomplishment, considering its 16-color, predominantly blue-, black-, and gray-

shaded palette. Chahi is a true artist and an avid movie buff, and his study of the cinematographer's art has resulted in the flawless execution of the beautiful, highly detailed scenes that can only be referred to as art in action.

The animated characters are clear, sharp, and distinct portrayals that seem to be living, breathing creatures. This may be the first time flight simulator-like filled polygons have been used in an action-adventure game. The polygonal graphics do not move to represent the 3-D presentation of a static item but instead are adapted to portray in two dimensions the living bodies of the characters and monsters. By changing the location of the point that defines the lines of the polygons, the characters' movement is uniquely fluid. It's a flowing animation technique, one surprisingly realistic in its representation of the true movement of living tissue.

*Out of This World* is a combination of action and logical, satisfying puzzles. You move from the point of entry in the

world to the point where our hero liberates a world from slavery by his own struggle to be free of bondage. Many of the head-slapping puzzles link one screen to another with the use of logical clues that keep you coming back for more realtime action. One puzzle requires you to observe an alien guard on another level—or, rather, observe his reflection on a metal ball. At a precise moment you must shoot the ball so that it drops on the guard. It takes timing and precision, but it isn't impossible. If you think through most puzzles, you'll eventually gain the satisfaction of completing them.

Another integral part of *Out of This World* is the effective use of the alien handgun, a combination shield, blaster, and explosive fireball generator. Knowing when and how to both use and recharge this weapon determines your failure or success. You use the gun to outwit the guardians and monsters. The pistol energy shield blocks blaster rays, while fireballs blast through doors, rock walls, and other energy shields.

As in other action-adventure games, such as *Gods and Prince of Persia*, *Out of This World* has aspects of both the realtime arcade game and the graphic adventure. These side-scrolling, fast-moving games require you to think on your feet, or at least on the edge of your chair—action and fast reflexes alone are not enough to traverse the labyrinth of screens to the winning cut scenes. Even combat in *Out of This World* is a blend of puzzle and realtime action.

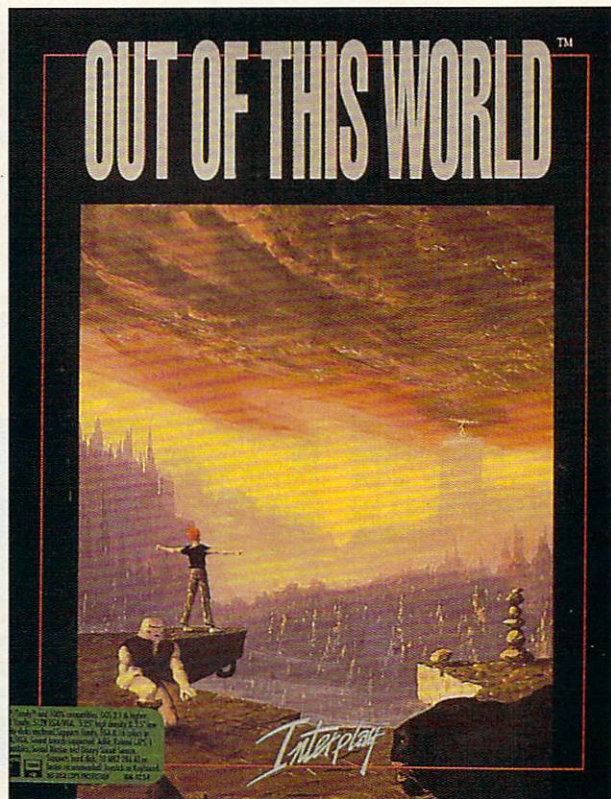
*Out of This World* is sprinkled with cut scenes, where

the course of the action is taken over by the computer, and you become the observer of a short movielike sequence. These cut scenes add to the game's cinematic quality and increase your involvement in the plot, which is in turn enhanced. The winning cut scene is very satisfying and is of sufficient duration to reward you handsomely for your efforts.

Like any other good role-playing or graphic adventure, *Out of This World* has a save-game feature. By pressing the C key and inputting one of a series of codes at any point in the game—even for a short time after the main character's death—you can restore the game to one of many corresponding critical points in the plot. The codes are revealed to you after you've successfully traversed these areas of the game. The save and pause features in action adventures make the games more enjoyable, for they alleviate your having to return to the beginning of the game each time you attempt to successfully traverse the game screens.

Music for most versions of the game includes a balanced and entertaining introduction, ending, and score mixed in Delphine's own music studio. Over 140 fully digitized sound effects are used to punctuate the action and keep you involved with the plot. While keyboard or joystick control is supported, the joystick provides better control.

The only black mark I gave to *Out of This World*, except one for its brevity, is for its arcane, color-coded, symbol-based, codewheel. I had trouble using the codewheel, even after receiving instructions



from the folks at Interplay.

What makes *Out of This World* so spectacular? Its satisfying blend of realtime arcade action, cinematic techniques, logical and workable puzzles, unique application of filled-polygon graphics, excellent use of color, artistic graphics, engaging story, and personality-filled characters. Besides, it's great fun. Many people will play it to completion just to see one more beautiful cut scene.

*Out of This World* clearly rivals any first-rate film production in its production quality and entertainment value. If you miss this highly acclaimed, award-winning action adventure, you'll never forgive yourself. □

**IBM PC or compatible (10-MHz 80286 or faster recommended); 512K RAM (EGA or VGA) or 640K RAM (Tandy); Tandy 16-color, EGA, MCGA, or VGA; hard disk recommended; supports Ad Lib, Roland LAPC-1, Sound Blaster, and Disney Sound Source—\$59.95**

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# GAMEPLAY

Paul C. Schuytema

## IF YOU CAN'T BEAT 'EM, MODEM

Playing against the computer is great, but victories either seem to come too easily or are nearly impossible after a while. What's needed is a true flesh-and-blood opponent. Thankfully, head-to-head (human versus human via a modem link) capability is now being included in a large selection of really great games.

I've always been a fan of flight simulators, and now more and more of them come

ter Falcon, but Knights makes up for its graphics with incredible playability. Hours melt away when you're playing. In Knights of the Sky, you're given a choice of Allied and German planes to fly so you can set up a handicapping system based on the abilities of the plane, placing an advanced player in a primitive plane.

If flight sims aren't your cup of tea but you like the war genre, check out Perfect General (QQP, 1046 River Avenue, Flemington, New Jersey 08822; 908-788-2799) and the WWII Battle Set for historical war gaming.

This war game places you in a generic WWII setting. The interface is a wonderful evolution of the old hex-grid war games of the 1970s. When you're playing against a modem opponent, the game takes

on a new dimension: line of sight and hidden troops. It's very spooky to see a line of enemy tanks suddenly appearing from behind a grove of trees.

If you prefer your war gaming to be more abstract, check out BattleChess (and the soon-to-be-released BattleChess 4000) for Windows (Interplay Productions, 17922 Fitch Avenue, Irvine, California 92714; 800-969-4263). The animations of battle coupled with the unpredictability of a real opponent work perfectly together. And for some deep psychological reason, seeing the pieces duke it out and knowing that there's another human on the other end make victory mighty sweet (and losing almost bearable).

If war gaming isn't your style, there are a couple of

great addictive word games out there. Wordtris (Spectrum HoloByte) and Lexicross (Interplay Productions) offer special delights in modem play, if words are your thing.

Most of these games contain a small communications program, allowing you to dial and answer. If you have a friend who owns the game, call your friend and get one computer ready to receive the call and the other ready to send. Hang up and let the computers do the work (the manuals do a very good job of explaining the procedure).

But what if you don't have a friend who has the game you want to play? Try the classifieds in computer gaming magazines. They have listings of opponents, complete with phone numbers, and lists of the games they have.

And if you find someone halfway across the country you want to play against, you don't have to pay premium telephone rates. CompuServe runs a modem-to-modem (MTM) gaming lobby, with a standard \$12.80-per-hour connect charge (for 1200- and 2400-bps modems), regardless of who or where your opponent is. You can set up a profile of yourself or search the database to find an opponent and issue a challenge. You finally meet in the MTM lobby, where you can chat and then begin play.

To use this service, you'll need a communications program that allows you to exit without hanging up (such as Procomm Plus). CompuServe will prompt both players to exit and start the game, and then you're playing. When you're done, you end up back in the lobby to set up for another game, issue a challenge, discuss strategy, or just hang up. Use your modem to mine the online world; there's fun to be had. □

Use your modem to mine the online world; there's fun to be had.



equipped for modem play. One of the most advanced simulators, Falcon 3.0 (Spectrum HoloByte, 2490 Mariner Square Loop, Alameda, California 94501; 800-695-4263) offers breathtaking graphics and speed. Over the phone lines, the game presents you with a dogfight between F-16s (you can play cooperatively, but the dogfight is a whole lot more fun).

While Falcon is the current king of the high-tech, modern-era flight sims, MicroProse (180 Lake Front Drive, Hunt Valley, Maryland 21030; 410-771-0440) is soon to release modem-capable F-15 Strike Eagle III. From what I've seen, the graphics will be amazing.

MicroProse also publishes Knights of the Sky, a World War I dogfighting simulator. The graphics seem simple af-

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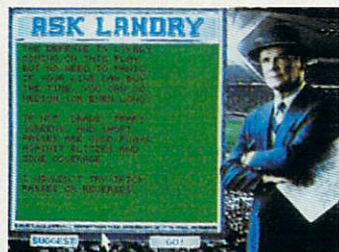
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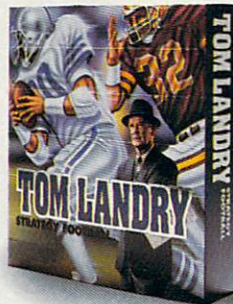
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# Virtual Reality

Reality—what a concept!

B Y J E F F R E Y H S U

For the longest time, people have been searching for new realities—new worlds more interesting, more exciting, and more meaningful than the real world.

In the past, creating unreal worlds meant nothing more than daydreaming, wishful thinking, and simple fantasy. But recent developments in computer technology, graphics, and specialized hard-

ware have served to make fantasies come to life in a form that others can share, in a form that increasingly is indistinguishable from the other reality—the nonvirtual reality of ordinary life.

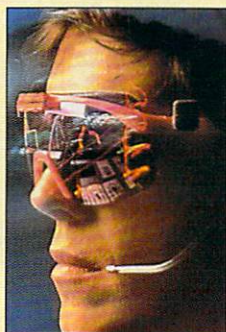
While the holodeck depicted on "Star Trek: The Next Generation" may be decades away, virtual reality—VR for short—is coming to be used for serious applications. Not just for games and recreation anymore, VR is now being taken seriously as a tool for creating environments that are either too difficult or too impractical to create in real life.

## What Is Reality?

VR could be described as a type of advanced computer simulation in which the user doesn't passively view the artificial environment but, rather, interacts with it. The interactive nature of VR makes it possible for the user to become completely immersed in the environment.

Using VR techniques, a developer might create an opportunity to travel back in time and battle dinosaurs. Or an architect might construct a virtual kitchen where you could try out the stove, check the cupboards, and see if it's the kitchen you want in your new house. Or you might try your hand at surgery on a virtual patient. Or dock molecules together and actually feel the push and pull of atomic forces.

Using powerful, integrated computer systems that are capable of displaying



What you see with

your eyes,

what you touch with

your hands,

what you believe

to be true

may be real only to

you.

three-dimensional graphics and generating stereophonic sound, together with specialized equipment such as head mounts, data gloves, and other I/O devices, VR can give a realistic portrayal of new worlds not yet created. The head mounts submerge you in the virtual, three-dimensional world by presenting your eyes with realistic images that instantly adjust based on what you're looking at, together with realistic sounds to make you feel that you're actually there. Wearing data gloves, you can manipulate items in a virtual environment—open doors, pick up objects, or cut into virtual patients.

## Feed Your Head

Mention VR, and many people will think of the movie *The Lawnmower Man*, which tells of a simpleminded gardener who is sent into VR to play Cyber Boogie and to experience teledildonics (virtual sex) and other unique pleasures. The plot turns on his inadvertent transformation into the malevolent and psychotic alter ego, CyberJobe.

While the experience portrayed in the movie is a far cry from current VR technology, the movie does hit on one truth: The most exciting work being done in VR is entertainment related. Instead of just watching television or guiding a tiny animated figure in a computer game, you can climb inside the experience of fighting opponents as a giant mechanized robot, crashing a car in a demolition derby, exploring in a world of

checkerboards and pterodactyls, and much more.

### The Specter of Virtuality

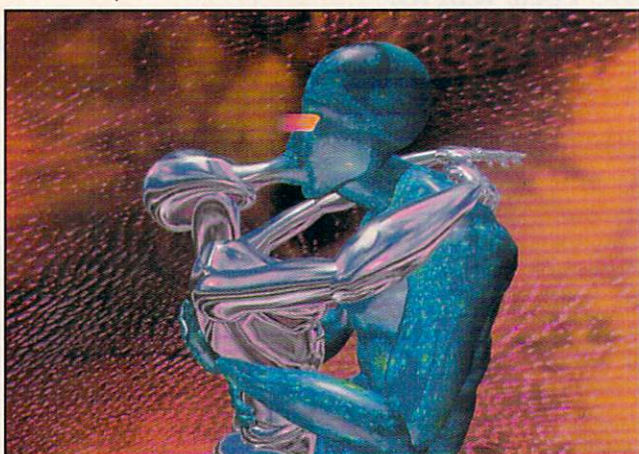
One line of VR products that has begun to hit the entertainment scene is Virtuality. With Virtuality, you can enter a simulated or fantasy world and interact with the surroundings—fight opponents with swords or drive a car madly down a racetrack.

Virtuality units, including headgear and related devices to give you a 3-D VR effect, have become more and more common at entertainment centers around the country. Developed by Cyberstudio and marketed by Spectrum HoloByte, Virtuality offers VR game simulations are among the most realistic available.

Hook yourself into the headgear and data glove of the stand-up unit or take a seat in the sit-down driving unit, and off you go to another world. You can fight a space battle in *Battle Sphere*, go into an elf and wizard fantasy world in *Legend Quest*, smash up some cars in the virtual demolition derby *Total Destruction*, or go hang gliding in *HERO*. Want to fight opponents using a mechanized battle machine? Play *EXOREX*. Finally, for a truly out-of-this-world experience, fall into *Dactyl Nightmare* to explore an abstract environment of checkerboards



Realistic architectural designs can be "walked through" using Straylight's PhotoVR system.



Virtual reality promises pleasures undreamed of in real life.

and flying pterodactyls.

Virtuality promises to be a form of entertainment more realistic and exciting than anything previously created. These sophisticated multimedia systems contain a set of closely integrated components,

including Amiga-type processors, math coprocessors, graphic chips, CD-ROMs, microphones, motion tracking systems, and much more.

If you find Virtuality's *EXOREX* particularly exciting, you might want to

give Chicago's Battletech Center a try. Located in the North Pier section of town, the Battletech Center is a complete entertainment complex devoted to space warfare. Your \$7 buys a 25-minute experience including training, briefing, and 10 minutes of actual playing time. You learn how to operate a giant mechanized robot called a Battlemech, which involves responding to terrain changes, adjusting for heat dissipation, and laying out battle strategy.

The heart of the Battletech center is a room containing 16 podlike cockpits. Encased in a kind of futuristic spacecraft cockpit, you must learn to use over 100 controls while observing the battle on full-color viewing screens. (Despite the large array of controls, knowing how to use 4 main controls will allow you to play satisfactorily.) During ten minutes of intense play, you must make critical decisions while being deluged with information. You have to manage Battlemech movement and firing, decipher sound effects, and choose strategies.

What gives realism and challenge to the Battlemech experience is the fact that you play against living opponents rather than the algorithms of a computer program.

Battletech and Virtuality appear to be only the precursors of a flood of VR

### Myron Krueger's Artificial Realities

Think of virtual reality, and the vision of a person fully suited up in headgear and data gloves comes to mind. However, many experts in VR circles believe that a person exploring virtual worlds should be free of the heavy burdens of technology. In other words, you should experience VR unencumbered.

Myron Krueger is one of these. One of *Life* magazine's 100 Most Important Americans of the 20th Century, he is considered the father of artificial reality. He is an advocate of experiencing artificial worlds without any kind of physical interface device.

In Krueger's artificial reality, art and science become interrelated, and the viewer interacts with and actually becomes part

of the new simulated environment. These interactive environments react to your movements, allowing you to communicate with both graphical images and other users. You use your hands, your head, your feet, or your entire body to interact with these artificial realities. You can play with an animated animal, engage new art form called body surfacing (in which every movement produces fan-

tastic colors and shadows), or compose music and draw pictures with your feet. Participants in separate rooms can tickle each other, create a collaborative finger-painting masterpiece, or perform free-fall gymnastics.

Part art form, part tool, Krueger's artificial reality provides a more enjoyable way to interact with virtual reality while introducing a more creative aspect to the artificial environment.



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options. VR theme rides and parks are being planned by Disney and Universal Studios, and similar attractions may soon appear in Japan.

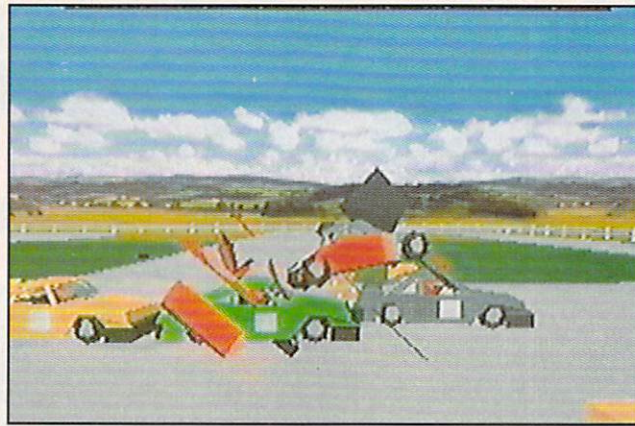
### Molecular Reality

It's not all fun and games in the virtual world. Researchers Frederick Brooks and Henry Fuchs of the University of North Carolina at Chapel Hill are using VR to study how molecules and receptor sites interact. Employing computer-integrated head mounts and a mechanical grip, they set out to simulate the way molecules—and especially drug molecules and receptors—join and dock, and also to examine up close how different molecules would attract or repel each other.

This kind of research is normally accomplished using plastic models, but VR simulations give an entirely new perspective to understanding why certain drugs work or fail based on dynamic, visual models. VR is also being tested as a way to look at various radiation treatment options.

### The Deepest Cut

Joseph Rosen, an associate professor of surgery at the Dartmouth Medical School, has developed a "surgery rehearsal" system that gives surgeons a virtual patient to work with, showing graphically what happens when parts of the



Virtuality provides vicarious thrills in Total Destruction.



Cyber Boogie is Hollywood's interpretation of virtual reality entertainment.

body are cut into. By using virtual scalpels and other instruments, surgeons can learn how the body reacts to certain procedures before moving on to perform them on a live patient.

Greenleaf Medical Systems, started by Walter

Greenleaf, has developed VR systems that allow aphasics (people who cannot talk, often as the result of a stroke) to communicate using hand gestures while wearing a data glove. These gestures are translated into printed

text or synthesized speech. The same firm offers a line of products that measure the motion range of a disabled patient, and other products that analyze how a person walks, which is useful to orthopedists.

### Castles in the Air

VR's uses go far afield, and uses currently under development demonstrate that it's as protean as the computer that serves as its brain. Air-traffic controllers may one day take direct control of the planes on their radar scope through VR. You may've already read how architects and designers can place clients inside rooms that have yet to be built. But even when a space exists, VR can take you there through robot technology—a particularly useful feature if the location is remote or inaccessible. One day, you might walk through deadly landscapes like the surface of the moon or the bottom of the sea.

### Portal to the Future

VR is still a very young field. The level of sophistication of many of the systems is high, but progress must still be made in the quality of the visual images. Once the technology arrives, each of us will be like Columbus or Marco Polo at the portal of a new world of our own making. Neither space nor time is the final frontier. We have yet to set foot on the territory of pure imagination. □

### Virtual Reality Studio

Want to experience virtual reality firsthand? Well, now you have your chance. An innovative 3-D graphics system called Virtual Reality Studio (available from Accolade) gives you a taste of what VR is all about.

Virtual Reality Studio differs from other graphics packages in that it allows you to create 3-D environments and then move

around within them using your keyboard or mouse as a controller. The objects you create out of geometric solids can be animated and interactive. By putting these together, you can build a dream house, lay out a landscape of geometrical objects, or create your own interactive adventure games.

This power does not come without a price, however. Creating your own 3-

D environment takes time and practice, and it requires that you take time to learn how the system works. Also, in order to make your environment interactive, you need to use the programming language, which like any language, requires experience before you can apply advanced features easily.

Virtual Reality Studio does require some effort to learn, but it's a very

good program for exploring the power and promise of VR.

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# 64/128 VIEW

The future of Gazette depends upon the support of its readers. Also, send us your spreadsheet templates.

Tom Netsel

Now that *RUN* has joined such journals as *Ahoy*, *Commodore*, and *Transactor* in 8-bit heaven, a number of people have written or called asking about Gazette's future. As a matter of fact, I just got off the telephone with one concerned subscriber who called from Australia. I assured him that as long as readers support Gazette with their subscriptions, we'll provide them with information, articles, and programs for the 64 and 128. As a matter of fact, I have plans for something new, but I can't announce it until all the details are worked out.

We have quite a few readers in Australia and around the world, and I'm delighted by their continuing support of Gazette. Like my friend in Australia, subscribers in other countries have to pay about twice the price that U.S. subscribers pay. Postage accounts for much of that extra cost, and they get the magazine a month after the newsstand date. Looking at a subscription card in a recent issue, I see U.S. readers can order 12 issues for \$9.97. (Prices may be higher now.) I see ads on TV for a pizza that costs more! That's less than 85 cents an issue! I hope you'll inform any former *RUN* subscribers about *COMPUTE's* Gazette edition—or the multi-edition which includes 64/128 and Amiga sections for the same price. Pass the word on your local BBS, user group newsletter, or tell your friends in person to send in subscription cards from the magazine or call (800) 727-6937.

As Gazette Disk subscrib-

ers are aware, each month we provide one or two bonus programs that do not appear in the magazine. The December disk included a bonus called SpeedCalc Help. It's a help screen that loads into our popular spreadsheet program.

That started me thinking more about spreadsheets and how useful they can be. I then began wondering about all the ways our readers might be using SpeedCalc. I'm sure many of you have devised interesting and useful spreadsheet applications. How about sharing them with other 64 and 128 users? These files or spreadsheet templates might be stock analyzers, grade books, home budgets, conversion programs, or any useful application.

Send us a disk with a copy of your spreadsheet template that will load into SpeedCalc (or GemCalc, a compatible spreadsheet available on the Gazette PowerPak Disk). We'll publish a number of them as bonuses on future Gazette Disks. We'll pay \$100 for each program we use. A simple budget is provided on this month's disk as an example. Be sure to include enough instructions within the program itself. It must be a single self-explanatory program that users can load into their spreadsheets, filling in the blanks with their own data.

Send your templates—for SpeedCalc or GemCalc only—to SpeedCalc, *COMPUTE's* Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Sorry, but no disks will be returned. □

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Telecommunications is the magical process by which distant computers communicate with each other via telephone lines. For those just getting their feet wet in the sea of telecommunications, a primary concern is the speed at which modems communicate.

A modem is a device that converts (modulates) digital signals from a computer into audio tones that can be transmitted over phone lines. Another modem at the other end converts the tones back into their original digital form (demodulates). Transmission speed is measured in the number of bits sent per second (bps). Although a byte that represents one character contains eight bits, a usual telecommunication byte is ten bits long. It consists of eight bits for the information or data and two delimiting bits that separate contiguous data bytes.

Theoretically speaking, a 300-bps modem can send 30 characters per second. A typical double-spaced typed page of 1800 characters and spaces would need about a minute if transmitted at 300 bps. A modem operating at 2400 bps can send the same page in 7.5 seconds!

A 64's commonly used modem speeds of 300, 1200, and 2400 bps are in a sense analogous to the XT, AT, and 386 technologies familiar to PC users. XTs

# BAUDS MEAN BUCKS

**Time is money  
when you connect to  
commercial  
information services.**

**By Ranjan Bose**

are inexpensive and adequate for some uses, but they're slow. The AT is more efficient yet inexpensive, but it's neither here nor there—similar to 1200-bps modems. The 386s are fast, very well supported, and available at reasonable cost—as are 2400-bps modems. To carry the analogy further, the new super-

speed modems would be comparable to 486s.

Slower modems are the least expensive ones to buy, but they can cost you money if you use them on commercial online services. To give you an example of the savings you can achieve with a higher-speed modem, let's assume that an online service charges \$6.00 an hour for 300-bps access

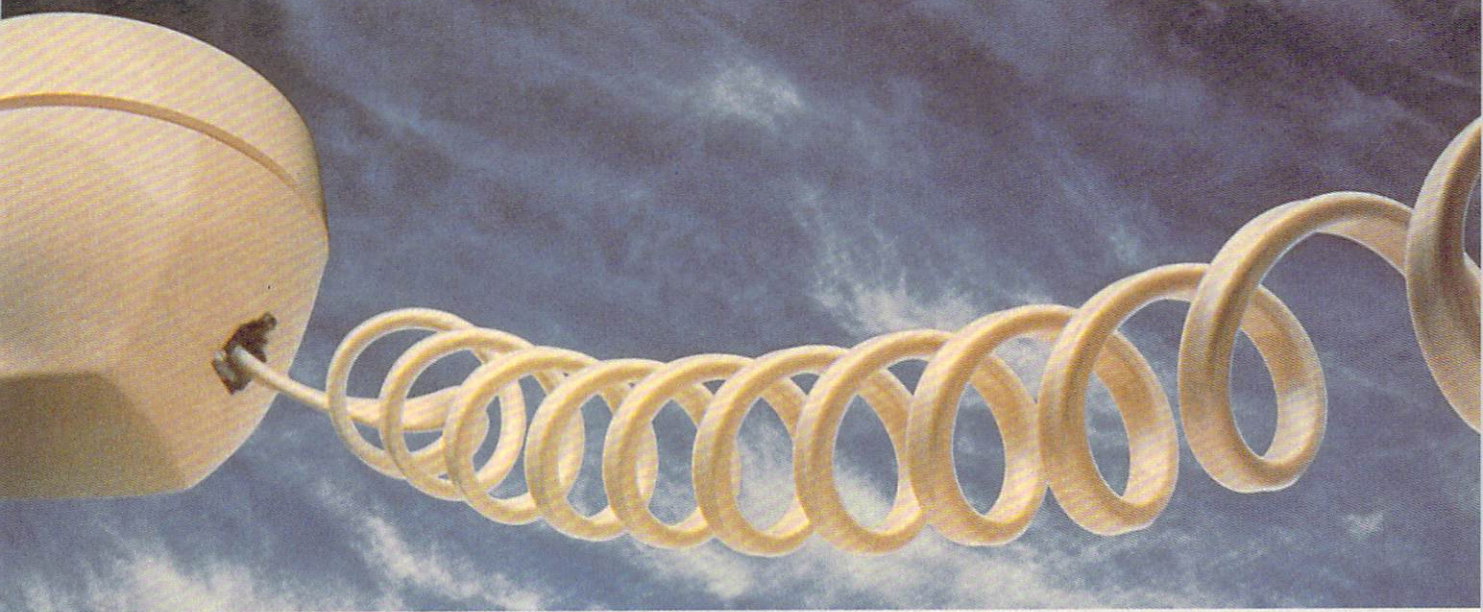
and \$12.50 an hour for 1200- or 2400-bps access. If you were to access the service for an average of ten hours every month, you would be paying \$60.00 for 300-bps access and \$125.00 for 1200- or 2400-bps access. If you spend most of your online time downloading files or messages (and not chatting in forums), you could download four times as much at 1200 bps and eight times as much at 2400 bps as you could at 300 bps—for just over twice as much money.

This ideal scenario is obviously subject to several variables, such as the condi-

tion of the phone connection, the network load (ensuring error-free transmission), and the presence of either a DOS speed-up utility in your system or the ability to use an REU as a RAM disk.

If we consider the amount of data transferred at 300 bps over ten hours as an arbitrary data unit, each data unit at the above prices would cost \$60.00 at 300 bps, \$31.25 at 1200 bps, and \$15.63 at 2400 bps. For a little more than the difference in the cost of accessing our arbitrary data unit at 300 bps as compared to 2400 bps, you can buy a 2400-bps modem.

Also, while a PC user cannot buy an XT/AT/386 combo, a 2400-bps modem will let you telecommunicate at all three speeds when necessary. If a BBS you call operates at a slower speed, your 2400-bps modem can slow down. You could use 300 bps when chatting online or typing messages, or anything else that involves online waiting or keyboard entry. Then use 2400 bps when transferring files. The 1200-bps or slower speeds can come in handy for those occasions when a phone line is noisy.



Data transmission is less subject to error on noisy phone lines when transmitted at slower speeds.

## In Praise of Speed

I cannot help but toot the 64's horn at this point. Electronic eons ago when 300 bps was the 64's telecommunication standard, people thought that reliable data transfer at 1200 bps and higher speeds was impossible because of idiosyncrasies in the Commodore Kernal routines. At any rate, 1200 bps became a reality, fought the gremlins, and is now aging gracefully.

There may not be as many 64 users telecommunicating at 2400 bps, but those who do are quite happy. With 2400-bps external modems selling for well under \$100, you need not shy away from using them because of price. Several commercial and shareware terminal programs exist which support 2400-bps access. NovaTerm, Terminal One, and Bell Term are just a few of them.

## RS-232 Devices

Commodore decided on a different type of interface for its user port, rather than going with the industry standard RS-232. Therefore, connecting an RS-232 device, such as a modem, to a 64 used to be a problem. That's no longer the case. Aprotek makes a fine product called Com-Modem, which works well with external RS-232 modems. Several other RS-232 interfaces which plug into the 64's user port are also available from Aprotek, Creative Micro Designs, and other companies. Aprotek also sells a 2400-bps modem that plugs directly into the user port.

RS-232 modems supporting 2400 bps come in two varieties, a plain-vanilla modem which allows 300-bps to 2400-bps speeds and one which offers built-in protocols for error checking and data compression (MNP, V.42bis). These latter ones are great toll savers, but only if the modem at the other end also uses them.

## Expedient or Exotic

CompuServe users, for instance, would not be able to use MNP5 or V.42bis because the online service does not yet support these protocols. CompuServe may eventually add these protocols, but a plain-vanilla 2400-bps modem is sufficient for several reasons. To a significant extent, a well-engineered modem can compensate for occasional line noise using adaptive equalization, line impedance

Time of day	Download time in seconds				Cost per 10K bytes
	#1	#2	#3	Mean	
8:00 a.m.	45.36	29.33	30.33	35.01	\$1.19
11:00 a.m.	33.09	39.51	33.29	35.30	\$1.20
10:00 p.m.	19.42	19.98	19.17	19.52	\$0.66
6:00 a.m.	16.93	17.40	18.95	17.76	\$0.60

matching, and other techniques.

To use MNP5 and V.42bis protocols effectively, your software should support 4800 or 9600 bps, neither of which is supported by any 64 telecommunication software. NovaTerm with the CMD Swiftlink is a combination of software and hardware that claims to do this. MNP protocols are very useful during ASCII (text) transfers, but their advantages vanish when transferring programs (binary) or files that are already compressed, such as ARC or LYNX.

Finally, these protocols interact variably with software error-checking protocols such as XMODEM and YMODEM. These software protocols are usually self-sufficient anyway. MNP and similar protocols are more

useful for transferring numerical business data where glitches could result in financial disaster. So instead of waiting for these sophisticated protocols and modems that can use them, go for it! The longer you postpone getting a 2400-bps modem, the more money you're losing online.

You may see an occasional garbled character in messages or bulletins that have been sent at 2400 bps, but you can easily correct them by using your parallel processing, multigigabyte supercomputer known as your brain.

## Rush-Hour Blues

If you've ever used an online service, you may have noticed its slowing down at times. When large numbers of users are online simultaneously, the effective transmission of bits and bytes through the phone network becomes appreciably slower than that occurring during nonpeak hours. The delay is especially noticeable when using packet switching networks such as Tymnet or Datapac. For top-dollar values, try to download large files during nonpeak hours, usually early morning or very late at night. If you're calling from Japan, be aware of the time difference. You may stay up late only to run into bright-eyed, well-rested U.S. users—thousands of them!

## Time Is Money

I recently ran a simple experiment in which I downloaded a certain file from CompuServe at different times of the day, with XMODEM at 1200 bps (using the Common Sense 1200 terminal program that is bundled with the Commodore 1670 modem). I downloaded each file three times during each online session. A digital chronometer allowed me to time the transfer of eight XMODEM blocks (1048 bytes). To rule out varying disk transfer delays, I always downloaded to a freshly formatted disk. Boy, was I surprised!

Note that the variations in rates of transfer between similar samples 1, 2, and 3 is less during the nonpeak hours. (See the above table.)

### Are MNP Modems Necessary?

While shopping for modems capable of transmitting at 2400 bps, you come across many with choices such as MNP (Microcom Network Protocols) and V.42bis protocols. These modems can check and correct for errors during transmission arising from phone line noise and other interferences. They can compress data so that you get an effective transfer rate of 4800-9600 bps.

To be effective, however, the modem at the other end must also be an MNP or V.42bis type. You must also remember that most downloadable files are already compressed and do not benefit much from these procedures. Protocols which enable an apparently higher speed transmission (MNP5) cannot be used with a 64 because none of the terminal software allows for speeds greater than 2400 bps.

Finally, during downloading, you usually employ software-based error checking protocols such as XMODEM or Punter. So save your money. A plain-vanilla 2400-bps modem will suffice for most of your telecommunication purposes.

These transfer rates are not cast in stone and do vary somewhat depending on many factors, but they illustrate the point that the time of day does make a significant difference in telecommunication costs. During the day and in the early evening, there are longer delays and more errors (requiring repeated transmissions of blocks of data), possibly because of higher line noise and longer switching delays as a consequence of heavier usage.

### Can Software Help?

If you examine the above values closely, you will observe that even at the best transfer rate of 1048 bytes in 17.76 seconds, only 59 bytes were getting transferred each second (1048/17.76=59). Since I was operating at 1200 bps, in theory, the transfer rate should have been 120 bytes per second. (Each telecommunication byte is ten bits long: eight bits for the data and two delimiter bits.) You cannot expect 100-percent efficiency in the real world, but I was getting less than 50 percent. Something was not right!

I wondered if my telecommunication program was using inefficient code. In order to figure that out, I fired up my computer and downloaded a certain file by first using Common

### Why Use 2400?

If you access CompuServe at 300 bps, it costs \$6.00 an hour, whereas at 1200 or 2400 bps, the cost is \$12.50 an hour. The volume of data which can be sent at 300 bps, under ideal conditions, would cost approximately half as much at 1200 bps and one-fourth as much at 2400 bps. Over a short period of time, you could easily recoup the cost of the modem by stepping up from 300 to 2400 bps.

The savings are even more relevant for those who don't have local CompuServe nodes and must use Datapac or other packet switching

networks which charge \$10.50 per hour above regular CompuServe connect fees.

Higher speeds save you money when you're downloading files and programs, but at other times you may prefer a slower rate. In situations which involve online waiting, such as chats or conferences, 300 bps can be your best bet. Most 2400-bps modems also support 300 bps, so there's no need to have both.

So to answer the question of why we need 2400-bps modems, Scrooge says it best: "Money, money, money!"

Going one step further, I tried similar transfers using NovaTerm at 2400 bps. To my dismay, I found that when using a packet switching network such as Datapac, downloading with XMODEM was only a little faster at 2400 bps—not 100 percent faster as I had expected.

### Reading Text

Does this mean that a 2400-bps modem is not really a big toll saver? Quite the contrary, since most of the online time is spent in ASCII transfers,

complex process. Gremlins such as network delays, disk drive delays, phone line noise, and other errors all contribute toward reducing the actual transfer of data.

Since all modem speeds are likely to be affected proportionately by these factors, a 2400-bps modem still represents a good investment if you do a fair amount of telecommunicating. This is especially true if you access online information networks or call BBSs in distant cities.

### Maximum Efficiency

If you simply send data via phone line to another computer, you have no way of knowing whether that information arrives correctly or not. Noise and static on the line could alter the bits and bytes, garbling the data. To help insure error-free transmissions, most terminal programs utilize some form of error-checking technique called a protocol.

There are basically three kinds of software protocols used when uploading or downloading files. XMODEM is an example of a protocol which transfers small blocks (131 bytes) of data at a time. Another type, which includes XMODEM 1K and YMODEM, transfers a bigger block (1024 bytes). A third kind of protocol uses blocks of variable sizes. Examples of the third type are Punter and Kermit.

All of these protocols employ some form of checksum comparison between the sending and receiving computers. If an error is detected, the block is retransmitted. Even if only one error is detected, the computer must send that whole block of data.

If the phone line connecting the computers is clean and requires a small number of retransmissions, then protocols that support larger blocks are more efficient. If a lot of errors

	XMODEM 1200 bps		XMODEM 2400 bps	
	Datapac	CompuServe	Datapac	CompuServe
DL time	31.19	13.94	19.30	8.75
Bytes/sec	34	75	54	120
Efficiency	8.3%	62.5%	22.5%	50%
	YMODEM 1200 bps		YMODEM 2400 bps	
	Datapac	CompuServe	Datapac	CompuServe
DL time	12.08	10.64	11.83	6.09
Bytes/sec	85	96	87	168
Efficiency	70.8%	80%	36.2%	70%

Sense 1200 and immediately afterward using NovaTerm 9.3 (distributed by Aprotek). Since Common Sense 1200 doesn't support 2400 bps, the time in seconds required for downloading 1048 bytes at 1200 bps was measured for both programs. I ran and timed this test five times for each program.

With Common Sense 1200, the mean value of five downloads was 32.7 seconds, with the fastest transfer 27.54 seconds. With NovaTerm 9.3, the mean value for five downloads was 23.1 seconds, with the fastest value 20.15 seconds.

NovaTerm, therefore, proved to be 30 percent faster than Common Sense 1200 for XMODEM transfers under nearly identical conditions.

such as chatting or reading messages and bulletins. I decided to test this activity by reading text files instead of downloading them.

To do this, I called CompuServe and let data flow in as fast as it could. To avoid drive-induced delays, I used the buffer RAM disk that NovaTerm supports. I closed the buffer at 30 seconds. At 1200 bps, I managed to receive 3511 characters (117 characters per second). When I switched to 2400 bps, I received 7059 characters (235 cps) in 30 seconds. This is close to the theoretical limits of 120 and 240 characters per second for the two modem speeds.

Compared to straight ASCII transfers, protocol-controlled downloading is obviously a more demanding and

occur during transmission, then a protocol using smaller blocks gains an upper hand because it has to resend only 131 bytes instead of 1024. One YMODEM retransmission could, in theory, equal seven or eight retransmissions via XMODEM.

### X or Y?

So is YMODEM really more efficient than XMODEM? Are transmissions affected by the network you use, such as a dedicated network versus a packet switching network?

To test these variables, I accessed CompuServe from my home in Canada through Datapac, which is a 128-byte packet switching network similar to Telenet and Tymnet, and by directly calling the dedicated CompuServe node in Toronto. The following table indicates the results of my test.

The DL time is the mean value in seconds to download either 1048 (XMODEM) or 1024 (YMODEM) bytes from CompuServe at 1200 and 2400 bps using the popular telecommunication program NovaTerm 9.3.

With clean phone lines, no errors occurred during these transmissions. The delays were primarily due to the way the data packets were handled by the networks. Bytes/sec indicates

the number of bytes downloaded per second. The efficiency figures represent the actual performance compared to the modem's theoretical maximum transfer rates of 120 and 240 bytes per second.

Several interesting things became obvious. Calling a CompuServe node directly resulted in more efficient transfers, although on those occasions when Datapac was working at its peak efficiency, it was almost at par with the CompuServe node.

If you compare the bytes-per-second transfer rates obtained at the two speeds in the Datapac columns, 2400 bps was faster than 1200 bps by 2-59 percent. XMODEM showed more improvement than YMODEM, but it was still lower than YMODEM in the total number of bytes transferred.

Looking at similar values, when CompuServe was accessed directly, we discover that 2400 bps was faster than 1200 bps by 60-75 percent. YMODEM was always more efficient than XMODEM.

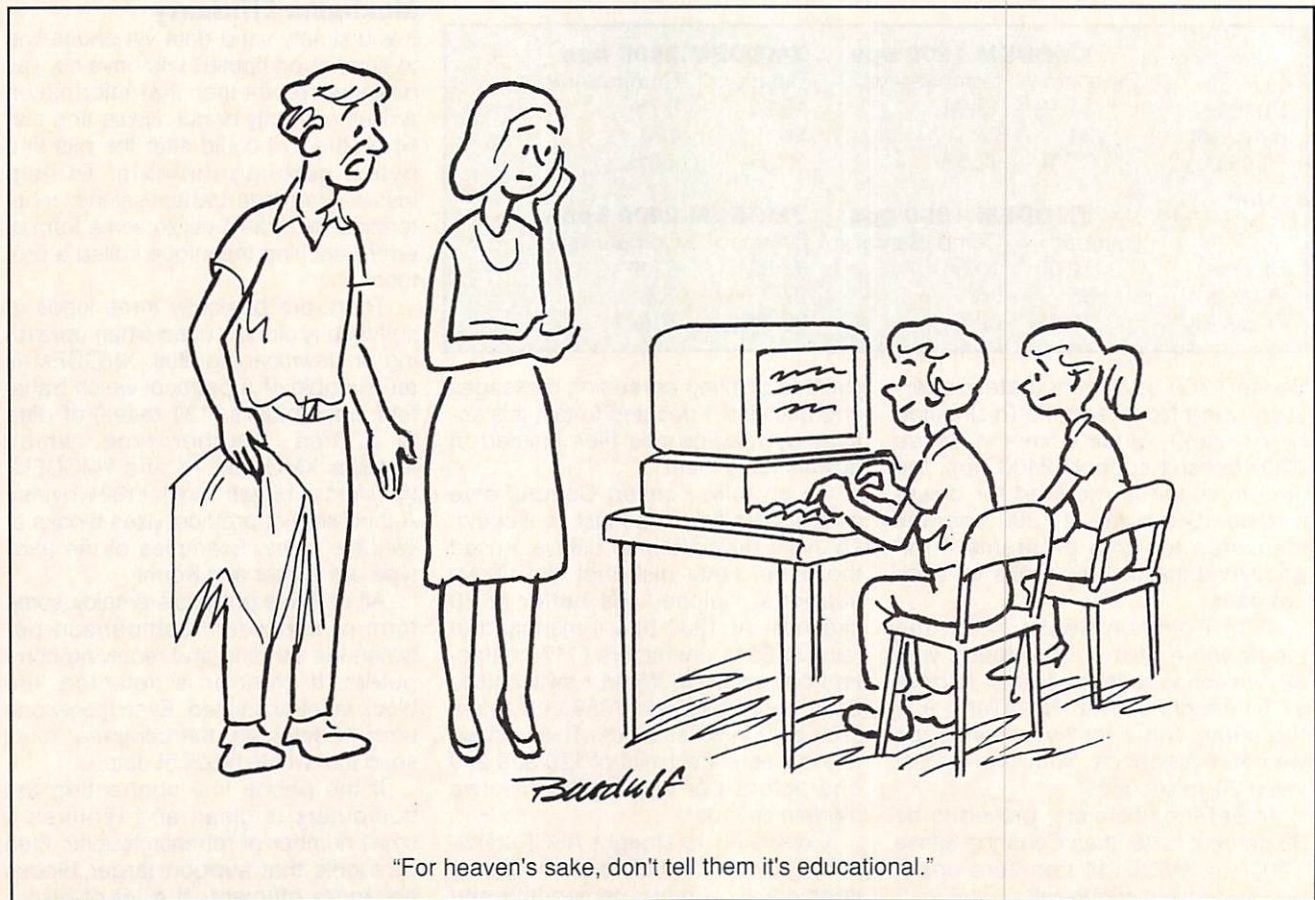
Assuming the theoretical 100-percent efficiency of transfer to be 120 bytes per second at 1200 bps and 240 bytes per second at 2400 bps, the actual performances observed for XMODEM ranged from 23-63 percent,

while performances for YMODEM ranged from 36-80 percent.

### The Bottom Line

Just a few short years ago, the price of a 1200-bps modem was several hundred dollars, and 2400-bps modems were even higher. When a modem could cost more than a computer, most users made do with 300-bps. Now that 1200- and 2400-bps modems are less than \$100, frugal users still want to cut costs where they can. When you're connected to an information network that charges by the minute, connect time is the obvious place to trim.

In conclusion, while accessing services which charge the same amount per hour for 1200- or 2400-bps access, it's more efficient to use the faster speed, coupled with YMODEM. Moreover, it's better to connect with the service through a dedicated node, rather than through a packet switching network, even if it means calling long-distance. And if you're willing to work between 12:00 a.m. and 7:00 a.m., the long-distance charges are usually lower, and the phone connections usually cleaner, further reducing your telecommunication costs. □





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## FASTOFFICE

Most people consider the 64 to be a personal computer that's used mainly at home, but it's found its way into many offices as well. Word processing is undoubtedly its biggest use, but it's capable of much more.

Spreadsheets and databases are powerful and flexible programs that users can adapt to any number of office activities. They can be used for budgets, inventory control, managing customer lists, and dozens of other uses, depending on the skill and needs of their users.

Most of the commercial business applications have been designed for flexibility. Rather than targeting one specific business or performing one specific task, these programs are tailored to satisfy a variety of commercial needs. This flexibility enables the software to appeal to a wide audience, which in turn makes for sizable sales and profits for the software companies. When software is customized for one business, it can no longer appeal to a wide audience. As a result, its price normally jumps dramatically.

Fastoffice is such a piece of software, but it bucks the norm. It is designed for billing and practice analysis for physicians. To narrow its scope even more, it's designed for solo practitioners. Price is where Fastoffice differs from most customized software. To make a profit selling to a small number of physicians, most billing software costs thousands of dollars. Fastoffice costs \$50!

Fastoffice doesn't pretend to compete with full-featured billing and practice analysis programs, but it does handle a number of billing chores. And it does

them well. It was written by an ophthalmologist for his practice, and he's been using it for more than five years.

Fastoffice is menu driven and fairly simple to use. A physician who is used to billing patients, sending claims to insurance companies, and writing off certain amounts would probably have no difficulty using the program. That's probably why the review copy I received came with no documentation—just a few words of explanation in an accompanying letter.

From the opening menu, you have the option to view, print, or modify a record; create a new record; print bills; or move to another menu. I knew from the letter that I would need a separate data disk. By selecting another menu, I found the system utilities that let me format that disk. That menu also offers the options to compress or unpack data disks using a dual-drive system.

Once your data disk is ready, you can create new records. This is where you fill in a patient's name, address, insurance carrier, billing code, and billing history. Four lines allow you to enter procedures and fees. I discovered that payments can be entered in this area by placing a minus sign in front of the amount. Once basic information has been recorded, you can then enter another new patient or return to the menu.

After the basic information has been entered, you can print the patient's bill. One drawback that I noticed here is that while the program prints the patient's name and address, it doesn't print the physician's. That form of the bill might be sufficient to hand to a pa-

tient in the office; otherwise, I'd recommend using pre-printed billing statements.

Once you have a patient on record, you can then view or modify any information simply by entering the patient's last name. If more than one person with that name is in your data, the program tells you how many matches it's found and asks which patient you want. From there, you can delete a record, alter any line, return to the main menu, or move to another menu.

This other menu lets you print a bill or summarize the billing notes. A bill has space for four itemized lines of procedures and/or payments. You can summarize this data and bring the balance forward at any time. The balance then appears on the top line, freeing three lines for additional information regarding procedures and/or payments.

In many cases a physician's fee is paid in part by an insurance company with another portion billed to the patient. Depending on the circumstances, some portions of the fee must be written off. Fastoffice enables the physician to keep track of these write-offs. With a patient's bill on the screen, you have the option to convert to write-off format. You are presented with the patient's charges and asked if this amount is billable. If not, you can enter the billable portions and any insurance payments. The amount the patient owes is then presented as the new balance. The program then computes the write-off percentage and prints an updated bill.

Another menu lets you browse through each of the records, making any changes or printing them out. You can also view any write-offs.

This option prints the patient info with the amount and percent that has been written off. A summary prints the number of write-offs and the total percentage and dollar amount of the write-offs. A practice analysis prints an active account summary, listing the number of patients, the total amount receivable, and the percentage of patients covered by each insurance carrier. You can also see how much business is represented by each insurance company. Fastoffice computes the percentage owed to you by all the patients handled by a particular carrier.

Make sure your printer is on before you try to print bills or analyze your practice. Fastoffice crashes if it tries to print and your printer is turned off. One of its good points, though, is that it recognizes any files left open prior to a crash. It lets you close them properly when you reboot, saving any data that might have been jeopardized.

More and more physicians are turning to computers to handle their billing, and it's not uncommon for them to spend more than \$10,000 for software. I don't think Fastoffice will replace the heavy-duty systems that store CPT or ICD9 codes, fee schedules, referring physicians, and patient birthdays, but it certainly does offer a lot for \$50.

The program is easy to operate, but a page or two of documentation would help explain some of the program's finer points. I don't think that would boost its price too much. Perhaps if more physicians used Fastoffice on a 64, they could save on computer costs. Then perhaps they could pass the savings on to their

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## REVIEWS

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## DIEHARD

At a time when publications dedicated to 8-bit computers are about as scarce as brand-new 1581 drives, it's refreshing to see a new magazine on the newsstand. Well, *newsstand* isn't exactly the right word, because this bimonthly publication is available only by subscription.

This magazine is called *dieHard*, and it's billed as "the Flyer for Commodore 8biters." Its editor in chief, Brian L. Costhwaite, says *dieHard* supports most Commodore 8-bit computers, such as the VIC-20, C-16, Plus 4, 64, and 128. Its major focus is on the 64 and 128, however, but Costhwaite says he hopes the magazine will grow enough to support other 8-bit machines as well.

I don't know whether it's an editing quirk or if Costhwaite is taking a poke at Commodore for its minimal support of the 8-bit machines it created, but whenever Commodore's name appears in *dieHard*, Costhwaite spells it with a lowercase *c*.

The copy of *dieHard* that I saw for this review contains 33 pages in 8½ × 11 format. Two yellow sheets make up the front and back covers, with the whole publication held together by a single staple in the upper left corner. At first glance, *dieHard* looks like a user group newsletter that was printed with geoPublish. At second glance, you'll notice that there's a lot of information between its covers.

Up front is a call to writers for submissions. (Seems like I've often read that plea in newsletters.) As with many new publications, *dieHard* can't afford to pay its authors. They get free copies of the magazine. Since this is *dieHard*'s third issue, Costhwaite is still writing many of the articles himself.

The first article is a collection of word-processing tips and advice to writers. It stresses the importance of correct spelling, proper grammar, and having someone else proofread important documents. The article starts off with the word *editing* as a subhead in a large font—and, unfortunately, the

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## REVIEWS

word is misspelled.

The article goes on to offer some good writing advice, and it even provides a short program that lets you read sequential files. That's a handy little program to have, since writers may submit articles as sequential files. Too bad no one caught one major mistake in the program before it hit the presses. The OPEN command is inadvertently omitted from the line of code that is supposed to open the file for reading. Typos in BASIC programs can be particularly annoying to novices who are trying to learn.

Another page of tips for GEOS is helpful, especially the information about formatting text in columns. Another short article offers good basic computer-related advice. There are tips warning against writing on disk labels with ballpoint pens, covering the vents in electronic equipment, and letting dust get into things. Humor is not a neglected commodity in this article, which offers a range of advice. For those of you whose tempers flare on occasion, Costwaite warns against throwing your computer out the window.

Costwaite has a two-page review of Final Cartridge III. He tells about its many features and ways it can aid programmers. I was all set to order one but discovered that the review doesn't supply ordering information. Guess I'll have to check an old copy of Gazette or RUN to find an advertisement for it. An article about public domain software is a bit more helpful, since it provides addresses for several sources of PD disks.

In an article called "Shhh It's A Secret," Costwaite provides some interesting programming tips. I knew that the Ctrl key could be used in conjunction with other keys to produce some surprising results, but this article lists a number of interesting combinations. Did you

know that Ctrl+; moves your cursor to the right? How about Ctrl+M? That's the same as hitting the Return key.

A feature article about the Commodore text screen provides a lot of PEEKs and POKEs, screen addresses, and animation routines for the 64, 128, VIC-20, and other 8-bit Commodore machines. This article goes on for several pages and provides some good solid programming examples.

What's a good Commodore magazine without type-in programs? Well, *dieHard* has those, too. About 10 of the 33 pages in this issue are devoted to programs. A 128 program that prints a grocery shopping list, complete with prices, looks useful. I'll have to confess that I haven't typed it in yet. No method for avoiding typos is offered (such as Gazette's Automatic Proofreader), but the listings seem to be in pretty straightforward BASIC and shouldn't be a problem.

The articles presented in *dieHard* seem accurate, entertaining, and informative. Its format is simple, not flashy. Let's face it—it's about what you'd expect from something published on a 64. Like any new venture, *dieHard* has some bugs to work out.

One problem I have is the magazine's typeface. A font shouldn't draw attention to itself, but *dieHard*'s light eight-point GEOS font is tough to read in many instances. The dots make it look as though the type is fading from the page. I notice that text is much easier to read whenever an article is set in boldface.

Spelling errors also draw my attention away from the magazine's message. I'll have to say that the main articles contain very few errors. I'll attribute that to the author, editor, proofreader, and any spelling checker they might have used. This same care with the English language is absent, however, in many of the magazine's in-house ads. In one three-paragraph pitch to



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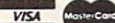
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sell advertising space, I counted 11 misspelled words. In another half-column ad requesting articles and programs, the word *submissions* was spelled three different ways—and not one was correct!

In a time when Commodore-related information is hard to find, I laud Costhwaite and his 8-bit diehards for their publishing efforts. They've packed a lot of useful information into the magazine. I hope the magazine gets the support it deserves. In return, as publishers who want to sell their words to the public, they have a professional responsibility to make sure those words are spelled correctly.

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## Bug-Swatters

James T. Jones of Klondike, Texas, pointed out two errors in our October 1992 issue. In "Beginner BASIC," we omitted the REM command in line 30. The line should be corrected to read as follows.

### 30 POKE 646,5: REM SET CURSOR COLOR

Also, to store labels in some other area of memory in La BASIC, line 10 should be entered to read as follows.

### 10 TP=TP-32: POKE 49969,TP/ 256: POKE 49970,TP-INT (TP/ 256)\*TP

John Nauman of Arden Hills, Minnesota, discovered an error in the listing that accompanied Jim Butterfield's November "Machine Language" column. The article mentions three machine language programs, but the program uses only two of them. Change the SYS address in line 460 to 8192, and the program should work correctly.

## Nix Null Modems

In October's "Feedback," you answered a question about how to transfer files from a 64 to an IBM by using a null modem cable. There's another way without using a cable if both computers have modems, and it doesn't require calling a third computer. Simply unplug one modem's telephone cable from the wall and plug it into the other modem. Many modems have extra sockets built into them.

Next, run both terminal programs, making sure that their baud rate and other telecommunication parameters are the same. Then, on either machine, dial a number. This can be done by dialing any number you may have in a dialing directory or by using manual AT commands. Type

ATDP for pulse or ATDT for tone and at least one digit. Since you aren't connected to a telephone line, it doesn't matter which command or number you use. Do this so the computer will dial and generate an originate tone.

Quickly type ATA on the other machine to have it answer. You should see a message on both screens saying that they have connected. Then have the 64's program upload the files, and instruct the the Amiga or IBM to download them.

BOB KUBOTA  
LOWELL, OH

## Which Machine?

Since you changed Gazette's format, I've been dissatisfied with your leaving out a directory which references 64 programs clearly. In prior issues, each article showed what computer system the article pertained to. Also, since you lack a phone number, it's impossible for me to call in this complaint.

CHARLES J. JACKSON  
ASTORIA, NY

*We usually publish system information in the opening paragraphs of each article. If you find it helpful to have that information on the table of contents page, we'll reinstate it with this issue.*

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## Random Numbers

How can I generate random numbers on my 64 between 100 and 200 by steps of 5?

ALBERT WIGMORE  
ORLANDO, FL

*There are a couple of ways to do it. The range you need—100, 105, 110, and so on up to 200—contains 21 different numbers. If you generate a random number between 0 and 20, this will cover the range of 21. Then multiply this number by 5 to produce the steps, and add it to 100, which is your base of 100. This will give you the desired results. Here's a sample program to show how it's done.*

```
10 N=INT(RND(1)*21)
20 N=N*5+100
30 PRINT N
```

*Another method is to generate a random number between 100 and 200 and then check to see if it's one of the desired numbers. This can be done with a FOR-NEXT loop that is incremented by steps of 5. Here's how it works.*

*Generate a random number within your range of 100-200; then use a FOR-NEXT loop to check and see if it's equal to 100. If not, increment your loop by 5 and check to see if the number is equal to 105, and so on up to 200. If no equal condition is found, the program generates another random number and repeats the process. When the condition is equal, the number is printed, and the program jumps to line 50. You'll notice that this second method executes more slowly than the first example.*

```
10 N=INT(RND(1)*101)+100
20 FOR B=100 TO 200 STEP 5: IF
   N=B THEN PRINT N: GOTO 50
30 NEXT
40 GOTO 10
50 PRINT"THAT'S IT!"
```

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# BEGINNER BASIC

Larry Cotton

## PUT WAIT TO WORK

This month we'll look at the often-ignored WAIT statement—the last of the three BASIC statements that cause the 64 or 128 to wait for something to happen. In the case of GET and INPUT, discussed here over the last two months, the computer waits for the user to press a key on the keyboard. With WAIT, however, the computer waits for a particular memory address to have a particular value.

WAIT is a command, like LET, which really doesn't ever need to be used. It can be used, however, as a replacement for GET and PEEK.

WAIT's normal syntax is WAIT MA, A, B, where MA is a memory address and A and B are two masks. The WAIT statement takes the value in the memory location and performs a logical AND operation with the value in the first mask and then performs an exclusive OR on the result with the second mask. Now you can see why WAIT isn't BASIC's most popular statement.

Fortunately, WAIT's second mask is optional. The following is a common example.

```
10 PRINT“(CLR)(DOWN) PRESS  
ANY KEY.”  
20 WAIT198,1: POKE198,0  
30 PRINT“END OF PROGRAM.”
```

The 64 and 128 have a ten-character area in memory—a buffer—that holds keystrokes that are entered faster than the computer can process them. In SpeedScript, it's easy to see this phenomenon when trying to insert words near the beginning of a long document.

Memory register 198 contains the number of characters in that buffer. Line 20 waits until a key has been

pressed and then clears the buffer so that the keypress isn't displayed onscreen. This program runs infinitely.

```
10 PRINT“(DOWN)TYPE RUN,  
THEN PRESS ENTER”  
20 WAIT198,4
```

The way to end this little mind-boggler is to type a syntax error (such as RUD) or hit Run/Stop-Restore. Here's how to use WAIT instead of GET in a subroutine.

```
10 PRINT“(CLR)”  
20 FOR=54272TO54295:  
POKE,0: NEXT  
30 POKE54296,15  
40 FOR=1TO300: NEXT  
50 POKE54277,8  
60 PRINT“(DOWN)(2 SPACES)  
TURN UP VOLUME AND PRESS  
ANY KEY (DOWN)”  
70 FORZ=1TO7  
80 GOSUB200  
90 READD1,D2,$$  
100 POKE54273,D1:  
POKE54272,D2  
110 POKE54276,16:  
POKE54276,17  
120 PRINT$$;  
130 NEXT: END  
140 DATA25,30,“(2 SPACES)  
ONE”,18,209,“(1  
SPACE)BYTE'S”,18,209,“(1  
SPACE)THE”,19,239,“(1  
SPACE)SAME”  
150 DATA18,209,“(1  
SPACE)AS”,23,181,“(1  
SPACE)EIGHT”,25,30,“(1  
SPACE)BITS.(DOWN)”  
200 WAIT198,1: POKE198,0:  
RETURN
```

Lines 10–60 prepare the screen and the computer's sound chip, as we've seen in previous columns. Line 70 begins a FOR-NEXT loop that ends at line 130. Seven times, line 80 calls our WAIT subroutine at line 200. After a key is pressed, line 90 reads three pieces of data: two frequencies for the notes played and a word corresponding to each note.

Line 100 pokes the note frequencies to their appropriate memory registers, while line 110 turns the note off and then on. (In this case, the person pressing the keys controls the length of time the notes play; a FOR-NEXT delay loop wouldn't work. The voice's envelope thus helps control the notes' playing time.)

Line 120 prints the message, while line 130 closes the FOR-NEXT loop and ends the program.

Following are two other ways to write the keypress-waiting subroutine.

```
200 GETA$: IFA$=“ ”THEN200  
210 RETURN
```

or

```
200 IFPEEK(197)=64THEN200  
210 RETURN
```

The first alternative works better. Note that RETURN cannot be on line 200. The second alternative has been studied in another column. Memory register 197 holds keyboard matrix values; 64 is the value in 197 if no key is pressed. As soon as a key is pressed, control drops to the RETURN in line 210. If you try this, you'll notice that it really doesn't work very well. The keys must be tapped rather than pressed to avoid words spewing out too fast.

In the remaining space, let's discuss LET, a command to assign values to variables.

```
10 LET A = 5: LET F$ = “APPLE”  
20 PRINT A, F$  
30 LET A = A + 3: LET F$ = F$ +  
“SAUCE”  
40 PRINT A, F$
```

LET makes code easier for novices to understand, but its use is entirely optional. This example shows how the same variable can be used on both sides of the equal sign. □

Put the often-ignored WAIT statement to work in your BASIC programs.

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# MACHINE LANGUAGE

Jim Butterfield

## FAST INTERRUPTS

People often ask me why they can't print directly from an interrupt routine. Well, you just can't—but more important, you shouldn't want to. Interrupts are fast if you don't bog them down with too many instructions. You can't get an interrupt from the IRQ while you're still servicing the last one. The NMI interrupt can break in while a prior one is being serviced. It's best to do whatever must be done and get out fast.

It's quite easy to have your interrupt code leave a signal that a background (noninterrupt) program can pick up and handle. Simple signals can be created by adding to or subtracting from a counter. The INC and DEC instructions are ideal for this. More complex data can be put into a rotating buffer; the background program will follow along, picking up remaining information.

This NMI program is a simple demonstration of how a high-level interrupt can pass a message to a background program. The exercise shows how to make the interrupt coding as fast as possible. All we do is perform an increment: INC \$2100. Address 2100 will hold the action counter. A nonzero value will signal the background program that work needs to be done. After the increment, the NMI interrupt returns to wherever its vector had been pointing.

The custom NMI code is linked by storing the address of that NMI vector. On the 64 and 128, the vector is located at \$318/9 (decimal 792/3). We keep the previous address in this vector in order to restore that address when our program is finished and to allow our own code to exit to this each time it's called.

The address held in an interrupt vector is two bytes

long. That can lead to danger if an interrupt strikes at the instant we've changed one byte but not the other. The computer could go to a wrong address. An IRQ can be locked out briefly with SEI to allow that vector to be safely changed. The NMI cannot be locked out, so our best bet is to make sure that the two bytes are changed at almost the same moment.

Starting at address \$2000, the program zeroes two counters: the interrupt counter at \$2100 and the loop counter at \$2101. This is done with LDA (LoaD A register) and STA (STore A register) commands.

At \$2008, the NMI vectors are copied from \$318/9 to \$2102 and \$2103. Then, we put the address of our NMI code into the vector at \$204C.

```
2014 LDY #4C
; low part of address
2016 LDX #20
; high part of address
2018 STY $0318
201B STX $0319
; store both parts quickly
```

The NMI code will now run independently of the program. All our background program needs to do is to keep watching address \$2100 until it's not a 0. One way of doing this is to loop and test address \$2100.

```
201E LDA #000
; test value
2020 CMP $2100
; if it's 0
2023 BEQ $0200
; go back and wait
```

The program falls through to \$2025 when a nonzero value is found in \$2100. That value is decreased with DEC \$2100, and our loop counter is incremented with INC \$2101. Now, the background program will print a message on the screen, using the usu-

al loop to pick the message from \$2052-\$2067.

While all this is going on, one or more new interrupts may have struck. That's no problem. We'll get to them when we've finished the current work. Our loop counter is checked. If it hasn't yet reached five, we'll go back and look for the next interrupt.

```
2038 LDX $2101
; is the loop counter
203B CPX #5
; equal to five?
203D BNE $201E
; no, go back
```

When five interrupt occurrences have been noted, it's time to restore the original NMI vector address. The usual sequence of LDY, LDX, STY, and STX will do this job. After the vector is restored, the program returns to BASIC with RTS.

After each cycle, the tiny NMI program links back to the normal address with an indirect jump. Here's its code, followed by the whole program as a BASIC loader.

```
204C INC $2100
204F JMP ($2102)
```

```
RQ 100 DATA 169,0,141,0,33,141
,1,33,172,24,3,174,25,3
,140,2,33
SK 110 DATA 142,3,33,160,76,16
,2,32,140,24,3,142,25,3,
169,0
GC 120 DATA 205,0,33,240,251,2
06,0,33,238,1,33,162,0,
189,82,32
BH 130 DATA 32,210,255,232,224
,22,208,245,174,1,33,22
4,5
GK 140 DATA 208,223,172,2,33,1
74,3,33,140,24,3,142,25
,3,96
EJ 150 DATA 238,0,33,108,2,33
BJ 160 DATA 82,69,83,84,79,82,
69,32,75,69,89
DR 170 DATA 32,68,69,84,69,67,
84,69,68,33,13
QP 200 FOR J=8192 TO 8295
EJ 210 READ X:T=T+X
BP 220 POKE J,X
AE 230 NEXT J
SM 240 IF T<>8942 THEN STOP
SK 300 PRINT "INTERRUPT DETECT
PROGRAM."
EG 310 PRINT "PRESS >RESTORE<
{SPACE}FIVE TIMES!"
KG 320 SYS 8192
QH 330 PRINT "...END..."
```

Interrupts provide fast action, provided your code isn't long-winded.

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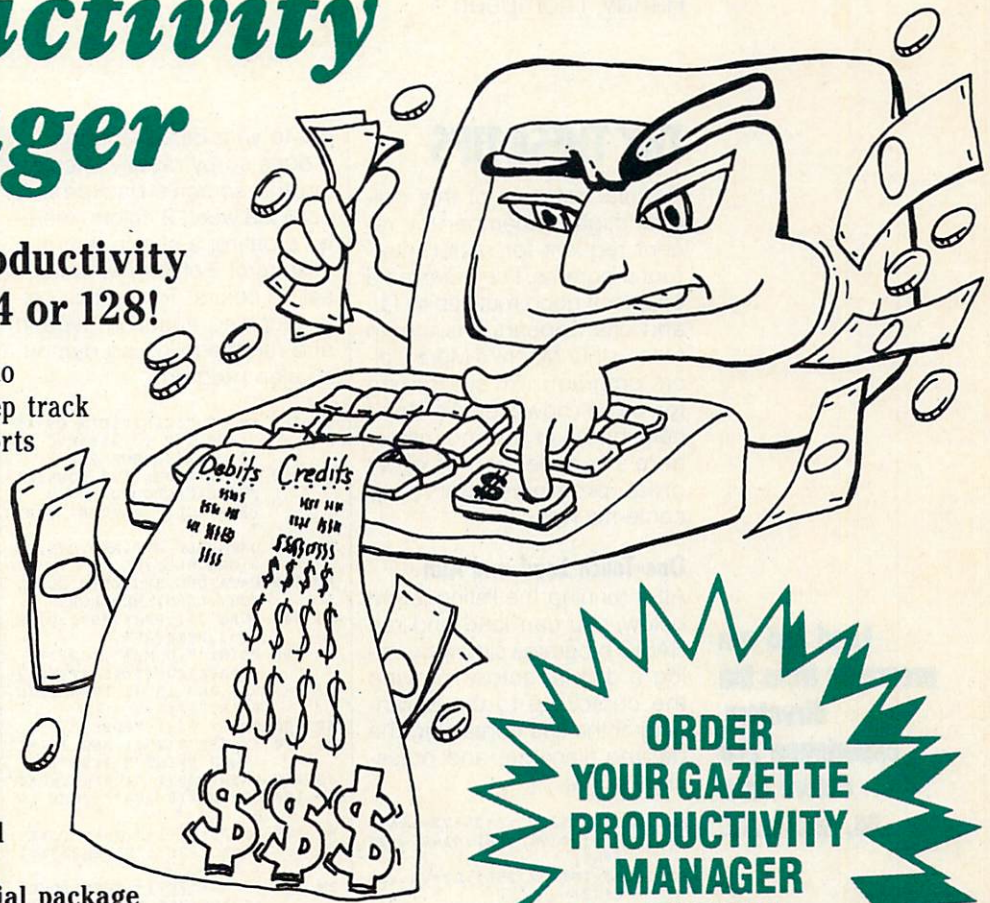
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# PROGRAMMER'S PAGE

Randy Thompson

## TRY THESE TIPS

Regular readers of this column might remember my recent request for raster interrupt programs. I've received a couple of good routines so far, and one appears this month (see Arthur Moore's More Colors program). I'm still looking for more, however, so don't hold back. In the meantime, here's a collection of other great programs that have come my way.

### One-Touch Load and Run

After running the listing found below, you can load and run BASIC programs simply by listing a disk directory, moving the cursor up to the beginning of the line containing the desired filename, and pressing Restore.

```
ED 10 S=49152:V1=S+25:V2=S+67
BF 20 H1=INT(V1/256):L1=V1-(25
6*H1)
GX 30 H2=INT(V2/256):L2=V2-(25
6*H2)
CF 40 FOR I=0 TO 93:READ D:POK
E S+I,D:C=C+D:NEXT
QQ 50 IF C>7825 THEN PRINT "E
RROR IN DATA STATEMENTS"
:END
RP 60 POKE S+14,L1:POKE S+19,H
1
DH 70 POKE S+26,L2:POKE S+28,H
2
KG 80 SYS S:PRINT "AUTO-RUN IS
READY."
ME 90 END
AJ 100 DATA 173,24,3,141,252,3
,173,25,3,141,253,3
GG 110 DATA 120,169,25,141,24,
3,169,192,141,25,3,88
GX 120 DATA 96,169,67,160,192,
32,30,171,169,13,141,11
9
QH 130 DATA 2,141,124,2,169,82
,141,120,2,169,85,141
HS 140 DATA 121,2,169,78,141,1
22,2,169,58,141,123,2
PP 150 DATA 169,6,133,198,108,
252,3,76,79,65,68,29
HA 160 DATA 29,29,29,29,29,29,
29,29,29,29,29,29
GR 170 DATA 29,29,29,29,29,29,
44,56,58,0
```

FRANCISCO FELIX  
BAJA CALIFORNIA SUR  
MEXICO

### More Colors

Add more colors to your programs with this machine language hack. Using a raster interrupt, the following program adds 240 simulated col-

ors to your 64's standard 16. It does so by rapidly alternating the screen's background color between 2 colors, thereby creating a shade that is a mixture of 2 of the computer's set 16 colors. To see this color blending in action, type in and run the following demonstration program.

```
BB 100 PRINT "[CLR]":DIM CS(15
):FOR I=0 TO 15:READ CS
(I):NEXT:GOSUB 240
QX 110 PRINT"[HOME]{19 DOWN}F1
/F7 BACKGROUND
{2 SPACES}[RETURN] TEXT
"
KE 120 DATA BLK,WHT,RED,CYN,PU
R,GRN,BLU,YEL
FQ 130 DATA ORG,BRN,LRED,DGRY,
MGRY,LGRN,LBLU,LGRY
EJ 140 POKE 251,PEEK(253):POKE
252,PEEK(254)
DP 150 PRINT "(HOME)":FOR I=0
{SPACE}TO 15:IF (PEEK(2
53) AND 15)=I THEN PRIN
T"[RVS]";
EP 160 PRINT CS(I)"[OFF]",
PX 170 IF (PEEK(254) AND 15)=I
THEN PRINT "{RVS}";
JQ 180 PRINT CS(I)"[OFF]":NEXT
FR 190 GET AS:IF AS="" THEN 19
0
BQ 200 IF AS="{F1}" THEN POKE
{SPACE}253,(PEEK(253)+1
) AND 15
BM 210 IF AS="{F7}" THEN POKE
{SPACE}254,(PEEK(254)+1
) AND 15
MC 220 IF AS=CHR$(13) THEN POK
E 646,(PEEK(646)+1) AND
15
QB 230 GOTO 140
KK 240 SA=679:FOR I=0TO 73:REA
D D:POKE SA+I,D:NEXT
XS 250 A=SA+36:POKESA+30,A/256
:POKE SA+25,A-PEEK(SA+3
0)*256:SYS SA:RETURN
JJ 260 DATA 120,173,26,208,9,1
,141,26,208
HX 270 DATA 173,17,208,41,127,
141,17,208
RR 280 DATA 169,0,141,18,208,1
33,2,169,203
GJ 290 DATA 141,20,3,169,2,141
,21,3,88,96
BB 300 DATA 173,25,208,41,1,20
8,3,76,49
RF 310 DATA 234,166,2,181,251,
141,32,208
EP 320 DATA 181,253,141,33,208
,138,73,1
KF 330 DATA 133,2,173,25,208,9
,1,141,25
HE 340 DATA 208,76,129,234
```

Many color combinations can cause the screen to flicker (much like a Commodore Amiga in interlace mode). You can reduce the flickering by turning down your monitor's brightness and contrast, or by selecting more compatible colors.

To use More Colors in your

BASIC programs, simply extract the subroutine found in lines 240-340 from the listing above. After calling this subroutine, you set the two colors that you want the computer to mix by poking their numerical values into locations 253 and 254. For example, to alternate between red and brown, you might execute the commands POKE 253,2:POKE 254,9.

This subroutine currently stores its machine language code in memory starting at location 679. You can change this to another location, such as 49152, simply by changing the variable SA in line 240.

ARTHUR MOORE  
ORLANDO, FL

### Easier ML Loads

The standard method for loading disk-based machine language programs from BASIC is to start your program with a line such as this.

```
10 IF L=0 THEN L=1: LOAD "file-
name",8,1
```

You must place this code near the beginning of your program because loads from within BASIC cause your program to reexecute. The IF statement keeps the program from entering an infinite loop that loads the same file over and over again. There's another method, however, that uses a couple of your computer's ROM routines instead of BASIC's LOAD command.

```
10 POKE 147,0: SYS 57812 "file-
name",8,1: SYS 62631
```

You can use this line of code anywhere within your program without causing the computer to restart itself. This routine gives 64 owners the functional equivalent of the 128's BLOAD command.

MATT ZEILENGA  
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# GEOS

Steve Vander Ark

## A GEOS TOUR OF Q-LINK

I've spent a lot of time and not a little money on QuantumLink over the past few years, where I go by the innocuous handle of SteveV14. Some of you might know me as a sometimes-host in the Starving Artists Café. Others might recognize me from my endless posts in the GEOS message bases. I've met a lot of great folks on Q-Link, and I'd like to meet more. Feel free to contact me anytime by E-mail.

So what does Q-Link offer that other services don't? Plenty. And if you're a GEOS fan, you simply can't afford to pass up the incredible treasures waiting for you there. Let me give you a GEOS-specific tour of QuantumLink, and you'll see what I mean.

We'll start with the GEOS support area itself, which you locate from the main menu by choosing Commodore Software Support. Here you'll find a wide range of services designed to help you with all of your GEOS needs, and it doesn't matter if you're a GEOS novice or an ace programmer. The folks who run things in the GEOS area are very friendly and willing to help any user who drops by. These are experts, many wearing the GeoRep or GeoHost hats, and they're intimately familiar with GEOS. If you have problems with your equipment, for example, you're sure to find someone who uses a setup similar to yours and can offer advice on keeping everything running smoothly.

Probably the most active section of the GEOS area is the message base. There are sections devoted to GEOS in general; printer support; geoProgrammer; geoFile and geoCalc; geoPublish; and even GeoWorks Ensemble, the PC

version of GEOS. Each of these sections has its own representative who takes the lead in answering questions and offering advice. In the general area, you'll find nice people such as Dave Ferguson and Jim Collette lending their considerable expertise to users with questions, problems, or ideas to share.

The printer support area is masterfully monitored by George Wells under the name GeoRep GHW. George is a printer expert par excellence who can tell you the dip switch settings for just about any interface and printer combination you might want to use with GEOS. George is the author of some of the finest printer drivers available for GEOS. If you have questions about your printer setup—which driver to use, how to make it do what you want it to do, or whatever—George is standing by to give you the most informed answers you'll get anywhere.

Another popular place for GEOS users is the GEOS Chat Room. Every evening from 9:00 to 11:00 Eastern time, a GeoHost shoots the breeze with all who wander in. The conversation can occasionally roam into some pretty esoteric realms, but no matter where the conversation flits to, you'll be able to get quick answers to your GEOS questions. You'll get a chance to meet some of the experts in the Chat Room, too.

Now comes the really exciting part: the software libraries. Q-Link's GEOS libraries are brimming with great files, just waiting for you to download them. The libraries are divided into several categories: BSW Applications, User Applications, Printer/Input Drivers, geoWrite Files, geoPaint Files, geoPublish/Clip Art Files, and Fonts. You'll be delighted and amazed with what you'll find there. Of course,

with all those files available, you might become lost. Don't worry. Once again, you can get some good advice on which files are worth your time from the message area or the Chat Room.

The GEOS support area isn't the only place where you'll find GEOS information on Q-Link. Other excellent places to poke around are the software libraries of the now-defunct *RUN* magazine. I hope these files will remain available on Q-Link, since many of them are particularly good. The download will cost you an extra \$1.50, but for programs such as Import Runner or geoTerm, it's worth it.

Another place to check is the graphics area, which you'll find in the Commodore Information Network under Computing Support Groups. Here you can ask for GEOS graphics advice and be assured of a prompt reply—very likely from me. There are GEOS-format graphics in the picture libraries here.

Probably the best source of GEOS information outside of the GEOS area itself is the Creative Micro Designs support area. That's in the Commodore Information Network area under Hardware Support. CMD is easily the most enthusiastic 64/128 GEOS supporting company left, and it provides plenty of technical advice and support for its GEOS products in its message areas. The libraries contain some GEOS files that you'll want if you buy RAM-Link or RAMDrive.

So what do you do to join? Give QuantumLink a call at (800) 827-8444 for more information. The service costs \$9.95 a month, with additional charges for many areas (including the ones I've been talking about) at the rate of \$4.80 an hour. No other service can offer so much for GEOS and for such a reasonable cost. □

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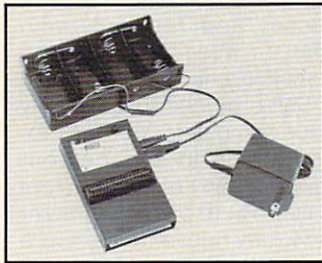


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# D'IVERSIONS

Fred D'Ignazio

## HIS MASTER'S VOICE

When the phone rings and I answer, I sometimes get a peculiar or aggravating response. I might hear "Oh, hi, Janet! I was looking for Fred." (I have a high tenor voice, and callers frequently mistake me for a female.) My favorite is "Hi, honey. Is your mommy or daddy at home?"

Over the years, I've tried to change my telephone voice. The best I've managed to achieve is that of a feeble old man. But I shouldn't despair. Thanks to modern technology, I don't have to stick with my normal falsetto or toddler-like peep. Help is on the way.

A recent issue of *The Wall Street Journal* reported on a booming business in phone machines that electronically alter your voice. Security consultants are making a killing selling these machines to businesses and residents who want to alter their voice to something new.

Some machines are really voice computers. You can program them to change your voice into any of 250 different voices—from barroom brawler to violin virtuoso. If you are a person living alone or a security guard anchoring a company's graveyard shift, it's just the thing. You can make your voice so frightening and overpowering that even professional hit men would shiver at the sound of it.

Computerized voice boxes are still too expensive to be popping up in every home, but not for long. New, inexpensive voice chips are appearing, and high-speed digital signal processors (DSPs) and voice-compression algorithms are being perfected that will soon put synthetic speech inside every residential telephone for just pennies a pop.

Virtual voices may not have found their way into every home, but they have already taken over most offices. Company voice mail is a must for corporations which aim to survive lean-and-mean downsizing. Who hasn't called a company recently, only to tumble into the labyrinthine bowels of a computerized answering machine?

This is the way most user-friendly voice-mail systems handle customer calls.

"Hi, this is Fred D'Ig—"

"You have reached the Pygmy Bungee Jumping Society. If you have a rotary phone, please stay on the line, and an operator (at some far-off distance in the future) will (eventually) be on the line."

"But I just—"

"Press 1 if you wish to speak with customer services to order our new products. Press 2 if you would like our mail-order catalog. Press 3 for technical support. . . . Press 993 if you would like a salesman for our voice-mail company to pay you a visit. Press 994 if you would like to speak with our attorneys about suing us for the cruel and unusual punishment inflicted by this voice-mail message. Press . . ."

Think about it. Electronic voices may sound like science fiction, but they're also a very real part of life. During an average day, how many times do you talk to a computer or hear a computer's voice? Let's face it: Do you really know if there's a computer or a person at the other end of the line?

Computerized voices are not always a blight, either. Electronic voices are a godsend for visually handicapped people, for semiliterate and illiterate people, and for anyone who needs to keep his or her eyes on something else.

Here are some of the computer voices you are liable to hear during an average day.

- Your car nagging you to fasten your seat belt
- A digital telephone answering machine
- A talking clock
- A Jiminy Cricket watch
- A singing greeting card
- An electronic telephone operator
- Your electronic bank teller or stockbroker
- A computerized telephone salesperson
- Talking animatrons at Chuck E. Cheese, Disney World, and museums
- Videogames
- Home and automobile security systems
- An electronic conductor on a subway car
- Talking tech data computers in hospitals, labs, factories, and elsewhere

One of the geniuses of the computer revolution, Alan Turing, created a seemingly impossible intelligence test for computers over 50 years ago. He said computers would be truly intelligent when a human judge couldn't tell if he or she were conversing with a human or a computer.

Maybe we've already reached that point—and passed it.

How many robotlike waiters, bank tellers, telephone operators, and supermarket cashiers have you run into? In comparison, a computerized voice often sounds warm, friendly, and personable. The computer can sound truly human—something that people in rote, mechanical jobs have difficulty imitating.

On the other hand, even with the eclipse of the Cold War, we still may not survive the future. Instead of perishing through global holocaust, we may wink out slowly, one person at a time, through terminal boredom produced by listening to interminable computer phone messages! □

Are you sure that the voice you hear on the phone belongs to a human being?

# PROGRAMS

## ROGUE SUNBATHERS

By Alain Tremblay

The sun that shines on this distant planet is a potent and powerful source of energy. The natives of this planet take advantage of its power by erecting tall stone columns that they can use to bask in the rays high above the ground. Your task in this amusing one- or two-player game is to surpass the other sunbathers by building the tallest column.

Rogue Sunbathers is written entirely in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

Starting address: 0801

Ending address: 1838

Be sure to save a copy of the program before exiting MLX.

### Playing the Game

At the start of the game, use the joystick to select how many computer opponents you wish to play against. You can select up to four. Also select the number of human players and the game's speed factor. Confirm each selection by pressing the fire button.

When the game begins, each player (including the computer opponents) starts at the foot of a short column. Move the joystick up and down to climb a column; move it left and right to run. You'll notice that each player has a distinctive hair color. This color matches a color bar at the bottom of the screen that indicates the status of that player's health.

### Gather Rocks

Your first objective is to gather stones that you can pile on top of your column to make it higher. One way to get stones is to kick at an opponent's column. Stand beside a column, push the joystick button, and then move the joystick in the direction you want to kick. Keep pressing the joystick button.

If you're successful in your kick attempt, a stone will be freed from the base of the column. To pick it up, move to it and push the joystick up. The stone will disappear, but you'll notice that your movements are slightly

slower. Take the stone and climb to the top of your column where it will be automatically added.

To drop a stone, move the joystick down. Stones are also found just outside the left and right screen borders. Run until you almost leave the screen. Keep running even if you're not actually moving. You'll automatically pick up a stone after a short time. Take it back to your tower.

If a player builds a column taller than your own, you can climb to the top of it and kick several stones off. You can dislodge stones by pushing the joystick button and moving the stick left or right.

Be aware that the owner of a column objects to this behavior and has the right to push you off on your head. Each fall from the top of a column cuts your health by half. You won't be allowed to kick if your health status falls to 0.

You may recover and even gain extra health by climbing your column and sitting in the sun's powerful rays. Also, watch out for falling rocks. If a stone hits you on the head, it not only smashes you a little, but it's also harmful to your health.

### The Winner

The game ends when the sun reaches the right side of the screen. The player with the tallest column wins. Health status is also taken into account for establishing the winner.

To change the game's color settings, type in the following POKEs after loading the game but before running it. POKE 4390, X will change the border color. POKE 4391, X will change the screen. POKE 2063, X will alter the stone color. For X, enter any Commodore color code number (0-15).

### ROGUE SUNBATHERS

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:32 00 00 00 00 A9 08 8D 76
0811:21 D0 8D 86 02 A9 93 20 FD
0819:D2 FF 20 D9 10 20 92 12 6C
0821:A0 11 8C 13 D4 88 8C 14 7E
0829:D4 A9 27 8D 0D D4 A9 0F E9
0831:8D 18 D4 8D 03 D4 A9 7F BF
0839:8D 06 D4 A2 07 A9 0A 95 DE
0841:C0 CA 10 FB 20 1B 15 18 D5
0849:65 0A 0A 0A 85 FF A9 20 10
0851:E5 0C E5 0C E5 FF 85 06 15
0859:20 7B 13 20 6D 15 A4 0C D1
0861:98 0A AA A9 AF 9D 01 D0 F6
```

```
0869:A9 00 85 02 B9 00 9B 0A 2E
0871:0A 0A 26 02 69 1E 20 55 47
0879:10 A9 C0 99 F8 07 A9 02 E6
0881:99 27 00 88 10 DA 8C 15 CA
0889:D0 A6 0A 20 45 0E CA 10 F6
0891:FA 20 6F 09 20 89 14 20 15
0899:7D 15 A6 0C B5 80 F0 1E F2
08A1:86 FF A9 00 95 80 B4 C0 03
08A9:8A 18 69 14 AA 20 E1 14 21
08B1:A6 FF F6 C0 A9 44 91 D1 53
08B9:C0 27 D0 02 D6 C0 CA 10 8D
08C1:DB A5 3B C9 27 D0 C2 A6 D5
08C9:0C 86 94 B5 C0 4A 7D 20 B9
08D1:9B 9D 20 9B CA 10 F2 20 71
08D9:33 0B 98 09 30 8D 42 09 2F
08E1:C8 84 7F A0 08 A2 27 20 AA
08E9:EE 08 4C 3C 08 A9 00 85 2D
08F1:08 A5 08 10 FC BD 05 09 63
08F9:29 3F F0 07 99 C8 04 C8 BD
0901:E8 D0 F2 60 4E 55 4D 42 C4
0909:45 52 20 4F 46 20 43 4F D3
0911:4D 50 55 54 45 52 40 4F D0
0919:50 50 4F 4E 45 4E 54 53 95
0921:20 28 31 2D 34 29 3F 3A 45
0929:20 31 00 54 48 45 20 57 CB
0931:49 4E 4E 45 52 40 49 53 92
0939:20 50 4C 41 59 45 52 20 B1
0941:23 58 21 00 4E 55 4D 42 C3
0949:45 52 20 4F 46 20 50 4C 2B
0951:41 59 45 52 53 3A 20 31 1D
0959:00 53 50 45 45 44 20 46 60
0961:41 43 54 4F 52 28 31 2D 27
0969:34 29 3F 20 31 00 A6 0C AC
0971:E8 CA 86 FF 8A 0A 85 11 14
0979:E4 0A F0 87 D6 36 10 F1 B8
0981:A5 06 95 36 B4 50 F0 0A D0
0989:4A C0 04 B0 01 4A 75 36 CE
0991:95 36 B5 4B F0 05 20 19 5C
0999:0E D0 D6 B5 68 D0 D2 B5 FE
09A1:3C F0 0D D6 3C D0 CA B5 8D
09A9:58 F0 05 A9 C8 9D F8 07 15
09B1:B5 27 10 1F 4A 90 03 4C 43
09B9:73 0A B5 46 15 58 F0 2B 3A
09C1:B5 58 F0 03 20 91 0D B5 2A
09C9:60 C5 FF F0 0E 20 7A 0C 7E
09D1:4C 72 09 B5 50 F0 19 B5 51
09D9:46 F0 10 20 7E 0C B5 58 37
09E1:F0 06 A9 00 95 27 95 50 E7
09E9:4C 72 09 A4 FF 4C DB 0A 1D
09F1:B4 27 F0 2E 88 F0 7B B5 DD
09F9:46 F0 03 4C AC 0A B5 31 BA
0A01:C9 14 A9 FF 90 02 A9 01 15
0A09:85 02 20 A7 0E 20 96 0B 08
0A11:20 05 0B F0 07 A9 FF 85 4B
0A19:03 20 BC 0D 20 49 0B 4C A7
0A21:72 09 B5 C0 C9 04 90 0F 02
0A29:20 17 0B F0 2D 20 33 0B DE
0A31:D0 0B B9 20 9B C9 3C A9 CF
0A39:02 90 17 0B 1A B9 20 9B F3
0A41:4A DD 20 9B A9 01 B0 0A 6C
0A49:A5 08 C9 C0 A9 02 B0 02 30
0A51:A9 01 95 27 20 91 0D 4C 4D
0A59:72 09 B5 A0 D0 F9 B9 F8 84
0A61:07 C9 D0 A9 01 B0 02 A9 98
0A69:FF 85 02 A9 78 95 A0 4C 61
0A71:79 0F B5 46 15 58 F0 3E 4B
0A79:B4 60 C4 FF F0 2D B5 58 98
0A81:F0 19 B5 85 F0 0F A5 08 7A
0A89:29 0F D0 09 95 85 95 75 04
0A91:A9 02 4C 53 0A A9 01 95 48
```





# PROGRAMS

```

17B9:15 00 00 55 40 00 55 40 B4
17C1:01 54 40 01 14 50 01 14 95
17C9:00 00 3C 00 00 1C 00 00 EF
17D1:15 00 00 05 00 00 05 00 E4
17D9:00 14 00 00 04 FB 0C A8 DD
17E1:00 00 B0 00 00 90 00 00 68
17E9:50 00 00 40 00 00 54 00 EC
17F1:01 55 00 05 51 50 04 50 6A
17F9:00 10 54 00 10 14 00 00 87
1801:3D 50 00 1F 55 00 14 00 A8
1809:00 04 00 00 04 00 00 10 6A
1811:00 00 10 FB 24 14 00 00 74
1819:55 A0 03 55 60 03 D4 60 EA
1821:01 44 20 00 55 00 00 51 E2
1829:00 00 50 00 01 44 00 01 7D
1831:04 FB 05 FB 00 00 00 00 C2
  
```

*Alain Tremblay does his sunbathing in Sainte-Foy, Quebec, Canada.*

## SPACE TREK

By Bob Yu

The space adventure continues with Space Trek. Boldly go where no computer has gone before in this fast-paced, one- or two-player arcade-style game for the 64.

As captain of a space vessel, you have a mission to explore the final frontier of space. Your mission for this part of the adventure is to guide your ship through dangerous asteroid fields to reach the other side of the Alpha sector.

### Getting Started

Space Trek is written entirely in machine language. To enter the program, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

**Starting address: 0801**

**Ending address: 1638**

Be sure to save a copy of the program before exiting MLX.

### Playing the Game

Space Trek loads and runs like a BASIC program. At the menu prompt, move joystick 1 left for a one-player game or right for a two-player game. Your task is to guide your ship through an asteroid belt, trying to avoid collisions. Your shields have only enough power to resist three hits from the asteroids. You can either fly around the asteroids or destroy them with blasts from your ship's phaser. Also be

on the alert for enemy ships.

Control your ship with either the keyboard or joystick. Joysticks are required for the two-player game. Use a joystick to guide your ship left or right, and press the fire button to launch a phaser blast. From the keyboard, move your ship to the right by pressing the 2 key. Press Ctrl to move to the left. Press the space bar to fire the ship's phaser. Press the Commodore key to pause the game and then press the Shift key to resume play.

Game levels are determined by the length of time you successfully avoid collisions. At higher levels your ship will increase its speed. There are six levels in all. Watch out for the last level; it's a killer.

### Scoring

Each rock that you hit with your phaser earns you 150 points. You earn 250 points for hitting an enemy ship. Nothing will shoot at you, but watch out for those fast-approaching rocks. Each asteroid hit causes you to lose one shield factor. Warning: this game may look simple, but it's addictive.

### SPACE TREK

```

0801:0B 08 0A 00 9E 32 30 36 2E
0809:31 00 00 00 20 9F 08 20 6F
0811:7D 0A 20 44 E5 20 7D 0A 5F
0819:20 E5 0D 20 C8 13 20 7D A6
0821:0A 20 E9 12 20 90 0B 20 16
0829:2F 12 20 09 12 A9 00 85 A6
0831:A1 20 AA 0B 20 CA 0B AD 10
0839:15 D0 29 01 F0 03 20 EA FB
0841:0B AD 15 D0 29 04 F0 03 30
0849:2D 1B 0C 20 B1 0D 20 CB 81
0851:0D 20 4C 0C 20 7A 0C 20 5D
0859:A8 0C 20 C3 0E 20 31 10 64
0861:20 3B 13 20 E0 0F 20 A6 DE
0869:0E 20 B0 13 AD C7 13 18 9A
0871:69 F9 AA 20 9D 0B A5 A1 12
0879:48 AD 8D 02 C9 02 D0 07 E9
0881:AD 8D 02 C9 01 D0 F9 68 50
0889:85 A1 AD C7 13 C9 06 D0 93
0891:03 4C 59 14 AD 15 D0 29 2F
0899:05 D0 96 4C 19 08 A2 00 26
08A1:BD BA 08 9D 00 30 E8 E0 8D
08A9:00 D0 F5 A2 00 BD BA 09 4C
08B1:9D 00 31 E8 E0 C0 D0 F5 E6
08B9:60 00 20 00 00 20 00 00 7E
08C1:A8 00 00 A8 00 00 A8 00 02
08C9:00 A8 00 00 A8 00 00 A8 F1
08D1:00 00 A8 00 02 AA 00 02 B3
08D9:AA 00 0A AA 80 0A AA 80 2D
08E1:00 30 00 00 FC 00 00 FC E2
08E9:00 00 FC 00 00 FC 00 00 8D
08F1:FC 00 00 30 00 00 00 00 83
08F9:00 00 20 00 00 20 00 00 8E
0901:A8 00 00 A8 00 00 A8 00 43
  
```

```

0909:00 A8 00 00 A8 00 00 A8 33
0911:00 00 A8 00 02 AA 00 02 F4
0919:AA 00 0A AA 80 0A AA 80 6E
0921:00 30 00 00 FC 00 00 FC 24
0929:00 00 30 00 00 00 00 00 41
0931:00 00 00 00 00 00 00 00 43
0939:00 00 00 00 20 00 02 CD
0941:A8 20 28 AA A0 23 A8 20 62
0949:2B E8 AA 2F 2E A2 AB 03 C9
0951:88 8E EF AA BF FF 22 2E 64
0959:FB FA BE CE CA AF 83 02 0B
0961:83 E3 28 BA A3 F8 FF 87 67
0969:A8 2E 8E 88 0A 2A A0 0C FB
0971:82 80 00 28 00 00 00 00 67
0979:00 00 00 00 20 00 02 0E
0981:A8 00 08 A2 00 03 8A 00 34
0989:0B EE 80 0E 2F 80 2B F2 92
0991:80 2E FF 80 2A FE 80 08 CD
0999:EE 80 0A EA 00 02 A8 00 8C
09A1:00 80 00 00 00 00 00 00 D3
09A9:00 00 00 00 00 00 00 00 BB
09B1:00 00 00 00 00 00 00 00 C3
09B9:00 00 20 00 08 20 00 08 98
09C1:00 08 82 22 08 20 28 80 D9
09C9:2B B2 80 02 BF 80 22 FF 92
09D1:00 28 2C 00 0B FA 80 83 3C
09D9:F8 28 83 A2 80 02 38 00 89
09E1:02 22 80 08 02 A0 A0 20 02
09E9:20 20 20 28 00 00 00 00 9A
09F1:00 00 00 00 00 00 00 00 04
09F9:00 00 00 00 00 00 00 00 0C
0A01:00 00 00 00 00 00 00 00 3D
0A09:00 55 00 01 55 40 2A 55 D7
0A11:A8 AA AA AA AA AA AA 02 7B
0A19:FF 80 00 3C 00 00 00 00 11
0A21:00 00 00 00 00 00 00 00 35
0A29:00 00 00 00 00 00 00 00 3D
0A31:00 00 00 00 00 00 00 00 45
0A39:00 00 00 00 00 00 20 00 CD
0A41:20 00 00 20 00 00 20 00 A7
0A49:00 20 00 00 20 00 00 20 86
0A51:00 00 20 00 00 00 00 00 69
0A59:00 00 00 00 00 00 00 00 6D
0A61:00 00 00 00 00 00 00 00 75
0A69:00 00 00 00 00 00 00 00 7D
0A71:00 00 00 00 00 00 00 00 85
0A79:00 00 00 00 A9 00 8D 21 17
0A81:D0 8D 20 D0 A9 01 8D 86 65
0A89:02 A9 8E 20 16 E7 A9 08 88
0A91:20 16 E7 20 66 E5 A0 00 46
0A99:A9 07 8D D0 0A A2 00 A9 87
0AA1:00 8D CF 0A A9 1D 20 16 CB
0AA9:E7 EE CF 0A AD CF 0A C9 92
0AB1:21 D0 F1 BD D1 0A 20 16 B1
0AB9:E7 E8 EC D0 0A D0 F4 AD D1
0AC1:D0 0A 18 69 07 8D D0 0A 74
0AC9:C8 C0 17 D0 D2 60 00 7A
0AD1:20 53 50 41 43 45 20 20 78
0AD9:20 54 52 45 4B 20 20 20 EC
0AE1:20 20 20 20 20 20 20 20 F5
0AE9:20 20 20 20 4C 45 56 45 85
0AF1:4C 3A 30 20 20 20 20 20 A4
0AF9:20 20 50 4C 41 59 45 52 41
0B01:31 20 53 43 4F 52 45 20 C4
0B09:30 30 30 30 30 30 30 20 0F
0B11:20 20 20 20 20 20 20 53 5A
0B19:48 49 45 4C 44 20 20 20 16
0B21:33 20 20 20 20 20 20 20 C0
0B29:20 20 20 50 4C 41 59 45 BF
0B31:52 32 20 53 43 4F 52 45 77
  
```



# PROGRAMS

```

11C9:03 9D 37 03 CA E0 28 D0 E6
11D1:F2 8A C9 28 90 05 E9 28 60
11D9:4C D3 11 C9 00 D0 04 8A AB
11E1:E9 08 AA 60 A0 00 20 72 0E
11E9:0B C9 38 B0 F9 E9 18 AA 68
11F1:A9 2E 9D 00 04 C8 C0 03 EF
11F9:D0 EC 60 A2 00 A9 20 9D 7A
1201:00 04 E8 E0 20 D0 F6 60 E3
1209:A9 00 8D 2E 12 20 FC 11 B2
1211:20 E5 11 20 88 11 20 B1 5D
1219:0D 20 CB 0D EE 2E 12 AD 18
1221:2E 12 C9 1A D0 E7 20 FC 1F
1229:11 20 E5 11 60 00 A9 0F 11
1231:8D 18 D4 A9 4F 8D 13 D4 03
1239:A9 10 8D 14 D4 A9 11 8D 26
1241:12 D4 A9 FF 8D 0E D4 A9 D0
1249:59 8D A2 12 A2 F8 20 9D C9
1251:0B EE A2 12 AD A2 12 8D D5
1259:0F D4 C9 66 D0 EE A2 0A 6B
1261:20 9D 0B A9 65 8D A2 12 B1
1269:A2 F8 20 9D 0B EE A2 12 66
1271:AD A2 12 8D 0F D4 C9 80 10
1279:D0 EE A2 32 20 9D 0B A9 70
1281:81 8D A2 12 A2 F8 20 9D 16
1289:0B CE A2 12 AD A2 12 8D 06
1291:0F D4 C9 73 D0 EE A2 0F 79
1299:20 9D 0B A9 10 8D 12 D4 E0
12A1:60 00 A2 0F 8E 18 D4 A2 5C
12A9:4F 8E 05 D4 A2 10 8E 06 7F
12B1:D4 8C 04 D4 A2 FF 8E 00 63
12B9:D4 8D 01 D4 60 8D 01 D4 29
12C1:60 8C 04 D4 60 A2 0F 8E 41
12C9:18 D4 A2 4F 8E 0C D4 A2 69
12D1:10 8E 0D D4 8C 0B D4 A2 6D
12D9:FF 8E 07 D4 8D 0B D4 60 66
12E1:8D 08 D4 60 8C 0B D4 60 0A
12E9:A9 03 8D AE 13 8D AF 13 81
12F1:A9 C2 8D 85 11 8D 86 11 82
12F9:8D 87 11 A9 80 8D 7F 11 C9
1301:8D 80 11 8D 81 11 8D 82 F6
1309:11 8D 83 11 8D 84 11 8D CA
1311:1A 0C 8D 4B 0C 8D C7 13 E6
1319:A2 00 9D 79 0E 9D 9F 0E 10
1321:E8 E0 07 D0 F5 A2 00 9D B9
1329:AC D0 E8 E0 05 D0 F8 A2 14
1331:00 9D D2 0F E8 E0 0E D0 C1
1339:F8 60 AD DE 0F F0 34 CE 0B
1341:AE 13 AD AE 13 18 69 30 20
1349:8D DC 05 AD AE 13 C9 00 3E
1351:D0 21 A9 02 8D 21 D0 A9 B9
1359:C4 8D F8 07 A2 E6 20 9D 63
1361:0B AD 15 D0 49 01 8D 15 A6
1369:D0 A9 C0 8D F8 07 A9 00 8A
1371:8D 21 D0 AD DF 0F F0 34 EC
1379:CE AF 13 AD AF 13 18 69 93
1381:30 8D F4 06 AD AF 13 C9 3E
1389:00 D0 21 A9 02 8D 21 D0 FB
1391:A9 C4 8D FA 07 A2 E6 20 CF
1399:9D 0B AD 15 D0 49 04 8D 99
13A1:15 D0 A9 C0 8D FA 07 A9 D7
13A9:00 8D 21 D0 60 03 03 A5 1F
13B1:A1 C9 0F 90 10 A9 00 85 B2
13B9:A1 EE C7 13 AD C7 13 18 61
13C1:69 30 8D C7 04 60 00 20 98
13C9:09 12 A2 00 BD 19 14 9D 65
13D1:6E 05 E8 E0 10 D0 F5 A2 ED
13D9:00 BD 29 14 9D BB 05 E8 A4
13E1:E0 19 D0 F5 AD 01 DC 29 8C
13E9:0F C9 0B F0 07 C9 07 F0 D8
13F1:0E 4C E5 13 AD 15 D0 09 8C

```

```

13F9:01 8D 15 D0 4C 08 14 AD 0C
1401:15 D0 09 05 8D 15 D0 20 DB
1409:09 12 A2 00 BD 42 14 9D 4B
1411:6B 05 E8 E0 17 D0 F5 60 A3
1419:0D 0F 16 05 20 0A 0F 19 FE
1421:13 14 09 03 0B 20 23 31 79
1429:0C 05 06 14 20 06 0F 12 E3
1431:20 31 20 0F 12 20 12 09 E8
1439:07 08 14 20 06 0F 12 20 1C
1441:32 17 05 0C 03 0F 0D 05 1D
1449:20 01 02 0F 01 12 04 2C 77
1451:20 03 01 10 14 01 09 0E 30
1459:AD 15 D0 29 05 8D 15 D0 A3
1461:20 09 12 A2 00 BD BD 14 CE
1469:9D 6D 05 E8 E0 12 D0 F5 D1
1471:A2 00 BD CF 14 9D BE 05 39
1479:E8 E0 10 D0 F5 20 2F 12 FD
1481:20 2F 12 20 2F 12 20 09 D4
1489:12 A2 00 BD DF 14 9D 6B 35
1491:05 E8 E0 15 D0 F5 20 90 13
1499:0B A0 81 A9 03 20 A3 12 2C
14A1:A9 02 20 C6 12 A9 00 8D 54
14A9:F4 14 A2 0A 20 9D 0B EE C2
14B1:F4 14 AD F4 14 C9 1E D0 33
14B9:F3 4C 19 08 03 0F 0E 07 0A
14C1:12 01 14 15 0C 01 14 09 9C
14C9:0F 0E 13 21 21 21 09 92
14D1:13 13 09 0F 0E 20 03 0F 60
14D9:0D 10 0C 05 14 05 14 08 43
14E1:01 0E 0B 20 19 0F 15 20 C0
14E9:06 0F 12 20 10 0C 01 19 E8
14F1:09 0E 07 00 FF 00 FF 00 03
14F9:FF 00 FF 00 FF 00 FF 00 42
1501:00 FF 00 FF 00 FF 00 FF 2B
1509:00 FF 00 FF 00 02 00 FF 3B
1511:00 FF 00 FF 00 FF 00 FF 3B
1519:00 FF 00 FF 00 FF 00 FF 43
1521:00 FF 00 FF 00 FF 00 FF 4B
1529:00 FF 00 FF 00 FF 00 FF 53
1531:00 FF 00 FF 00 FF 00 FF 5B
1539:00 FF 00 FF 00 FF 00 FF 63
1541:00 FF 00 FF 00 FF 00 FF 6B
1549:00 FF 00 FF 00 FF 00 FF 73
1551:00 FF 00 FF 00 FF 00 FF 7B
1559:00 FF 00 FF 00 FF 00 FF 83
1561:00 FF 00 FF 00 FF 00 FF 8B
1569:00 FF 00 FF 00 FF 00 FF 93
1571:00 FF 00 FF 00 FF 00 FF 9B
1579:00 FF 00 FF 00 FF 00 DD 81
1581:FF 00 FF 00 FF 00 FF 00 AB
1589:FF 00 FF 00 FF 00 FF 00 B3
1591:FF 00 FF 00 FF 00 FF 00 BB
1599:FF 00 FF 00 FF 00 FF 00 C3
15A1:FF 00 FF 00 FF 00 FF 00 CB
15A9:FF 00 FF 00 FF 00 FF 00 D3
15B1:FF 00 FF 00 FF 00 FF 00 DB
15B9:FF 00 FF 00 FF 00 FF 00 E3
15C1:FF 00 FF 00 FF 00 FF 00 EB
15C9:FF 00 FF 00 FF 00 FF 00 F3
15D1:FF 00 FF 00 FF 00 FF 00 FB
15D9:FF 00 FF 00 FF 00 FF 00 04
15E1:FF 00 FF 00 FF 00 FF 00 0C
15E9:FF 00 FF 00 FF 00 FF 00 14
15F1:FF 00 FF 00 FF 00 FF 00 1C
15F9:FF 00 FF 00 FF 00 FF 22 46
1601:00 FF 00 FF 00 FF 00 FF 2D
1609:00 FF 00 FF 00 FF 00 FF 35
1611:00 FF 00 FF 00 FF 00 FF 3D
1619:00 FF 00 FF 00 FF 00 FF 45
1621:00 FF 00 FF 00 FF 00 FF 4D

```

```

1629:00 FF 00 FF 00 FF 00 FF 55
1631:00 FF 00 00 00 00 00 00 5D

```

*Bob Yu is working on a sequel to Space Trek. He lives in Lawrenceville, New Jersey.*

## PUSH BUTTON 64

By Matthew D. Boardman

Graphic environments such as GEOS are popular with users because they make ordinary computer tasks simple and fun to do. A menu-driven program is easy to learn, since there are no commands or complex keystrokes to remember. The trouble, however, is that the easier it is for the person to use the program, the more difficult it is for the programmer to write. With GEOS, for example, programmers have to use machine language and must acquaint themselves with the complex algorithms built into the GEOS system.

Push Button 64 lets any BASIC programmer create complex menu-driven applications for the 64. It uses machine language routines for speed, but you don't need to know any machine language to use the program. With Push Button 64, the most complex commands can be accessed with a simple arrow on the screen controlled with a joystick.

### Typing It In

Push Button 64 consists of two parts—the actual program and a demonstration. The first is written in machine language. It must be entered using MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts you for the starting and ending addresses, respond with the following values.

**Starting address: C000**

**Ending address: C267**

Be sure to save a copy of this program before exiting MLX. Use the filename Button64.ml so that the second program can load it properly. The second program is a BASIC demonstration that shows how to incorporate the routines into your programs. To help you avoid typing errors, it should be entered with The Automatic Proofreader. Again, see "Typing Aids," and remember to save a copy of the program.



## The Pointer

To see the demonstration, plug a joystick into port 2. Load the BASIC program and type *RUN*. The machine language code will be read from the disk and then an arrow will appear on-screen. Moving the joystick up, down, left, or right will make the arrow on-screen move accordingly. Pressing the fire button selects something on-screen. A clicking noise will confirm that the button was pressed.

The second line on the screen consists of four menus. To make the program shorter to type in, only the first two menus are functional. Maneuver the arrow onto the File menu and click the button. A sample menu pulls down.

Pointing and clicking the button on one of these menu items activates an associated routine. Click anywhere else and the menu closes. Click on the Load menu item. A box appears in the center of your screen indicating the item you selected. This box is called a dialog box, since it confirms choices or gets information from the user. For demonstration purposes, the selections activate dialog boxes rather than perform actual tasks. Point and click on the Continue box to go on.

The three buttons on the right of the screen activate dialog boxes that indicate which button you pressed. On the bottom of the screen is a slider. This is a graphical way for the user to input information, in this example a number from 0 to 26. Point and click on the left or right triangle on either side of the slider to decrease or increase the number respectively. The red slider moves to the left or right, and the number on the right of the slider changes accordingly. If you point and click on an empty part of the slider, the red indicator moves to that position, and the number changes. To leave the program, click on the Files menu and select Quit.

## Your Own Menus

The machine language program contains several routines that are accessed through the following SYS calls and memory locations.

### Activate Arrow (SYS 49152)

This command causes an arrow to appear on the screen. You can control it

by moving the joystick.

### Deactivate Arrow (SYS 49633)

This removes the arrow from the screen and deactivates the analysis program, but the following two commands can still be accessed.

### Save Screen (SYS 49653)

This saves the characters and colors on the screen to two special buffers. It is included in order to make the pop-up menus easier to manipulate.

### Load Screen (SYS 49709)

This retrieves the characters and colors from the buffers and restores the screen as it was when the screen was saved. The technique for using these two commands is explained below.

### Flag (location 49572)

This is a variable which allows your BASIC program to tell the machine language routine whether or not it is accepting button presses. If the location contains a 1, then the computer will ignore all button presses. If you poke a 0 into the location, this tells the machine language routine to process button presses normally.

### Xchar (49571)

This is the x coordinate of the screen character in which the arrow was present when the button was last pressed, a number from 0 to 39.

### Ychar (49570)

This is the corresponding y coordinate of the screen character, from 0 to 24. These two locations help to determine which object the user is pointing to.

### Xdot (49568)

This is the actual x coordinate of the arrow in pixels. This is useful if you need more accuracy than just a character coordinate or if you are working in high-resolution mode.

### High (49569)

This is the most significant byte of the sprite's x coordinate; see the 64's user's manual for a more detailed explanation of sprite coordinates. The location either contains a 0 or a 1, regardless of the positions of all other sprites. It makes Xdot a 16-bit number.

### Ydot (49567)

This is the corresponding y coordinate of the sprite.

## How It Works

When the machine language routine is activated (SYS 49152), it puts two sprites on the screen to create the arrow. The first sprite is a white arrow, and the second is a black outline directly underneath. These two colors allow the sprite to show up on all background colors. The actual coordinates used when the user clicks the button are those of the tip of the white part of the arrow.

The activation routine also sets up a machine language interrupt that calls the routine to move the arrow sprite with the joystick. The deactivation routine turns off this interrupt and the sprite. You can turn the arrow on and off as often as you need with successive calls of the activation and deactivation routines.

When the routine detects a press of the button, it stores the current sprite coordinates in Xdot, Ydot, and High. It then converts these coordinates into character coordinates and stores them in Xchar and Ychar. A 1 is then placed in Flag so that no more clicks will be processed until the BASIC program has determined what to do. The BASIC program must poke a 0 into Flag in order for the machine language routine to analyze more coordinates.

## The Demo Program

You don't have to know all of this to use the routines, however. The BASIC demonstration shows how to use them in terms of menu manipulation. The program has numerous comments in the form of REM statements that show the operation of the program, which you can take note of as you type it in. The program's plan of attack is as follows.

1. Load in the machine language routines and run the activation sequence (SYS 49152).
2. Draw the screen, showing all buttons, menus, and sliders. Save the screen to the buffers (SYS 49653).
3. Wait until Flag contains a 1.
4. Determine if the Xchar and Ychar coordinates show a point that the program recognizes and jump to the ap-

# PROGRAMS

appropriate subroutine if so. If not, type *POKE FLAG,0* and repeat step 4.

5. When the routine has finished, load the old screen back in from the buffers (SYS 49709) and continue with step 3.

Examine the routines in the BASIC demo to get ideas for your own programs, or modify this one to suit your needs. The machine language routines will not interfere with BASIC programs.

The demonstration program contains other routines that may be useful. One is for drawing dialog boxes. You can include those routines in your own programs to make your programming easier. For example, step 3 is actually a subroutine (lines 1570-1630) that puts Xchar into variable X and Ychar into variable Y. The dialog box is drawn by another routine (lines 1500-1550).

Since the routine that moves the arrow works in the background, you can type in BASIC programs while the arrow is onscreen. If you position the arrow and then peek the Xchar and Ychar coordinates, you can position the buttons onscreen more easily.

You are not limited to BASIC, however. Since the machine language routines are called by the SYS command, machine language programmers can call the routines with a JSR command. Feel free to experiment.

## PUSH BUTTON 64

```
C000:78 AD 14 03 8D C8 C0 AD 9A
C008:15 03 8D C9 C0 A9 CA 8D F2
C010:14 03 A9 C0 8D 15 03 A9 0E
C018:C0 8D F8 07 A9 C1 8D F9 56
C020:07 A9 03 8D 15 D0 A9 00 08
C028:8D A4 C1 AD 10 D0 29 7C 3F
C030:8D 10 D0 A9 01 8D 27 D0 8E
C038:A9 00 8D 28 D0 A9 65 8D 4B
C040:00 D0 8D 01 D0 A9 64 8D 3B
C048:02 D0 8D 03 D0 A2 00 A9 9B
C050:00 9D 00 30 E8 E0 81 D0 DA
C058:F8 A2 00 BD 86 C0 9D 00 4D
C060:30 E8 E0 1D D0 F5 A2 00 C5
C068:BD A3 C0 9D 40 30 E8 E0 19
C070:23 D0 F5 A9 00 8D A0 C1 4A
C078:8D 9F C1 8D A1 C1 8D A3 8C
C080:C1 8D A2 C1 58 60 80 00 FB
C088:00 60 00 00 78 00 00 3E 24
C090:00 00 3C 00 00 1E 00 00 12
C098:17 00 00 03 80 00 01 C0 9C
C0A0:00 00 80 C0 00 00 B0 00 9F
C0A8:00 4C 00 00 43 00 00 20 77
C0B0:80 00 21 00 00 10 80 00 D7
C0B8:14 40 00 0A 20 00 01 10 08
C0C0:00 00 A0 00 00 40 00 00 57
C0C8:00 00 EA AD 00 DC 29 01 49
C0D0:C9 01 F0 10 AD 01 D0 C9 73
```

```
C0D8:33 B0 03 4C E4 C0 CE 01 0E
C0E0:D0 CE 03 D0 AD 00 DC 29 3C
C0E8:02 C9 02 F0 10 AD 01 D0 37
C0F0:C9 F9 90 03 4C FD C0 EE E2
C0F8:01 D0 EE 03 D0 AD 00 DC 57
C100:29 04 C9 04 F0 33 AD 10 52
C108:D0 29 02 C9 02 F0 0A AD B0
C110:02 D0 C9 18 B0 03 4C 39 E6
C118:C1 AD 00 D0 D0 08 AD 10 07
C120:D0 29 7E 8D 10 D0 CE 00 60
C128:D0 AD 02 D0 D0 08 AD 10 DE
C130:D0 29 7D 8D 10 D0 CE 02 52
C138:D0 AD 00 DC 29 08 C9 08 62
C140:F0 2D AD 10 D0 29 01 C9 35
C148:01 D0 0A AD 00 D0 C9 57 CA
C150:90 03 4C 6F C1 EE 00 D0 F7
C158:D0 08 AD 10 D0 09 01 8D 37
C160:10 D0 EE 02 D0 D0 08 AD A5
C168:10 D0 09 02 8D 10 D0 AD 65
C170:00 DC 29 10 C9 10 F0 03 C4
C178:4C 7E C1 6C C8 C0 AD A4 0A
C180:C1 C9 00 D0 F6 A9 01 8D 52
C188:A4 C1 AD 01 D0 8D 9F C1 52
C190:AD 00 D0 8D A0 C1 AD 10 55
C198:D0 8D A1 C1 4C A5 C1 00 B4
C1A0:00 00 00 00 00 AD 9F C1 DB
C1A8:E9 32 4A 4A 4A 8D A2 C1 2B
C1B0:AD A1 C1 29 01 C9 01 D0 40
C1B8:15 A9 01 8D A1 C1 AD A0 3A
C1C0:C1 69 03 4A 4A 4A 69 1C EE
C1C8:8D A3 C1 4C 7B C1 A9 00 2F
C1D0:8D A1 C1 AD A0 C1 E9 17 8D
C1D8:4A 4A 4A 8D A3 C1 4C 7B 6E
C1E0:C1 78 AD C8 C0 8D 14 03 0D
C1E8:AD C9 C0 8D 15 C0 58 A9 B5
C1F0:FC 8D 15 D0 60 A2 00 BD 51
C1F8:00 04 9D 65 C2 BD 00 D8 6D
C200:9D 65 C6 BD 00 05 9D 65 17
C208:C3 BD 00 D9 9D 65 C7 BD 4C
C210:00 06 9D 65 C4 BD 00 DA 19
C218:9D 65 C8 BD 00 07 9D 65 77
C220:C5 BD 00 DB 9D 65 C9 E8 B4
C228:E0 00 D0 CB 60 A2 00 BD 40
C230:65 C2 9D 00 04 BD 65 C6 75
C238:9D 00 D8 BD 65 C3 9D 00 F8
C240:05 BD 65 C7 9D 00 D9 BD 3F
C248:65 C4 9D 00 06 BD 65 C8 20
C250:9D 00 DA BD 65 C5 9D 00 59
C258:07 BD 65 C9 9D 00 DB E8 A7
C260:E0 00 D0 CB 60 A3 00 00 BE
```

## BUTTON DEMO

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
DR 10 REM LOAD AND RUN PROGRAM
AB 20 IF X=0 THEN X=1:LOAD"BUT
TON64.ML",8,1
MM 30 SYS 49152:POKE 53280,0:P
OKE 53281,15
HF 40 REM SETUP SCREEN AND MEN
US
HJ 50 PRINTCHR$(14)"{CLR}{RVS}
{BLU}MENU{SHIFT-SPACE}TE
MPLATE{27 SPACES}";
CG 60 PRINT"{WHT}{RVS}FILE
{3 SPACES}{M}LAYOUT {M}T
OOLS{2 SPACES}{M}OPTIONS
{9 SPACES}{OFF}";
```

```
CJ 70 PRINT"{DOWN}{5 SPACES}
{BLK}↑{DOWN}{LEFT}-
{DOWN}{3 LEFT}{WHT}CLICK
ON THESE TO TEST MENUS.
"
SS 80 PRINT"{2 DOWN}CLICK ON T
HESE":PRINT"TO TEST BUTT
ONS {BLK}***"
CF 90 PRINTTAB(21)"{2 UP}{CYN}
{A}*****{S}"
KJ 100 PRINTTAB(21)"{CYN}-
{BLK}{RVS}{@}{WHT}{OFF}
BUTTON #1{CYN}-"
EG 110 PRINTTAB(21)"{CYN}-
{BLK}{RVS}{@}{WHT}{OFF}
BUTTON #2{CYN}-"
DF 120 PRINTTAB(21)"{CYN}-
{BLK}{RVS}{@}{WHT}{OFF}
BUTTON #3{CYN}-"
SX 130 PRINTTAB(21)"{CYN}{Z}**
*****{X}"
CS 140 PRINT"{3 DOWN}
{2 SPACES}{CYN}{A}****
*****"
KD 150 PRINT"{2 SPACES}{CYN}-
{SPACE}{BLK}{RVS}<{OFF}
{WHT}*****
{RED}+{WHT}*****
{BLK}{RVS}>{OFF} {WHT}1
5{CYN}-"
MM 160 PRINT"{2 SPACES}{CYN}
{Z}*****
*****{X}{BLK}"
CP 170 PRINT"{DOWN}{4 RIGHT}↑
{DOWN}{LEFT}-{DOWN}
{LEFT}-{DOWN}{3 LEFT}
{WHT}CLICK ON THIS TO T
EST SLIDER."
DB 180 SL=15
HM 190 SYS 49653 : REM SAVE SC
REEN TO BUFFER
SP 200 GOSUB 1570 : REM GET A
{SPACE}POINT
AP 210 REM TEST FOR KNOWN POIN
TS
QE 220 IF Y<>1 THEN 270
HH 230 IF X<8 THEN 320:REM FIL
ES
BB 240 IF X>7 AND X<16 THEN 84
0:REM LAYOUT
KJ 250 IF X>15 AND X<24 THEN 9
90:REM TOOLS
SR 260 IF X>23 THEN 1070:REM O
PTIONS
AM 270 IF X=22 AND Y=9 THEN 11
50:REM B1
PK 280 IF X=22 AND Y=10 THEN 1
230:REM B2
EG 290 IF X=22 AND Y=11 THEN 1
310:REM B3
KK 300 IF Y=17 THEN 1390 : REM
SLIDER
CJ 310 GOTO 190
AG 320 REM FILE MENU WAS CHOSE
N
MS 330 PRINT"{HOME}{2 DOWN}
```

```

{RIGHT}{WHT}{RVS}LOAD
{4 SPACES}{DOWN}
{8 LEFT}SAVE{4 SPACES}
{BLK}{WHT}{DOWN}
{9 LEFT}";
SH 340 PRINT"NEW{5 SPACES}
{BLK}{WHT}{DOWN}
{9 LEFT}DIR{5 SPACES}
{BLK}{WHT}{DOWN}
{9 LEFT}";
JE 350 PRINT"QUIT{4 SPACES}
{BLK}{WHT}{DOWN}
{9 LEFT}";
FA 360 PRINT"{BLK}{RIGHT}
{8 SPACES}{OFF}{WHT}"
DB 370 GOSUB 1570
FP 380 IF X<1 OR X>8 THEN 440
QF 390 IF Y=2 THEN 450 : REM L
OAD ROUTINE
BJ 400 IF Y=3 THEN 520 : REM S
AVE ROUTINE
EF 410 IF Y=4 THEN 590 : REM N
EW ROUTINE
CE 420 IF Y=5 THEN 660 : REM D
IR ROUTINE
MM 430 IF Y=6 THEN 730 : REM Q
UIT ROUTINE
KK 440 SYS 49709 : GOTO 190
DB 450 GOSUB 1500
JF 460 PRINT"{HOME}{7 DOWN}
{12 RIGHT}{RVS}{WHT}YOU
PRESSED THE"
QS 470 PRINT"{11 RIGHT}{RVS}LO
AD ROUTINE."
QK 480 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
AK 490 GOSUB 1570
XO 500 IF Y<>11 OR X<19 OR X>2
8 THEN 490 XQ
MR 510 SYS 49709:GOTO 190
QF 520 GOSUB 1500
KB 530 PRINT"{HOME}{7 DOWN}
{12 RIGHT}{RVS}{WHT}YOU
PRESSED THE"
FE 540 PRINT"{11 RIGHT}{RVS}SA
VE ROUTINE."
QF 550 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
BR 560 GOSUB 1570
AG 570 IF Y<>11 OR X<19 OR X>2
8 THEN 490
XA 580 SYS 49709:GOTO 190
JJ 590 GOSUB 1500
PR 600 PRINT"{HOME}{7 DOWN}
{12 RIGHT}{RVS}{WHT}YOU
PRESSED THE"
GR 610 PRINT"{11 RIGHT}{RVS}NE
W ROUTINE."
PB 620 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
DB 630 GOSUB 1570
BC 640 IF Y<>11 OR X<19 OR X>2
8 THEN 490
SE 650 SYS 49709:GOTO 190
KQ 660 GOSUB 1500
XJ 670 PRINT"{HOME}{7 DOWN}
{12 RIGHT}{RVS}{WHT}YOU
PRESSED THE"
PG 680 PRINT"{11 RIGHT}{RVS}DI
R ROUTINE."
HS 690 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
CF 700 GOSUB 1570
GS 710 IF Y<>11 OR X<19 OR X>2
8 THEN 490
BX 720 SYS 49709:GOTO 190
PA 730 GOSUB 1500
SF 740 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}ARE
YOU SURE YOU"
KA 750 PRINT"{11 RIGHT}{RVS}WA
NT TO QUIT THE"
PE 760 PRINT"{11 RIGHT}{RVS}PR
OGRAM?"
CX 770 PRINT"{DOWN}{11 RIGHT}
{BLK}{RVS} YES
{9 RIGHT} NO "
CP 780 GOSUB 1570
AS 790 IF Y<>11 THEN 780
PP 800 IF X>10 AND X<16 THEN 8
30
KD 810 IF X>24 AND X<29 THEN S
YS49709:GOTO 190
JM 820 GOTO 780
XK 830 SYS 49633:POKE 53280,14
:POKE 53281,6:PRINT"
{CLR}{7}"CHR$(142);:END
SE 840 REM LAYOUT MENU
XF 850 PRINT"{HOME}{2 DOWN}
{9 RIGHT}{RVS}{WHT}LAYO
UT 1{DOWN}{8 LEFT}LAYO
UT 2{BLK}{WHT}{DOWN}
{9 LEFT}LAYOUT 3{BLK} "
;
CX 860 PRINT"{WHT}{DOWN}
{9 LEFT}LAYOUT 4{BLK}
{WHT}{DOWN}{9 LEFT}LAYO
UT 5{BLK}{WHT}{DOWN}
{9 LEFT}LAYOUT 6{BLK} "
;
JM 870 PRINT"{WHT}{DOWN}
{9 LEFT}LAYOUT 7{BLK}
{WHT}{DOWN}{9 LEFT}LAYO
UT 8{BLK}{DOWN}
{8 LEFT}{8 SPACES}"
MB 880 GOSUB 1570
JS 890 IF X<9 OR X>16 THEN 980
GH 900 IF Y<2 OR Y>9 THEN 980
JX 910 L=Y-1
KQ 920 GOSUB 1500
GG 930 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}LAY
OUT #"L
MQ 940 PRINT"{RVS}{11 RIGHT}WA
S SELECTED."
HX 950 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} CO
NTINUE "
XE 960 GOSUB 1570
MM 970 IF Y<>11 OR X<19 OR X>2
8 THEN 960
AS 980 SYS 49709:GOTO 190
XR 990 REM TOOLS MENU
XD 1000 GOSUB 1500
MS 1010 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}TH
E TOOLS MENU"
PH 1020 PRINT"{RVS}{11 RIGHT}W
AS SELECTED."
CF 1030 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} C
ONTINUE "
HP 1040 GOSUB 1570
XQ 1050 IF Y<>11 OR X<19 OR X>
28 THEN 960
CQ 1060 SYS 49709:GOTO 190
SG 1070 REM OPTIONS MENU
HK 1080 GOSUB 1500
MJ 1090 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}TH
E OPTIONS MENU"
EM 1100 PRINT"{RVS}{11 RIGHT}W
AS SELECTED."
GA 1110 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} C
ONTINUE "
DS 1120 GOSUB 1570
QH 1130 IF Y<>11 OR X<19 OR X>
28 THEN 960
KH 1140 SYS 49709:GOTO 190
DB 1150 REM BUTTON #1 WAS PRES
SED
DQ 1160 GOSUB 1500
KD 1170 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}YO
U PRESSED"
CX 1180 PRINT"{RVS}{11 RIGHT}B
UTTON #1."
SK 1190 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} C
ONTINUE "
QF 1200 GOSUB 1570
AD 1210 IF Y<>11 OR X<19 OR X>
28 THEN 960
FP 1220 SYS 49709:GOTO 190
QM 1230 REM BUTTON #2 WAS PRES
SED
QD 1240 GOSUB 1500
QJ 1250 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}YO
U PRESSED"
XJ 1260 PRINT"{RVS}{11 RIGHT}B
UTTON #2."
BF 1270 PRINT"{2 DOWN}
{19 RIGHT}{BLK}{RVS} C
ONTINUE "
EP 1280 GOSUB 1570
JQ 1290 IF Y<>11 OR X<19 OR X>
28 THEN 960
BS 1300 SYS 49709:GOTO 190
ME 1310 REM BUTTON #3 WAS PRES
SED
JG 1320 GOSUB 1500
AF 1330 PRINT"{HOME}{7 DOWN}
{11 RIGHT}{RVS}{WHT}YO
U PRESSED"
DC 1340 PRINT"{RVS}{11 RIGHT}B

```

```

UTTON #3."
FA 1350 PRINT"{2 DOWN}
      {19 RIGHT}{BLK}{RVS} C
      ONTINUE "
AS 1360 GOSUB 1570
RH 1370 IF Y<>11 OR X<19 OR X>
      28 THEN 960
JH 1380 SYS 49709:GOTO 190
QC 1390 REM SLIDER
FX 1400 GOSUB1450
JA 1410 IF X=4 AND SL>0 THEN G
      OSUB 1460:SL=SL-1:GOSU
      B1470:GOTO 1480
EC 1420 IF X=32 AND SL<26 THEN
      GOSUB 1460:SL=SL+1:GO
      SUB1470:GOTO 1480
KQ 1430 IF X>4 AND X<32 THEN G
      OSUB1460:SL=X-5:GOSUB1
      470:GOTO1480
QJ 1440 GOTO 190
MR 1450 PRINT"{HOME}{17 DOWN}
      {3 RIGHT}";:RETURN
DA 1460 GOSUB1450:FORT=0TO SL+
      1:PRINT"{RIGHT}";:NEXT
      :PRINT"{WHT}*";:RETURN
HF 1470 GOSUB1450:FORT=0TO SL+
      1:PRINT"{RIGHT}";:NEXT
      :PRINT"{RED}+";:RETURN
JQ 1480 GOSUB1450:PRINT"{DOWN}
      {10 LEFT}{WHT}";:IF SL
      >9 THEN PRINTSL"{LEFT}
      {CYN}-":GOTO 190
SX 1490 PRINT" "SL"{LEFT}{CYN}
      -":GOTO 190
AB 1500 REM DRAW DIALOG BOX
BA 1510 SYS 49709 : REM LOAD S
      CREEN
GP 1520 PRINT"{HOME}{6 DOWN}
      {10 RIGHT}{RVS}{WHT}
      {20 SPACES}"
QE 1530 FOR T=1 TO 6:PRINT"
      {10 RIGHT}{RVS}
      {20 SPACES}{BLK} {WHT}
      ":NEXT
CM 1540 PRINT"{11 RIGHT}{RVS}
      {BLK}{20 SPACES}"
ED 1550 RETURN
CG 1560 REM -----
      -----
QP 1570 REM GET A SCREEN COORD
      FROM ML
KF 1580 POKE 49572,0
PP 1590 IF PEEK(49572)=0 THEN
      {SPACE}1590
SJ 1600 X=PEEK(49571):Y=PEEK(4
      9570)
RX 1610 POKE 54296,15:POKE 542
      96,0
ME 1620 IF PEEK(56320)<>127 TH
      EN 1620
JH 1630 RETURN

```

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## EZ-LOADER

By Joe Votour

Finding files on disks can be quite a chore. Just ask anybody who has more than a couple of disks on hand. It's especially true if you're a programmer. Once you find the disk you're looking for, you'll then probably have to search through the directory about five times before you finally hit on the right file.

A menu program is especially helpful for finding your frequently used programs. This is where EZ-Loader comes in. EZ-Loader is a menu program for the 64 that will read a disk directory and let you select a file using the cursor keys and the Return key. It'll also do more.

### Typing It In

EZ-Loader is written entirely in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following.

Starting address: 0801

Ending address: 1380

Be sure to save a copy of the program before you exit MLX.

### Drive Compatibility

EZ-Loader will work with any 1541, 1571, or 1581 drive. In fact, it'll work with any combination of drives (device numbers 8-99, drive number 0 only) that support Commodore's DOS commands U1 and B-P. A 1581 drive has two limitations, however. EZ-Loader supports partitions, but it locates only the first 255 files in the main directory or partition. Also, the disk ID will be read incorrectly since EZ-Loader checks track 18, sector 0, the track and sector used for a 1541/1571 ID code.

### Using EZ-Loader

Although EZ-Loader is written in machine language, it loads and runs like a BASIC program. The title screen is displayed as the directory of the current drive is loaded. Note that the directory loaded is the one of the disk drive from which EZ-Loader was loaded.

On the main screen, a blue bar indicates the current file to be selected. To move the bar, use the cursor keys to

move up and down the directory listing. To load the highlighted file, press the Return key.

The function keys are defined for special purposes. Press f1 to see a directory in the usual format. It's like using the LOAD "\$",8 command, with the program type and block size listed. Press any key and EZ-Loader will return to its title screen and reload that directory.

Press f3 to change disks in the current drive. You will then be returned to the title screen, and EZ-Loader will read the directory as usual.

Press f5 to enter a DOS command to the current drive. Any standard DOS command can be issued. This will allow 1581 users to change partitions by simply typing /O:PARTITION NAME. Also, EZ-Loader offers a new DOS command, #aa, where aa is a two-digit drive number such as 09 or 10. The number must be a two-digit number; otherwise, EZ-Loader will lock up while trying to read the number.

Press f8 to boot the first file on any drive. You will be asked which device to boot from (8-11 only). To change the device number, use the cursor keys. Then the program will load and run from the device you selected.

### Additional Notes

EZ-Loader will convert to question marks any control characters that appear in a filename. These include any non-ASCII values, color codes, and so on. For example, if you have a Koala Paint file called A, it will appear in the directory listing as ?PIC A. If you have files that have the same filename except for a control character, EZ-Loader may get confused. Not too many programs use filenames such as these, however.

EZ-Loader can load only BASIC programs or machine language programs that start with a SYS statement. This is because the program is loaded using the ,n extension, where n is the device number of the drive. A RUN command is executed from the keyboard buffer.

### EZ-LOADER

```

0801:0B 08 90 06 9E 32 30 34 5D
0809:39 00 A0 00 78 E6 01 B9 E4
0811:C9 12 99 40 03 C8 D0 F7 96
0819:4C 40 03 98 FB 91 FD 93 FE
0821:82 E6 FE 17 02 D8 D0 EF 82

```



# PROGRAMS

```

0EB9:1F 9A 12 00 92 14 E8 AF B4
0EC1:99 87 29 F4 8E 49 74 B2 36
0EC9:71 94 C6 28 46 49 4C 45 54
0ED1:20 23 B3 72 4F 46 09 F9 04
0ED9:00 0D 91 4E 20 1D 99 29 22
0EE1:0D 9A 5F 05 FA B7 05 21 49
0EE9:D0 A4 6F 20 11 1B E8 A3 F1
0EF1:77 AB A8 46 31 8D 2D 0C 54
0EF9:52 72 C0 30 33 46 33 23 33
0F01:18 26 F0 41 6C DD 9B 15 0E
0F09:86 46 35 62 5C 61 44 4F 09
0F11:88 43 4F 4D 4D 32 1D 53 C3
0F19:0D 0D AE 12 D1 46 38 20 30
0F21:92 49 4A 57 F1 A1 5F 92 01
0F29:52 73 20 46 49 9C D8 20 44
0F31:4F 4E CF AF 13 00 9E 95 EA
0F39:3B C5 E1 B9 11 3E AD A5 C0
0F41:D4 EB D1 F5 B0 C4 1B 3C 69
0F49:53 48 49 46 8C F2 4C 84 FD
0F51:DE 53 45 2C 1D 27 55 4E 9D
0F59:2F CF CE 4F 50 20 54 4F CC
0F61:2B 58 80 07 21 99 32 96 16
0F69:C5 B0 94 2D 47 59 20 4B 27
0F71:45 59 E2 0A 2E D0 18 24 8E
0F79:30 63 C4 76 53 57 49 54 67
0F81:43 48 D8 55 89 08 8E 45 92
0F89:49 4E D0 52 EB C1 4E 45 67
0F91:57 CE B9 49 53 4B F9 56 EC
0F99:9C 85 18 B7 05 5C B2 95 7A
0FA1:9B B4 97 12 48 9B 20 02 C1
0FA9:5F 44 4F 91 43 4F 4D 4D CA
0FB1:49 79 62 9B 20 98 20 97 14
0FB9:20 0D 11 9E EC 96 75 63 47
0FC1:05 07 C2 09 99 09 99 52 83
0FC9:4E 28 02 2E 4C D0 99 53 59
0FD1:54 41 54 55 70 36 62 76 E1
0FD9:49 C4 00 9A 93 12 08 11 7D
0FE1:08 87 60 53 45 4C 45 43 50
0FE9:5A 45 42 4F 4F 54 20 44 14
0FF1:45 56 49 6E CB 20 3A 20 CB
0FF9:9E 00 0D 9A 66 01 70 20 EA
1001:41 4E 44 20 50 52 45 53 89
1009:53 20 3C 53 50 41 43 45 EA
1011:3E 0D 00 93 4C 4F 41 44 33
1019:22 3A 2A 22 00 BE 80 3B 77
1021:CE 6E 60 01 1A 25 A3 EE FB
1029:30 3E C9 43 46 60 DE 63 33
1031:26 2C 9B E5 C0 8B DC 0F 3E
1039:87 60 D8 7C B9 C4 98 C1 EB
1041:62 E6 44 1E 4F 9F 45 6C A6
1049:78 6C 2C 1F 02 E0 F5 02 B9
1051:11 16 76 7E 6E B1 7C 91 FA
1059:C3 35 0F 60 CB CE 6E 36 3D
1061:8B C0 66 1F 7A 67 24 F3 E3
1069:74 63 1E 62 8E 22 B9 2C 23
1071:26 27 32 7E 98 8F 8C C2 7B
1079:82 17 4E 7E 6B B3 78 8A F7
1081:4B 98 1C 36 78 30 25 4A 6D
1089:94 3C B6 08 AB 98 EB 24 16
1091:4A 10 30 7F 7F 30 10 82 38
1099:05 00 B6 1C C1 03 E3 29 DF
10A1:C1 98 0F 9F 66 C0 13 6A B0
10A9:B6 3C F3 7A 62 57 33 63 94
10B1:0C 2E 85 38 6C 6C 3E 74 9D
10B9:6D E3 95 0C F6 5A D6 30 FB
10C1:FE AD 24 3E 24 58 7E A9 5E
10C9:6D 96 A7 D8 44 4F 02 60 8C
10D1:3C 02 D6 26 61 93 FC 21 42
10D9:AC 37 18 38 C2 84 1D 60 67
10E1:D9 15 49 3C E9 4F 66 66 E0

```

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10E9:7E E5 A9 7E 5E 7A 3E 60 99
10F1:7C 55 3E 7C 35 80 33 12 59
10F9:66 3C 80 07 E4 3E 06 7C 85
1101:E6 A1 79 20 22 2B 95 06 1F
1109:F2 0C 06 55 34 48 7E 38 B5
1111:00 60 30 18 30 60 00 00 D5
1119:3C 66 0C 18 00 18 00 80 D6
1121:7C C8 C8 C8 A9 00 85 10 C1
1129:A6 FB 30 0D 06 FA 2A 26 0B
1131:10 C6 FB 88 D0 F2 AA 18 D4
1139:60 48 A1 FF 85 FA A2 07 36
1141:86 FB E4 FF A6 FE D0 02 17
1149:C6 FF C6 FE 68 90 DD E0 B9
1151:E7 D0 D9 A9 37 85 01 58 9B
1159:4C A2 01 A9 10 85 04 AA 4E
1161:BC D8 07 20 32 07 A6 04 F9
1169:7D C7 07 48 A5 10 69 00 E1
1171:E0 0F 69 00 A8 68 A6 02 2B
1179:D0 08 C0 00 D0 04 C9 10 58
1181:F0 D9 18 65 FC AA 98 65 15
1189:FD 85 49 A4 11 F0 20 8A 96
1191:38 E5 11 B0 03 C6 49 38 74
1199:85 48 A5 FC E5 11 B0 02 EB
11A1:C6 FD 85 FC B1 48 88 91 78
11A9:FC C6 01 EE 20 D0 E6 01 1E
11B1:98 D0 F1 60 44 4D 26 52 8E
11B9:4F 00 04 0C 1C 3C 7C BC 4C
11C1:FE 00 08 10 20 41 81 C5 34
11C9:00 80 02 03 04 05 06 06 C2
11D1:06 07 03 03 04 05 06 06 8F
11D9:06 07 07 00 0B 08 C4 07 AA
11E1:9E 20 28 32 30 36 34 29 6F
11E9:F1 05 00 AD 31 8D B2 14 5A
11F1:CF 06 8D B3 8A 80 86 BF 8D
11F9:F1 90 EA 8D 19 03 B4 71 1F
1201:85 FD A9 D0 A2 8D F7 78 5D
1209:C0 78 A9 33 4F 55 BE 00 61
1211:00 18 21 11 B9 0F 11 99 36
1219:1C 07 C8 D0 F7 20 31 07 DC
1221:F0 46 20 31 07 D0 30 20 62
1229:30 07 69 02 C9 04 90 27 1B
1231:D0 07 20 31 07 69 04 D0 4D
1239:1E 20 2F 07 69 06 C9 0D CE
1241:D0 11 C8 20 2F 07 69 0D A2
1249:C9 0D D0 07 A0 05 20 32 AB
1251:07 69 1D EE 00 04 EA 85 51
1259:11 A6 FE A5 FF 20 97 07 A0
1261:A5 49 85 FF A5 48 85 FE B3
1269:20 31 07 85 02 F0 14 0A 29
1271:2C A9 03 85 11 20 2F 07 3D
1279:A6 02 D0 02 69 08 20 6B C2
1281:07 F0 9A 20 31 07 F0 E9 2C
1289:20 30 07 69 04 C9 06 90 25
1291:E2 D0 07 20 30 07 69 06 B4
1299:D0 D9 A0 05 20 32 07 69 42
12A1:0A C9 D0 F0 0D C9 12 D0 72
12A9:CA A0 02 20 32 07 69 2A 48
12B1:D0 C1 A0 06 D0 F5 A9 00 D4
12B9:85 2D A9 18 85 2E 4C 10 30
12C1:08 A9 18 85 2E 4C 10 08 7A
12C9:C6 01 58 A7 A2 CD 12 D0 58
12D1:D0 34 A2 06 A9 FF 95 F8 91
12D9:BD 90 03 95 F7 CA CA 10 4B
12E1:F3 A2 12 BD A0 03 4D 5E D0
12E9:03 9D E8 07 CA 10 F4 A9 AE
12F1:13 A2 E8 A0 07 20 97 03 5A
12F9:A9 0F A8 A2 08 20 94 03 E2
1301:20 9A 03 20 9D 03 29 00 8B
1309:A8 78 E6 01 B9 0F 12 99 56
1311:FA 00 C8 D0 F7 4C 00 01 CC

```

```

1319:BA BD C0 E7 6C F7 00 6C 52
1321:F9 00 6C FB 00 6C FD 00 3F
1329:4D 7D 77 0E 02 01 1A 14 81
1331:03 62 19 05 08 6D 0B 02 F2
1339:1F 0E 08 1A 1A 1A 1A 9C
1341:1A 1A 1A 1A 1A 1A 1A 67
1349:1A 1A 1A 1A 1A 1A 1A 6F
1351:1A 1A 1A 1A 1A 1A 1A 77
1359:1A 1A 1A 1A 1A 1A 1A 7F
1361:1A 1A 1A 1A 1A 1A 1A 87
1369:1A 1A 1A 1A 1A 1A 1A 8F
1371:1A 1A 1A 1A 1A 1A 1A 97
1379:1A 1A 1A 1A 1A 1A 00 00 51

```

Joe Votour keeps track of his files in Hanmer, Ontario, Canada.

## STOCK ANALYSIS 128

By Philip Addeo

Stock Analysis 128 is a full-fledged stock advisory program, not a simulation program or a game. Although admittedly not as sophisticated as the programs the big boys use, this program can be very useful in evaluating your stock portfolio or in tracking the stock market as a whole.

This 128 program is written entirely in BASIC 7. It's easy to use and requires the 128 to be in 80-column mode. To help avoid typing errors, enter the program with The Automatic Proofreader. See "Typing Aids" elsewhere in this section. Be sure to save a copy of the program before exiting Proofreader.

### What You Need

To use Stock Analysis 128, you'll need the weekly closing stock prices printed in larger daily newspapers, usually on Saturday or Sunday. You'll also need the total stock price advances and declines and Standard & Poor's (S&P's) 500 closing price.

Before using the program, you must decide which stocks you'd like in your file. You can have any number of stocks in a file, but I'd suggest a maximum of 20. Things can get a little cumbersome if you have more than that. Of course, you can have any number of different files. The program requires three weeks of stock data to start, and data must be entered on a weekly basis for the program to be useful.

### Getting Started

The opening menu of Stock Analysis 128 gives you four options: update an existing file, analyze an existing file,

open a new file, and quit.

To start, choose option 3, open a new file, and follow the prompts for entering the filename and stock data. Use option 3 to open as many new files as you need. Use option 1 to update your files weekly. Use option 2 to analyze your files.

The program's main body consists of three screens. The first one displays general market trends for the past three weeks, which include advances, declines, and an advance/decline index. The second screen displays S&P's 500 data for the past three weeks, which include short-, medium-, and long-term trends; the trend's direction; and a market indicator. The third screen is the main analysis screen and displays the name of the stock, three weeks of data, trends, and a recommendation for each individual stock in your file.

## STOCK ANALYSIS 128

```
PK 5 REM COPYRIGHT 1993 - COMP
UTE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
SA 10 FAST
QA 20 L$="":A$=CHR$(176):B$=CHR
R$(99):D$=CHR$(174):E$=C
HR$(98):Z$=E$
DS 30 I$=CHR$(173):K$=CHR$(189
)
DD 40 L1$="*****
*****
*****
*****"
DK 50 L2$=".....
.....
....."
XF 60 DIMA(250):Z$=CHR$(13)
FJ 70 PRINT"{CLR}{RVS}
{9 SPACES}{SHIFT-SPACE}
{20 SPACES}STOCK MARKET
{SPACE}ANALYSIS
{29 SPACES}{OFF}"
CR 80 PRINT"{DOWN}":GOSUB2190
CK 90 PRINTTAB(31)"{RVS}1.
{OFF} UPDATE FILE"
AR 100 PRINTTAB(31)"{RVS}2.
{OFF} STOCK ADVISOR"
XK 110 PRINTTAB(31)"{RVS}3.
{OFF} OPEN NEW FILE"
CA 120 PRINTTAB(31)"{RVS}4.
{OFF} QUIT"
QP 130 PRINTTAB(35)"{2 DOWN}CH
OICE";:INPUT I
XQ 140 IFI<10R1>4THENPRINT"
{4 UP}":GOTO130
PS 150 IFI=4THEN170
PJ 160 ONIGOTO410,1060,180
RA 170 END
SG 180 PRINT"{CLR}{RVS}
{11 SPACES}CREATE NEW F
ILE{14 SPACES}"
FX 190 INPUT"{DOWN}WHAT IS THE
NAME OF NEW FILE";NFS
JE 200 INPUT"{DOWN}HOW MANY ST
OCKS IN FILE";M
MA 210 DOPEN#1,(NFS),W
QA 220 INPUT"{CLR}{2 DOWN}ENTE
R WEEKS CLOSING ADVANCE
S, DECLINES{5 SPACES}";
A,D
MA 222 INPUT"{DOWN}ENTER LAST
{SPACE}WEEKS CLOSING AD
VANCES, DECLINES
{2 SPACES}";A1,D1
EB 224 INPUT"{DOWN}ENTER WEEK
{SPACE}BEFORE CLOSING A
DVANCES, DECLINES ";A2,
D2
PR 230 INPUT"{DOWN}ENTER WEEKS
CLOSING PRICE OF S&P 5
00{9 SPACES}";S
FR 240 INPUT"{DOWN}ENTER LAST
{SPACE}WEEKS CLOSING PR
ICE OF S&P 500
{4 SPACES}";S1
EM 250 INPUT"{DOWN}ENTER WEEK
{SPACE}BEFORE CLOSING P
RICE OF S&P 500
{3 SPACES}";S2
HD 260 FORJ=0TO3:A(J)=A-D:NEXT
AR 270 FORJ=4TO13:A(J)=S:NEXT
FF 280 PRINT#1,M
SD 290 PRINT#1,A(0);Z$;A(1);Z$
;A(2);Z$;A(3);Z$;A(4);Z
$;A(5);Z$;A(6)
EQ 300 PRINT#1,A(7);Z$;A(8);Z$
;A(9);Z$;A(10);Z$;A(11)
;Z$;A(12);Z$;A(13)
PE 310 PRINT#1,S1;Z$;S2;Z$;A;Z
$;A1;Z$;A2;Z$;D;Z$;D1;Z
$;D2
PX 320 FORK=1TOM
AQ 330 PRINT"{CLR}{2 DOWN}ENTE
R NAME OF STOCK NUMBER
{SPACE}"K"{DOWN}":INPUT
A$
GJ 340 INPUT"{DOWN}ENTER END O
F WEEK CLOSING PRICE :
{SPACE}";X
JG 350 INPUT"{DOWN}ENTER LAST
{SPACE}WEEKS CLOSING PR
ICE{2 SPACES}":X1
SG 360 INPUT"{DOWN}ENTER WEEK
{SPACE}BEFORE CLOSING P
RICE : ";X2
CF 370 FORJ=1TO10:A(J)=X:PRINT
"{HOME}{6 DOWN}":NEXT
QG 380 PRINT#1,A$;Z$;A(1);Z$;A
(2);Z$;A(3);Z$;A(4);Z$;
A(5);Z$;A(6)
QJ 390 PRINT#1,A(7);Z$;A(8);Z$
;A(9);Z$;A(10);Z$;X1;Z$
;X2
QD 400 NEXT:DCLOSE:RUN
GK 410 INPUT"{CLR}{4 DOWN}WHAT
IS NAME OF FILE YOU WI
SH TO ANALYZE";F$
FP 420 PRINT"{CLR}{RVS}
{8 SPACES}UPDATE STOCK
{SPACE}PRICES
{13 SPACES}{OFF}"
GG 430 DOPEN#1,(F$)
CG 440 INPUT#1,M,A(0),A(1),A(2
),A(3),A(4),A(5),A(6)
HQ 450 INPUT#1,A(7),A(8),A(9),
A(10),A(11),A(12),A(13)
,S1,S2,A,A2,A3,D,D1,D2
KD 460 S2=S1:S1=A(4):A3=A2:A2=
A:D2=D1:D1=D
AK 470 PRINT"{DOWN}{7 SPACES}
{RVS}GENERAL MARKET INF
ORMATION{OFF}"
PP 480 INPUT"{2 DOWN}ENTER ADV
ANCES, DECLINES, S&P 50
0";A,D,S
GM 490 PRINT"{2 DOWN}"A,D,S:Y=
1:N=0:INPUT"{DOWN}ANY
{2 SPACES}CHANGES Y/N";
X$
DR 500 IFX$="Y"THEN480
DB 510 A1=A-D
QS 520 A(0)=A(0)+A1:A(3)=A(2):
A(2)=A(1)
MS 530 A(1)=.875*A(2)+.125*A(0
)
MQ 540 A(4)=S:A(7)=A(6):A(6)=A
(5)
MB 550 A(5)=INT(66.67*A(6)+33.
33*S)/100
CM 560 A(10)=A(9):A(9)=A(8)
JG 570 A(8)=INT(87.5*A(9)+12.5
*S)/100
BJ 580 A(13)=A(12):A(12)=A(11)
ED 590 A(11)=INT(95*A(12)+5*S)
/100
DP 600 GOTO660
QM 610 FORJ=0TO13:PRINTJ,A(J):
NEXT
EF 620 INPUT"{DOWN}ANY
{2 SPACES}CHANGES Y/N";
X$
KD 630 IFX$="N"THEN660
PE 640 INPUT"{DOWN}ITEM # AND
{SPACE}CHANGE";J,A(J)
RQ 650 GOTO600
FG 660 DIMB$(M):FORI=1TOM
BH 670 L=12*I+1
QA 680 INPUT#1,B$(I),A(L+1),A(
L+2),A(L+3),A(L+4),A(L+
5)
QR 690 INPUT#1,A(L+6),A(L+7),A
(L+8),A(L+9),A(L+10)
RE 700 INPUT#1,A(L+11),A(L+12)
XC 710 A(L+12)=A(L+11):A(L+11)
=A(L+1)
PS 720 PRINT"{CLR}{DOWN}STOCK:
";B$(I)
RK 730 PRINT"{DOWN}LAST WEEKS
{SPACE}PRICE WAS";A(L+1
)
GH 740 INPUT"{DOWN}ENTER THIS
```

# PROGRAMS

```

{SPACE}WEEKS PRICE";P
DQ 750 INPUT"{DOWN}ANY
      {2 SPACES}CHANGES Y/N";
      XS
SX 760 IFX$="Y"THEN720
JP 770 A(L+1)=P:A(L+4)=A(L+3):
      A(L+3)=A(L+2)
JG 780 A(L+2)=INT(66.67*A(L+3)
      +33.33*P)/100
JG 790 A(L+7)=A(L+6):A(L+6)=A(L
      +5)
BD 800 A(L+5)=INT(87.5*A(L+6)+
      12.5*P)/100
DK 810 A(L+10)=A(L+9):A(L+9)=A
      (L+8)
MF 820 A(L+8)=INT(95*A(L+8)+5*
      P)/100
FQ 830 GOTO890
PG 840 FORJ=1TO12:PRINTJ,A(L+J
      ):NEXT
BG 850 INPUT"{DOWN}ANY
      {2 SPACES}CHANGES Y/N";
      XS
XH 860 IFX$="N"THEN890
AA 870 INPUT"{DOWN}ITEM # AND
      {SPACE}CHANGE";J,A(L+J)
PQ 880 GOTO830
MM 890 NEXT
CB 900 DCLOSE
BS 910 PRINT"{CLR}{DOWN}THAT'S
      ALL THE STOCKS IN THE
      {SPACE}FILE{2 SPACES}"
FJ 920 FORT1=1TO2000:NEXT
SB 930 DOPEN#1,"@"+(FS),W
CQ 940 PRINT#1,M
BP 950 PRINT#1,A(0);Z$;A(1);Z$
      ;A(2)
SR 960 PRINT#1,A(3);Z$;A(4);Z$
      ;A(5);Z$;A(6);Z$;A(7);Z
      $;A(8);Z$;A(9);Z$;A(10)
BA 970 PRINT#1,A(11);Z$;A(12);
      Z$;A(13);Z$;S1;Z$;S2;Z$
      ;A;Z$;A2;Z$;A3
MQ 980 PRINT#1,D;Z$;D1;Z$;D2
JJ 990 FORI=1TOM
HA 1000 L=12*I+1
ED 1010 PRINT#1,BS(I);Z$;A(L+1
      );Z$;A(L+2);Z$;A(L+3);
      Z$;A(L+4);Z$;A(L+5)
MM 1020 PRINT#1,A(L+6);Z$;A(L+
      7);Z$;A(L+8);Z$;A(L+9)
      ;Z$;A(L+10)
JE 1030 PRINT#1,A(L+11);Z$;A(L
      +12)
BQ 1040 NEXT:DCLOSE
HA 1050 PRINT"{DOWN}ALL DATA H
      AVE{2 SPACES}BEEN RECO
      RDED":FORZ=1TO2000:NEX
      T
JC 1060 M=0:K=0
GX 1070 DB$="{YEL} DON'T BUY
      {OFF}{21 SPACES}"
JE 1080 DBB$="{YEL} DON'T BUY
      {SPACE}(BEAR) {OFF}
      {14 SPACES}"
CG 1090 HSS="{PUR} HOLD STOCK
      {SPACE}{OFF}
      {20 SPACES}"
CH 1100 ASS="{YEL} AVOID STOCK
      {OFF}{19 SPACES}"
GD 1110 SSS="{CYN} SELL STOCK
      {SPACE}{OFF}
      {20 SPACES}"
KJ 1120 BSS="{CYN} BUY STOCK
      {OFF}{21 SPACES}"
KF 1130 SFS="{YEL} STAY FULLY
      {SPACE}INVESTED (BULL)
      {OFF}{4 SPACES}"
FH 1140 UCS="{WHT} UNCERTAIN--
      DON'T BUY {OFF}
      {10 SPACES}"
JH 1150 INS="{WHT} INCONCLUSIV
      E {OFF}{18 SPACES}"
RF 1160 WAS="{YEL} WAIT FOR CL
      EARER MARKET TRENDS
      {OFF}"
AB 1170 INPUT"{CLR}{4 DOWN}WHA
      T IS NAME OF FILE YOU
      {SPACE}WISH TO ANALYZE
      ";FS
QQ 1180 DOPEN#1,(FS)
FF 1190 PRINT"{CLR}{WHT}{RVS}
      {18 SPACES}PERSONAL ST
      OCK ADVISOR GENERAL MA
      RKET TRENDS{18 SPACES}
      {OFF}"
GC 1200 PRINTTAB(29)"{DOWN}
      {RVS} ADVANCES AND DEC
      LINES {RVS}":PRINT
CF 1210 GOSUB2280
KE 1220 PRINTL1$
BE 1230 INPUT#1,M,A(0),A(1),A(
      2),A(3),A(4),A(5),A(6)
      ,A(7),A(8),A(9),A(10),
      A(11),A(12)
SX 1240 INPUT#1,A(13),S1,S2,A1
      ,A2,A3,D,D1,D2
KF 1250 Y=0:IF(A1>A2)AND(A2>A3
      )THENY=1:A=Y
JD 1260 IF(A1<A2)AND(A2<A3)THE
      NY=-1:A=Y
RA 1270 FORJ=1TO3:A(J)=INT(A(J
      )):NEXT
KM 1280 PRINT"{DOWN}ADVANCES";
      TAB(21);:PRINTUSING"##
      ###";A1;:PRINTSPC(10);
      :PRINTUSING"#####";A2;
      :PRINTSPC(10);:PRINTUS
      ING"#####";A3;:GOSUB21
      60
QP 1290 Y=0:IF(D>D1)AND(D1>D2)
      THENY=1:A=Y
SP 1300 IF(D<D1)AND(D1<D2)THEN
      Y=-1:A=Y
JQ 1310 PRINT"{DOWN}DECLINES";
      TAB(21);:PRINTUSING"##
      ###";D;:PRINTSPC(10);:
      PRINTUSING"#####";D1;:
      PRINTSPC(10);:PRINTUSI
      NG"#####";D2;:GOSUB216
      0
AD 1320 Y=0:IF(A(1)>(A2))AND(A
      (2)>A(3))THENY=1:A=Y
CQ 1330 IF(A(1)<A(2))AND(A(2)<
      A(3))THENY=-1:A=Y
FR 1340 PRINT"{DOWN}A/D INDEX"
      ;TAB(21);:PRINTUSING"#
      ###";A(1);:PRINTSPC(1
      0);:PRINTUSING"#####";
      A(2);:PRINTSPC(10);:PR
      INTUSING"#####";A(3);:
      GOSUB2160
JG 1350 PRINT"{DOWN}"L2S
QR 1360 PRINTCHR$(158)TAB(30)"
      {2 DOWN}ANY KEY TO CON
      TINUE"
HA 1370 GETKS:IEK$="THEN1370
FK 1380 PRINT"{CLR}{WHT}{RVS}
      {18 SPACES}PERSONAL ST
      OCK ADVISOR GENERAL MA
      RKET TRENDS{18 SPACES}
      {OFF}"
DP 1390 PRINTTAB(35)"{DOWN}
      {RVS} S & P 500 {RVS}"
      :PRINT
QB 1400 GOSUB2280
KA 1410 PRINTL1$
DG 1420 Y=0:IF(A(1)>A(2))AND(A
      (1)>A(3))THENY=1:A=Y
      IF(A(1)<A(2))AND(A(2)<
      A(3))THENY=-1:A=Y
DR 1440 FORJ=1TO3:A(J)=INT(A(J
      )):NEXT
XM 1450 Y=0:IF(A(5)>A(6))AND(A
      (6)>A(7))THENY=1
QQ 1460 IF(A(5)<A(6))AND(A(6)<
      A(7))THENY=-1
KG 1470 PRINT"{DOWN}{YEL}SHORT
      "TAB(19);:PRINTUSING"$
      #####.##";A(5);:PRINTSP
      C(7);:PRINTUSING"$###.
      .##";A(6);:PRINTSPC(7)
      ;:PRINTUSING"$###.##"
      ;A(7);
      GOSUB2160
HF 1480 Y=0:IF(A(8)>A(9))AND(A
      (9)>A(10))THENY=1
FK 1490 IF(A(8)<A(9))AND(A(9)<
      A(10))THENY=-1
GD 1500 PRINT"{DOWN}{CYN}MEDIU
      M"TAB(19);:PRINTUSING"
      $###.##";A(8);:PRINTS
      PC(7);:PRINTUSING"$###
      .##";A(9);:PRINTSPC(7
      );:PRINTUSING"$###.##
      ";A(10);
      GOSUB2160
XH 1520 Y=0:IF(A(11)>A(12))AND
      (A(12)>A(13))THENY=1:L
      =Y
BA 1530 IF(A(11)<A(12))*A(12)
      <A(13))THENY=-1:L=Y
KQ 1540 PRINT"{DOWN}{6}LONG"TA
      B(19);:PRINTUSING"$###
      .##";A(11);:PRINTSPC(
      7);:PRINTUSING"$###.##
      #";A(12);:PRINTSPC(7);
      :PRINTUSING"$###.##";
      A(13);
      GOSUB2160
DJ 1560 Y=0:IF(A(4)>(S1))AND((
      DP 1570

```



```

S1)>(S2))THENY=1:A=Y
DA 1580 IF(A(4)<(S1))AND((S1)<
(S2))THENY=-1:A=Y
MR 1590 PRINT"{DOWN}{WHT}LEVEL
"TAB(19);:PRINTUSING"$
####.##";A(4);:PRINTSP
C(7);:PRINTUSING"$####
.##";S1;:PRINTSPC(7);:
PRINTUSING"$####.##";S
2;
KB 1600 GOSUB2160:PRINTL2S
GD 1610 PRINT"INDICATION:
{RVS}";
RJ 1620 IF(A=0)AND(L=0)THENPRI
NTINS:B=0:GOTO1730
SF 1630 IF(A=1)AND(L=1)AND(A(8
)>A(11))THENPRINTSF$:B
=1:GOTO1730
MS 1640 IF(A=1)AND(L=1)AND(A(8
)<A(11))THENPRINTUC$:B
=0:GOTO1730
RB 1650 IF(A=-1)AND(L=-1)AND(A
(8)>A(11))THENPRINTUC$:
B=0:GOTO1730
SS 1660 IF(A=-1)AND(L=1)AND(A(
8)<A(11))THENPRINTDBB$:
B=-1:GOTO1730
RS 1670 IF(A=-1)AND(L=-1)AND(A
(5)<A(11))AND(A(8)<A(1
1))THENPRINTDB$:B=-1:G
OTO1730
FG 1680 IF(A=-1)AND(L=-1)AND(A
(5)>A(11))AND(A(8)<A(1
1))THENPRINTBS$:B=1:G
OTO1730
MB 1690 IF(A=1)AND(L=-1)AND(A(
5)<A(11))AND(A(8)<A(11
))THENPRINTBS$:B=1:GOT
O1730
HH 1700 IF(A=1)AND(L=-1)AND(A(
5)>A(11))AND(A(8)<A(11
))THENPRINTBS$:B=1:GOT
O1730
KS 1710 IF(A=1)AND(L=-1)AND(A(
5)>A(11))AND(A(8)>A(11
))THENPRINTBS$:B=1:GOT
O1730
CE 1720 B=0:PRINTINS$
PE 1730 PRINTCHR$(158)TAB(30)"
{2 DOWN}ANY KEY TO CON
TINUE"
RJ 1740 GETK$:IFK$=""THEN1740
EP 1750 PRINT"{CLR}{CYN}{RVS}
{30 SPACES}PERSONAL ST
OCK ADVISOR{28 SPACES}
{OFF}"
JS 1760 FORK=1TOM
CP 1770 INPUT#1,A$,A(14),A(15)
,A(16),A(17),A(18)
PR 1780 INPUT#1,A(19),A(20),A(
21),A(22),A(23),A(24),
A(25)
BA 1790 PRINT"{HOME}{2 DOWN}"T
AB(8)"{57 SPACES}"
BB 1800 PRINTCHR$(2)"{HOME}
{2 DOWN}{CYN} STOCK:
{WHT}";A$:PRINT"{CYN}"
:GOSUB2280
MG 1810 PRINT"{CYN}"L1$
FA 1820 Y=0:IF(A(15)>A(16))AND
(A(16)>A(17))THENY=1
QE 1830 IF(A(15)<A(16))AND(A(1
6)<A(17))THENY=-1
QB 1840 PRINT"{DOWN}{YEL}SHORT
"TAB(19);:PRINTUSING"$
####.##";A(15);:PRINTSP
C(8);:PRINTUSING"$####
.##";A(16);:PRINTSPC(9)
;:PRINTUSING"$####.##";
A(17);
BM 1850 GOSUB2160
AS 1860 Y=0:IF(A(18)>A(19))AND
(A(19)>A(20))THENY=1
SH 1870 IF(A(18)<A(19))AND(A(1
9)<A(20))THENY=-1
PM 1880 PRINT"{DOWN}{CYN}MEDIU
M"TAB(19);:PRINTUSING"$
####.##";A(18);:PRINTS
PC(8);:PRINTUSING"$####
.##";A(19);:PRINTSPC(9
);:PRINTUSING"$####.##"
;A(20);
RS 1890 GOSUB2160
SC 1900 Y=0:IF(A(21)>A(22))AND
(A(22)>A(23))THENY=1:L
=Y
RH 1910 IF(A(21)<A(22))AND(A(2
2)<A(23))THENY=-1:L=Y
FD 1920 PRINT"{DOWN}{6}LONG"TA
B(19);:PRINTUSING"$####
.##";A(21);:PRINTSPC(8
);:PRINTUSING"$####.##"
;A(22);:PRINTSPC(9);:P
RINTUSING"$####.##";A(2
3);
EB 1930 GOSUB2160
GD 1940 Y=0:IF(A(14)>A(24))AND
(A(24)>A(25))THENY=1:L
=Y
HF 1950 IF(A(14)<A(24))AND(A(2
4)<A(25))THENY=-1:L=Y
XJ 1960 PRINT"{DOWN}{WHT}PRICE
"TAB(19);:PRINTUSING"$
####.##";A(14);:PRINTSP
C(8);:PRINTUSING"$####
.##";A(24);:PRINTSPC(9)
;:PRINTUSING"$####.##";
A(25);
AC 1970 GOSUB2160
XM 1980 R=INT(100*(A(11)/A(21)
)*A(15)/A(5))+.5)
FQ 1990 PRINTL2$:PRINTTAB(18)"
{DOWN}{6 SPACES}"
GQ 2000 PRINT"{UP}RELATIVE STR
ENGTH:";R;TAB(30);"REC
OMMENDATION:{RVS}";
QH 2010 IF(L=1)AND(A(15)>A(21)
)AND(A(18)>A(21))THENP
RINTHSS$:GOTO2120
MA 2020 IF(L=-1)AND(A(15)<A(21)
)AND(A(18)<A(21))THEN
PRINTASS$:GOTO2120
SK 2030 IFB=0THENPRINTWAS$:GOTO
2120
DJ 2040 IF(B=1)AND(L=1)AND(A(1
8)>A(21))AND(A(15)<A(1
8))THENPRINTHSS$:GOTO21
20
HH 2050 IF(B=-1)AND(L=1)AND(A(
18)>A(21))AND(A(15)<A(
18))THENPRINTSS$:GOTO2
120
BK 2060 IF(B=1)AND(L=1)AND(A(1
8)>A(21))AND(A(15)<A(2
1))THENPRINTHSS$:GOTO21
20
DG 2070 IF(B=-1)AND(L=1)AND(A(
18)>A(21))AND(A(15)<A(
21))THENPRINTSS$:GOTO2
120
GA 2080 IF(B=1)AND(L=-1)AND(A(
18)<A(21))AND(A(15)>A(
21))THENPRINTBS$:GOTO2
120
DR 2090 IF(B=-1)AND(L=-1)AND(A
(18)<A(21))AND(A(15)>A
(21))THENPRINTDB$:GOTO
2120
SS 2100 IF(B=1)AND(A(18)>A(21)
)THENPRINTBS$:GOTO2120
EX 2110 PRINTINS$
CA 2120 PRINTCHR$(158)TAB(30)"
{3 DOWN}ANY KEY TO CON
TINUE"
MK 2130 GETK$:IFK$=""THEN2130
MG 2140 NEXT
BH 2150 DCLOSE:PRINT"{CYN}":RU
N
HG 2160 IFY=1THENPRINTTAB(72)"
UP":RETURN
DH 2170 IFY=-1THENPRINTTAB(72)
"DOWN":RETURN
GD 2180 PRINTTAB(72)"NONE":RET
URN
XQ 2190 REM{3 SPACES}BOX MAKER
PA 2200 PRINT"HOME}{3 DOWN}"
KB 2210 FORI=1TO18:L=L$+B$:NE
XT
GK 2220 Z1$=A$+L$+D$:PRINTTAB(
29)Z1$
XQ 2230 FORI=1TO18:Z2$=Z2$+" "
:NEXT:Z2$=Z2$+E$
XF 2240 FORI=1TO4:PRINTTAB(29)
Z2$:NEXT
CQ 2250 X$=I$+MID$(Z1$,2,18)+K
$
JC 2260 PRINTTAB(29)X$:PRINT"
{HOME}{4 DOWN}"
PS 2270 RETURN
AH 2280 PRINTTAB(22)"{WHT}THIS
"SPC(11)"LAST"SPC(11)"
WEEK"
AA 2290 PRINT" TRENDS"SPC(15)"
WEEK"SPC(11)"WEEK"SPC(
10)"BEFORE"SPC(12)"DIR
ECTION":RETURN

```

Philip Addeo is a biomedical engineer who lives in Roselle, New Jersey. He enjoys electronics, programming the 128, and classical guitar. □

# THE AUTOMATIC PROOFREADER

Philip I. Nelson

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in Proofreader exactly as listed. Because the program can't check itself, be sure to enter each line carefully to avoid typographical errors or other mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy of the program before running it.

Next, type *RUN* and press Return. After the program displays the message *Proofreader Active*, you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, Proofreader displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, the line probably was typed correctly. If not, check for your mistake and correct the line. Also, be sure not to skip any lines.

Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. Spaces inside quotes are almost always significant, so the program pays attention to them.

Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can still check the line by listing it, moving the cursor back to the line, and pressing Return.

If you're using Proofreader on the 128, do not perform any GRAPHIC commands while Proofreader is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing Proofreader to crash. The same thing happens if you run any program with a GRAPHIC command while Proofreader is in memory.

Though Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. To disable it, turn the computer off and then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64).

## AUTOMATIC PROOFREADER

```
0 CLR
10 VE=PEEK(772)+256*PEEK(773):
  LO=43:HI=44:PRINT "{CLR}
  {WHT}AUTOMATIC PROOFREADER
  {SPACE}FOR ";
20 IF VE=42364 THEN PRINT "64"
30 IF VE=17165 THEN LO=45:HI=4
  6:WAIT CLR:PRINT"128"
40 SA=(PEEK(LO)+256*PEEK(HI))+
  6:FOR J=SA TO SA+166:READ B
  :POKE J,B:CH=CH+B:NEXT
50 IF CH<>20570 THEN PRINT "*E
  RROR* CHECK TYPING IN DATA
  {SPACE}STATEMENTS":END
60 FOR J=1 TO 5:READ RF,LF,HF:
  RS=SA+RF:HB=INT(RS/256):LB=
  RS-(256*HB)
70 CH=CH+RF+LF+HF:POKE SA+LF,L
  B:POKE SA+HF,HB:NEXT
80 IF CH<>22054 THEN PRINT "*E
  RROR* RELOAD PROGRAM AND CH
  ECK FINAL LINE":END
90 IF VE=17165 THEN POKE SA+14
  ,22:POKE SA+18,23:POKESA+29
  ,224:POKESA+139,224
100 POKE SA+149,PEEK(772):POKE
  SA+150,PEEK(773):PRINT"
  {CLR}PROOFREADER ACTIVE"
110 SYS SA:POKE HI,PEEK(HI)+1:
  POKE (PEEK(LO)+256*PEEK(HI)
  )-1,0:NEW
120 DATA120,169,73,141,4,3,169
  ,3,141,5,3,88,96,165,20,13
  3,167
130 DATA165,21,133,168,169,0,1
  41,0,255,162,31,181,199,15
  7,227
140 DATA3,202,16,248,169,19,32
  ,210,255,169,18,32,210,255
  ,160
150 DATA0,132,180,132,176,136,
  230,180,200,185,0,2,240,46
  ,201
160 DATA34,208,8,72,165,176,73
  ,255,133,176,104,72,201,32
  ,208
170 DATA7,165,176,208,3,104,20
  8,226,104,166,180,24,165,1
  67
180 DATA121,0,2,133,167,165,16
  8,105,0,133,168,202,208,23
  9,240
190 DATA202,165,167,69,168,72,
  41,15,168,185,211,3,32,210
  ,255
200 DATA104,74,74,74,74,168,18
  5,211,3,32,210,255,162,31,
  189
210 DATA227,3,149,199,202,16,2
  48,169,146,32,210,255,76,8
  6,137
220 DATA65,66,67,68,69,70,71,7
  2,74,75,77,80,81,82,83,88
230 DATA 13,2,7,167,31,32,151,
  116,117,151,128,129,167,13
  6,137
```

## ONLY ON DISK

Here are the bonus programs on this month's Gazette Disk.

### Ezee Design

By Frank Kirsch  
Milwaukee, WI

If you're an electronics hobbyist or professional, you'll use this outstanding reference program often. Ezee Design fills more than 125 blocks with problem-solving electronic formulas. It'll help you calculate problems dealing with Ohm's Law; capacitors, resistors, and inductors in series and parallel circuits; and more.

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Get the February Gazette Disk for only \$9.95 plus \$2.00 shipping and handling. Send your order to Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

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## LOTUSWORKS 3.0

New computer owners, facing a confusing profusion of competing software products, often start with an inexpensive program that combines the basic productivity applications. An early contender in that market was AlphaWorks, which Lotus Development bought and renamed LotusWorks. Lotus recently improved, updated, and released LotusWorks as version 3.0 (there was no version 2.0, in case you're wondering).

LotusWorks features word-processing, spreadsheet, database, and communications programs. The first three are considerably stronger than those usually found in Works-style programs. (They also fill almost 8MB of hard disk space and require a full 640K RAM to run.)

The programs are tightly integrated; you can pull data from one program into another. You can, for instance, merge names and addresses from the database into a word-processing letter template to produce a series of personalized form letters.

The powerful new interface is a character-based version of Windows, with individually resizable program windows. You can open several windows at once, clicking back and forth between them with the mouse.

The program has a modern, colorful look to it, and it's a pleasure to use. I have a few complaints about its slightly unusual interface, however. For instance, each basic program screen has a menu bar across the top, with the first letter of each pull-down menu item highlighted. In most programs, you access such menus by hitting the Alt key

and the highlighted letter. It's that way in Windows, DOS 5.0, and zillions of other programs that support IBM's CUA (Common User Access) standard. Not so in LotusWorks. Here, you must hit F10 to activate the menu bar and then hit the highlighted key. (There are other pro-

grams that use F10 in this manner, but not many.) Five years ago, this wouldn't have raised an eyebrow, but today it's surprisingly non-standard. I also found the system for typing values into fields in dialog boxes unusual and awkward.

2.01, slightly altered to fit the pull-down menu interface minus a few of the advanced functions. Need I say more? It's an outstanding spreadsheet for this kind of program.

The small relational database is surprisingly powerful. Its native file format is

tusWorks format or ASCII. I found it to be an extremely handy feature.

LotusWorks comes with five hours of 5- to 15-minute tutorial lessons, teaching all aspects of the programs. The context-sensitive help is extensive and usually useful, although there were a few things I couldn't find. The manual is written for beginners, explaining such things as memory and hard disks. It's thorough and clearly written.

LotusWorks isn't without minor irritations, but on the whole, it's a powerful suite of basic applications that will handle anyone's ordinary daily home computing needs. Small businesses might find themselves limited, but only if someone on the staff turns out to be a computer nut. With all its features, it's no surprise that Lotus has sold a million and a half copies of LotusWorks.

RICHARD O. MANN



*LotusWorks combines strong word processing, an excellent spreadsheet, a powerful database, and skeletal communications.*

grams that use F10 in this manner, but not many.) Five years ago, this wouldn't have raised an eyebrow, but today it's surprisingly non-standard. I also found the system for typing values into fields in dialog boxes unusual and awkward.

The word processor can embed graphics or spreadsheets in documents, so when you change the source file, it changes the document. It has full support for text styling, including bold, italic, and underlining for a variety of fonts. It comes with a large set of downloadable Bitstream fonts that work with both dot-matrix and laser printers. There's a thesaurus, spelling checker, and print preview function.

The spreadsheet appears to be Lotus 1-2-3 release

DBF, the dBASE standard. You can draw data input forms on screen (nine per database) and validate field data as you enter it. It has calculated fields and large memo fields. The only drawback is that it's not particularly easy to learn. The extensive tutorial helps.

The bare-bones communications program offers only four communications protocols and four terminal emulations, although they're the most common ones. Its simple learn-mode recording of log-on scripts is refreshing, but it doesn't have a built-in phone directory. (You can autodial from database records, however.)

The dialog box for opening files has a fast file viewer that peeks into the file highlighted on the directory list, if it's in the native Lo-

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## C. ITOH CI-8E

The C. Itoh CI-8E desktop laser printer is much more than an enhanced, beefed-up version of the C. Itoh 4. In addition to the CI-8E's being endowed with more speed, there are several other noteworthy features which set it apart from its sibling.

The CI-8E comes with 1MB of RAM standard, but this can be expanded to a maximum configuration of 5MB. The review unit was equipped with 3MB of RAM, a comfortable amount for all

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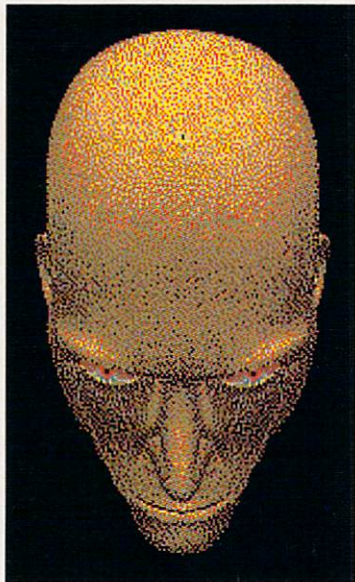
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## REVIEWS

but the most grueling DTP or graphics applications utilizing many soft fonts.

Fourteen bitmapped and eight scalable fonts are resident in the CI-8E, and additional fonts can be added using HP-compatible font cartridges (there are two slots provided) or down-



The CI-8E goes beyond the C. Itoh 4, offering many fonts and easy setup and use.

loadable soft fonts. The CI-8E also incorporates C. Itoh's EEG (Edge Enhancement Technology) which smooths out the jaggies that are often present in curved areas of text or graphics. The EEG circuitry redefines the curved areas and remaps them, producing a smoother overall appearance. The scalable fonts consist of CG Times Medium in roman, italic, bold, and bold italic and Universe Medium in roman, italic, bold, and bold italic; the bitmapped fonts resident in both portrait and landscape orientations are 10- and 12-point Courier in roman, bold, and italic and 8.5-point Line Printer.

Parallel, RS-232C serial, and RS-422 serial interfaces are standard equipment on the CI-8E. Standard emulation capabilities for the CI-8E include HP LaserJet Series III (PCL5), Epson FX-850, and IBM ProPrinter XL24e emulations. A PDL cartridge is also available as an option for PostScript capability, and this cartridge adds 35 PostScript-compatible fonts which can be scaled or rotated.

A soft-touch control panel comprised of eight function buttons, four colored LEDs, and a 16-character LCD message display permits changing the printer's settings and also provides a window on the CI-8E's operational status. Setting up and using the CI-8E are very easy and uncomplicated; the menu-driven LCD panel is augmented by an excellent user's manual.

This eight-page-per-minute laser printer is conservative in the amount of desktop space it requires, measuring a compact 15.5 x 15.9 x 8.6 inches and weighing just under 31 pounds.

A 250-sheet multipurpose paper

tray feeds paper into the CI-8E, while an output lever selects either faceup or facedown delivery modes. An optional second bin paper feeder which holds 300 sheets (list price, \$175) and a 20-sheet faceup output tray (list price, \$30) are also available as optional items. Transparencies, envelopes, and label stock can be manually fed into the CI-8E.

The C. Itoh CI-8E puts the features wanted by most users into one package, and it offers additional features as options for those users who need them—a most sensible arrangement. The CI-8E's 8-ppm output speed, relatively small footprint, EEG technology, good assortment of standard fonts, and serial or parallel interfacing combine to make it a printer worthy of serious consideration.

TOM BENFORD

C. ITOH CI-8E—\$1,695

C-TECH ELECTRONICS  
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Irvine, CA 92713-9673  
(714) 833-1165

Circle Reader Service Number 435

## HEAVEN & EARTH

Heaven & Earth is the first software offering produced by the newly formed Buena Vista Software to target a wider audience than Disney Software, another Disney computer products unit. It's been called an antiarcade game in that it provides a respite from the standard shoot-'em-ups and kill-the-evil-wizard games.

Heaven & Earth is a peaceful grouping of three games: The Pendulum, the Heaven & Earth Card Game, and The Illusions, which in turn can be combined to form the Pilgrimage, patterned after the Buddhist path of 108 steps to enlightenment. Oriental concepts for seasons organize and provide structure to the games. Earth, air, fire, and water are paired with winter, spring, summer, and fall to form the 12 seasons used for the 12 suits in the Heaven & Earth Card Game, the four levels of The Illusions, and the backgrounds for The Pendulum.

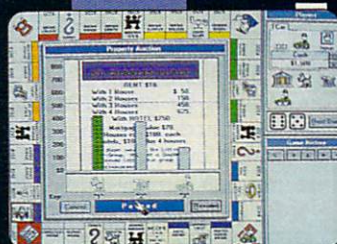
The first and most obscure of the antiarcade games is The Pendulum. The pendulum can only be persuaded to move in the needed direction to strike the positive stones, which will remove stones from the geometric design below the pendulum. If the negative gravity vortexes, or stones, are hit by the pendulum, more stones appear. As with all the games, there's no way to lose The Pendulum game, and you can keep playing until you win, no mat-

# Trade Up!

## The Game You Grew Up With Has Grown Up Too!



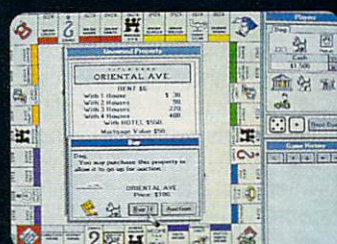
WINDOWS™ version



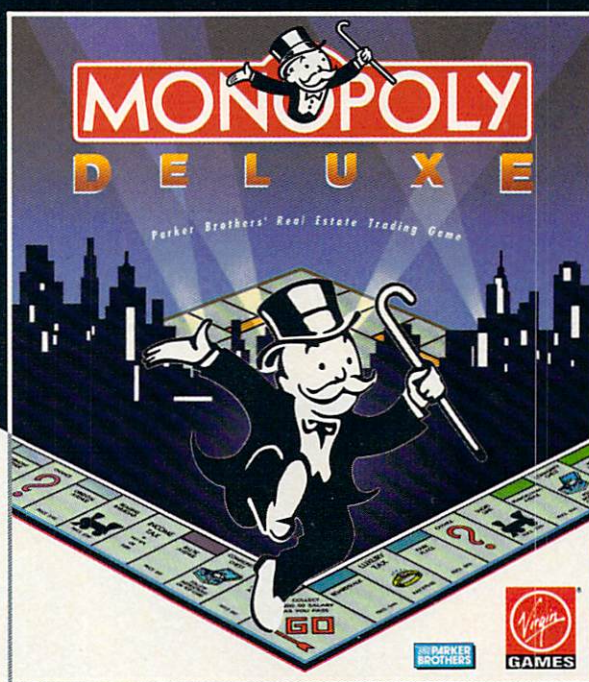
IBM PC version



WINDOWS™ version



IBM PC version



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WINDOWS™ version features all of the DELUXE features listed above plus the added bonus of easier-to-use point-and-click interface. MONOPOLY® DELUXE with the ultimate easy-to-use point-and-click interface will be available this fall in PC and WINDOWS™ versions.

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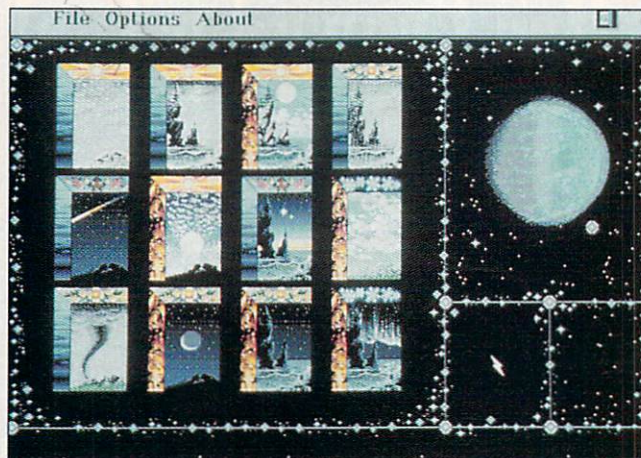
ter how long it takes.

The Heaven & Earth Card Game uses 12 suits to match up two-, three-, and four-of-a-kind suits of the same month or the same central pattern of ocean, mountain, desert, or sky. Points are gained by getting more similar cards, having no cards left over, and having animations on the paired cards. Animations are special cards that combine animation with digitized sound, creating, among other things, the star Betelgeuse, a tornado, and lightning.

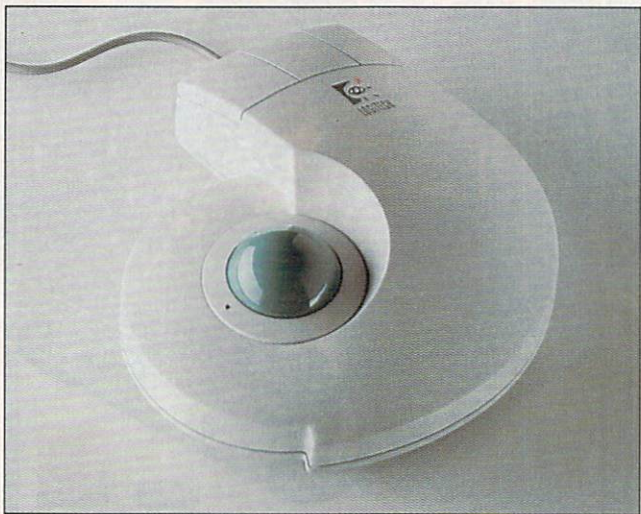
The 576 illusions are divided into 12 types of four difficulty levels, with 12 illusions per type. The Illusions, which basically consists of computer-based puzzles, gets progressively more difficult as the game progresses. The illusion types include antimaze, identity, grouping, and "fit fall," a Tetris-like game puzzle. These are further classified into four increasing difficulty levels of ocean, desert, mountain, and sky. Each difficulty level brings a change of rules that makes the next set even harder.

The Pilgrimage is a combination of The Heaven & Earth Card Game, Illusions, and Pendulum, with 26 unique and different puzzles that allow you to save your progress in a kind of marathon of Heaven & Earth. You must complete the current game before you can move on to the next, in contrast to the free access of all the individual games.

Production values are high on Heaven & Earth, as evidenced in the high-gloss, heavy-paper manual. The 640 x 480 VGA resolution is really in 16 colors with advanced dithering (shading) techniques, making the limited palette look



Take the PC path to software enlightenment with Heaven & Earth, the first offering from Disney's Buena Vista Software.



The Logitech Trackman offers a stationary alternative to a mouse, eliminating the need for scurrying room.

more like 256 colors. Installation into 6.5MB of hard disk space is quick and easy. The Pilgrimage supports six save games, as well as pause and load functions. The digitized music, gongs, and whistles have a definite oriental flavor, giving away the fact that some of the designers worked on Shanghai and Ishido.

Heaven & Earth has an intangible beauty about it, something inscrutable and mystifying. That's not just an

illusion, if the large number of sales to women—a group that traditionally avoids computer games—is any indication.

On the surface, the game appears to be simply another game that combines three lesser games to give substance to the product. On closer inspection, though, you see that each of the game modules is a full game in itself, needing no support from the others. All of which makes Heaven

& Earth a most unusual—and rewarding—game.

ALFRED C. GIOVETTI

IBM PC or compatible (10-MHz 80286 or faster); 640K RAM; EGA, MCGA, VGA, VGA gray scale, or Tandy 16-color; hard drive with 6.5MB free; mouse recommended; supports Sound Source, Thunderboard, Sound Blaster, Ad Lib, IBM PS/1 audio card, and Tandy DAC sound—\$49.95

BUENA VISTA SOFTWARE  
500 S. Buena Vista St.  
Burbank, CA 91521-6385  
(800) 688-1520

Circle Reader Service Number 436

## LOGITECH TRACKMAN

The Trackman trackball from Logitech is a terrific alternative to a mouse. It looks something like a three-fingered hand, and for good reason: The widths of the buttons on this three-button device (the three "fingers") fit your real fingers well. The thumb is the trackball itself, which can be easily manipulated by your real thumb.

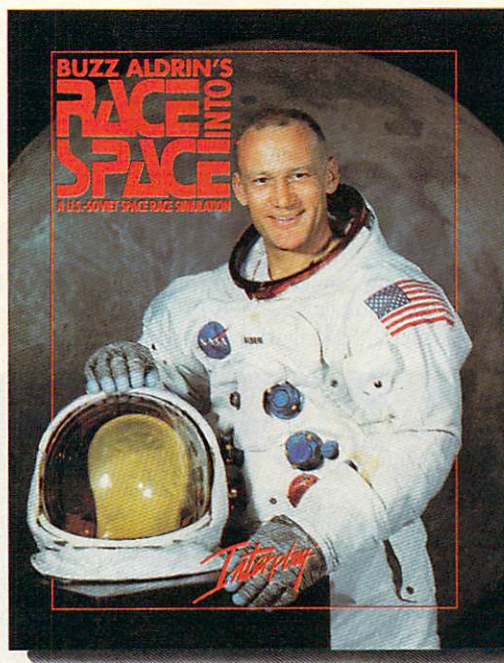
Of course, since your thumb must be trained to do what your whole hand (and arm) previously did, it takes some getting used to when quick pointing is required. Even so, for applications where moving the pointer isn't time critical, adaptation is almost automatic. Generally speaking, the ergonomic design is excellent. Of course, the real advantage of the Trackman—what Logitech calls a stationary mouse—is that it sits in one place, whereas a mouse needs room to move. Everyone with a crowded workspace should look closely at this product.

Because this trackball is as large as an adult hand (about 5½ inches long and 1½ inches high), it may not be convenient for packing when space is tight. It might not work well



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 —John F. Kennedy

**“Likely to set a standard for multimedia entertainment products.”**  
 —Computer Gaming World



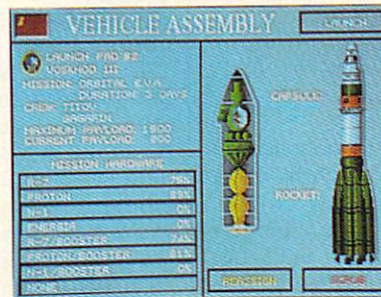
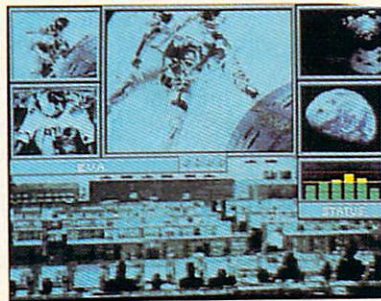
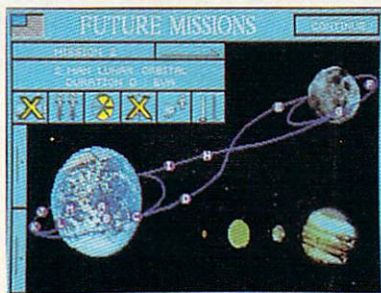
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MS-DOS Screens Pictured.

Circle Reader Service Number 105

for a small child, either. In most cases, however, size shouldn't be a problem.

The Trackman comes with the same versatile MouseWare software that accompanies all of Logitech's mouse products. This makes it adaptable to virtually any system configuration. Also included with the trackball is a 9-to-25 pin serial adapter, a 9-to-6 pin mouse port adapter, and a thorough and well-written manual.

If you're looking for a sturdily built, versatile alternative to a mouse, you might consider giving your hand to the Trackman.

BRUCE M. BOWDEN

Logitech Trackman—\$139

LOGITECH  
6505 Kaiser Dr.  
Fremont, CA 94555  
(800) 231-7717  
(510) 795-8500

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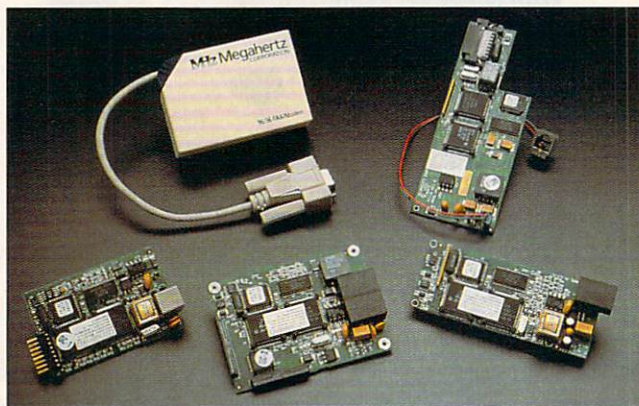
## MEGAHERTZ T396FM

A decent modem should do three things: run at 9600 bps, support V.42bis data compression, and send and receive faxes. A year ago, such a modem would've cost you more than \$1,000. Today, you can expect to spend much less.

If you need this kind of modem for your laptop computer, take a look at Megahertz's new line of internal laptop fax/modems. These include the AR196FM (for the AST Premium Exec 386SX/20, 386SX/25, and 386SX/25C), the C596FM (for the Compaq Portable 486c and LTE 386s/20, Lite/20, and Lite/25), the T396FM (for the Toshiba T1000, T1200, T1600, T2000, T3100, T3200, T4400, and T6400 series), and the Z396FM (for

the SlimsPort, Zenith MinisPort, and MastersPort 386SL). Each is \$569, except for the Toshiba and Zenith models, which are \$599.

You can also buy the same circuitry in a small external unit about the size of a deck of cards. It's called



Laptop users looking for a good internal or external modem can get a top-quality Megahertz model for a reasonable price.

the P296FMV pocket fax/modem (\$599); it plugs into your serial port and can run on either AC power or two AA batteries. With batteries, it weighs only 6.8 ounces.

I tried out the T396FM internal fax/modem with a Toshiba T6400 laptop, and it worked just fine. When communicating with a system that supports both V.32 protocol (this allows you to transmit at 9600 bps) and V.42bis (this gives you a 4 : 1 rate of data compression), you can send and receive data at an effective rate of 38,400 bps. I also tested the unit with my usual fax software, WinFAX Pro, and it worked again without a hitch.

Megahertz thoughtfully includes two batch files that let you quickly switch back and forth from V.42bis to a stripped-down 9600-bps mode without any error correction or data compres-

sion. (You can use your telecommunications program to automatically send commands that do the same thing.)

The company also includes a DOS-based modem program from MagicSoft, called MTEZ, that supports the XMODEM and

YMODEM protocols. You can also use MTEZ to send and receive faxes. In addition, you get a coupon that you can send in for an unnamed Windows-based fax software package.

When I first tried to use the T396FM with Crosstalk for Windows, I wasn't sure which modem to choose. Because the modem is new, it wasn't listed on my older version of Crosstalk. Fortunately, Megahertz provides toll-free technical support, and a technician walked me through the initialization string for Crosstalk's custom-modem setup.

If you have an AST, Compaq, Toshiba, or Zenith laptop, this is currently the best deal in town for a fax/modem (9600-bps fax and modem) with V.42bis. If you're looking for a small external fax/modem with the same capabilities, you won't go wrong with the pocket

model, either. Top quality, excellent price, toll-free support, and a five-year unlimited warranty—who could ask for anything more?

DAVID ENGLISH

Megahertz T396FM—\$599

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Circle Reader Service Number 438

## SIMCITY FOR WINDOWS

Regular COMPUTE readers almost certainly know about SimCity. Since its introduction to deservedly wild accolades in 1989, it has won nearly every award in the industry, been featured in *Newsweek* magazine, sold a quarter of a million copies, and won a place in the hearts of the computing public. It's a classic in the truest sense of the word.

The big news on the SimCity front this year is the new SimCity for Windows. Windows users will love having SimCity available at the click of an icon. Windows brings several new capabilities to the game, not the least of which is the ability to leave your city growing and developing in the background while you go about your other multitasked Windows business.

Just in case you're new here, though, let's go over what SimCity is all about. It won't hurt you veteran city planners to be reminded of the charms of running the mayor's office. I have to admit that until this new Windows version came in, it had been months since I visited Rich's Ridge. Now I'm hopelessly hooked again.

SimCity puts you in charge of a simulated city.

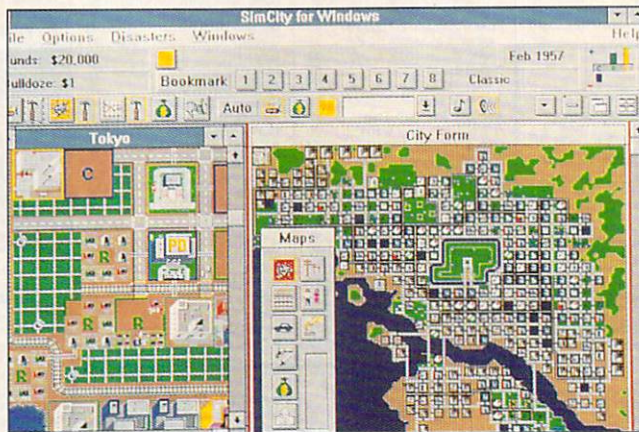


Starting with an undeveloped expanse of land along a large waterway, you establish the zoning for industrial, residential, and commercial areas. You build power plants, roads, tracks for light rail, parks, police and fire stations, airports, and a stadium. Then you string the power lines to your zoned areas so construction can start.

That's all there is to it. Really. The amazingly intricate and realistic programming takes it from there. You zone a sector residential, you provide power and transportation, and the sims (simulated citizens) take over. You'll see tiny houses going up and minuscule automobiles appearing on the roads. Of course, you'll need industrial and commercial zones nearby, or no one will move in—sims need places to work and shop, you know.

You'll need to fine-tune things, which is the essence and joy of the game. If you build too much industry and rely on automobiles entirely, you'll soon learn the consequences of pollution. If you skimp on police protection, crime rates will skyrocket. These and a dozen other negative outcomes result in unhappy citizens, who move out and leave you presiding over an empty, decaying city.

As in real life, money makes all this work. The more citizens and businesses in your city, the larger the tax base. You start with seed money, but you have to earn tax revenues to build anything, maintain the infrastructure, and pay police and firefighters. As in real life, it's a delicate juggling act to keep the services going without increasing taxes beyond the citizens'



*SimCity for Windows, the latest version of the popular software game, lets you build and maintain your own city.*

willingness to pay.

There are joyous touches of delight in the game: The tiny stadium fills up periodically with pinpoint-sized sims, and Lilliputian football players move up and down the inch-long field. A traffic-reporting helicopter shares the sky with airplanes, which occasionally crash into the city. Earthquakes and a nuclear meltdown (if you've been adventurous enough to choose a nuclear power plant) may blight your city. A monstrous Godzilla creature may appear and stomp parts of your city to rubble.

The Windows version adds floating toolboxes, giving you access to more of your map windows. You can open multiple maps and information windows at once, and a ribbonlike master toolbar has been added. Access to game controls and information is much easier.

If you already have SimCity, you probably don't need to upgrade to the Windows version—that is, unless you're hooked on the game and use Windows most of the time. Then you'll love it. If you haven't joined the ranks of fledgling mayors yet, run (don't walk) to your

nearest software outlet and buy one of the SimCity versions. You're in for a challenging, addicting experience. Games simply don't get any better than this.

RICHARD O. MANN

IBM PC or compatible (80286 compatible), 1MB RAM, EGA or VGA, hard disk, Windows 3.0 or higher; mouse recommended—\$59.95

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Circle Reader Service Number 439

## CALCULUS EZ-FAXIT

Computerized faxing is becoming mainstream. So much so that Calculus, which specializes in network fax solutions, has introduced sophisticated models for home offices.

While the Calculus EZ-FAXit board and Windows software deliver beautiful graphics in a manner that's as easy to use as creating and printing documents, the price might make you think twice about the many advantages packed into this kit.

The version I tested carries a \$299 list price for 4800-bps fax and Windows

software. The company's 9600-bps fax kit costs \$499. These prices compare unfavorably to the \$169–\$279 price range found for comparable fax cards at two computer stores in my area—and those prices include 9600-bps fax and 2400-bps modem. Calculus does not have a modem—a distinct disadvantage, since you have to dedicate a phone line to the fax and give up a card slot to a modem so you can use your autodialer and online services.

The EZ-FAXit half-width card has two coprocessors that can send and receive faxes in the background, so you can work without interruption—a major advantage.

Installing the half-width card couldn't be easier. EZ-FAXit prevents headaches by automatically configuring itself during software installation. This is an advantage, because if you incorrectly set switches on other fax boards, not only will the fax not work, but other devices will also fail.

Using EZ-FAXit is also simple. Unlike other programs that require you to convert files to ASCII, exit your application, and load their fax software, EZ-FAXit works completely inside your application. For instance, if you create a document in Microsoft Word for Windows and select Print, a pop-up menu asks for the recipient's name and phone number. You can type it or select information from a phone directory which can hold an unlimited number of names. You can also select when to dial, saving money by scheduling phone calls during low-rate periods. Moreover, you can broadcast faxes to groups of colleagues, thus eliminating the need to re-create faxes or wait through the

# DUNE™ II

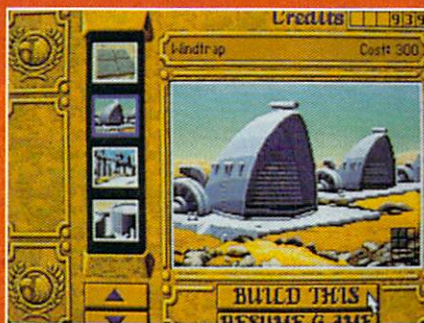
The Building of A Dynasty



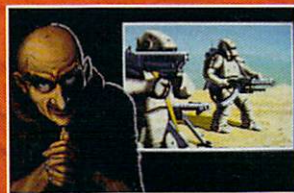
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conversion process. These high-end features begin to justify the price of EZ-FAXit.

People who have received my faxes say the 24-point Times Roman fonts and boxes printed beautifully. This is a major advantage over other fax boards that strip out your formatting to present legible yet bland displays of information, usually in 10-point sans-serif type.

EZ-FAXit sends faxes in the background, so you quickly get back control of your machine to work on other projects. It even has clever sound effects: A successful fax yields a sound like Teddy Roosevelt charging up San Juan Hill; a failed transmission sounds like you gave the wrong answer on a TV game show.

The board also receives faxes automatically. This is a bonus I appreciate when I think of colleagues who must demand prior notice so they can set up their machines to receive faxes.

EZ-FAXit does have problems. A graphics-heavy fax refused to print on my Hewlett-Packard LaserJet III. Received documents can't be easily viewed onscreen. Transmission takes about two minutes per page. And EZ-FAXit appears on your cover sheet, detracting from your company's image.

I wouldn't let those problems overwhelm the program's other worthwhile qualities, however. It may not be perfect, but EZ-FAXit is easy to install and use, and it delivers crisp graphics.

DANIEL JANAL

Calculus EZ-FAXit—\$299

CALCULUS  
1761 W. Hillsboro Blvd.  
Deerfield Beach, FL 33442-1530  
(305) 481-2334

Circle Reader Service Number 440

116 COMPUTE FEBRUARY 1993



Calculus EZ-FAXit costs a lot but provides plenty of features—if only it didn't print EZ-FAXit on your cover sheet.

## COMPOSER QUEST

Don't be fooled by Composer Quest's title. This multimedia exploration may dream of snaring game players by simply doing some name-dropping, but that won't work. *Quest* isn't always synonymous with *game*.

Instead, appreciate Composer Quest for what it really is—a miniature musical encyclopedia that plays snippets of famous classical pieces, offers up a few facts about the periods, and displays a smattering of biographical information. Sure, there's a game here, one with a time-traveling motif and a game-show, name-that-tune mentality, but it's nothing more than an unnecessary diversion from the

real work at hand. What's that? Learning, of course.

You'll need a CD-ROM drive and a sound card before you can hear a peep from Composer Quest, which runs under Windows. Unfortunately, it doesn't take advantage of resolutions above the 640 x 480 of standard VGA, so you can't expand Composer Quest's display to fill the entire screen in 800 x 600 mode. A pity.

But looks aren't everything, as you'll quickly learn. Covering seven classical and three jazz periods, this CD-ROM title lets you point and click your way from time line to historical period to composer in a matter of moments.

Most of the 35 composers are represented by several of their most memora-

ble pieces. Want Wagner? You can play his "Ride of the Valkyries." Bach? Listen to Brandenburg Concerto no. 2. The selections are all too brief (30 seconds or so) and leave you wanting more. Even worse, the most modern composers, including jazz greats such as Armstrong and Ellington, are without music. Their work hasn't fallen into the public domain—the obvious reason Composer Quest fails to include much of anything from this century.

Historical tidbits from the period, and even some on-screen images of art and architecture, help to put the music in perspective. You can, if you want, take quizzes to see how well you know the biographical and historical material.

Or you can, if you must, play the time-travel game. You listen to the music and then try to guess its creator by traveling to the right period, finding the right person, and identifying the right piece. This gets old faster than it takes to read this description.

Stick with Composer Quest's free-form exploration, and you'll be much happier. You won't drown in facts—you get little more than a wet toe. Composer Quest is an affordable and even entertaining way to learn something about the Western world's most famous musical creators.

GREGG KEIZER

IBM PC or compatible (80386 compatible); 2MB RAM; VGA; CD-ROM drive; Windows 3.1 or Windows 3.0 with multimedia extension; Sound Blaster, Ad Lib, or compatible sound board—\$99

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NEW WORLD COMPUTING®

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Into competition with Quick-checks and other check printers comes an easy-to-use program from American Check Printers. The kit advertises that you "buy this kit once and get checks inexpensively forever!"

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The box is covered with advertising and prices comparing the prices charged by Intuit and other software companies for computer checks to American Check Printers' prices. The price may be the best part of the deal, since the kit price is much lower than the prices offered by banks and software companies for computer checks. The quoted prices show savings of as much as \$10 over Intuit's prices and \$20 over the bank prices for 250 pin-feed checks or 250 laser "trippies." (A trippie is three checks on one 8½" x 11-inch piece of laser paper.)

You save an additional \$5 keypunch fee when you use the ordering disk to place your first order, saving the company the trouble of inputting the information. People are more careful about spelling when typing in information about their own checks

than your average key-punch technician.

The software is keyboard-directed, with an adequate use of function keys to move the product along. An order cannot be written until all the necessary information is put in. One area the company double-checks for the

toward any first order of checks, making the program virtually free. (Since 250 personal checks cost \$29.95, taking the \$20 credit and buying the extra 150 checks for \$9.95 is a better deal than the 100 free checks.) Checks can be printed in three styles: Tradi-

ent account or to change the style of the checks, will require that you supply your own disk, disk mailer, and postage. But reorders can also be accomplished by calling a toll-free number. The documentation is brief, but it tells you all you need to know to run the software.

This new way to order computer checks is very quick, easy, and economical when compared to other alternatives. It allows the computer user to customize his or her checks and to save money at the same time. Anyone who uses a computer to keep books with any of the 11 programs listed above should look into this inexpensive product.

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customer is the bank codes. You must include a voided check with the order so that American Check Printers can double-check the bank numbers and codes that you have entered, at no additional charge. The program's error checking is quite sophisticated and corrected me several times when I tried to enter a fictitious bank number. After all the error-checking parameters have been reviewed, the program prompts you to check the numbers one more time.

The software retails for \$20, with a lower price at discounters, and you get 100 free checks or a \$20 credit

tional, Professional, and Premier. The Premier, which uses laser color shading and a script style, is recommended for architects and designers. The Professional style uses parchment paper and Old English type and is recommended for accountants, attorneys, and physicians. The Traditional checks use a color border with block lettering and are recommended for those who require less elegant checks. Most checks are available in green, blue, maroon, or gray.

After the first order, the software can be copied to your hard drive with DOS. Additional orders, for a differ-

## KODAK DICONIX 180SI

The Kodak Diconix 180si ink-jet printer packs a lot of power in a small package. It's manufactured by the same people who make that film in bright yellow boxes.

Kodak has entered the mobile printer market. These printers—like the 180si and its bigger brother, the 701—are lightweight but powerful computer printers working from internal batteries or AC power. Kodak's aim is to support the mobile office concept, where you take your laptop computer home or out on trips to continue working. A new-generation portable computer and a 180si together weigh about ten pounds.

The basic printer weighs





only 2.9 pounds, but batteries, printhead cartridge, and power adapter add a little more. It's only 2 inches high x 6.5 inches deep x 10.8 inches wide.

Power is provided by the AC adapter or by five C-cell nickel-cadmium batteries (not included). The batteries go in a unique place—inside the platen. Lifting the cover of the printer and rotating the platen reveal the battery compartment. The batteries are automatically recharged when the AC adapter is plugged into the printer.

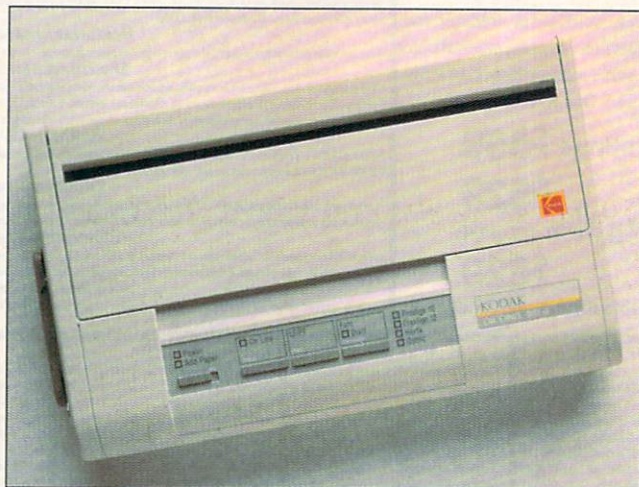
The 180si has a built-in tractor feed to use fanfold paper and forms. You can also print sheets of paper without perforations, like letterheads.

Print quality approaches that of a laser printer—and it costs you less money and weight. There are two print-quality settings. Draft is the faster: between 145 and 180 characters per second, depending on the size of the characters. Elite or 12-character-per-inch fonts print fastest, such as the Prestige 12 selection on the 180si's control panel. Draft text is 96 x 96 dots per inch; draft graphics are 192 x 96 dpi.

The quality setting is slower—down to 36 cps for Prestige 12, and slower for larger type. But it gives much better quality, with both text and graphics at 192 x 192 dpi, rivaling laser printers (usually 300 x 300 dpi). Four quality fonts are built in, with draft mode for each.

The 180si emulates the Epson FX-85 and IBM ProPrinter. Many programs use the 180si easily, since those two printers are often supported.

I installed and tested the 180si with a number of programs. It worked perfectly. Installing the printer driver included for Windows let me (using Adobe Type Manger)



*With the Diconix 180si from Kodak, you get a powerful, versatile printer that's easy to take on the road with your laptop.*



*The Flashdrive 25 offers portable hard drive storage, working well despite its relative slowness and battery-saving shutdowns.*

print more than 200 fonts to the 180si using Windows 3.1—not bad for such a small printer.

There are two reasons you might want to purchase a 180si: if you take your portable computer out of the office and need a powerful—but equally portable—printer, or if you want a printer that has graphics and text quality approaching that of a laser, but you would prefer not to mortgage your house to get it. At \$399 suggested retail, the 180si is a good solution to both requirements. It's a nice *little* printer.

RALPH ROBERTS

Kodak Diconix 180si—\$399 (parallel), \$419 (serial)

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## FLASHDRIVE 25

Weighing in at 1½ pounds with a battery life of about five hours, the Flashdrive 25 is an excellent choice for those needing extra portable hard drive storage or those who use portables without built-in hard drives.

Although I expect most

users will attach the Flashdrive to their portables or notebooks, I found it most convenient for transferring large blocks of files and applications from my notebook to my desktop. I simply installed the drive onto both computers and moved it from one to the other. It also saved me the trouble of installing the same applications on both machines. In this way I created exactly the same environment on both machines. For those of us who travel or who have large amounts of data to move—between our home and office computers, for instance—the Flashdrive offers a convenient alternative to floppies.

Although the documentation could be better (I found it to be skimpy, and not as clear as it could've been), most users will be able to connect the drive through the parallel port and install the necessary software. The drive comes preformatted and partitioned as two 32MB drives and one 19MB drive. On my system they installed as drives D, E, and F. It's possible to reconfigure the Flashdrive using the software provided. Even though the Flashdrive connects to the parallel port, you can still connect your printer through the standard parallel connector built into the Flashdrive.

I tried the Flashdrive on two notebooks, a Magnavox 386 and a Gateway 2000 Nomad 386SXL, with no problems. I also attempted to install it on four desktops with mixed results. I successfully installed and used the Flashdrive on a Tandy 4825 SX Multimedia 486SX and an old no-name 286 clone. I never was able to get the Flashdrive to operate on a Gateway 386SX/16 or a

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## REVIEWS

Wyse Decision 386/40, however.

Since the Flashdrive operates through the parallel port, you'll find the drive a bit slower than internal drives. And since the Flashdrive uses the battery-saving technique of shutting down when it's not being accessed, you'll find the same delay as when re-starting the drive if you're running it on battery power.

Although I found the Flashdrive quite satisfactory and can recommend it to those who need portable hard disk storage, my experience suggests that if you're thinking about buying the Flashdrive, you should be sure to purchase it with the right to a full refund if you discover that it's not compatible with your computer.

STEPHEN LEVY

Flashdrive 25—\$299 (20MB), \$459 (40MB), \$599 (60MB), \$699 (80MB), and \$849 (130MB)

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## ROBOSPORT FOR WINDOWS

Ever since Muse Software released Robot War for the Apple II computer ten years ago, computer gamers have had a love affair with computer robots, competing against each other in nationwide tournaments. RoboSport by Maxis, the creators of SimCity, SimEarth, SimLife, and SimAnt, is the newest entry in this love affair with computer robots. The technology has changed enough that RoboSport has a chance of clanking its way to the forefront and becoming the new robot tournament software.

RoboSport is a strategy game that provides for the robot-programming commands to be made in advance of the battle, which proceeds in a simultaneous combat mode. RoboSport pits as many as four teams, composed of up to eight robots each, against one another. Robots can be controlled by computer or human. The computer-controlled robots can be set to any of four levels of artificial intelligence, from stupid to ferocious. The human-controlled robots are programmed or edited; then you can watch an animated "movie" of how the conflict turned out using the game's VCR feature. Cycles of editing and viewing results can continue until the time set for the game runs out or one team is declared

the winner. You win by completing the game goal or incapacitating all enemy robots.

RoboSport provides for up to five types of games, or "sports," with different goals, such as survival, capture the flag, hostage rescues, treasure hunt, and even a baseball variant, which requires the robots to touch all four bases in the corners of the battlefield in or-



With RoboSport for Windows, Maxis tosses its sensors into the robot battle ring.

der to win. RoboSport has three basic battle sets: the suburbs, rubble, and computer. It can be played on seven types of terrain, with four levels of robot intelligence, five types of robots, eight types of weapon systems, five sports, five beginning formations, four game lengths, up to four teams, and up to eight robots per team, giving the game an impressive variety of conditions to interest the most discerning robot warrior.

The eight increasingly destructive and longer-ranged RoboSport weapons systems include rifle, burst, auto, grenade, missile, zap (a high-energy, low-frequency burst), time bomb, and kamikaze. The five types of robots have different armor protection and weapons systems. The stealth robot is unique in that it cannot be seen unless moving or scanned from an adjacent square. Hitting a robot when firing is determined by the length of the scan and the speed of the target. Damage is calculated from the range, angle of fire, and armor protection of the target; it's subtracted from the total remaining damage points of the robot.

The mouse-controlled window interface makes use of Windows 3.1 sound support; no DOS version of the game is planned. The Super VGA graphics support gives 800 x 600 resolution and a 256-color palette. The documentation indicates that you can experience a performance decrease if you have a number of programs running when in 386-enhanced mode. RoboSport can be played with up to four human players on the same computer, on two computers over a null modem or telephone modem, and on up to four machines on a network. Modem

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## REVIEWS

play from Macintosh to IBM is supported, as well.

RoboSport is not a realtime arcade game, nor is it your traditional war game. RoboSport may take a long time or a short time to play. Purchase with caution, though: Many will enjoy the process of programming computers for viewing the outcome, while others may find it a tedious process.

ALFRED C. GIOVETTI

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## HONEYWELL OPTO-MECHANICAL

A mouse is a mouse. Or is it? Usually, there isn't much you can say to separate one mouse from another. Is the mouse easy to install? Today, most mice are simple to install, and most new mice are both PC and Windows compatible.

Such is the case with the new Honeywell Opto-Mechanical mouse. How does the mouse feel in your hand? Is it easy to control? Again, the Honeywell mouse passes muster with a comfortably rounded shape that contours nicely to the hand. Its buttons aren't too stiff when clicking, handling smoothly.

In other words, this serial mouse passes all the tests. But what separates it from others I've tried is the new x-y axially inclined transducer technology that is used instead of the standard ball mechanism. Unlike other mice, the Honeywell mouse doesn't get contaminated by surface dirt, which often causes mice to become less reliable. In place of the usual ball, the Honeywell mouse has two small, round, plastic sensors which detect the x-y position and move the cursor. This mouse doesn't need to be cleaned! It can be used with or without a mouse pad on almost any surface you're likely to use.

I used this mouse with several applications, including Quattro Pro, PageMaker, Word for Windows, Excel, Windows, and GeoWorks (and its various applications). I also used the Opto-Mechanical mouse to play games, including Links golf, Solitaire's Journey, Lemmings, and King's Quest. For

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## REVIEWS

each of these, the mouse functioned as expected.

Although I found the Honeywell mouse to be reliable and easy to install, it wasn't noticeably more sensitive or less sensitive than others I've put to the test. The use of sensors rather than a ball means the mouse will probably last longer than the standard ball mouse. Although I wouldn't recommend that you run out and immediately replace your standard mouse with this new technology, you'd be wise to consider the Honeywell Opto-Mechanical mouse when you need a new or replacement serial mouse.

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## QUEST FOR GLORY I

Released in 1989, Hero's Quest is arguably the most ambitious Sierra On-Line undertaking and probably the most satisfying game in the Sierra family. Hero's Quest effectively combines the statistical character development features of a role-playing adventure with the basic side-scrolling, third-person perspective, interconnected scene-based interface of a graphic adventure. Quest for Glory I, the completely reworked remake of the original game—rotoscoped and icon driven, with 20-frame clay animation, 256-color VGA graphics, and enhanced stereo sound—is in many ways a significant improvement.

To the chagrin of some and the delight of others, gone is the original text parser, now replaced with an icon-directed "conversation tree" communication system. One general question leads to many additional,

more specific choices of topics to discuss, which are added to the conversation tree. After experimenting with the intuitive graphic icon mouse pointers, the game player should discover the correct location to click with the right combination of icon and object to get the desired result. The emphasis in the game is still firmly rooted in conversations and puzzles, not combat, even though combat opportunities abound if you're so inclined. The only real disappointment is that the chance of getting a speaking CD-ROM version is considered remote, considering both the already ambitious Sierra CD conversion schedule and the 80 actors and more than 6000 lines of conversation needed to be professionally recorded.

The three-dimensional, clay animation, rotoscoped graphics are the most striking feature of this game (and will be used in future games). Each of the more than 40 characters or creatures is molded—in both full torso and "talking head" versions—with modeling clay, which is photographed by a stop-action movie camera in black-and-white, giving the characters a realistic and believable three-dimensional effect, complete with shadows and nuances of expression. Each character has been given a little personality of its own, dedicated to the purpose of entertainment. Photographed at 20 frames per second, the film, which provides smooth and realistic animation, is then rotoscoped onto the computer, where the image is colorized with a 256-color palette by a computer artist, pixel by pixel. To quote one previously skeptical Sierra artist, "The results are amazing." Even Stefan Spielberg (the strangely familiar name of the baronial ruler of the town and its surrounding countryside, the setting for the game) would be happy with the results.

Even if you've played through the original Hero's Quest, you should look at







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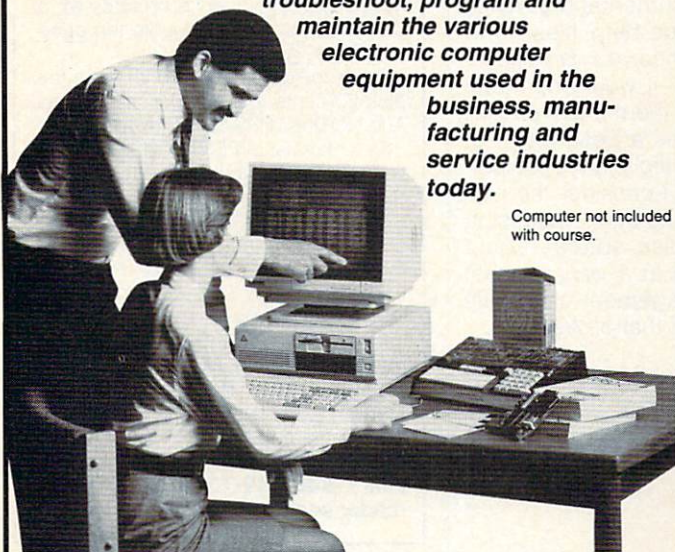
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## REVIEWS

this exceptional total remake of the game. The art is fantastic. The new stereo music soundtrack is wonderful (except for the glitch that turns off the music in the last few scenes of the game). The plot remains as delightful and interactive as in the original. The totally rewritten text by the original design team of Corey and Lori Cole, who have very deep roots in the pen, pencil, and dice role-playing games, is more fun, more witty, more suspenseful, and better written than that of the original.

Whether or not you bought the original, there are many features that make this hybrid role-playing-cum-graphic adventure a must-buy for your collection. When you consider the new discounted prices, the updated highly intuitive interface, the stunning graphics, the new script, the updated soundtrack, and the high quality of the upgrade, it's hard to resist.

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## TEMPEST

Housekeeping is a chore in any sense of the word, and computer housekeeping is no exception. Your hard disk has grown bigger and bigger, and it holds lots of files, many that you've probably forgotten. Every now and then, a little cleanup and management is called for, and even with the improvements in DOS 5.0, file management from the DOS command line is a tedious, time-consuming task. The TEMPEST program is designed to ease that task for you, and it does a very nice job.

The program presents you with a screen containing three windows, a menu bar, and a toolbar. Two of the windows show icons representing the contents of your computer. At the highest level, you see your drives, both floppies and the partitions of your hard disk. Double-click on a drive, and the window changes to show the contents of the root directory of that drive. Double-click on a subdirectory, and you see its contents. When an icon is selected by a single click, another click

on the Information tool of the toolbar brings up information on that item. For a drive, you see the type, capacity, free space, and number of files and subdirectories. For a directory, the information is name, number of files and subdirectories, byte size, and date and time of creation. For a file, you see name, size, date, and time.

A very powerful feature of the program is that the two icon windows are independent and you can switch between them simply by clicking. You can have a different drive in each window, at any level, or you can have different levels of the same drive. The third window presents the tree structure of the selected drive or directory.

One of the tools of the toolbar copies or moves a file or directory. To use it, you select an item in one icon window, bring up the destination directory in the other icon window, click on the tool to select Move or Copy, and drag the icon to be moved from one window to another. TEMPEST gives you a progress report as the action takes place; it will show an error message if the destination has too little space for the item to be moved. A very convenient aspect is that if you're moving, copying, or deleting a directory, TEMPEST will act on the entire contents.

An attractive feature of the program is the variety of its icons. Default icons are provided to show the two types of floppy drives and a hard drive, a directory symbol, and different representations for the various types of files. TEMPEST assigns icons to files based on the file extension and will portray exe, com, sys, and bat files differently. There is a generic icon for files with an unassigned extension. If you wish to be creative, you can draw your own icon and assign it to a file extension.

With all its attributes, TEMPEST deserves better documentation. While there are numerous help files—and with a little persistence you *can* discover what you need—it would be much more convenient if the manual offered such information as a description of the function of the tools in the toolbar.

Aside from that, I consider the program a very valuable utility. Modest in its appetite for disk space—about 1MB—and selling at a very modest price, its file management capability compares well with that of Windows.

CHARLES IDOL

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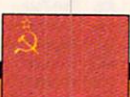
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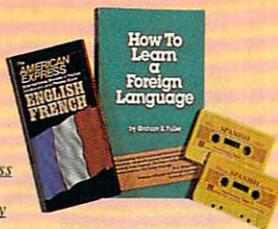
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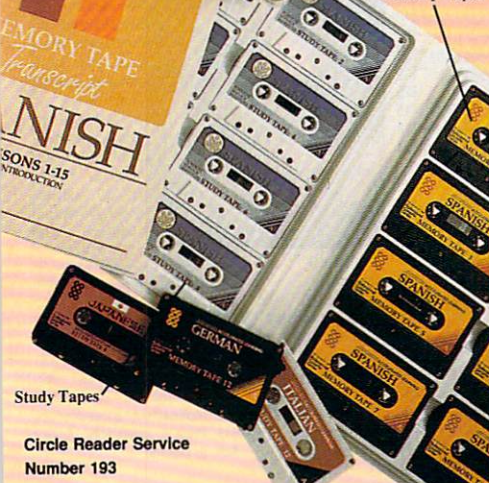
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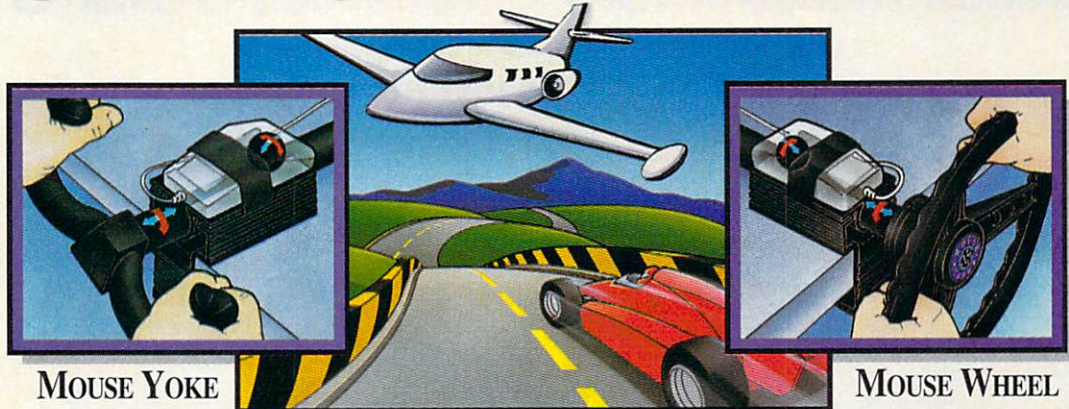
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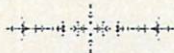
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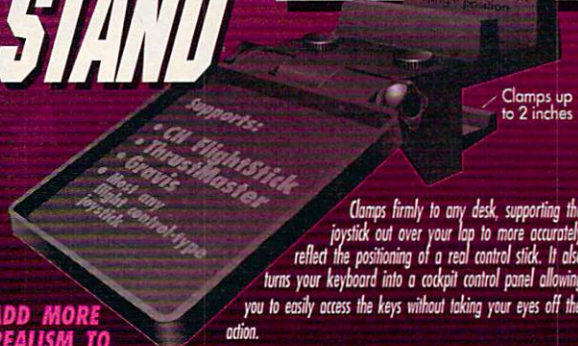
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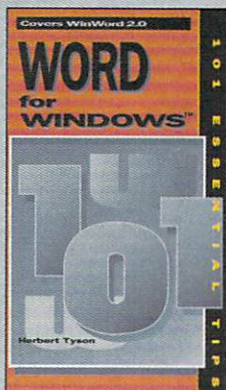
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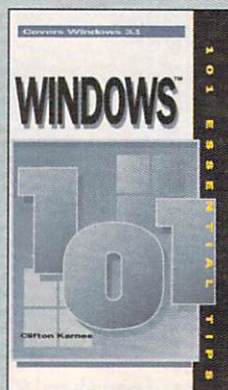
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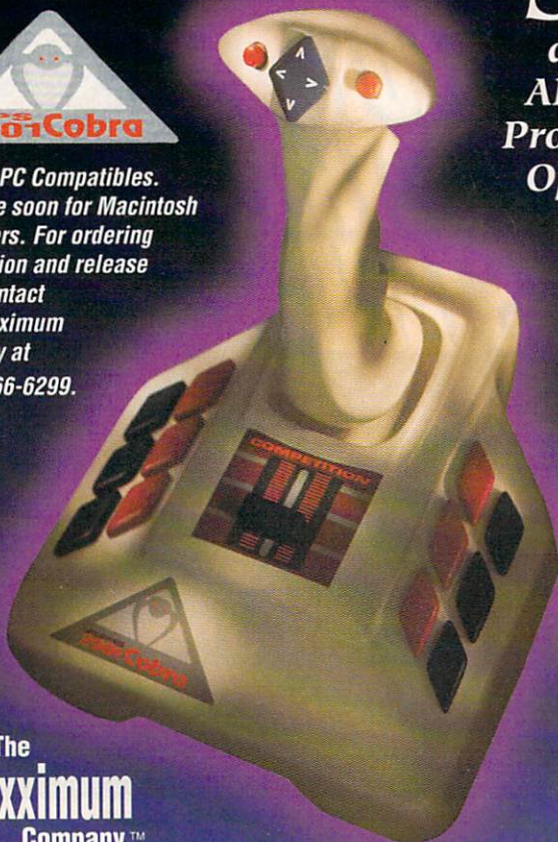
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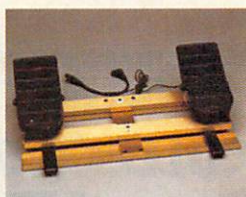
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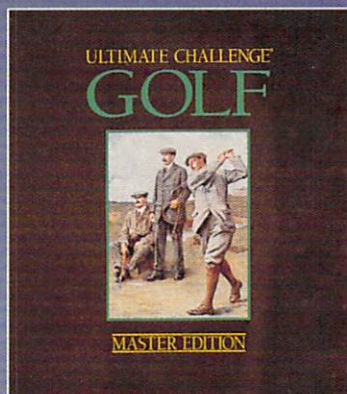
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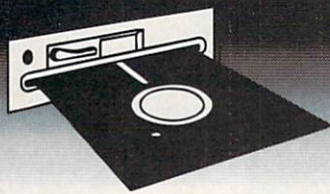
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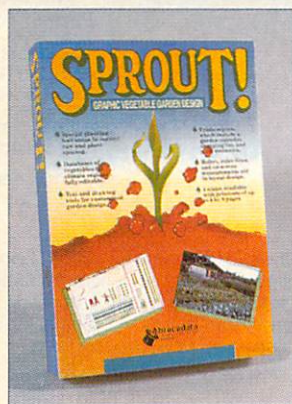
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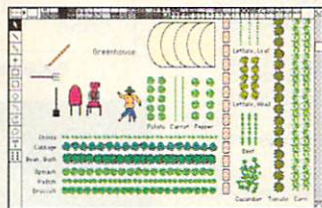


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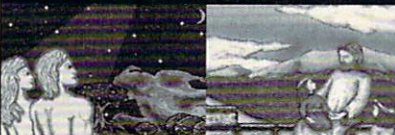
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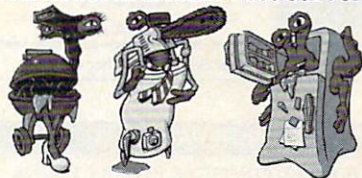
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# NEWS BITS

Clifton Karnes, David English, and Robert Bixby

## COMDEX HIGHLIGHTS

One of the biggest stories at COMDEX was the coming of age of the notebook computer. These machines have always been at least a generation behind their desktop cousins in features and power, but this year that's all changed.

The new breed of notebook is a 486-powered machine with a large hard disk (as large as 200MB), lots of RAM (4MB is standard), and eye-pleasing color. Leading the pack at COMDEX was the TravelMate 4000 WinDX2/40 Color. This screamer boasts a 40-MHz DX2 CPU, a 640 x 480 screen with 256 colors, 8MB of RAM (expandable to 20MB), a 200MB hard disk, a Microsoft BallPoint with a QuickPort connection, and Windows 3.1 installed and ready to go. (See "News & Notes" for more information about the TravelMate 4000 computer.)

Following the trend of smaller and more powerful, the PCMCIA interface gives notebooks near desktop power by putting all the electronics that normally fit on a full-sized expansion board into a credit card-sized device.

PCMCIA has always been an exciting technology, but at COMDEX, we saw the most innovative PCMCIA card to date. MiniStor was demonstrating a PCMCIA card-based 64MB 1.8-inch IDE hard disk that offered amazing performance and durability. This MiniStor drive has a seek time of 18 ms, can withstand an impact of nearly 300 G's, and will run 250,000 hours before failing.

Not a new product but a new technology ripe for licensing, QSound promises to add new dimensions to multimedia audio. Using DSP technology, QSound makes a simple pair

of speakers generate sound so realistic and accurately placed stereophonically that many people swear that they can locate sounds coming from behind and above them (though QSound spokespersons only claim 180-degree placement).

IBM, Texas Instruments, and Intermetrics have incorporated this technology into a chip set that will eventually be installed on IBM motherboards. To fill the gap until that time, Texas Instruments has created a soon-to-be-released sound card, identified as Mwave, that will use the QSound DSP technology. Mwave is compatible with Ad Lib and Sound Blaster and is capable of far more than simple entertainment sound.

Already well known in the recording industry, QSound has garnered tributes from recording artists such as Sting and Roger Waters.

Desktop publishers know that the best color proofing is achieved with thermal transfer technology, and until very recently this technology was limited to a few very-high-end printers. But now Fargo Electronics, a small printer manufacturer that formerly specialized in bar-code printers, has announced the Primera Color Printer, a 200-dpi color thermal transfer printer for under \$1,000. Using special paper and a waxlike material, it generates color printouts that have unusual color density. It can generate a page with 100-percent coverage every two minutes at a cost of 45 cents per page. The Fargo unit is designed for "Windows printing"—printing from its own Windows driver. If you want PostScript printing with the same unit, you have to go to LaserMaster, which will market the upgraded printer in late spring for \$1,795.

It's not often you see a prod-

uct with the potential to shake up an industry. One such product, FontChameleon (shown privately at COMDEX by Ares Software) can not only combine any two fonts in a variety of ways, but it can also provide just about every popular font.

Because the program needs less than 2K to store the parameters for a complete font, FontChameleon will ship with hundreds of popular fonts on a single disk. In fact, Ares can ship any font with the program—including fonts owned by other companies—as long as the font ships as a set of parameters and Ares doesn't use the copyrighted name of the font (Ares gets around the name problem by using a pull-down menu that says "Similar to...").

Observing the FontChameleon demo was a representative from one of the large type houses. He said that the program is legal and his company is looking for a way to cash in on Ares' new technology.

Years from now, we may look back on the fall 1992 COMDEX as the time when video came to Windows in a big way. Just a week before COMDEX, Microsoft announced Video for Windows. At COMDEX, Apple previewed a similar, though incompatible, product called QuickTime for Windows, based on its Macintosh program called QuickTime. You can now buy feature films on CD-ROM for the Mac, including *A Hard Day's Night* and the X-rated *House of Dreams*. Similar CD-ROMs should be available soon for the PC.

To capture your own software movies, you'll need a video-capture board, such as Brown-Wagh's Studio Master (\$499), Media Vision's Pro MovieSpectrum (\$399), or Creative Labs' Video Blaster (\$495). The booths for all three companies were overflowing with eager buyers. □

**Fall COMDEX had its share of surprises. Here are some products and technologies to watch in the coming months.**

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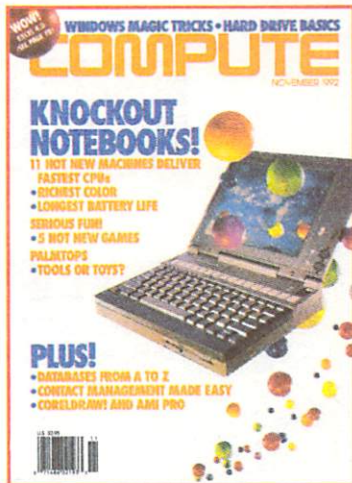
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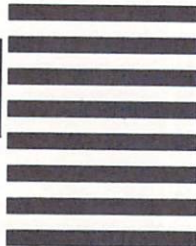
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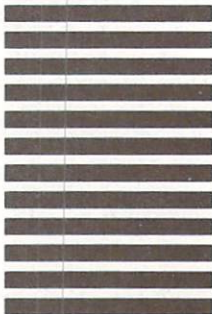
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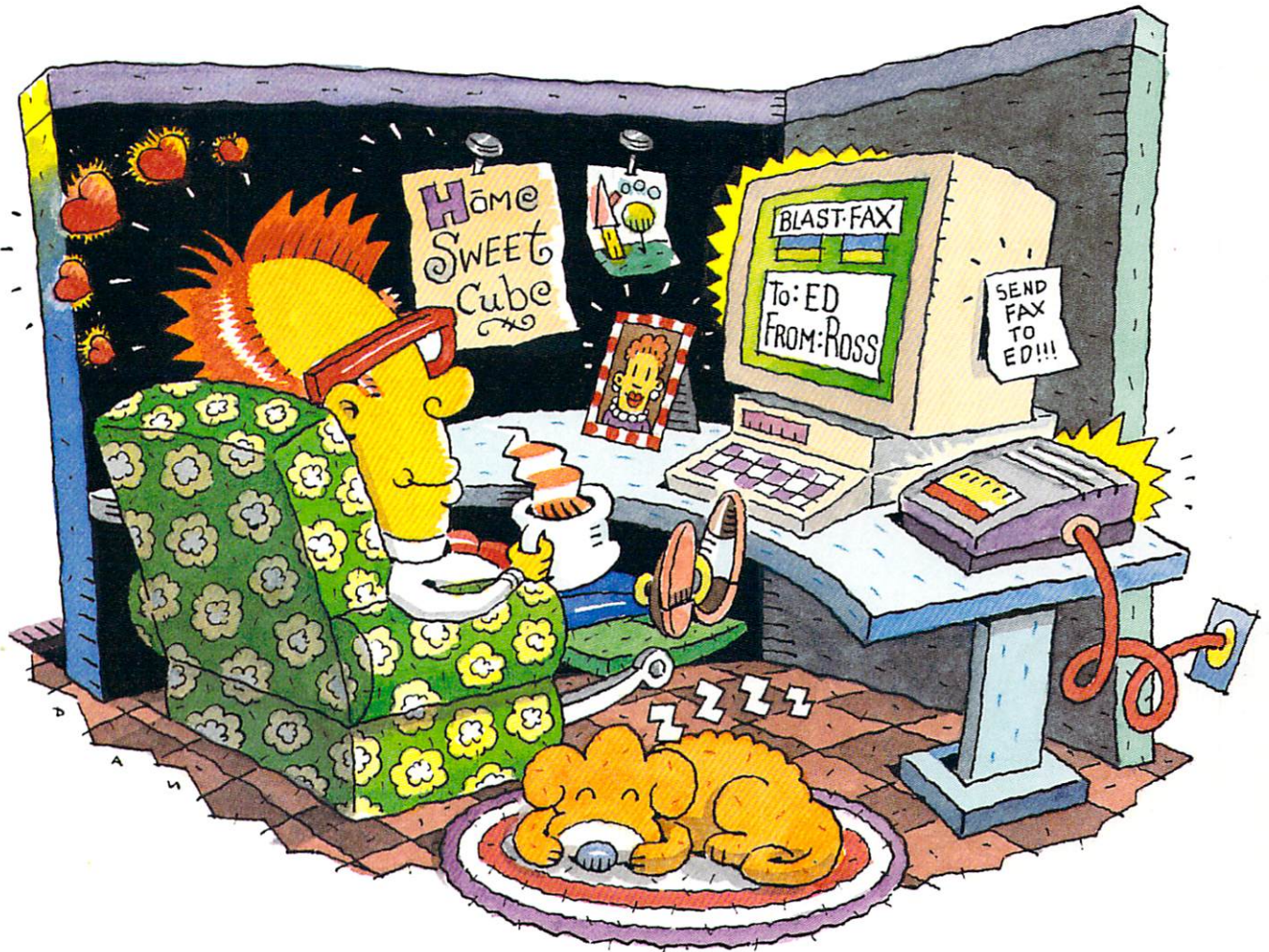
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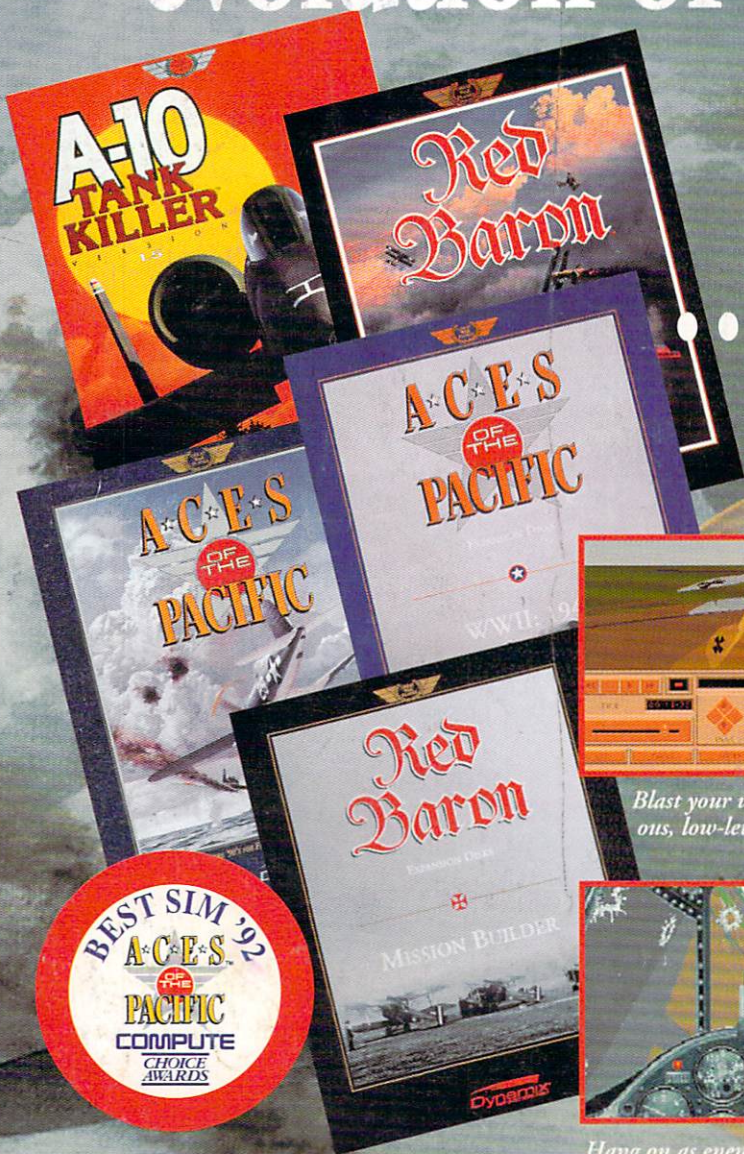
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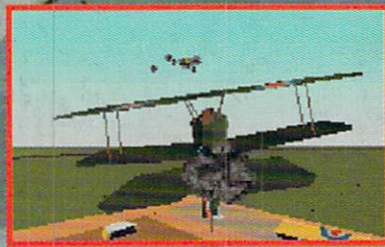
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