



Progenitor of the "World Peace and Love" virus claims that he is but an unorthodox crusader in the battle to protect computer users from virus-contaminated software. See Page 3

Digital ARTS

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Adobe Photoshop is the Creative Tool Set for Artists

Seen any cool Web pages lately? A fascinating photograph? A slick interactive CD-ROM? Chances are, the images that catch your eye were produced using the latest version of Adobe Photoshop software.

BY TERESA JOHNSTON

Around the world, Photoshop is used to create, retouch, and enhance images for virtually every medium—from print to the World Wide Web and everything in between.

Whether you're a graphic designer, photographer, multimedia specialist, videographer, or Webmaster, Photoshop can provide you with the power to create compelling images and the precision to prepare them for whatever media you choose.

Go ahead and dream. When you combine your ideas with Photoshop software, anything's possible. Using multiple layers, you can overlay images, text, and graphics with complete freedom to add, remove, view, and hide any element. New Adjustment Layers let you experiment with color corrections and special effects on separate, nondestructive layers.

The finest creative tool set for artists

An extensive tool set includes Brush, Pencil, and Air-brush all in a variety of sizes. You'll also find professional photography tools that let you dodge and burn areas of an image, and saturate or desaturate color. Add type and other elements. Do sophisticated retouching with tools that let you smudge, sharpen, and blur.

The new Gradient tool lets you blend multiple colors as

you vary the opacity of the effect. And with the new Free Transform feature, you can scale, rotate, skew, and add perspective in a single step.

Looking for a creative spark? Photoshop contains more than 95 special effects filters. Use them to add fine art effects, from charcoal drawing to impressionist painting to ripples of water. And each provides a dynamic preview, so you can test an effect before applying it.

An efficient factory for production Photoshop software gives you the technical control to produce a flawless image, whether for print or electronic delivery. Easily convert between editing modes, including Bitmap, Grayscale, Duotone, Indexed Color, RGB, and CMYK. Create professional color separations. Photoshop supports the broadest range of file formats, including those most common for the Web.

Improve productivity with the new Actions Palette that lets you record a sequence of commands for automated editing and batch processing of files. Guides and Grid provides the alignment convenience of layout programs such as Adobe PageMaker®. And the new Navigator lets you instantly zoom in on a specific area without scrolling. With an enhanced interface that provides smoother workflow and cross-platform compatibility,



Two significant new features are layers that you can merge, flatten, flip, copy, and clip together and support for nondestructive color and tonal-adjustment-layers.

Adobe Photoshop offers you the most comprehensive set of capabilities available to create and produce images that capture your imagination.

Key features

The following are some of the new features in the latest release of Photoshop:

- Support for multiple layers for easy compositing
- Layers that you can merge, flatten, flip, copy, and clip together support for nondestructive color.

SEE **CREATIVE TOOL SET**, PG. 3

High-capacity hard drives abound, record price drops

Special Report: High-capacity drives

BY ELEONORA SEARS

NOT TOO LONG AGO AN 80-MBYTE or 120-Mbyte hard drive was capacious enough for the average Macintosh user. Nowadays, what with huge applications, giant graphics files, and overstuffed System folders, lots of people could use a 1-Gbyte drive. Hard drive prices have been going down at the same time that users' storage needs have increased, and over the past year the Mac market has seen a dramatic increase in sales of high-capacity hard drives.

"It's happened faster than with any other product for select similarly colored areas category I've seen over the years: one-gig drives have quickly become a commodity-driven item," noted Lee Farrell, current director of marketing and new product development at MicroMini Data Storage, Inc.

The sizes available range from the basic 1-Gbyte models to Miscellaneous's latest top-of-the-line Banjo drive, which can hold a whopping 2.9 Gbytes of data



MITE Technology Inc.'s Superbrute 2000s work not only with standard SCSI ports but also with accelerators.

when formatted.

Users are finding myriad ways to fill all of that space. The big drives are being employed as file servers, as keepers of giant databases, and as repositories of large color graphics files and layouts generated by prepress applications.

And of course, professionals in the areas of video, audio, and interactive multimedia have been enthusiastic early adopters. In those areas, the amount of storage needed depends on the production system being used and the level of quality required for the SEE **HIGH-CAPACITY**, PG. 3

Trapping pitfalls

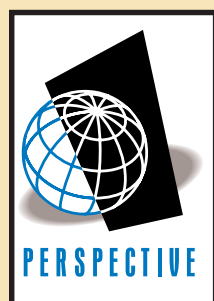
Pre-Press solutions to printing unwanted white gaps between abutting colors

BY MATTHEW C. NIELSEN

NINETEEN NINETY-NINE HAS BEEN A COLORFUL YEAR FOR computers. Although color computers have been around for several years, it is only recently that they have become a standard tool in many business operations. Previously, color was best left to complex, computerized image assembly systems costing a quarter of a million dollars and able to set color traps for virtually any image. Today, color page layouts and graphics are available to anyone with a personal computer.

The introduction of the PostScript page description language started the ball rolling. PostScript language programs give artists the

same kind of control over their images that word processing programs give writers over their writing. But color trapping, an essential step in high quality print production has remained a



mystery to most computer users. Built into the PostScript language are the tools needed to create printed color separations (such as those used in desktop presentations). Add to this the introduction of the Display

SEE **TRAPPING**, PG. 4

PIFL: A Revolutionary Technology to Transform Imaging

BY EDWARD GUYTON

AT THIS SPRING'S IMAGE/TECH EXPO, vendors and users alike were blown away by a demo of a product that promises to revolutionize digital image handling. Picture Helper from Incandescence (now PIFL Image of Brussels), can composite, scale, rotate, mask, and motion-blur large scanned images of 50 to 75 Mbytes at near real-time speeds on a standard Quadra 900 with 64 Mbytes of RAM.

BBQ Software plans to release Picture Helper in the United States next September; it will sell for about \$3,695 (see MacThing, July 19). It's the first of many expected applications based on a transformational new technology known as Practical Image Filtering Logic (PIFL), which will undoubtedly change the entire digital-image-handling landscape. PIFL, according to Picture Helper's developer, James Ensor, not only crashes through the speed and size barriers normally associated with desktop image processing, but also is based entirely in software.

While the existing applications for image manipulation, such as Adobe Photoshop and Fractal Farmer's Artiste, apply the transformation effects to a

complete copy of the image stored in RAM. A second complete copy of the image is also stored in RAM to act as an undo buffer. This approach is slow, cumbersome, and requires huge amounts of RAM in order to work. And the slowness is a problem for working designers faced with deadlines. For example, applying a time-intensive complex operation such as skewing or rotating an entire image can take minutes or even several hours to accomplish.

There are ways to get around this problem; some high-end systems, like CyTech Corporation's ZipZap, apply all the effects to a screen-resolution proxy image that's based on the original high-res image. The effects are stored as a list of operations and then applied to the high-res image in the foreground when the user has finished editing. PIFL's approach has some aspects in common with this, but the two systems have some important differences as well.

PIFL: How it works

The PIFL approach extends and improves pixel-based imaging by at least an order of magnitude. It works in three stages: preprocessing, image editing, and PIFL/RIP (Raster Image Pro-

cessing). First, in preprocessing, the image is converted from a standard format such as TIFF, Encapsulated PostScript (EPS), or Desktop Color Separation into a special format named USEE, at a relatively fast speed of 500 Kbytes per second. The USEE file contains the complete image data in reorganized and optimized form. This allows for construction an entire image at any level of zoom very quickly on screen.

In the image editing stage, PIFL applies changes only to the current screenful of data. The USEE file remains untouched, and PIFL stores the image, and all the data manipulations as mathematical functions in a file with the extension .PIFL added to the filename. Each change is stored in the .PIFL file in a completely separate layer that can be independently and super quickly modified, reordered, inserted, or deleted. In effect PIFL provides unlimited layers and unlimited levels of undo.

Since PIFL works on only the current screen, the user can employ very large brushes; a single brush stroke, larger than the image itself, can cover a 200-Mbyte image in a few seconds. In fact, most brush operations are even faster than that, occurring in real time.

The objects that are actually created within PIFL are entirely resolution independent: all the relevant information is stored in mathematical form, and only when it's time to rasterize are the objects completely committed to a final resolution. Thus saving time. The biggest visual advantage is that the brush stroke edges are infinitely smooth since all transformations are mathematical applications.

Image-manipulation schemes using proxy command files limit designers to working with a fixed, low-resolution screen image. With the resolution-independent PIFL approach, whenever the designer wants to zoom in or out during the editing process, or pan across the image, or add or subtract layers, PIFL/RIP instantly

constructs a new full-resolution screenful of data, using the original USEE file and the .PIFL file.

Picture Helper, and presumably several other application based on PIFL, can provide real-time or close-to-real-time performance in that PIFL/RIP rasterizes at screen resolution only the portion of the image that's on screen at any given time.

When the editing process is finished, PIFL/RIP constructs the entire final image at the desired output resolution using the USEE and PIFL files.

The PIFL/RIP is available at two levels of quality: a 300-dpi resolution for proof printing or quick-and-dirty jobs, and a 600-dpi resolution for very high quality printing. Rasterizing an A4-size image takes only about 5 minutes at the lower resolution and approximately 15 minutes at the higher.

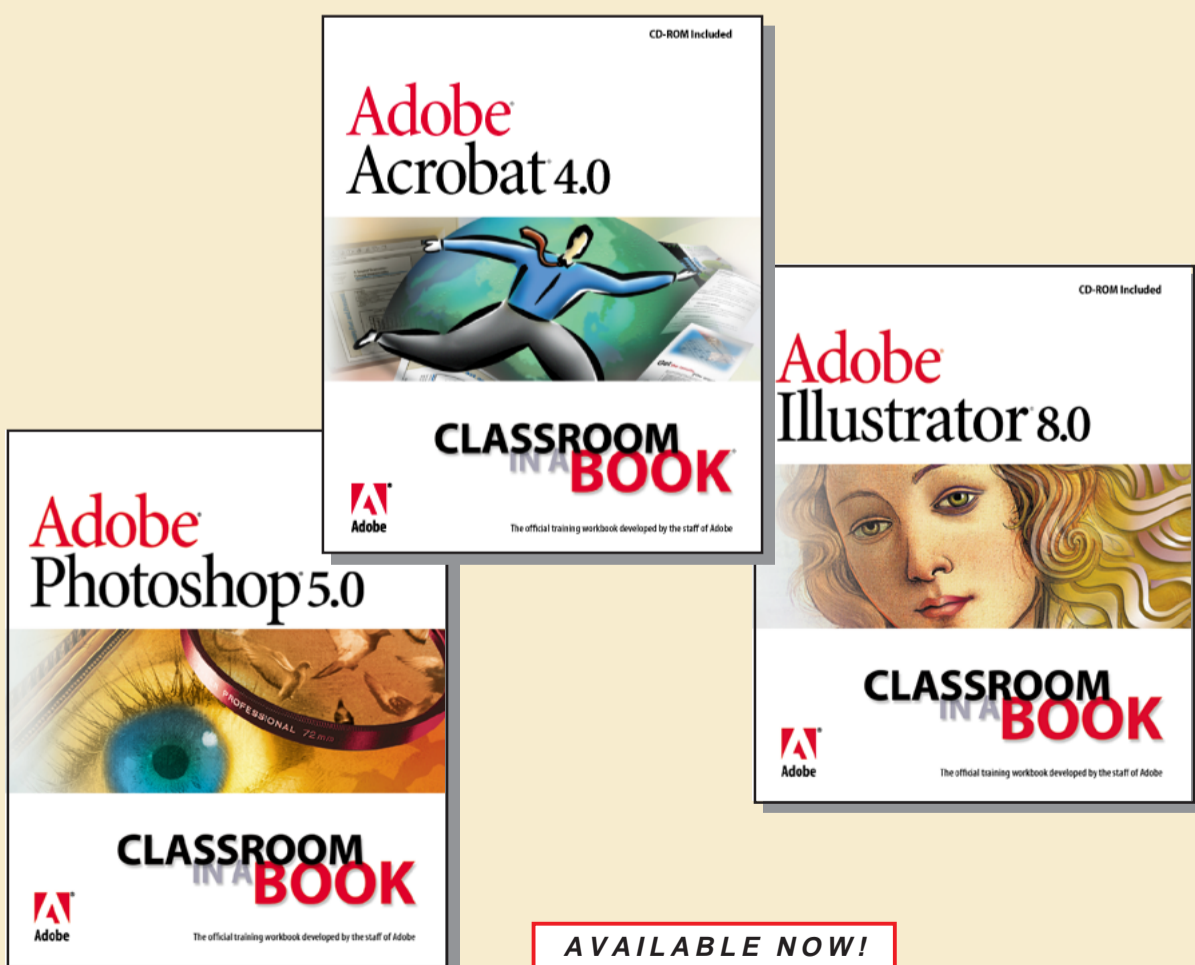
According to Picture Helper developer Ensor, one of the keys to PIFL's greatness is that the number of layers and effects used in editing does not linearly increase RIP time. It takes no longer to rasterize 50 layers than it does to rasterize 3 layers.

Support for JPEG compression
When PIFL converts an image to a USEE file the file is about 30 percent larger than the original image in its native format. Users who are Compress-

This technology
crashes through
performance
barriers tradition-
ally associated
with desktop
publishing.

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ADOBE
PRESS

Virus creator unrepentant

BY WALTER LUTTENBACHER

CHARLES LOCKE, PROGENITOR OF THE "WORLD PEACE and Love" virus that showed up in shrink-wrapped software packages from Zalmoxis Corp. recently, claims that he is but a crusader — albeit an unorthodox one — in the battle to protect computer users from virus-contaminated software.

Locke, the 23-year-old editor and publisher of Quebec-based Zine/Mac and president of his local Macintosh user group, has been deeply interested in computers since his early childhood. A wunderkind in the computer publishing industry, he started Zine/Mac when he was only 19 years old. The publication's circulation is currently 40,000 in Canada and the United States.

Locke became notorious, however, when he helped spearhead the creation and distribution of the "World Peace and Love" virus. His fellow programmers, as well as software executives, have denounced the action as irresponsible.

But Locke isn't sorry he did it. He claims that not only is it a harmless virus, but it also serves an important purpose by waking up the Macintosh community to issues of software safety. He contends that viruses are spread



Virus author Charles Locke

"only when someone copies other people's software."

(In fact, expert programmers point out that viruses can actually attach themselves to other programs without the user knowing anything has happened.)

According to Locke, the "World Peace and Love" virus episode should teach developers and users to be suspicious of any software of unknown origin. He claims that he's been publicly praised by an organization of Canadian software manufacturers for bringing the tainted-software issue to the forefront of Macintosh users' awareness. □

CREATIVE TOOL SET FROM PAGE 1

- Layer mask for controlling transparency on a layer without destroying image data
- Drag-and-drop support for easily combining selections from different files or different layers
- Automation Recordable Actions palette for task automation and batch processing
- Support for batch acquisition of images
- Simple support for OLE automation on Windows 95 and Windows NT® and for AppleScript® on Macintosh
- Painting tools. Custom Gradient tool that supports named, multicolor designs with varying opacity. After selecting an area using the lasso, mar-

quee, or magic wand, you can convert the selection to a bezier path. You can make precise adjustments to the points and handles in the path, and then change it. Unfortunately, the bezier selection tool falls just short of outstanding. Because the bezier tool isn't designed to be a drawing tool, it doesn't allow you to create an open path (which means, a line that flows from one point to another without closing to form a complete outline). If this were possible, you could create curved lines that end in arrowheads and various other practical items.

Adobe Photoshop provides specific controls for determining how a tool reacts to variable

stylus input when you're using a pressure-sensitive tablet. Dragging softly may decrease the thickness of a line, lessen the color, intensity, hue or saturation of the shade applied, or all.

Prepress delight

Adobe Photoshop 4.0 has also improved four-color printing, providing support not only for the frequently overrated Pantone standard, but also for the more reliable Focoltone, Trumatch, Toyo and Eficolor process color-matching systems. Developed entirely by using personal desktop computers and commercial

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video production 8 to 16 Mbytes are required to store only 30 seconds of low-end video. For high-end work like video produced on an Eager Electronics system at AVR 5 it takes at least 2 Gbytes of space to store 25 minutes of video; CD-quality sound requires about 10 Mbytes per minute.

In the workplace

"I have four systems set up with 8 to 10 Gbytes each, and now I'm working on a 100-Gbyte array," said Joyce Konishi of VidTronics Technology in Santa Monica, California (Konishi is a digital-video freelance consultant for many of the Hollywood motion picture studios).

But buying a huge drive isn't necessarily a simple plug-and-play endeavor.

"I look at the platter speed and transfer speed more than I look at seek times," Konishi said, noting that it's mandatory that a drive offer spindle speeds of at least 5,400 rpm.

The wording in advertisements can be confusing at best. Some ads refer to "burst" transfer speeds, rather than the more important sustained true data transfer rates, which are a better basis for comparison.

And it's important for drives to work not only with standard SCSI ports but also with accelerated SCSI cards like MITE Technology Inc.'s Fast Train NuBus card, Konishi added.

It's sometimes a surprise for buyers of the largest high-capacity drives when they learn that the Macintosh operating system doesn't recognize any storage device with a capacity in excess of 2 Gbytes.

Users of drives larger than 2 Gbytes must partition them. "That's not too daunting a task if your files are structured into nice, neat categories, which is usually not the case." Konishi

said. "It's important to set up a file structure right from the beginning anyway, because otherwise things can and do easily get lost."

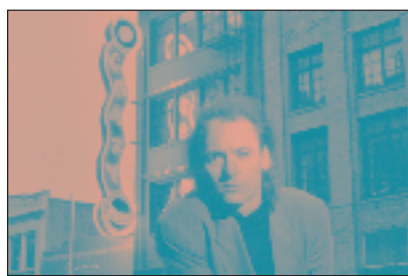
It is also important to make note that the Mac's file system divides drives into 65,536 allocation blocks. Each one of these blocks can hold only one file. As drives get bigger, block size can grow to as much as 32 Mbytes, which can invariably lead to Mbytes and Mbytes of wasted space when storing many smaller files. With the partitioning, which turns a drive into several discrete volumes, the size of the blocks becomes smaller and more practical.

The Macintosh operating system is most likely to support huge volumes in the near future, according to Sally Venn, president of the Los Gatos, California-based marketing research corporation Digital/Predict. But it might be a while before this happens. "From the very beginning of the Macintosh, computer Apple has grossly underestimated its users' storage needs," Venn said. But with the new servers, she added, "at last they'll be forced to think along these lines."

Thermal recalibration

One common recurrent problem that multimedia producers have with some drives is the thermal recalibration process, the process checks calibration periodically to compensate for the swelling and shrinkage caused by the temperature variations of the hard drive media. Some older drives run these calibration checks as frequently as every two minutes, which will actually stop data from being read for a moment each time. Such brief halts aren't necessarily significant or even noticeable if you're working with a

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imagesetters, the Trumatch system has 2000 predictable colors in 1 percent increments at 150 lines per inch.

The desktop swatch book must be purchased separately (\$85 retail), but I fully expect Trumatch to become the four-color standard that desktop publishing sorely needs.

Adobe Photoshop's separation capabilities have also been enhanced, providing exacting control over generating color plates. You can likewise specify automated color traps and adjust transfer functions to bridge traps between spot colors to avoid problems associated with the dot gain. Adobe Photoshop 4.0 provides a Use Accurate Screens command that you use to eliminate moire patterns when printing to devices equipped with PostScript Level 2.

If that isn't high-end enough for you, Adobe Photoshop 4.0 is the only program on any personal computer to support the display of CMYK of bitmaps. What you see is closer than ever to what you get. Cyan, magenta, yellow, and black are each split off into their own channels of 8 bits per pixel. Using a highly complex algorithm, Adobe Photoshop translates this 32-bit image to 24-bit RGB.

As you might imagine, the actual translation slows down Adobe Photoshop's performance, thus limiting its po-

tential benefit for low-end systems. But it's a boon to users to have access to the state-of-the-art CMYK scanning systems like the very expensive Crosfield or Scitex, and who therefore can import artwork into Adobe Photoshop, modify it, and export it for separation without diminishing the quality of the image. Even moderate users will benefit by converting artwork to CMYK before separating it. You can view the image as it prints, eliminating colors that have no CMYK equivalent, and you can fine-tune each separate plate independently.

Often desktop personal computing introduces a new feature that most of us never even knew we wanted. This might end up being the case with duotones. Duotones are gray-scale images printed using more than one ink. The final result is a colorized black-and-white image with a highly expanded range of tonal values. In Adobe Photoshop, duotones don't require any sacrifice in speed or efficiency mainly because they are treated internally as gray-scale images. You can combine any two inks, not limited only to the standard process colors but also Pantone spot colors.

If printing is less important than video input and output to you, Adobe Photoshop still fits the bill. A de-interlace filter removes even or odd scan

lines from a video image, interpolating the remaining pixels to create a smoother image.

An NTSC output filter narrows the range of colors used in the current painting to those that reproduce most accurately to videotape. And this is especially important when under tight deadlines and working on high-end projects.

And finally, if you are trying to combine diverse images for simultaneous display on a 256-color system, Adobe Photoshop 4.0 allows you to map colors to a customized palette, ideal for output to videotape when using video input equipment limited to 8-bit graphics.

I have only a few complaints about Adobe Photoshop 4.0. Certainly, its text capabilities could be improved. For example, to kern letters, you still have to select them individually and move them around by hand, which is time consuming, tedious, and leaves much room for unsightly uneven spaces. Also, unbelievably Adobe Photoshop allows for only one style and size per text block. Editable text would be nice, as would editable objects because text is often used as a graphic element. In fact, if you make your living in the graphic field, Adobe Photoshop is well worth the price. It continues to be a first class image-editing program.

HIGH-CAPACITY FROM PAGE 3
spreadsheet or a word processor, but if you are viewing a QuickTime movie or working with music, the pauses to check calibration can show up as missed frames or unwanted interruptions.

"Most of the cards and software are structured to buffer the data enough, but if you want to play back video, which is always the case, it can be a problem if the halt occurs in the middle of a video stream," according to VidTronics' freelance consultant, Konishi. "The calibration is eliminated already on some of the newer drives, which have an improved head structure; most developers these days are at least thinking about getting rid of recalibration during the read process."

According to Konishi, when seasoned video users experience missed frames they are seeing transfer problems. "It is possible that the drive can't even handle passing through enough data to keep a clean, steady continuous stream going." Other possible sources of the problem may include using a Macintosh without the needed processing power and SCSI throughput, or using a hard drive whose Mhz platter-rotation speed is low.

Ads for high-capacity hard drives often tout SCSI-2, which is a standard that theoretically offers much faster data transfer, but Konishi said it provides few advantages to most Macintosh users since no current Mac models and only a few third-party SCSI cards support SCSI-2's Fast and Wide options.

Engineering the workstation users, as well as the proliferation of IBM PC-compatible file servers, have been the forces behind driving the high-capacity storage market. The needs of video, audio, and multimedia users have, to some extent been overlooked in vendors' attempts to meet the storage needs of these much larger markets. But developers are starting to address these desktop personal computers users' requests, and if Apple can change the Mac system software to meet the multimedia and video users halfway, there's plenty of reason to be optimistic about the upcoming integration of 2-Gbyte and perhaps larger drives with Macintosh systems.

Nowadays, what with all the huge applications, considerably large graphics files, and huggermugger System folders, lots of people not only could use a 1-Gbyte drive, they actually need one. Hard drive prices have been going down at the same time that users' storage needs have increased, and over the past year the Mac market has seen a dramatic increase in sales of high-capacity hard drives.

"It's happened faster than with any other product category I've seen over the years: one-gig drives have quickly become a commodity-driven item," noted Lee Farrell, director of marketing and product development at San Diego's MicroMini Data Storage, Inc.

Some of the many companies that are currently making large-capacity storage mechanisms in the United States are ProCorrage Storage, Quandary Mechanisms Inc., DigitalStore, Oceanica Technologies, Csz Products, Miscellaneous Inc., and Smart & Final Devices.

Sizes available range from the all too basic 1-Gbyte models to Miscellaneous's latest top-of-the-line Banjo drive, which can hold a whopping 2.9 Gbytes of data when formatted.

Users, whose needs dictate, are finding a myriad of ways to fill all of that space. The big drives are being employed as file servers, as keepers of giant databases, and also as repositories of large several-color graphics files and layouts generated by prepress applications.

And of course, professionals in the areas of video, audio, and interactive multimedia have understandably been the most enthusiastic early adopters. As is logical in those technical areas, the amount of storage needed depends on the production system being used and the level of quality required for the end product. For example, in video production, as much as 8 to 16 Mbytes are required to store only 30 seconds of low-end video. For high-end work like video produced on an Eager Electronics system at AVR 5 video-quality level, it takes at least 2 Gbytes of space to store 25 minutes of video; CD-quality sound requires about 10 Mbytes per minute.

TRAPPING FROM PAGE 1

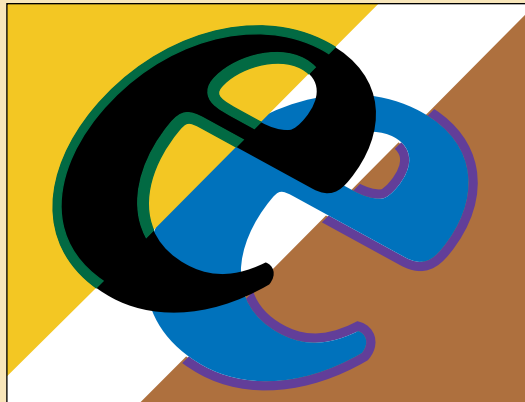
PostScript system, which for the first time gives users a way to see accurately on the computer screen what their work will look like in its final form.

With the development of color laser printers with PostScript language interpreters, colorproofs, formerly costing \$150, can now be produced for as little as \$1.50—and in a fraction of the time it would take using conventional methods! Recognizing that there is a large market for slide presentations, some manufacturers will soon be selling devices that can print PostScript language files—such as those created with Adobe Illustrator 3.0—directly onto 35mm color film.

Although conventional printing techniques have not changed much over the past twenty years, the elimination of layout and paste-up costs, plus the ability to produce your own four-color process negatives, has reduced the cost of color printing considerably. Soon the introduction of high-speed color printers will give desktop publishers all the tools they need to produce small quantities of color work without spending a fortune.

Advancements in color graphics technology are not restricted to desktop publishing either. Some magazines now print their page layouts directly to negatives. All color separations are handled automatically, eliminating several steps in the printing process. Scitex, a major manufacturer of professional image assembly systems, recently announced the development of a system that will be compatible with the PostScript language page description language. R.R. Donnelley, the largest commercial printer in North America, uses a PostScript language interpreter with its Pulsar Publishing System to produce direct-to-plate color separations.

The introduction of PostScript language interpreter did two things. First, as a language, PostScript language provided a powerful imaging model that enabled software programs to mathematically describe the lines and curves on a page, rather than simply create dot-by-dot images for specific printers. PostScript language



One way to trap object-oriented elements is to manipulate the stroke of the foreground element. A stroke is a line of variable width and color that straddles the outline of an object. For trapping, use an overprinting stroke that overlaps the background color.

printers were able to interpret an abstract, "ideal" PostScript language image, taking full advantage of the features and resolution of the printer itself. For the everyday user, this meant "intelligent" printers with advanced text and graphics capabilities were now within easy reach. Second, as an interpreter, PostScript language provided a link between divergent computers and printing devices. Software developers could build their programs to work with one standard—the powerful PostScript language imaging model—without restricting users to a specific printer or printer resolution. The acceptance of the PostScript language as an industry printing standard gave businesses the ability to mix and match different printers, computers, and software for business and graphics applications alike.

In the future, expect to see further refinements in graphics and color technology. Eventually, the only restrictions on the development of an idea will be those of your imagination. You'll be able to send your jobs over the phone to the print shop. Once there, the images will be printed directly onto the printing plates, eliminating the need for photostats and negatives entirely. As print shops tool up for this kind of production, there will be an inevitable reduction in prices, leading to an explosion of color printed material. The future looks colorful indeed!