



**User Guide**



# Adobe Photoshop™

*Macintosh Version*

GEORGINA HOLT

# **Adobe Photoshop<sup>™</sup>**

## **User Guide**

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## Preface

The Adobe Photoshop™ program is photo-retouching, image-editing and color-painting software for the novice and professional alike. This guide describes the Adobe Photoshop program, from its basic functions to its advanced photodesign and color printing features.

The book contains six sections.

### **Section 1: Getting Started**

Section 1 explains how to start using Adobe Photoshop software, including how to create new documents, open and save documents, and work with several documents open at once. The section explains the different image types and formats with which the Adobe Photoshop software works.

Chapter 1, "Managing Documents," describes the steps involved in creating new Adobe Photoshop documents, opening existing documents and documents saved in other file formats, and saving documents in the Adobe Photoshop format and in other file formats. The ability to save in a variety of file formats allows you to use images created or edited in Adobe Photoshop software in other application programs and on other computer platforms.

Chapter 2, "Scanning, Importing, and Exporting Images," discusses how to scan images, and how to import documents and export Adobe Photoshop documents so the documents can be used on other computer platforms and in other applications.

### **Section 2: Using the Adobe Photoshop Toolbox**

Section 2 describes the Adobe Photoshop toolbox and gives a detailed description of how the tools work.

Chapter 3, "Managing the Toolbox," gives a brief overview of all the tools in the toolbox and how they work.

Chapter 4, "Controlling the Artwork and Screen Display," describes how to zoom in and out from an image for a more detailed or greater view, scroll through a window, change the window display, and use rulers to make measurements on an image.

Chapter 5, "Using the Painting Tools," explains how to use the painting tools to alter an image or to create original artwork. The painting tools include the pencil tool, line tool, paint brush, paint bucket, and airbrush tools.

Chapter 6, "Using the Editing Tools," covers how to use the editing tools to retouch or customize an image. The editing tools include the eraser, the smudge tool, the blur tool, and the sharpen tool.

Chapter 7, "Painting and Editing Tool Options," explains additional features common to the painting and editing tools that allow you to choose a brush shape for each tool and specify the opacity (transparency) of the paint used by the tool.

Chapter 8, "Using the Type Tool," explains how to add type to an image to create a poster or special effect, and it covers how to choose a type font, size, and type styles.

Chapter 9, "Making Selections," covers various selection techniques including using selection commands and tools and their options to select part of an image based on the similarity of pixel colors.

Chapter 10, "Using the Fill Tools," describes how to fill part of an image. It also explains how to select colors to paint and fill an image with a solid color.

Chapter 11, "Selecting Colors," includes the various ways to select the foreground and background colors that are used by the Adobe Photoshop program tools, including from an image, and from either the Color Picker or the Color Wheel dialog box.

### **Section 3: Basic Image Editing**

Section 3 covers how to edit an image, including how to cut, copy, paste, resize, and transform images.

Chapter 12, "Cutting and Pasting Selections," shows how to cut, copy, and paste a selection within an image. Pasting instructions include pasting a selection inside and behind another selection, and using paste controls to determine precisely how a selection appears when it is pasted onto an image.

Chapter 13, "Transforming Images" discusses how to transform an image by rotating, skewing, or stretching.

Chapter 14, "Resizing Images" describes how to crop an image to eliminate extraneous portions, and resize and change the resolution of an image.

### **Section 4: Advanced Image Editing and Color Correction**

Section 4 describes how to convert images to different image types, make color corrections, edit an image's color table, and changing the color levels of pixels. It also describes how to use filters to modify images.

Chapter 15, "Converting Images and Working with Channels," describes how to convert images of one type to another in preparation for printing the image, how to edit a document's color table to adjust or correct the colors in an image, and how to manipulate an image's channels, or further alter the image.

Chapter 16, "Making Color Corrections," discusses the procedures for changing the colors in an image by comparing or mapping the colors of pixels in the image to other colors. This chapter also contains information on how you can use the Adobe Photoshop program to adjust the color levels of pixels. Included are the procedures to adjust the brightness, contrast, and gamma in an image.

Chapter 17, "Using Filters to Modify Images," describes the many filters available with Adobe Photoshop software to alter an image, and how to use them. It explains how to use filters to soften, sharpen, offset, outline, and brighten an image, and create such special effects as adding noise. It also describes how to create a custom filter.

### **Section 5: Printing Images**

Section 5 explains the procedures for printing images, including printing half-tones and color separations.

Chapter 18, "A Printing Overview," introduces basic concepts of printing and how to prepare an image for printing. It explains how to print a halftone of a gray-scale image, including the ability to print registration and crop marks, calibration bars, borders, and labels on images..

Chapter 19, "Printing Halftones," explains in detail how to print a halftone of a gray-scale image. It shows how to specify the screen frequency and angle, and how to specify the dot shape used for the screen. This chapter also explains how to make calibrations to compensate for different printers and printing presses.

Chapter 20, "Producing a Color Separation," covers the procedures for printing a four-color separation of a color image. The chapter explains how to calibrate the image to be printed using the on-screen display, and how to compensate for density changes on the output device. It also explains how to make the required calibrations of the four separations, and how to compensate for different printers and printing presses.

Chapter 21, "Tips and Troubleshooting," contains tips and techniques as well as solutions to problems you may encounter when making color corrections, printing images, using the Adobe Photoshop program, and using the program in conjunction with the Adobe Illustrator™ program.

### **Section 6: Reference Material**

The Appendix, "Photoshop Color Swatches," contains color swatches for adjusting the color displayed on your monitor. The Glossary defines terms used throughout the user guide.

Before beginning to use the Adobe Photoshop program, you should set up your Macintosh and be familiar with its use. You should know how to use the mouse and standard Macintosh menus. If you need to review these techniques, refer to your Macintosh documentation.



## Introduction

Welcome to the Adobe Photoshop program.

A darkroom on the desktop, the Adobe Photoshop program is extraordinary photo-retouching, image-editing, and color painting software for pixel-based images. Whether you are a professional or a novice, with the Adobe Photoshop program you'll quickly be able to enhance, retouch, and compose scanned images, original artwork, and other pixel-based graphics on the Macintosh.

The Adobe Photoshop program is a sophisticated graphics application program designed to allow graphic artists, photographers, desktop publishers, and other people who work with graphic images to create and manipulate digital images. You can use Adobe Photoshop tools and commands to paint new images or retouch existing digital images that were created by a scanner, video capture equipment, or some other means.

The Adobe Photoshop program supports a variety of pixel-based images in more than a dozen formats. As a result, the Adobe Photoshop program is a versatile, powerful tool useful in applications from photo retouching and color separation to animation, and on a variety of platforms, from monochrome to 32-bit color systems.

You'll find that the Adobe Photoshop program excels as an art production tool, whether you are an art director or electronic publisher who needs to merge and edit color images, a photographer who wants to retouch proofs, or a graphic designer who is creating original or composite artwork including collages and photo montages. The software is equally useful to printers and service bureaus that want to generate color separations, to animators who want to colorize images and produce audio-visual materials quickly, and to artists who want to create new artwork using the latest media and tools.

With the Adobe Photoshop program, you work with bitmapped images that are composed of a series of dots or picture elements ("pixels"). When you "paint" in a pixel-oriented program like Adobe Photoshop, you change the colors of pixels. The number of colors that you can work with at a time depends on the amount of color information available for each pixel. On an 8-bit color system, a maximum of 256 different colors can be displayed simultaneously. On a 24- or 32-bit color system, over 16 million different colors can be displayed at one time. The amount of information used for each pixel affects the file sizes of images: a 24-bit RGB image has three times as much information as an 8-bit gray-scale version of the same image, and so takes up three times as much disk space.

You can use the Adobe Photoshop tools to create an original image, while image processing functions allow you to edit scanned and other digitized images. With the painting tools in the Adobe Photoshop program, you can add lines to an image, fill an image with color, and spray-paint on parts of an image as if you were using an airbrush to retouch a photograph.

You can edit images in many ways. You can crop images and perform transformations on images, such as rotating, skewing, and flipping. You can also use the many filters in the Adobe Photoshop program to modify images by sharpening and blurring an image, and creating mosaic and facet effects.

Adobe Photoshop software allows you to perform color correction on images, too. You can adjust the levels of color in an image, as well as the brightness and contrast. You can also use the Adobe Photoshop program to change the resolution at which the image is printed on a printer or film recorder, or output to some other media.

When you are ready to generate a hard copy of an image, the Adobe Photoshop program includes the ability to create and print halftones and color separations. You can automatically convert images that are in the RGB (red, green, and blue) format, which is commonly used to display images on-screen, into the CMYK (cyan, magenta, yellow, and black) format used to print images on a printing press.

Image types that the Adobe Photoshop program supports include bitmapped, gray-scale, indexed color, RGB, CMYK; and hue, saturation and brightness (HSB); hue saturation, and luminance (HSL), and multichannel images. Supported image formats include the default Photoshop and Raw formats; formats suitable for graphics and page layout applications including EPS, MacPaint®, PICT, Pixel-Paint®, and TIFF formats; those useable by PIXAR workstations, Scitex image-processing, and Commodore Amiga computers; a format for Targa video boards; and a format for ThunderScan.

The Adobe Photoshop program stores images in channels, similar in concept to a plate in a four-color (four-plate) printing process. A bitmapped image and gray-scale image are single-channel images; RGB, HSL, and HSB images have three channels; CMYK images have four channels. In addition, alpha channels can be added to an image to manipulate the image and store masks.

Throughout this user guide, references are made to adjusting color levels. For the sake of consistency, this term applies to all image types, whether color or gray-scale.

## What you need

- Macintosh II, IIx, IIcx, IIci, SE, or SE/30
- Hard disk
- 2 megabytes random-access memory (RAM)
- Apple system software version 6.0.2 or later

In addition, a gray-scale or color monitor is recommended, and a Macintosh-compatible scanner is optional.

## Using this book

This book is divided into six sections. For information about creating new documents, opening, closing, and saving documents, you should read the chapters in Section 1, "Starting Out Using the Adobe Photoshop Program." If you are interested in learning how to use the painting, editing, fill, selection, and other tools to create an original image or edit an existing image, you should read the chapters in Section 2, "Using the Adobe Photoshop Toolbox."

For information about basic image editing, see Section 3, "Basic Image Editing." To learn how to make color corrections in an image and perform advanced image editing, you should read the chapters in Section 4, "Advanced Image Editing and Color Correction." If you want to know how to output an image, you should read the chapters in Section 5, "Printing Images." Section 6, "Reference Material" includes the Photoshop Color Swatches, the Glossary and the Index.

## The Adobe Photoshop program package

The Adobe Photoshop program package contains

- The program disk
- The tutorial disk, containing two sample images
- A program disk containing software designed by third-party software developers
- The calibration disk
- *Adobe Photoshop User Guide*
- *Adobe Photoshop Tutorial*
- The Adobe Photoshop Quick Reference Card
- Registration card and envelope

## Registration

Adobe Systems wants to keep you informed of the latest changes and improvements made to the Adobe Photoshop program and provide technical support if needed. To do that, we need to know who you are. Please fill out the enclosed registration card and mail it to us.

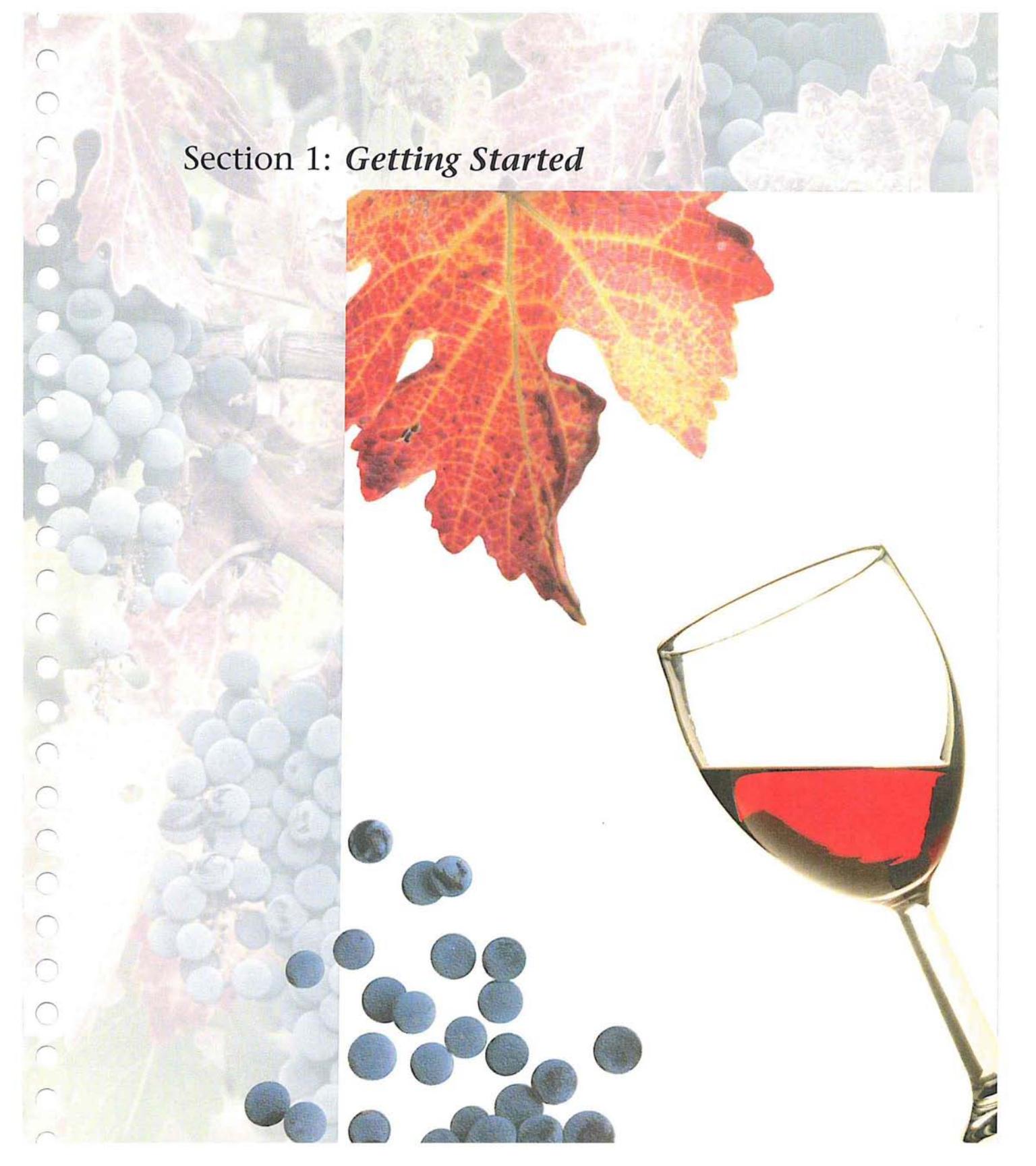
You must send in your registration card to receive technical support. The card also lists ownership benefits.

## Third-party development

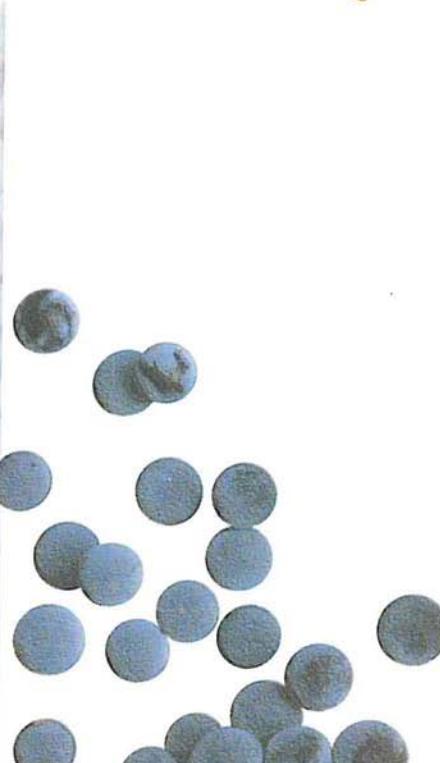
Adobe Systems is interested in working with third-party software developers on the continual enhancement of the Adobe Photoshop program.

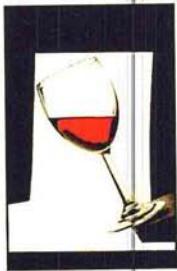
If you are interested in writing a plug-in module to support your input or output device, or in adding additional file formats, please contact Adobe Systems.





## Section 1: *Getting Started*





Beginning with a scan of grape leaves, the artist selected individual elements to paste into the new design. The Feather command was used to soften the edges of the selections. The Rotate and Paste Into commands were used to position the elements.

The background was created by first converting a copy of the grape leaves image to gray-scale. The gray-scale image was then pasted on top of the original color image of the grape leaves. Paste controls were used to make the gray-scale image slightly transparent, allowing some of the original color to show through.

## Chapter 1: *Managing Documents*

Adobe Photoshop software works with original artwork or with existing images that were created by other applications or digitized by a scanner, video camera, or other means. Whether created or imported into the Adobe Photoshop program, images are stored as documents and displayed within windows. To use the Adobe Photoshop images included on your tutorial disk, you simply open the images.

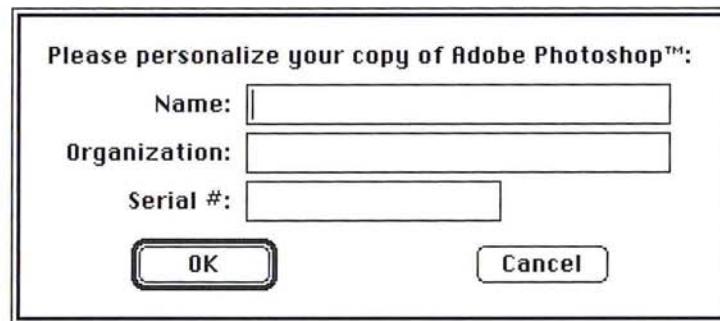
This chapter explains how to begin using the Adobe Photoshop program, and how to open, save, and manage image documents.

To work with an image, you open the document that contains the image. The document displays the image in a window.

Before you start to use the Adobe Photoshop program, turn on your computer and check to make sure that you have everything you need. See "What you need," in the Introduction earlier in this guide for a description of the requirements.

Make a backup copy of the program disk that you can work with. If you need help making a backup copy, see your Macintosh user guide for instructions. Use the backup copy to install the Adobe Photoshop program on your hard disk.

Double-click on the Adobe Photoshop program disk icon on the desktop. The first time you start the program, a dialog box appears asking you to personalize your copy of the program.



Type your name and the name of the organization you work for, if applicable. Enter the serial number listed on your Adobe Photoshop registration card or manuals, and click OK.

When you first start out using the Adobe Photoshop program, you are asked to create a preferences file. The preferences file holds the preference settings you choose in the Adobe Photoshop program. The preference settings include the separation setup information, display options, and options for exporting information to the Clipboard. The settings you save are used in all Adobe Photoshop documents.

You can change the name of the file as well as its location. You should keep the preferences file in a separate folder outside of the System folder. The location of the preferences file governs which hard drive the Adobe Photoshop program uses for virtual memory. If your system does not have enough random-access memory (RAM) to store large documents, Adobe Photoshop uses virtual memory, which accesses the hard disk, to automatically write and read image data to and from your hard disk. Make sure that you locate your preferences file on a disk that has enough space and speed for your needs.

The location of the preferences file also determines where the Adobe Photoshop program looks for plug-in modules. Plug-in modules are third-party developed programs that extend the capabilities of the Adobe Photoshop program to interface with new scanners and non-standard printers, to support additional file formats, and to include advanced, special effects filters.

The first time you use the Adobe Photoshop application, a dialog box appears, asking you to locate the preferences file.

**To create a new preferences file:**

1. Click New.

The Save As dialog box appears.

2. Use the drive and directory buttons (if necessary) to choose where you want to store the file.
3. As an option, type the desired name for the preferences file. By default, the file is named "PS Prefs."
4. Click Save.

A new preferences (PS Prefs) file is created and stored in the specified location on disk.

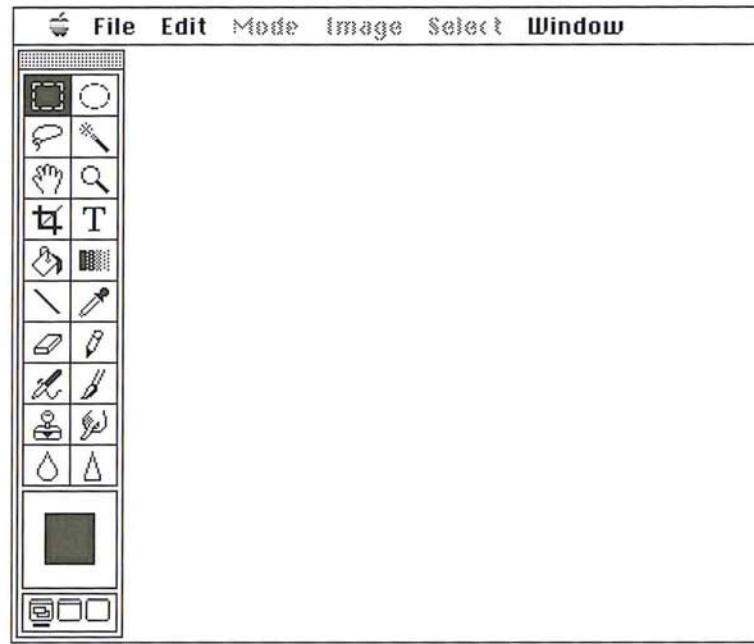
When you start and quit the Adobe Photoshop program, the software looks for the preferences file. If the preferences file has been moved from the last location where the program found it, a dialog box appears, asking you to locate the file.

**To locate the preferences file:**

1. Use the drive and directory buttons to locate the preferences file.
2. Click the preferences file name.
3. Click OK.

The Adobe Photoshop program will store the location of the preferences file and access the file automatically when you start up the application in the future.

After you have performed these preliminary steps, the Adobe Photoshop program startup screen appears, followed by the program's desktop.



You are ready to open a document and start working.

## Opening images

Images that you are not currently working on are stored in documents on disk. When you work on an image in the Adobe Photoshop program, the image is normally displayed inside a window.

The Adobe Photoshop program opens and displays all documents at 72-dpi screen resolution. This may cause a document to appear enlarged on-screen if the resolution of the original image is greater than 72 dpi. For example, a document that you scanned in at 300 dpi will be displayed at 72 dpi and therefore, will appear larger on-screen; however, the document will print at the same size as the original image.

## Opening a new document

When you create a new Adobe Photoshop document, you can specify the size of the overall image area, the image's resolution, and whether you want to create a gray-scale or an RGB color image.

Resolution, here, refers to the number of pixels per inch that are used in the image. This "image resolution" determines how much information is used in the image and how much information will be sent to the printer when you print it. The image resolution is measured in pixels per inch, whereas the resolution of output devices (such as printers) is measured in dots per inch (dpi). You can output images at resolutions of more than 2500 dpi on an imagesetter, but you normally won't use an image resolution that high because the printer doesn't require that much information to produce high-quality results. In addition, an image at a resolution of 2500 dpi would result in a document probably several hundred megabytes in size.

The resolution you specify for new documents affects the amount of information used in the document, which in turn affects the quality of the output and the amount of disk and memory space the document requires. By default, the Adobe Photoshop program selects RGB color as the image type, 512-pixels-by-512-pixels for the width and height, and 72 pixels per inch for the resolution. If you cut or copy a selection in an existing image and then create a new document into which you will paste the selection, the dimensions of the selection on the Clipboard are automatically entered in the Width and Height text boxes.

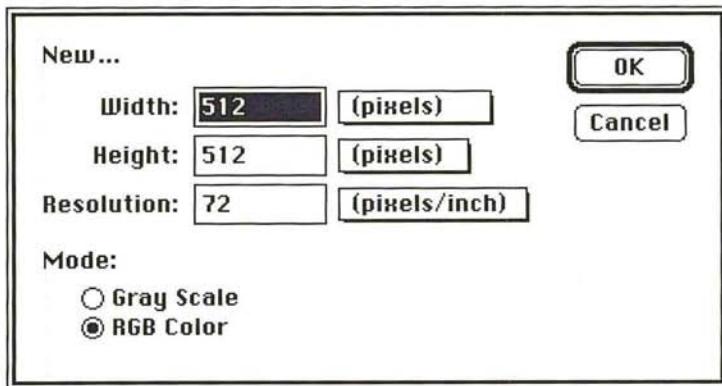
When you specify the size and resolution, you can also specify the units of measure you want to use. For the width and height, you can choose pixels, inches, centimeters, points, picas, or columns as the units. You can choose either pixels per inch (pixels/inch) or pixels per centimeter (pixels/cm) as the units for the resolution.

The current background color displayed in the toolbox becomes the background color for your new image.

**To create a new Adobe Photoshop document:**

1. Choose New from the File menu.

The New dialog box appears.



2. To change the default settings, click Gray Scale if you want to create a gray-scale image.
3. To select the units of measure, position the pointer on the box beside the parameter you want. Press down the mouse button.  
A pop-up menu appears.
4. Holding down the mouse button, drag to highlight the units you want. Release the mouse button.
5. To enter values for the parameters, type a value for the width in the Width text box, and press the Tab key.
6. Enter a value for the Height in the Height text box, and press the Tab key.
7. Enter a value for the desired resolution in the Resolution text box.
8. When you have finished defining the parameters for the new image, click OK.

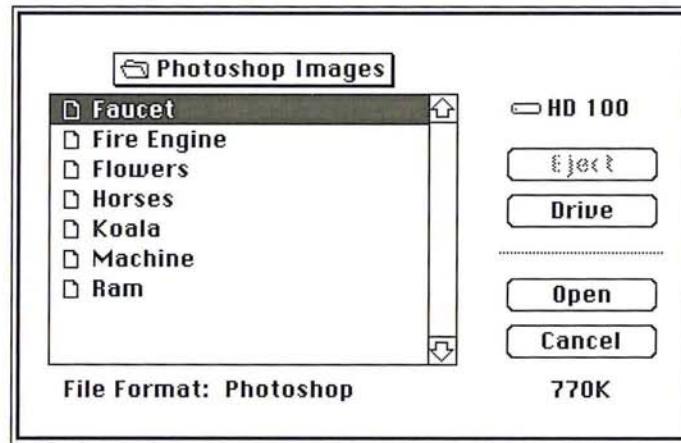
A new, untitled document appears.

### Opening existing documents

To open existing Adobe Photoshop documents as well as documents saved in other file formats in the Adobe Photoshop format, follow these steps.

1. Choose Open from the File menu.

The Open dialog box appears.



2. Use the drive and directory buttons, if necessary, to locate the folder that contains the document you want to open.
3. Click the document.
4. Click Open.

## **Resizing a newly opened document**

If the image you open appears enlarged, you may want to resize it to print the image at its original size or to view the entire image on-screen.

To display the current dimensions of the image, position the pointer on the size box in the lower-left corner of the image, and Option-click. If the dimensions of your image have changed, you can change the image size using the Size/Ruler option in the Page Setup dialog box in the File menu; the option will cause the image to print at its accurate size, but will not affect how the image appears on-screen. If your image has been enlarged and you would like to see the entire image on-screen, use the zoom tools.

It is recommended that you do not use the Resample command in the Image menu to resize the newly opened image, because you could alter the pixel information in the image and irretrievably lose image information. For more information about the resampling feature, see "Resampling images precisely," in Chapter 14, "Resizing Images."

## **Working with multiple documents**

You may sometimes want to have several Adobe Photoshop documents open at the same time and switch back and forth between them. Alternating between windows can be useful when you want to compare two versions of the same image or use one image to correct the color in another.

Only one document can be the active window at a time. You can work only in the active window, with the exception of when you use the eyedropper tool. The eyedropper tool is unique because it allows you to select colors from an inactive document window without activating the window. To switch between windows, you can click on the window you want to activate, or you can choose the window you want to activate from the Window menu.

**To select the active window when working with multiple documents:**

1. Select any of the tools in the toolbox except the eyedropper tool.
2. Click the window you want to activate; or choose the desired window from the Window menu.

## Saving documents

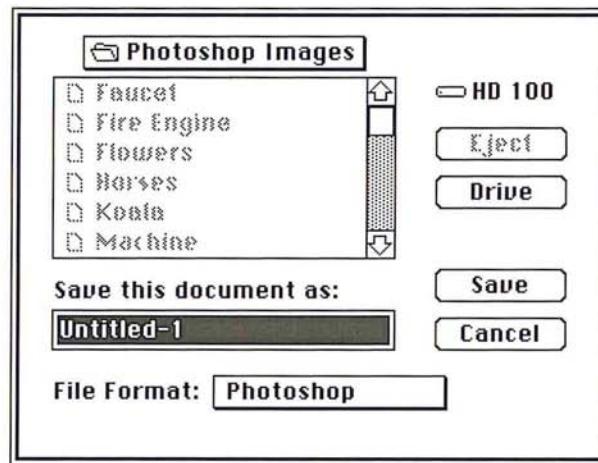
When you save a new document for the first time, you specify the name of the document and where on disk you want to store it. You should save a new document at an early stage to preserve the work you have done on it. You should also save existing documents periodically to protect the changes you made.

By default, all new documents are saved in the Adobe Photoshop file format.

### To save a document:

1. Choose Save from the File menu.

If the document has never been saved, the Save As dialog box appears.



2. Type a name for the document.
3. Use the drive and directory buttons (if necessary) to choose where you want to store the document.
4. Click Save.

The document is saved on disk with the specified name and in the specified location.

## Saving a copy of a document

You can also automatically create and save copies of a document using the Save As command. The Save As command also allows you to save Adobe Photoshop format documents in other file formats. For information about saving documents in other file formats, see the section, "Exporting images," in Chapter 2, "Scanning, Importing, and Exporting Images."

### To save a copy of a document:

1. Choose Save As from the File menu.

The Save As dialog box appears.

2. Type a name for the copy.
3. Use the drive and directory buttons (if necessary) to choose where you want to store the copy.
4. Click Save.

A copy of the active document is saved on disk with the name and in the location you specified.

## Closing documents

When you have finished working on a document, you can close it to store it. If you close a document that contains unsaved changes, an alert dialog box will appear to ask if you want to save the changes. Click No to close the document and discard any changes you made since you last saved the document. Click Cancel to resume working on the document. Click Save to save the changes. If the document has never been saved in the Adobe Photoshop file format, the Save dialog box will appear.

To close a document, choose Close from the File menu, or click the close box on the active window.

## Quitting the Adobe Photoshop program

When you have finished using the Adobe Photoshop program, choose the Quit command from the File menu. If there are any documents open that contain unsaved changes, the program will prompt you to save the changes.

## Chapter 2: *Scanning, Importing, and Exporting Images*

Images can be brought into the Adobe Photoshop program by scanning a photograph, slide, or image, or by importing electronic artwork created with a drawing program. You can import an image document in one format, and export it in another, depending on your needs. As a result, you can easily transfer Adobe Photoshop documents to other applications and computer platforms.

You can save Adobe Photoshop documents as encapsulated PostScript® files or TIFF documents, then place the documents in your page layout program. You can also export Adobe Photoshop documents in formats that can be read by IBM®-compatible and Commodore Amiga® computers, PIXAR® workstations, and Scitex® image-processing systems.

### Scanning images

The Adobe Photoshop program in conjunction with certain brands of scanners allows you to control the process through which a hard copy of an image, such as a photograph or a slide, is converted into a digital image.

Adobe Photoshop software directly interfaces with any scanner that has an Adobe Photoshop-compatible scanner driver. Check with your scanner manufacturer to determine the compatibility of your scanner driver.

To install the desired driver, simply drag it into the same folder that contains your Adobe Photoshop preferences file; this folder should not be the System folder. All plug-in modules are loaded when the Adobe Photoshop program starts. So if the Adobe Photoshop program is running when you install the plug-in module, you must quit the program and restart it.

If the scanner you are using does not have an Adobe Photoshop-compatible scanner driver, you can use the manufacturer's software to scan your images, save them as TIFF or PICT files, and import them into the Adobe Photoshop program.

### Importing images

The Adobe Photoshop program allows you to import documents in 14 formats including Photoshop, Raw, EPS, TIFF, PICT File, PICT Resource, Amiga IFF/ILBM, CompuServe GIF, MacPaint, PIXAR, PixelPaint, Scitex CT, TGA (Targa), and ThunderScan. You can also import documents in file formats that the Adobe Photoshop program does not support by using a plug-in module for the format. Plug-in modules are discussed later in this chapter in the section "Using plug-in modules to import and export images."

If the four-character code, called the "file type," is set correctly, you can use the Open command to open the document, and Adobe Photoshop will automatically select the correct file format.

You should use the Open As command if you know that the file type of the document is incorrect and you want to open the document in the correct format, or if you want to open a document in the Raw format. As an example, if you transfer a TIFF document from an MS-DOS® system to the Macintosh, the file type of the document is often TEXT instead of the correct TIFF. In this case, you should use the Open as command to open the file as a TIFF document in the Adobe Photoshop program. If the program is unable to open the document in the format you have specified, an alert box will appear.

The default file format when you use the Open As command is the Raw format. The Raw format is a highly flexible file format designed to accommodate images saved in undocumented formats, such as those created by scientific applications. When you open a document in the Raw file format, a dialog box appears for you to specify the parameters of the image so that the Adobe Photoshop program can open the document correctly. The information includes the width and height of the image (in pixels), the number of channels in the image, and the length of the header (in bytes). The header precedes the actual image information, and could include such information as the name of the application that created the document. Each character in the header (including spaces) represents one byte.

If you are uncertain of some of the document information, you can enter the information you know, then use the Guess button. The Adobe Photoshop program then estimates the other values based on the size of the document, which appears in the top left corner of the dialog box, and the values you have entered. (The size is measured in bytes. Each byte represents 1 pixel per channel in the image.)

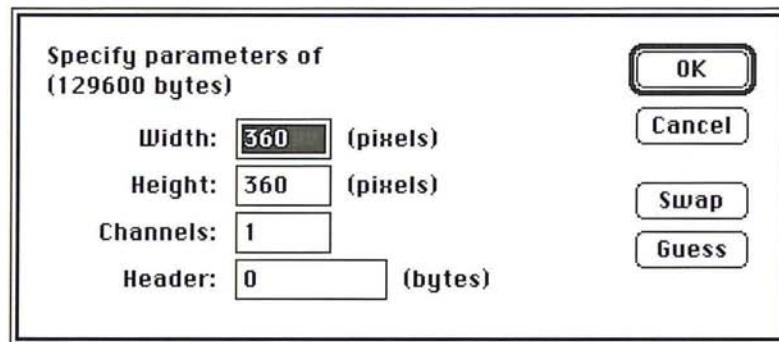
As an example, suppose you know the size of the header in the document, but you don't know the height and width of the image. You can enter the header's size in the Header text box, then click Guess. The Adobe Photoshop program will guess the number of rows and columns that comprise the image based upon the document's size on disk and the size of the header.

You can use the Swap button to change the default orientation assigned the image. The Guess option assumes that the image has a landscape orientation, with the width greater than the height. If you click Swap, the width and height values are automatically reversed.

#### To import a document in the Raw format:

1. Choose Open As from the File menu.  
The Open As dialog box appears.
2. Use the drive and directory buttons, if necessary, to locate the folder that contains the document you want to open.
3. Click the document.
4. Click Open.

The Specify parameters dialog box appears.



5. Specify the document information by entering the width, height, number of channels, and header (if desired).
6. To estimate the document's size parameters, enter either the correct height and width values to estimate the header size, or enter the correct header size to estimate the height and width. Click Guess.

The Adobe Photoshop program estimates the appropriate value or values and automatically enters the information in the dialog box.

7. To reverse the order of the width and height values, click Swap.
8. When you have finished entering information about the document, click OK.

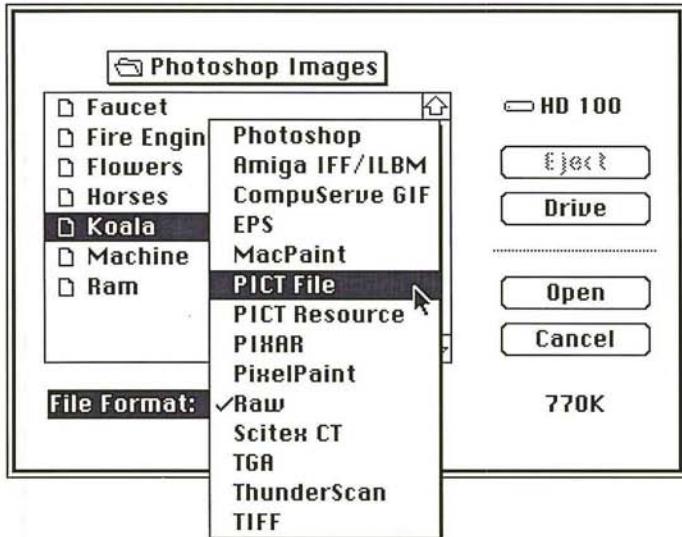
The document is opened.

If you want to open the document into a format other than Raw, follow the steps below.

#### To import a document in a file format other than Raw:

1. Choose Open As from the File menu.  
The Open As dialog box appears.
2. Position the pointer on the box beside File Format.
3. Press down the mouse button.

The pop-up menu listing the file formats supported by the Adobe Photoshop program appears.



4. Holding down the mouse button, drag to highlight the file format in which the document will be opened.
5. Release the mouse button.  
The chosen file format appears in the box.
6. Select the document from the directory window and click Open.

## Exporting images

The Adobe Photoshop program allows you to export documents in 14 different file formats: Photoshop, Amiga IFF/ILBM, CompuServe GIF, EPS, MacPaint, PICT File, PICT Resource, PIXAR, PixelPaint, Raw, Scitex, TGA, ThunderScan, and TIFF. The ability to export images allows you to use the Adobe Photoshop images in other applications and on other computer platforms.

You can save Adobe Photoshop documents as EPS or TIFF documents, then place these documents in page layout programs that support these file formats. You can also save Adobe Photoshop documents in formats that can be read by Commodore Amiga and IBM-compatible microcomputers, PIXAR workstations, and Scitex image-processing systems.

Certain file formats do not support some of the image types available in the Adobe Photoshop program. For example, you can't save an RGB image in the MacPaint format because the MacPaint format only accepts black-and-white image data. Formats that aren't available are dimmed. The options available for each format are discussed in the section that follows. Where dialog boxes appear with options, they are displayed.

## Export formats

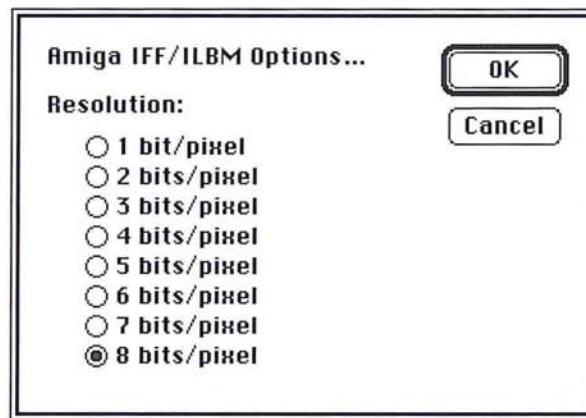
The file formats, and the information that can be specified when exporting an image in the file format, are described below.

### Photoshop

Photoshop is the default file format for saving newly created images.

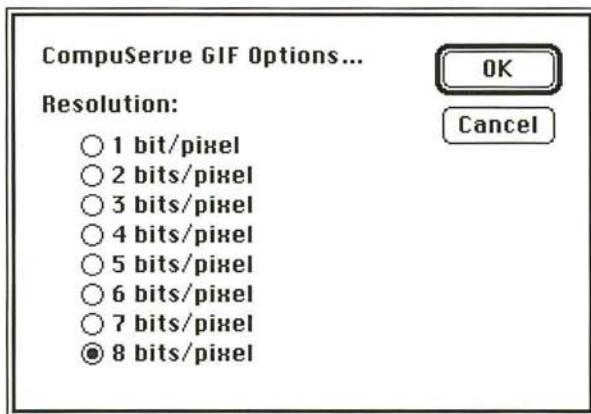
### Amiga IFF/ILBM

The Amiga Interchange File Format (IFF)/Interlaced Bitmap (ILBM) format is used to transfer documents to and from Commodore Amiga computers. You can specify the image resolution from 1 bit to 8 bits per pixel.



## CompuServe GIF

The CompuServe® Graphics Interchange Format (GIF) is commonly used to upload documents to the CompuServe Information Service, and to pass documents between other types of computers. You can specify the image resolution from 1 bit to 8 bits per pixel.



## EPS

The Encapsulated PostScript file (EPS) format is used by graphics applications. You can choose preview PICT and encoding options for documents to be saved in the EPS format. You can also specify if you want the halftone and transfer function information saved with the document.

Some graphics applications, like Adobe Illustrator 88™, let you display or "preview" a PICT representation of a PostScript language image saved in the EPS format. The PICT preview image gives you an idea of what the image will look like when it is printed and allows you to accurately place the image on the page. The Adobe Illustrator 88 program lets you preview a monochrome, 1-bit per pixel PICT image. Other applications let you display a 4-bit or 8-bit per pixel image, which can contain color.

You also have the option of saving a CMYK document as five separate EPS documents. This allows you to save color separations in a format that can be read by certain applications that use this format, like QuarkXPress®. Four of the documents will contain the color information: one document for the cyan information, one for the magenta, and so on. The fifth document will contain a PICT preview of the image and a low-resolution PostScript language version for proofs.

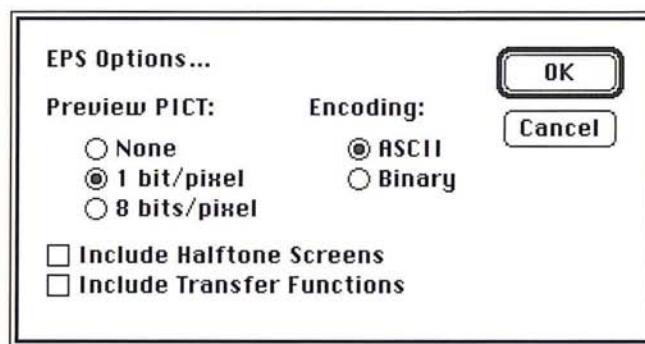
When you save a bitmap-type image in EPS format, you have the option of making the white areas in the document appear transparent.

### **EPS encoding options**

The encoding options control what type of information is saved in the document, either ASCII or binary. The binary option results in a file that is about half the size of an image saved with the ASCII encoding option and takes half as long to transfer to the printer. However, some applications (such as Aldus PageMaker® and FreeHand®) do not support binary EPS documents. For these applications, you should select the ASCII encoding option.

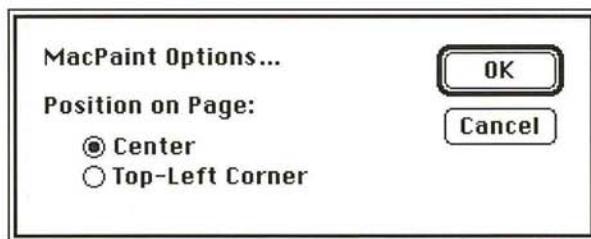
### **Saving halftone screen and transfer function information in EPS documents**

You can choose to include halftone screen information, including the frequencies and angles of the screens, and transfer function information (dot gain calibration) with an EPS document. If you include this information, and place it in another application, such as Adobe Separator™, the PostScript interpreter will use this information and override the application's own settings when the color separations are generated.



## MacPaint

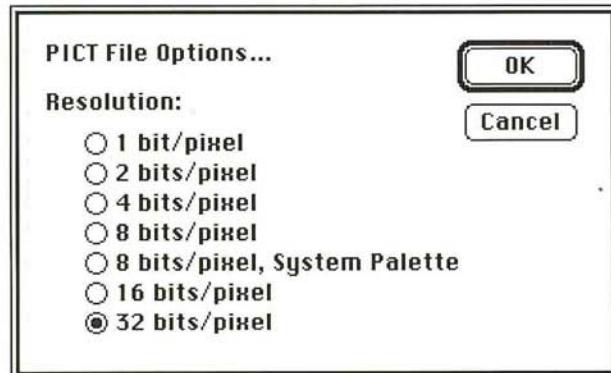
The MacPaint format is commonly used to transfer bitmapped images between Macintosh applications. You can only save Adobe Photoshop images that are in the Bitmap image type in the MacPaint format. You can choose to have the image either centered on the page when it is opened or placed in the upper left corner of the page. To select the placement option you want, click Center or Top-Left Corner, then click OK.



## PICT File

The PICT format is widely used among Macintosh graphics and page layout applications as an intermediary file format used to transfer documents between applications.

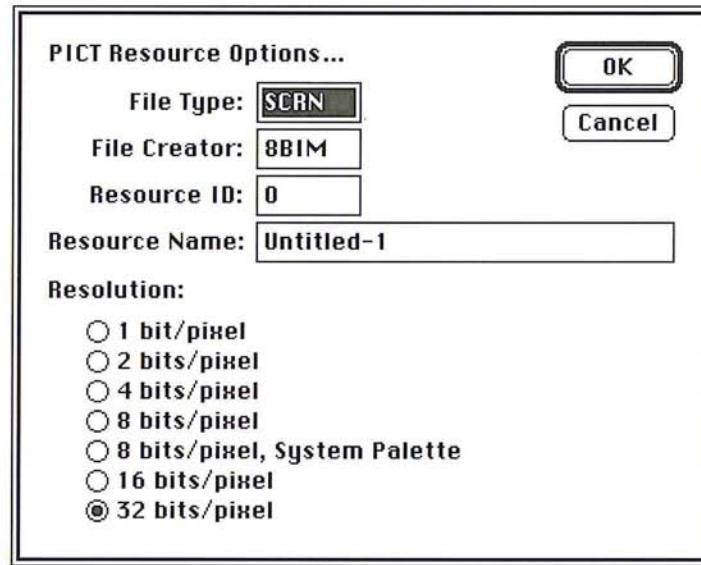
You can specify the resolution of the image, from 1 bit per pixel to 32 bits per pixel. The 8-bits per pixel System Palette option lets you automatically select the system color table as the color table used for the image. This option allows you to make sure the colors in the selection are displayed properly within applications that do not recognize custom color tables used to create an image.



## PICT Resource

The PICT resource allows you to export an Adobe Photoshop document as a start-up screen or include the document as a PICT resource in an application program.

You can specify information about the document that determines how the resource will be used. If you want to use the image as a resource in an application program, you must enter the information the application needs to make use of the resource including the file type and file creator IDs, the resource ID, the resource name, and the image's resolution. The default file type is SCRN, the default file creator is 8BIM, the default resource ID is 0, the default resource name is the document's name, and the default resolution is determined by the image type. You can change the resolution or other parameters.



## PIXAR

PIXAR workstations are designed for high-end graphics applications, such as work involving three-dimensional images and animation.

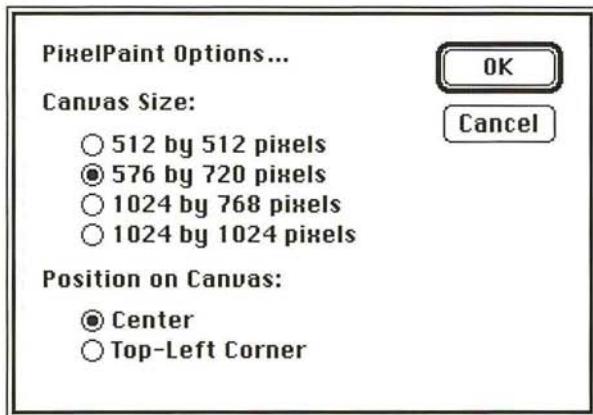
When you select the PIXAR option, you can specify the file type and file creator information for the document. The default file type is (PXR) and file creator (8BIM). However, you can change these settings. The file type must be set to PXR if you want to use the Open command to open the document in the Adobe Photoshop application.

To edit the file type and file creator settings, double-click in the text box of the parameter you want to change, then type the information. When you are ready to save the document, click OK.



### PixelPaint

The PixelPaint file format allows a document to be opened in the PixelPaint and PixelPaint Professional graphics applications. You can specify the image size (canvas) you want to use and whether you want the image to appear in the center of the canvas or in the top left corner when you open the document.



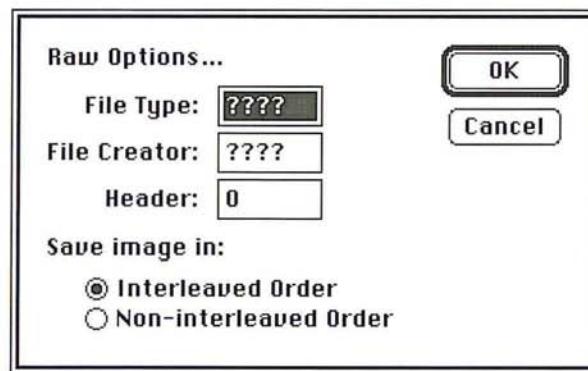
### Raw

The Raw format is a flexible file format for transferring documents between different applications and computer platforms.

You can specify the file type, file creator, and header information about the document.

The file type is generally a four-character ID that identifies the file; for example, TEXT identifies the document as an ASCII text document. The file creator also is generally a four-character ID. Most Macintosh applications have a unique file creator ID that is registered with the Apple Computer Developer Services group. The header is the number of bytes of information that will appear at the beginning of the document, before the actual image information. The value you enter for this parameter defines the number of zeroes that will be placed at the front of the document. The zeroes act as place holders in the document. After you save the document, you can use a file editing program, like Symantec Utilities for Macintosh (SUM) II®, to replace the zeroes with header information.

You can choose to save the image in an interleaved or non-interleaved format. If you choose the interleaved format, the color bands (red, green, and blue, for example) are stored sequentially. The choice you make depends on the requirements of the application you plan to use to open the document.



### Scitex CT

The Scitex Continuous Tone (CT) format is available for CMYK color images and gray-scale images. Scitex computers are used for high-end image processing. Contact Scitex to obtain utilities that will allow you to transfer a document saved in the Scitex CT format to a Scitex system. When you select the Scitex CT option, the active Adobe Photoshop document is converted directly to the Scitex format; no dialog box appears to allow you to select options for the conversion.

### TGA

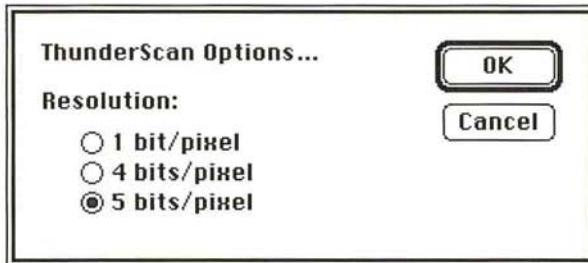
The TGA format is designed for use on systems that use TrueVision® video boards, and is commonly supported by MS-DOS color applications. The format is also known as "Targa," in reference to the TARGA® videographics board manufactured by TrueVision.

You can choose the resolution you want if you are saving an RGB color image.

## ThunderScan

ThunderScan® is a hardware and software package used to scan images.

You can specify the number of bits of information per pixel (the resolution) you want to save with the document.



## TIFF

The Tagged-Image File Format (TIFF) is used to exchange documents between different applications and different computer platforms. You can choose to save Adobe Photoshop documents in a format that can be read by either Macintosh or IBM PC computers. You can also choose to compress the document to a smaller size automatically by clicking the LZW Compression check box.



## Saving documents in different file formats

When you save a document in another file format, you use the pop-up menu in the Save As dialog box. The pop-up menu lists the file formats that the Adobe Photoshop program supports. Once you select a file format, in most cases, a dialog box containing options for the format will appear.

### To save an Adobe Photoshop document in another file format:

1. Choose Save As from the File menu.  
The Save As dialog box appears.
2. Type the name for the document.
3. Use the drive and directory buttons (if necessary) to choose where you want to store the document.
4. Position the pointer on the box next to File Format.
5. Press down the mouse button.

A pop-up menu appears listing the file formats the Adobe Photoshop program supports.



6. Holding down the mouse button, drag to highlight the format in which you want to save the active document. Release the mouse button.
7. Click Save.  
The options dialog box for the selected file format appears.
8. Select the options you want by clicking the appropriate check box or radio button.
9. When you are finished selecting the parameters you want, click OK.

When you save an Adobe Photoshop document in a different file format, a unique document icon identifying the selected file format is used for the document.

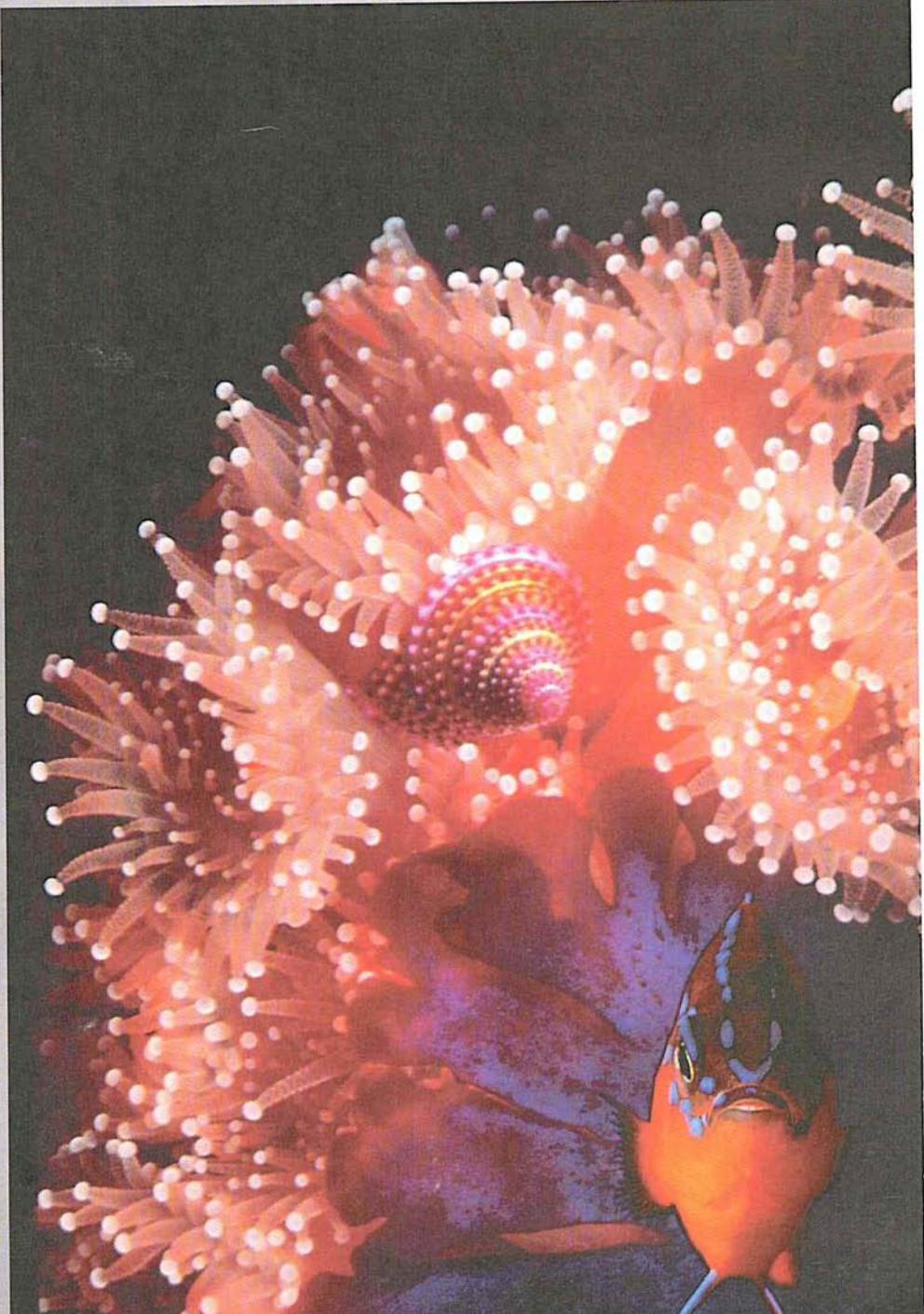
## Using plug-in modules to import and export images

Plug-in modules are software programs developed by third-party vendors in conjunction with Adobe Systems to extend the standard Adobe Photoshop program. The program modules are distributed on floppy disks and are represented as icons, like application and utility programs. The instructions for using the program are shipped with the module.

Modules are available that allow you either to import (acquire) images from devices such as scanners, or export images to devices such as printers that are not supported by the Apple® printer drivers. Acquire modules allow you to control a scanner or video frame capture system, or to decompress a document. Export modules let you save an Adobe Photoshop document in a file format not supported by the standard Adobe Photoshop program, or let you export images to devices such as printers that are unavailable through the Chooser.

To use an acquire or export module, you must install a copy of the module in the folder containing your preferences file. Once installed, the module will be active under the File menu when you select either the Acquire or Export command, depending on the type of module you are using. For detailed instructions on using plug-in modules with the Adobe Photoshop program, refer to the appropriate documentation included with the third-party software disk.

## Section 2: *Using the Adobe Photoshop Toolbox*





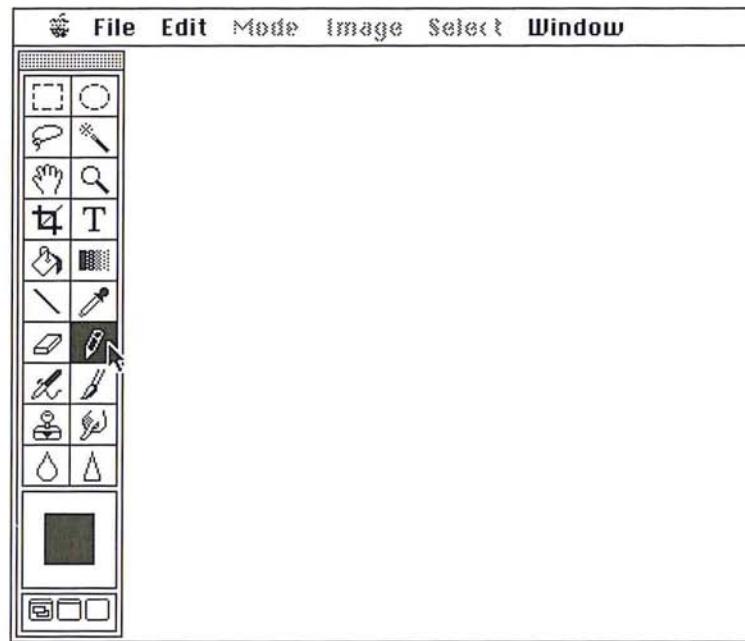
The designer scanned in three photos of sand, a fish, and an anemone as 35mm slides, and combined them in this illustration. She increased overall brightness in the images using the adjust levels controls to bring out as much detail in the shadow areas as possible. She blurred the sand and screened it to create a background texture, then rotated and cropped the plant image to fit within the foreground area. Using a separate file, the designer selected the fish and rotated its position, then copied and pasted the fish into the plant image.

## Chapter 3: *Managing the Toolbox*

The Adobe Photoshop tools in the toolbox allow you to paint, select, edit, and change your view of images. All of the tools are represented by icons that reflect the name of the tool and its function. The toolbox is a floating palette. This means that you can move it around the screen and it will float above the image, allowing you to paint beneath it. You can move the toolbox to a more convenient location, or hide it to make more room on the screen.

This chapter gives a brief overview of the tools in the toolbox and tells you how to control the toolbox.

To select the tool you want to use, click the tool in the toolbox.



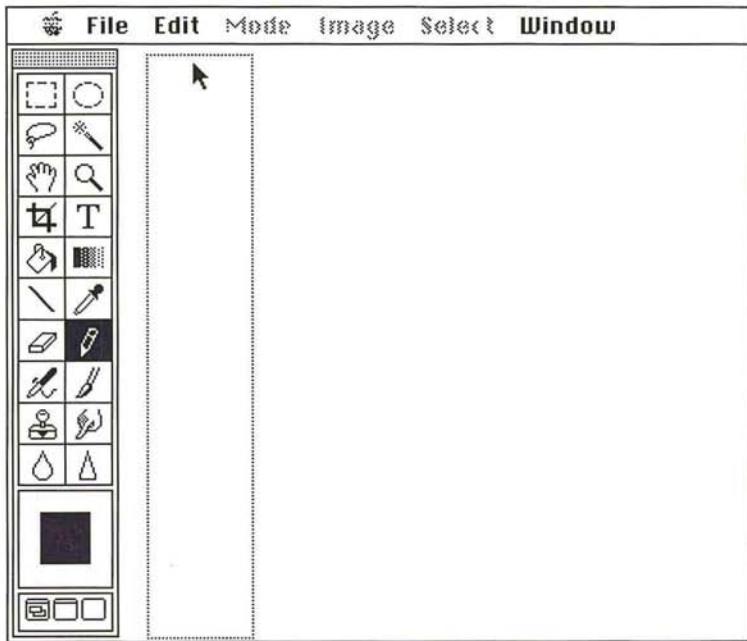
The tool is highlighted. Also, the arrow pointer changes into the pointer (cursor shape) appropriate for the selected tool when you position it in the active window.

**To use the tool on the image:**

1. Position the tool pointer on the image where you want to use the tool.
2. Press down the mouse button.
3. Drag the pointer across the image.
4. Release the mouse button when you have finished using the tool.

To move the toolbox, position the pointer on the gray bar at the top of the toolbox.

Hold down the mouse button. Drag until the toolbox is where you want it, then release the mouse button.



**To hide the toolbox:**

1. Press the Tab key to hide the toolbox.
2. Press the Tab key again to redisplay the toolbox.

## Tool overview

Below is a brief description of all of the tools in the toolbox. The tools are arranged in the toolbox according to their functions. The categories for tools are selection tools, viewing tools, text tools, fill tools, painting tools, editing tools, and miscellaneous tools. The toolbox also contains color and screen mode controls.

### Selection tools



#### The lasso tool

You can use the lasso tool to define any arbitrary selection area. The lasso tool operates like a freehand tool, and lets you trace the outline of a selection.



#### The rectangular and elliptical marquee tools

The rectangular marquee makes rectangular and square selections, and the elliptical marquee makes elliptical and round selections. The options available for both tools are very similar. For example, you can specify a certain fixed size, as well as a height-to-width ratio, for each marquee tool.



#### The magic wand tool

The magic wand is a versatile selection tool that allows you to select images based upon the color similarities of adjacent pixels. You can select part of an image without tracing it, and you can also choose how extensive you want the selection to be. For example, you can choose either to select just the dark hair of a person in an image, or the person's lighter clothing as well.



#### The eyedropper tool

The eyedropper tool selects the current foreground and background colors from colors in an image. The foreground color is used by the painting tools.

### Viewing tools



#### The grabber tool

The grabber tool lets you scroll through an image that is too large to fit in the active window. You can scroll in any direction without using the scroll bars on the window by temporarily switching from one of the painting tools to the grabber tool.



#### The zoom tool

The zoom tool allows you to zoom in on an image to perform close, detailed work on an image, or zoom out to get an overall view.



### The cross hair pointer

The cross hair pointer works in conjunction with the tools to give greater precision. When used with a painting, editing, or selection tool on an image, the cross hair pointer allows you great accuracy by focusing the “hot spot” of the cross hairs (the dot in the middle of the cross hairs) on the areas where you are using the tool. To use the cross hair pointer, press the Caps Lock key.



Release the Caps Lock key to resume using the tool’s normal pointer.

## Text tools



### The type tool

The type tool enters pixel-based type on an image. You can select a number of options for the type you enter, including the font and point size for type, and select style options such as underlining and italics.

## Fill tools



### The paint bucket tool

The paint bucket tool fills areas with the foreground color. The paint bucket tool fills pixels that are similar in color, in a similar way to the magic wand. Using the paint bucket tool, you can fill a discrete part of an image, such as a chair or an animal, simply by clicking on it.



### The blend tool

The blend tool creates a gradient fill that displays a gradual transition from the foreground color to the background color.

## Painting tools



### The pencil tool

The pencil tool creates either freehand or straight, hard-edged lines. The pencil tool includes an auto-erase option that allows you to change pixels that are the foreground color to the background color.



### The line tool

The line tool creates straight lines. You can specify the thickness of lines (line weight) you create, and create lines with arrowheads. Lines created using the line tool are anti-aliased. Anti-aliasing smoothes out the edges of lines so they do not appear jagged.



### The paint brush tool

The paint brush tool paints the foreground color into the image. The marks left by the paint brush tool are more diffused than the pencil tool's marks. The paint brush tool paints marks with soft edges.



### The airbrush tool

The airbrush tool lays down a diffused spray of paint on an image. You can control the pressure of the paint and the rate it is sprayed on the image.



### The rubber stamp tool

The rubber stamp tool picks up a sample of an entire image, and places an exact copy or a modified version of the selection elsewhere in the same image or in some other image. The rubber stamp options control the way a selected image, pattern, or texture is painted onto the image. The Revert option allows you to restore part of an image to the last version you saved.

## Editing tools



### The cropping tool

The cropping tool selects part of an image and discards the unselected portion. You define the cropping area by dragging a rectangular selection marquee around the image, or by specifying the size of the selection area you want, and placing the selection marquee around the selection.



### The eraser tool

The eraser tool changes pixels to the background color. This has the effect of "erasing" the pixels. You can change just the pixels you drag through or the entire image. You also can use the eraser to restore part of the image to the last version you saved.



### The smudge tool

The smudge tool simulates the effect of a finger dragging through wet paint. When you use the smudge tool, the colors of the pixels you drag through are gradually dispersed until the smudge fades out completely.



### The blur tool

The blur tool blurs part of an image. The blur tool produces a less focused image by diffusing colors in the pixels to which the tool is applied.



### The sharpen tool

The sharpen tool sharpens part of an image. As you drag through part of an image, the sharpen tool increases the contrast between adjacent pixels. This results in a sharper, more focused image.

## Color controls

### Foreground color indicator

The foreground color indicator on the toolbox displays the current foreground color. Many of the painting tools paint with the foreground color. By clicking the foreground color indicator, you can display the Color Picker dialog box, which you can use to select a new foreground color.

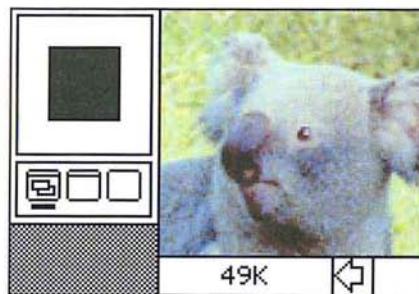
### Background color indicator

The background color indicator on the toolbox displays the current background color. The background color is used as the background in new documents and appears in place of parts of the image you cut or delete. By clicking the background color indicator, you can display the Color Picker dialog box, which you can use to select a new background color.

## Screen mode controls

The screen mode buttons on the bottom of the toolbox control the window display. The currently selected screen mode option is underlined in the toolbox. These options allow you to display the image inside the document window with the menu bar visible; at full-screen size without the document window and the menu bar visible; or, at full-screen size without either the document window or the menu bar.

To display the image inside the document window with the menu bar (this is the default screen mode), click the left screen mode button on the toolbox.



To display the image at full-screen size without the menu bar, click the right screen mode button on the toolbox.

To display the image at full-screen size with the menu bar, click the center screen mode button on the toolbox.



## Chapter 4: Controlling the Artwork and Screen Display

The Adobe Photoshop program provides various ways to change the view of an image. In addition to the scroll controls and other window controls, you can use the grabber tool to scroll in two directions simultaneously. You can use the zoom tool and Zoom commands to obtain a magnified or more distant view of an image.

For information about using the standard Macintosh window controls, like the scroll bars, resize, and zoom boxes, see your Macintosh user guide.

### Zooming in and out from an image

The zoom tool in the toolbox and the Zoom commands in the Window menu allow you to zoom in on an image for a magnified view, or zoom out for an overall perspective. The 1:1 view displays the image based upon the screen resolution and the image resolution, not the actual height and width dimensions of the image. Because the Adobe Photoshop program displays images at a screen resolution of 72 pixels per inch, images with greater resolution will appear enlarged on-screen. For example, when displayed at a 1:1 view, an image with a resolution of 200 pixels per inch will appear larger than its actual size because the screen can only display 72 pixels per inch. You can edit an image at any magnification.

The zoom tool changes by a factor of two (2x) each time you click the mouse button (2x, 4x, 8x, and 16x). The title bar always displays the current zoom level, for example, 2:1 for a magnification by a factor of two. A plus sign (+) in the zoom pointer indicates that you are ready to zoom in, while a minus sign (-) indicates you are ready to zoom out. The maximum zoom levels for an image is +16x and -16x.

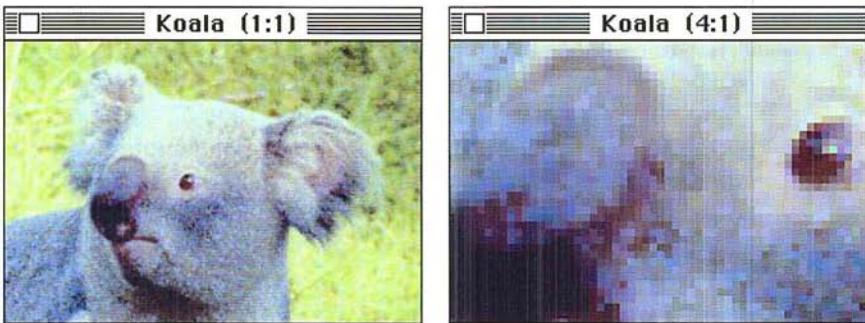
The Zoom In and Zoom Out commands (and their Command-key equivalents) allow you to magnify or shrink a view. In addition, you can use the Zoom Factor command to zoom in or zoom out to a specified zoom level.

#### To use the zoom tool to zoom in on an image:

1. Click the zoom tool in the toolbox.
2. Position the zoom pointer on the part of the image you want to magnify.  
Notice that a plus sign (+) appears in the zoom pointer.
3. Click the mouse button.

The image is magnified by a factor of two.

4. Continue clicking the mouse button until the view you want is displayed, or until you reach the maximum zoom level.



To zoom out from an image:

1. Click the zoom tool in the toolbox.
2. Position the zoom pointer on the image.
3. Press down the Option key.
4. Holding down the Option key, click the mouse button.
5. Continue clicking the mouse button until the view you want is displayed, or until you reach the minimum zoom level.
6. Release the Option key.

*Note: You can quickly return to the 1:1 view of an image by double-clicking the zoom tool. Also, you can activate the zoom tool from the keyboard by holding down the Command key and the spacebar, placing the pointer inside the active window, and clicking the mouse button. This activates the zoom-in mode. To activate the zoom-out mode, hold down the Option key and the space bar.*

### Using the Zoom commands

The Zoom commands allow you to change your view of an image similar to the zoom tool. The major advantage of using the Zoom In and Zoom Out commands over the zoom tool is that you can implement them directly from the keyboard. The disadvantage to using the Zoom commands is that you can't specify the area you want to magnify as you can with the zoom tool. When you use the Zoom In command, the Adobe Photoshop program magnifies the area in the center of the active window.

The Zoom In command magnifies the view of the image by a factor of 1 (1x, 2x, 3x, and so on) each time you choose it until the maximum zoom level of +16 is attained; the Zoom Out command zooms out by a factor of 1 each time you choose it until the maximum zoom level of -16 is attained.

To use the Zoom In command, choose Zoom In from the Window menu, or type Command + (plus sign).

To use the Zoom Out command, choose Zoom In from the Window menu, or type Command - (minus sign).

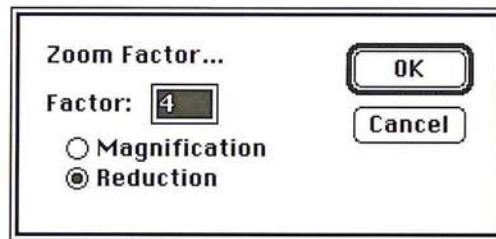
### Specifying a zoom factor

You can immediately magnify or reduce your view when you are working on a large, high-resolution image by using the Zoom Factor command. The Zoom Factor command specifies a magnification or reduction factor of a view. When you specify a zoom factor, the Adobe Photoshop program immediately displays the specified zoom level.

**To use the Zoom Factor command:**

1. Choose Zoom Factor from the Window menu.

The Zoom Factor dialog box appears.



2. Click Magnification to zoom in; click Reduction to zoom out.
3. Type a value from 1 to 16 for the zoom factor you want.
4. Click OK.

The specified zoom level is displayed on-screen.

### Scrolling in two directions

When you are working on an image that extends beyond the borders of the document window, you can use the grabber tool to scroll in two directions simultaneously.

**To use the grabber tool to scroll across an image:**

1. Click the grabber tool in the toolbox.
2. Position the grabber pointer on the image.
3. Press down the mouse button.

4. Holding down the mouse button, drag in the direction opposite the part of the image you want to display. For example, to display the lower-right corner of the image, drag toward the upper-left corner of the image.
5. Release the mouse button when you have displayed the part of the image you want.

**Note:** Double-click the grabber tool to display the entire image in the largest size possible on your screen.

## Using rulers

You can display rulers along the top and left side of the active window to make measurements on an image. The rulers measure sizes in inches, centimeters, points, or picas. You can choose the units of measurement for each ruler separately. The rulers also allow you to specify columns to simulate a page layout.

When you move a pointer inside the window, markers appear on the rulers to show the pointer's position relative to the zero origins of the rulers. The markers reflect the position of the pointer's "hot spot" in the window.

The ruler origin is tied to the document, not the window. As you scroll and zoom around the document, the rulers adjust accordingly.

To display the rulers, choose Show Rulers from the Window menu. To hide the rulers, choose Hide Rulers from the Window menu.

When you choose Show Rulers, a horizontal and vertical ruler appear along the top and left side of the active window.

You can change the rulers' zero origins. This allows you to make measurements from a specific point on an image.

**To change the rulers' zero origins:**

1. Position the pointer in the upper-left corner of the window, directly beneath the close box.
2. Press down the mouse button.



3. Holding down the mouse button, drag onto the image.  
A set of crosshairs appears.
4. Drag until the center of the cross hairs is on the point you want to use as the zero origin for the rulers.
5. Release the mouse button.

### Specifying units of measurement

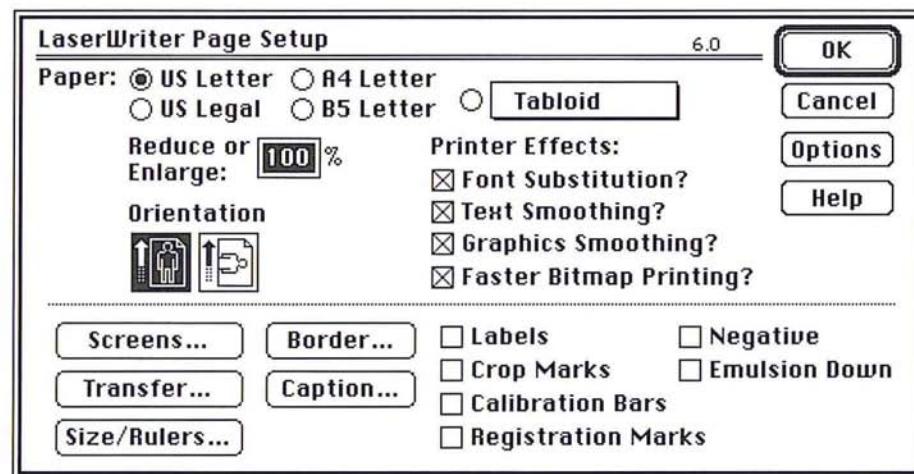
By default, the Adobe Photoshop program uses inches as the units of measure in documents. However, you can use centimeters, points, and picas instead. You can use different units of measurement for each ruler. For example, you could use points for the horizontal ruler and picas for the vertical ruler.

The size units you specify for the rulers are used in dialog boxes that allow you to specify size units. For example, the size unit choices for the horizontal ruler are used in the Resample dialog box in the Image menu for the Width parameter, and the units for the vertical ruler are used for the Height parameter.

To select the units of measurement you want for a ruler:

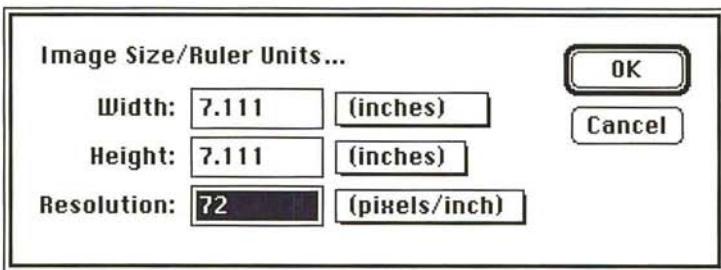
1. Choose Page Setup from the File menu.

The Page Setup dialog box appears.



2. Click Size/Rulers.

The Image Size/Ruler Units dialog box appears.

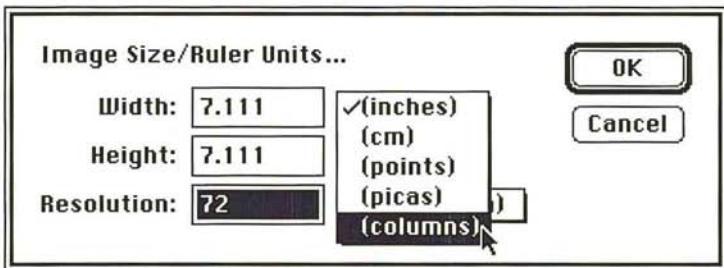


The two boxes beside the Width and Height text boxes are used to access pop-up menus. You use the Width pop-up menu to choose the units for the horizontal ruler; you use the Height pop-up menu to choose the units for the vertical ruler.

To choose the units of measurement you want for a ruler:

1. Position the pointer on the Width or Height box next to the ruler you want.
2. Press down the mouse button.

A pop-up menu listing the available units of measure appears.



3. Holding down the mouse button, drag to highlight the units you want.
4. When the desired units appear in the box, release the mouse button.
5. Click OK.

## Specifying a column size

You can use columns as a way to simulate page layouts in the Adobe Photoshop program. A column can be any size you specify. A column includes a specified width and gutter size. You can specify a particular column and gutter size to match the page layout of the page that will hold the final image. This allows you to make sure that the image will fit in your layout if you use the cropping tool or the Resample command in the Image menu to resize an image, or use the Size/Rulers option in the Page Setup dialog box to print out an image at a certain size. You can only use columns for horizontal measurements.

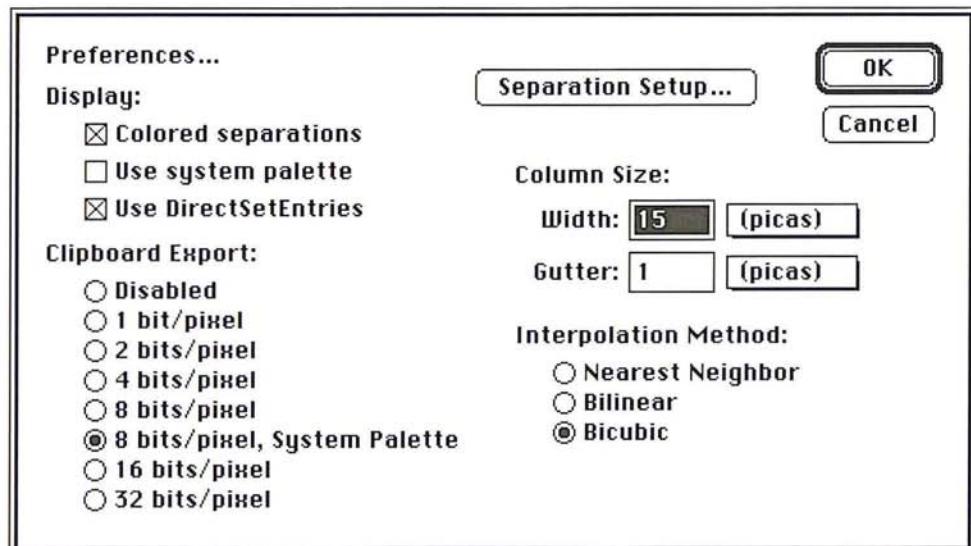
As an example, you can specify a size of 1 inch for columns, and .25 for the gutter, then specify 2 columns for the width parameter in the Cropping Tool Options dialog box and crop an image. The width of the cropped image will be 2.25 inches, which represents a width of 2 columns and 1 gutter size between the columns.

The Preferences dialog box in the Edit menu allows you to specify size units for the column width and gutter. Pop-up menus let you choose the size units, either inches, centimeters (cm), points, or picas.

### To specify column dimensions:

1. Choose Preferences from the Edit menu.

The Preferences dialog box appears.



2. Use the Width and Gutter pop-up menus to choose the units of measure you want for the column width and gutter.
3. Enter the width you want for the column.
4. Press the Tab key or double-click the Gutter text box.
5. Enter the size you want for the gutter.
6. Click OK.

## Chapter 5: Using the Painting Tools

This chapter describes how to use the painting tools. The painting tools in the toolbox allow you to add paint to a selected image or area. Painting changes the colors of pixels in an image. The painting tools include the pencil tool, the line tool, the paint brush tool, the airbrush tool, and the rubber stamp tool.

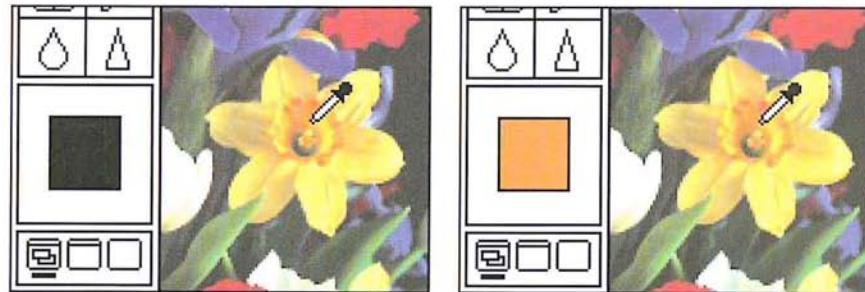
Each tool includes several options, which are accessed via a dialog box that appears when you double-click the tool in the toolbox. Some options common to all of the painting tools include the ability to paint or edit along a straight line, and to use color modes to paint or edit areas that are only lighter or darker than the foreground color. Chapter 7, “Painting and Editing Tool Options,” discusses the options common to several tools.

If you are using a painting tool on an image that is larger than the window, you can scroll through the image by switching temporarily to the grabber tool. This allows you to scroll in any direction without using the scroll controls.

Unless otherwise noted, the painting tools by default all paint with the foreground color. The foreground color is displayed in the center square within the rectangle at the bottom of the toolbox. The background color, which is displayed in the rectangle surrounding the square, is used for making blends and erasing. You can change the foreground and background color using the eyedropper tool. “Using the eyedropper tool” in Chapter 11, “Selecting Colors,” contains more information about selecting colors using the eyedropper tool.

**To change the foreground color to another color in an image:**

1. Click the eyedropper tool in the toolbox.
2. Position the eyedropper pointer on the color you want to use as the foreground color.
3. Click the mouse button.



**To scroll across an image while using a painting tool:**

1. Hold down the space bar.
2. Position the pointer on the image.  
The pointer changes into the grabber.
3. Press down the mouse button.
4. Drag in the direction you want the image to move. For example, if you want to view the left of the image, drag right to make the image move right.



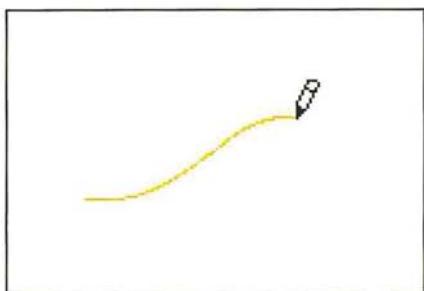
5. Release the mouse button.
6. Release the space bar to resume painting.

## Using the pencil tool

The pencil tool creates either freehand or straight lines. The lines are hard-edged. The pencil tool's Auto Erase option changes pixels that display the current foreground color to the background color. When you select the Auto Erase option, position the pointer on a pixel that is the same color as the foreground color, and drag through the image. The pencil tool changes all pixels.

**To paint with the pencil tool:**

-  1. Click the pencil tool in the toolbox.
- 2. Position the pointer where you want to start painting.
- 3. Holding down the mouse button, drag to paint a line.
- 4. When you have finished painting, release the mouse button.



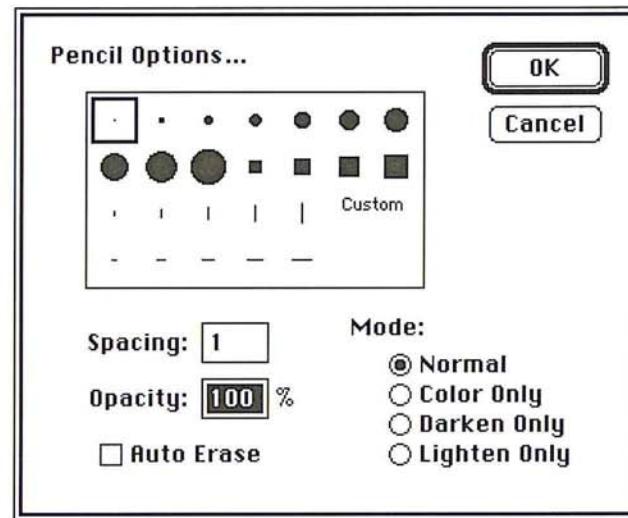
To draw a straight line with the pencil tool:

1. Click the pencil tool in the toolbox.
2. Press the Shift key, and click the mouse button at the beginning and end points of the line you wish to draw.
3. Release the Shift key.

To choose the Auto Erase option for the pencil tool:

1. Double-click or Option-click the pencil tool in the toolbox.

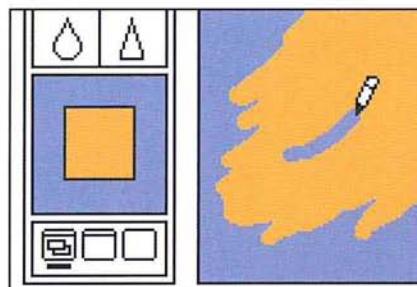
The Pencil Options dialog box appears.



2. Click Auto Erase.

The Auto Erase box is checked, indicating the Auto Erase option is active.

3. Click OK.
4. Position the pointer on the area you want to paint.
5. Holding down the mouse button, drag through the image.
6. When you have finished painting, release the mouse button.



## Using the line tool

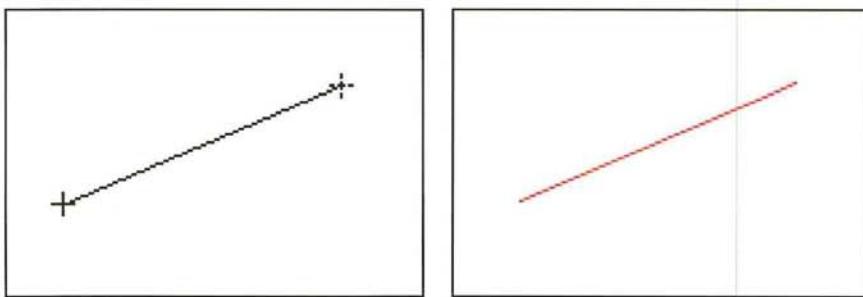
The line tool creates straight lines on an image. Line tool options allow you to specify the width of lines (in pixels) and create lines with arrowheads. Also, you can constrain the line tool to create horizontal or vertical lines, or lines constrained at 45-degree angles. You can choose to have the arrowheads appear at the start of the line, at the end, or at both ends.

Unlike the marks created using the pencil tool, the lines you create using the line tool are anti-aliased. The smooth, anti-aliased edges of the lines prevent the jagged edges that commonly appear in paint applications.

**To create a line using the line tool:**



1. Click the line tool in the toolbox.
2. Position the line tool pointer where you want the line to start.
3. Holding down the mouse button, drag in the direction you want to project the line.
4. When the line is the desired length, release the mouse button.



**To create a constrained, straight line using the line tool:**

1. Click the line tool in the toolbox.
2. Position the line tool pointer where you want the line to start.
3. Hold down the Shift key to constrain the line in 45-degree increments as you drag the mouse.
4. When the line is the length you want, release the mouse button.

## Specifying line weights and arrowheads

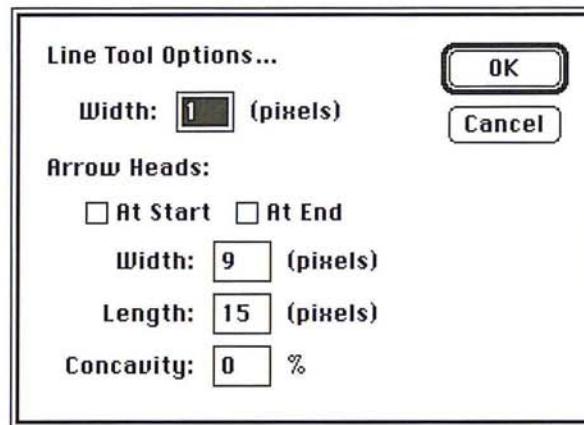
Before you create lines, you must choose the line weight and arrowhead options you want.

You can control the shape of the arrowhead by specifying the height and width (in pixels) and the degree of concavity (as a percentage value). The concavity parameter defines the amount of curvature on the widest part of the arrowhead where it meets the line.

To choose options for the line tool:

1. Double-click or Option-click the line tool in the toolbox.

The Line Tool Options dialog box appears.

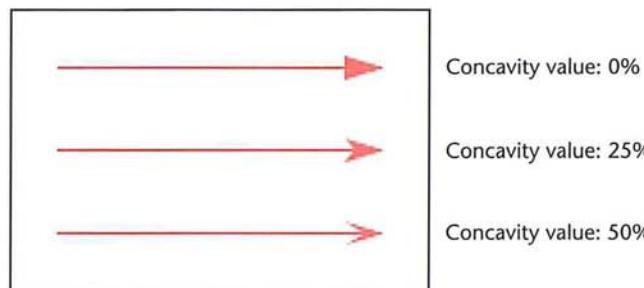


2. Type the width you want for lines (in pixels).
3. Specify where you want arrowheads to appear by clicking the At Start option to create lines with arrowheads at the starting points; the At End option to create lines with arrowheads at the ending points; or both options to create lines with arrowhead on both ends.

When the option is checked, arrowheads will appear on the specified end or ends of lines you create with the line tool.

To specify the attributes for arrowheads with the line tool:

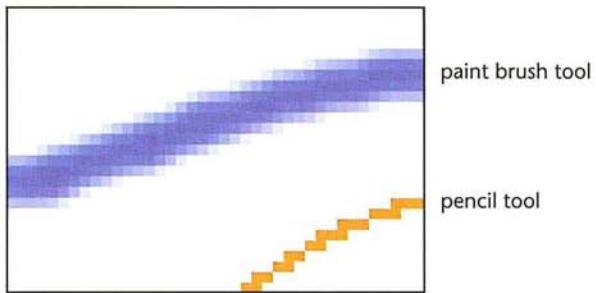
1. Double-click in the Width text box.
2. Enter a value from 5 to 99 for the arrowhead width.
3. Press the Tab key or double-click in the Length text box, and enter a value from 7 to 99 for the arrowhead length.
4. Press the Tab key or double-click in the Concavity text box, enter a value from 0 to 50 for the concavity of the arrowhead.



When you have finished choosing options for the line tool, click OK.

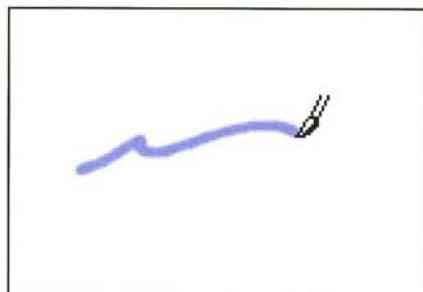
## Using the paint brush tool

The paint brush tool paints the foreground color into an image. The paint brush tool, unlike the pencil tool, applies the paint with soft edges. The paint brush tool works on all types of images, except bitmapped and indexed color images.



### To paint with the paint brush tool:

1. Click the paint brush tool in the toolbox.
2. Position the paint brush pointer where you want to begin painting.
3. Holding down the mouse button, drag to lay down a brush stroke.
4. To end the brush stroke, release the mouse button.

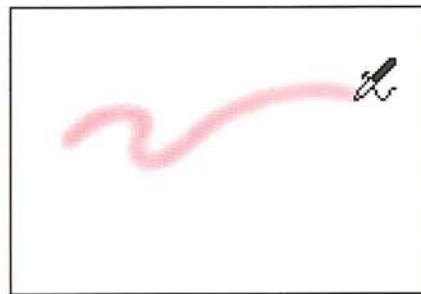


## Using the airbrush tool

The airbrush tool lays down a diffused spray of paint on an image. The tool works only on gray-scale and RGB images. You can specify the rate at which the airbrush tool deposits paint on the image. The higher the value you specify, the faster paint is deposited on the image. The Pressure parameter controls the rate of paint flow.

To paint with the airbrush tool:

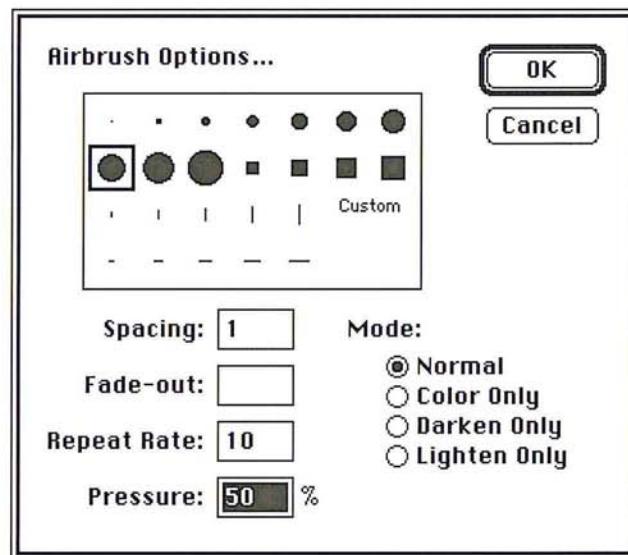
-  1. Click the airbrush tool in the toolbox.
- 2. Position the pointer where you want to begin spraying paint.
- 3. Holding down the mouse button, drag to spray-paint the image.
- 4. When you have finished airbrushing, release the mouse button.



To specify the pressure for the airbrush tool:

- 1. Double-click or Option-click the airbrush tool in the toolbox.

The Airbrush Options dialog box appears.



- 2. Enter a value from 1 to 100 in the Pressure text box.
- 3. Click OK.

## Using the rubber stamp tool

The rubber stamp tool differs from other painting tools because it allows you to paint more than just a color onto an image. You can use the rubber stamp tool to pick up a sample of an image, pattern, or texture and place an exact copy (called a “clone”) or a modified version of what you picked up on the same image or some other image.

The rubber stamp tool includes options that control how you can paint a pattern, texture, or part of an image onto the image. The options include the aligned and non-aligned Clone options, the aligned and non-aligned Pattern options, and the Texture, Impressionist, and Revert options. The default rubber stamp option, which is the aligned Clone option, allows you to pick up an image, and paint in an exact duplicate of that image.

**To use the rubber stamp tool with its default options:**



1. Click the rubber stamp tool in the toolbox.
2. Position the rubber stamp pointer on the part of the image you want to use.
3. Hold down the Option key.
4. Click the mouse button to take a sample of the image.
5. Release the Option key.

**To paint with the rubber stamp tool using the selected image:**

1. Position the rubber stamp pointer where you want to begin painting.
2. Hold down the mouse button.
3. Drag to paint in the selected image.
4. Release the mouse button.

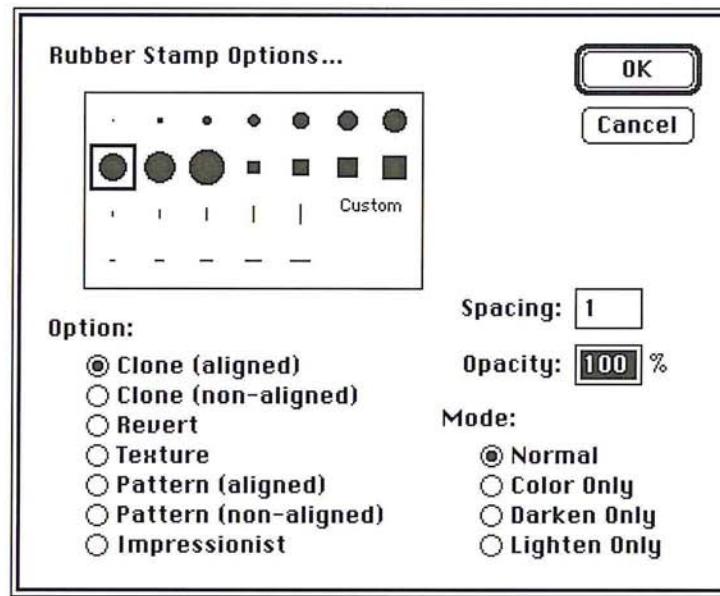
### Rubber stamp tool options

The Clone options allow you to choose part of an image and paint an exact copy of it elsewhere. The Revert option allows you to restore part of an image to the way it appeared the last time you saved the image. The Pattern options allow you to paint the current pattern on an image. The Texture option lets you select part of an image and paint a modified version of that part elsewhere. The Impressionist option lets you create an impressionistic effect on an image. The selected option is used throughout your Adobe Photoshop session until you choose another option.

To select the rubber stamp tool option you want to use:

1. Double-click or Option-click the rubber stamp tool in the toolbox.

The Rubber Stamp Options dialog box appears.



2. Click the name of the rubber stamp tool option you want.

The radio button beside the selected option is highlighted.

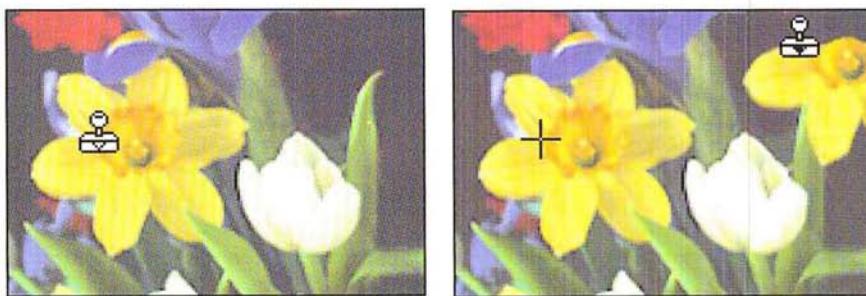
3. Click OK.

## The Clone option

The Clone option for the rubber stamp tool allows you to paint an exact copy of a selected image. The Clone option lets you take a sample of the entire image, then paint the sampled image, starting at the point from which you took the sample. Each stroke of the tool paints more of the image you sampled.

To select the part of the image you want to clone, you select the rubber stamp tool and Option-click. When you position the pointer on the image and drag, a marker mirroring the pointer's movement appears near the point where you Option-clicked. This marker identifies the part of the image you are currently painting.

When you begin painting, what appears first is the part of the image that was under the rubber stamp pointer when you picked up your sample. As you stroke through a wider area, more of the image is reproduced.



Two Clone options, aligned and non-aligned, determine what part of the sampled image appears first when you release the mouse button and start painting elsewhere on the image with the tool. The aligned option paints the sampled image continuously, as if you continued to drag the rubber stamp tool to a new position. The non-aligned option always paints the sampled image from the point where you started taking the sample.

When the non-aligned option is active, each time you start painting in a different area, the sampled image is painted in starting from the point you originally Option-clicked on the image. This option is useful for painting in multiple copies of part of an image (such as a daffodil or tulip) on many different parts of an image.

The aligned Clone option is useful in situations where you want to use different brushes to paint an image. You could select a large brush and paint the majority of the image, then select a small brush to paint the detailed areas. The aligned clone option ensures that the two different brush strokes (one with the large brush, the other with the small brush) create an image that lines up correctly. You could also use this option to paint two halves of an image, with one half on either side of another part of an image.

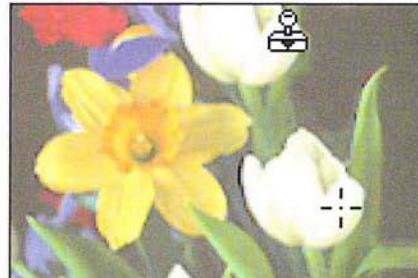
As an example, suppose you are working on an image that contains flowers and you want to paint an image of a tulip behind a leaf. To do this, you select the aligned Clone option from the Rubber Stamp Option dialog box, and Option-click on the image of the tulip. To paint the tulip behind the leaf, you position the tool on the left side of the leaf and paint the left side of the tulip. Then you release the mouse button, position the tool on the right side of the leaf and paint the right side of the leaf. This gives the effect of the tulip appearing behind the leaf.

**To use the non-aligned Clone option with the rubber stamp tool:**

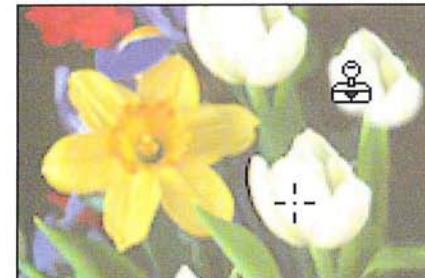
1. Double-click or Option-click the rubber stamp tool in the toolbox.  
The Rubber Stamp Options dialog box appears.
2. Select the Clone (non-aligned) option. Click OK.
3. Position the pointer where you want to take a sample from the image, and Option-click.
4. Position the pointer where you want to paint the cloned image.
5. Holding down the mouse button, drag to paint the image.
6. When you have finished painting the cloned image, release the mouse button.
7. To paint in the cloned image starting again from the point you sampled the image, reposition the pointer, hold down the mouse button, and drag to paint the image.



Clone (non-aligned) option selected



First application of paint



Second application of paint

**To use the aligned Clone option with the rubber stamp tool:**

1. Double-click or Option-click the rubber stamp tool in the toolbox.  
The Rubber Stamp Options dialog box appears.
2. Select the Clone (aligned) option. Click OK.
3. Position the pointer where you want to take a sample from the image, and Option-click.
4. Position the pointer where you want to paint the cloned image.
5. Holding down the mouse button, drag to paint the image.
6. When you have finished painting in part of the cloned image, release the mouse button.
7. Position the pointer where you want to paint more of the cloned image.
8. Holding down the mouse button, drag to paint the image.

In the illustration below of the second application of paint, notice that the marker shows part of the original, sampled image you are currently painting.



Clone (aligned) option selected



First application of paint



Second application of paint

## The Revert option

The Revert option for the rubber stamp tool restores an area on the image to the way it appeared the last time you saved the document. This option allows you to experiment freely with an image, then selectively restore a portion of the image. The Revert option is similar to the eraser tool's magic eraser mode, which restores part of an image to its state when you last saved it. The difference is that with the Revert option, you can specify a brush shape for the rubber stamp tool, and the brush is soft-edged rather than hard-edged.

When you use the Revert option, the Adobe Photoshop program reads in the last saved version of the image from disk, and restores the portions of the image through which you drag the rubber stamp tool. When you begin painting using this option, it may take a few moments for the tool to start working while the image is read in from disk.

### To use the Revert option with the rubber stamp tool:

1. Double-click or Option-click the rubber stamp tool in the toolbox.  
The Rubber Stamp Options dialog box appears.
2. Select the Revert option from the Rubber Stamp Options dialog box. Click OK.
3. Position the rubber stamp pointer where you want to begin restoring the image.
4. Holding down the mouse button, drag until you have restored the desired portion of the image.
5. Release the mouse button.



Modified but unsaved version of image



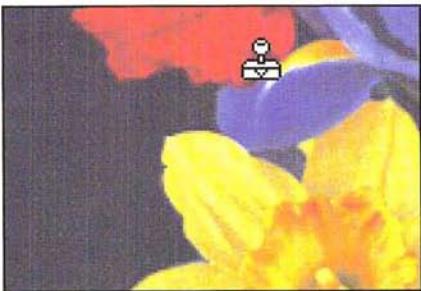
The Revert option restores the last saved version of the area through which you drag

## The Texture option

The Texture option for the rubber stamp tool paints a modified version of a selected texture. You select the Texture option, then select a texture on an image. When you paint the image, the pixels in the texture are randomly distributed to prevent a repeating pattern from appearing. If you make several strokes through the same area, the pattern will be different each time.

To use the Texture option with the rubber stamp tool:

1. Double-click or Option-click the rubber stamp tool in the toolbox.  
The Rubber Stamp Options dialog box appears.
2. Select the Texture option from the Rubber Stamp Options dialog box. Click OK.
3. Position the pointer on the texture in the image you want, and Option-click.



Texture selected

4. Position the pointer where you want to paint the texture.
5. Holding down the mouse button, drag to paint the modified texture.
6. When you have finished painting, release the mouse button.



Image with texture added

## The Pattern options

Two Pattern options allow you to paint a pattern onto your image: the aligned Pattern option and the non-aligned Pattern option. Both Pattern options let you select a pattern, then use the rubber stamp tool to paint using the selected pattern. The aligned option repeats the pattern as contiguous, uniform tiles; even when you stroke several times over the same area, the pattern is repeated. The non-aligned option centers the pattern around the center of the rubber stamp pointer without maintaining the entire pattern for each stroke.

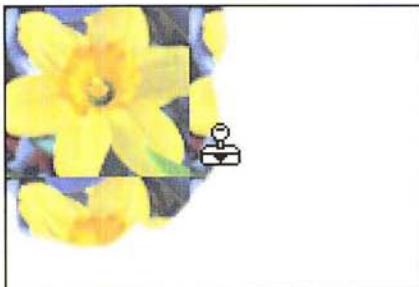
### To use the aligned Pattern option with the rubber stamp tool:

1. Click the rectangular marquee tool in the toolbox.
2. While holding down the mouse button, drag until you have selected the pattern you want to use; release the mouse button.

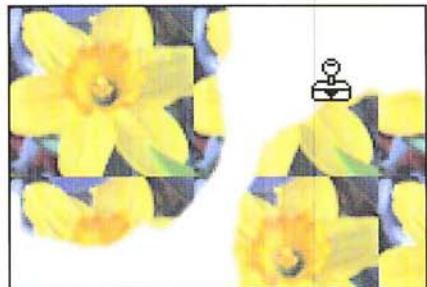


3. Choose Define Pattern from the Edit menu.
4. Double-click or Option-click the rubber stamp tool in the toolbox.  
The Rubber Stamp Options dialog box appears.
5. Select the Pattern (aligned) option from the Rubber Stamp Options dialog box.  
Click OK.

6. Position the rubber stamp pointer where you want to begin painting.
7. Holding down the mouse button, drag to paint in the pattern
8. When you have finished painting, release the mouse button.



First application of paint



Second application of paint



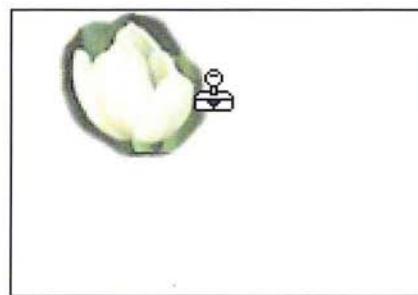
Aligned pattern

**To use the non-aligned Pattern option with the rubber stamp tool:**

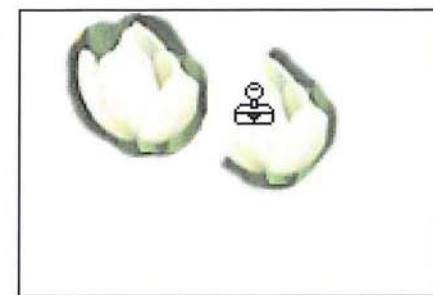
1. Click the rectangular marquee tool in the toolbox.
2. Holding down the mouse button, drag until you have selected the pattern you want to use.
3. When you have selected your pattern, release the mouse button.



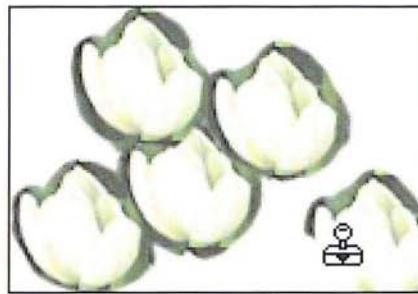
4. Choose Define Pattern from the Edit menu.
5. Double-click or Option-click the rubber stamp tool in the toolbox.  
The Rubber Stamp Options dialog box appears.
6. Select the Pattern (non-aligned) option from the Rubber Stamp Options dialog box. Click OK.
7. Position the rubber stamp pointer where you want to begin painting.
8. Holding down the mouse button, drag to paint in the pattern.
9. When you have finished painting, release the mouse button.



First application of paint



Second application of paint



Non-aligned pattern

### The Impressionist option

The Impressionist option for the rubber stamp tool creates textured designs based on the last saved version of a document. When you use the Impressionist mode, the Adobe Photoshop program reads in the colors from the last saved version of the area you drag through, and smears together the colors of the pixels beneath the brush to create an "impressionistic" effect. It may take a few moments for the rubber stamp tool to start working while the image is read in from disk.

**To use the Impressionist option with the rubber stamp tool:**

1. Double-click or Option-click the rubber stamp tool in the toolbox.  
The Rubber Stamp Options dialog box appears.
2. Select the Impressionist option from the Rubber Stamp Options dialog box. Click OK.
3. Position the rubber stamp pointer where you want to begin painting.
4. While holding down the mouse button, drag to paint the image.
5. When you have finished painting, release the mouse button.



## Chapter 6: *Using the Editing Tools*

The Adobe Photoshop editing tools let you erase, smudge, blur, and sharpen specific parts of an image. The eraser tool changes pixels to the background color. The smudge tool simulates the effect of dragging a finger through wet paint. The blur tool diffuses the colors of pixels you drag the tool through, to create a less-focused image. The sharpen tool increases the contrast between adjacent pixels to sharpen an image.

All of the editing tools include options. With the exception of the eraser tool, you can double-click a given editing tool to display the tool's options. The options include the ability to constrain an editing tool to a straight line, and edit only pixels that are lighter or darker than the foreground color. Chapter 7, "Painting and Editing Tool Options," describes the options common to all the editing tools.

You can also use the Blur and Sharpen commands in the Image menu to blur or sharpen selected parts of an image or the entire image at once. The advantage of using the blur and sharpen tools is that they allow you to concentrate the blur or sharpen effect on a small area.

For more information about the Blur and Sharpen commands, see the sections "Using filters to soften an image" and "Using filters to sharpen an image" in Chapter 17, "Using Filters to Modify Images."

### To use an editing tool:

1. Click the desired editing tool in the toolbox.
2. Position the tool pointer where you want to edit the image.
3. Hold down the mouse button.
4. Drag across the image.
5. Release the mouse button when you have finished editing.

### Editing with the eraser tool

The eraser tool changes pixels to the background color. This has the effect of "erasing" the pixels. You can erase just the pixels you drag through, or you can erase the entire image by double-clicking on the eraser tool in the toolbox. You can also use the eraser tool to restore part of the image to the last version you saved, using the magic eraser mode. You can undo your last erasure by immediately choosing the Undo command from the Edit menu.

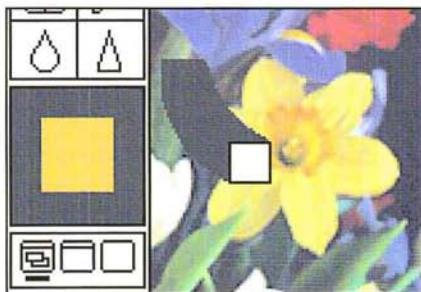
You can use the eraser tool in the magic eraser mode to restore part of an image to its state when you last saved the document. Unlike the Revert command in the File menu, which restores the entire image to its previous state, the eraser allows you to define specific parts of the image you want to restore. This operation is similar to using the Revert option for the rubber stamp tool. However, the Revert option for the rubber stamp tool gives you more control over the area that is restored because you can specify the brush size for the tool.

The eraser tool always erases or restores the area beneath the tool pointer. The eraser always appears the same size, regardless of the magnification level. Thus, the size of the erased area depends on the magnification level of your view. For example, at a 1:1 view, the eraser pointer covers a 16-pixel-by-16-pixel area, whereas at a 16:1 magnification, it covers only a 1-pixel-by-1-pixel area.

To erase part of an image by changing pixels to the background color:



1. Click the eraser tool in the toolbox.
2. Position the eraser pointer where you want to start erasing the image.
3. Holding down the mouse button, drag through the part of the image you want to erase.
4. When you have finished erasing the image, release the mouse button.



To erase the entire image at once, double-click or Option-click the eraser tool in the toolbox.



To use the eraser in the magic eraser mode to restore part of an image:

1. Click the eraser tool in the toolbox.
2. Position the eraser pointer where you want to begin restoring the image.
3. Hold down Option key, then the mouse button.

The pointer turns into the magic eraser pointer.

4. Drag over the part of the image you want to restore.

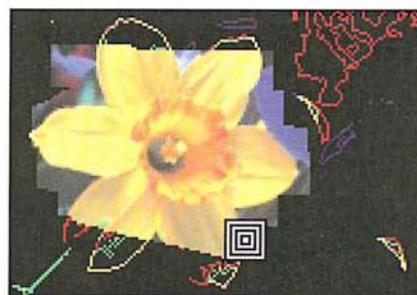
The area you drag through is restored to the way it looked when you last saved the document.



Last saved version of image



Current, unsaved version of image



Magic eraser restoring part of image to last saved version

5. When you have finished restoring the part of the image you want, release the mouse button and the Option key.

## Using the smudge tool

The smudge tool allows you to simulate the effect of dragging a finger through wet paint. The smudge tool works on all types of images except bitmap and indexed color images. When you use the smudge tool, the colors of the pixels you drag through are gradually dispersed until the colors dissipate completely.

You can define the length of the smudge using the Pressure parameter. To produce a short smudge, specify a low value. To specify a smudge that continues until you stop painting with the smudge tool, specify the maximum value.

### To use the smudge tool:

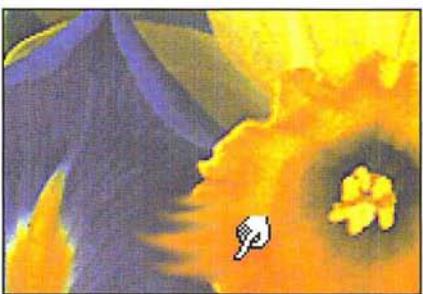


1. Click the smudge tool in the toolbox.

2. Position the smudge pointer on the area you want to smudge.



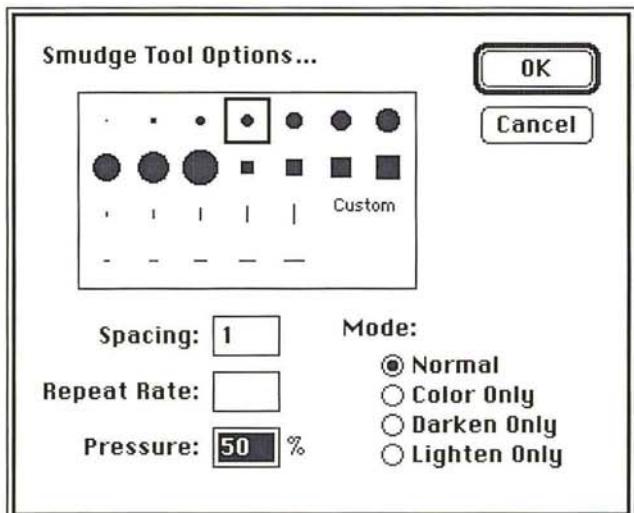
3. Holding down the mouse button, drag to create the smudge.



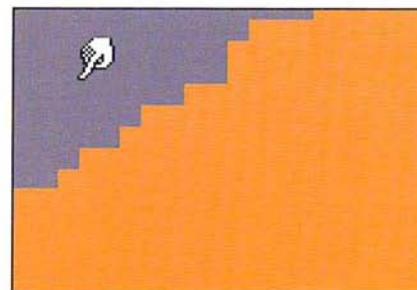
To specify a Pressure value for the smudge tool:

1. Double-click or Option-click the smudge tool in the toolbox.

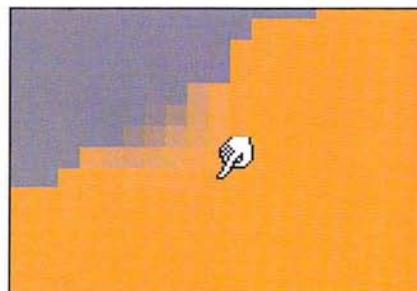
The Smudge Tool Options dialog box appears.



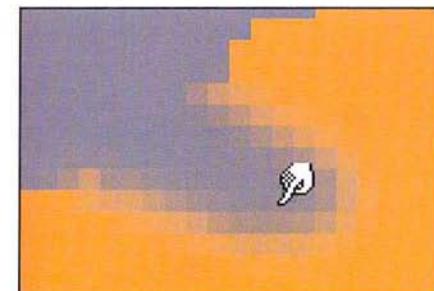
2. Enter a value in the Pressure text box from 1 to 100. For a short smudge, specify a low value; for a smudge that continues until you stop painting, specify the maximum value of 100.
3. Click OK.
4. When you have finished smudging the image, release the mouse button.



Before smudge



Smudge tool: 30% pressure



Smudge tool: 100% pressure

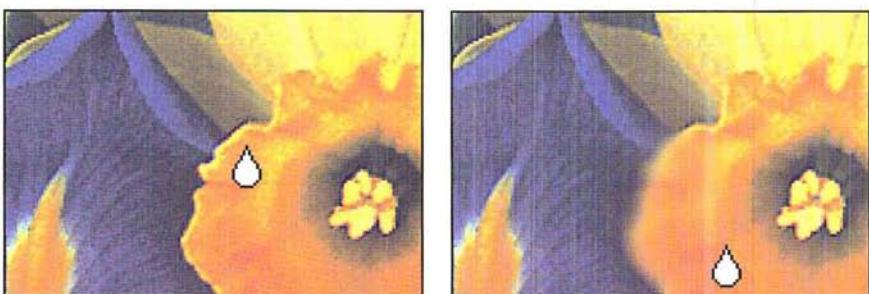
## Using the blur tool

The blur tool makes part of an image less focused by diffusing the colors to which you apply it. The blur tool works on all types of images except bitmapped and indexed color images. You can control the intensity of the blur tool using the Pressure parameter. To apply a strong blur effect to an image, you specify a high Pressure value; to apply a weak blur effect, you specify a low Pressure value.

### To use the blur tool:

- 1. Click the blur tool in the tool box.
- 2. Position the blur pointer on the area you want to blur.
- 3. Holding down the mouse button, drag to blur the image.

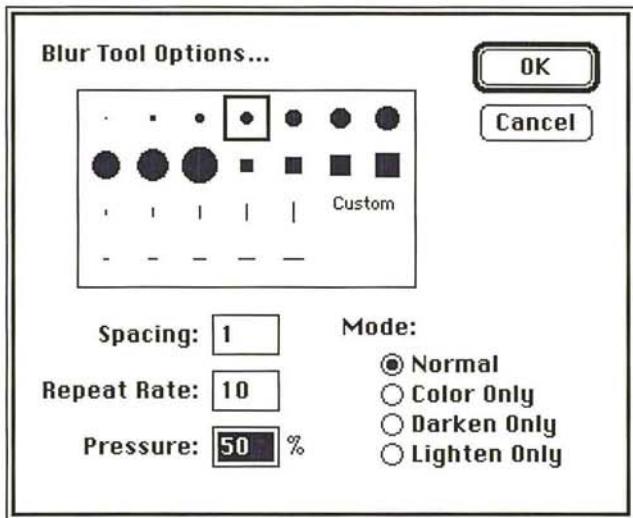
- When you have finished blurring the image, release the mouse button.



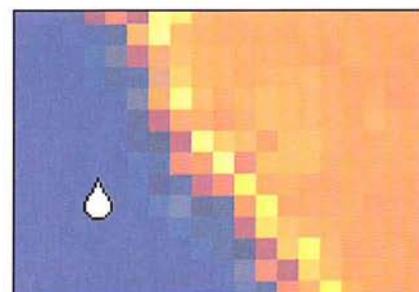
To control the intensity of the blur tool:

- Double-click or Option-click the blur tool in the toolbox.

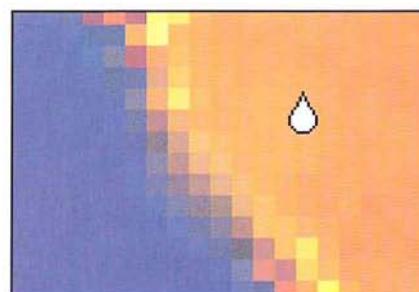
The Blur Tool Options dialog box appears.



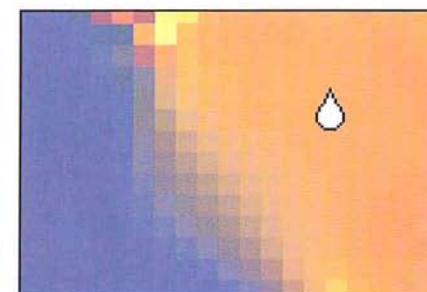
2. Enter a value from 1 to 100 in the Pressure text box. Click OK.



Before blur



Blur tool: 30% pressure



Blur tool: 100% pressure

## Using the sharpen tool

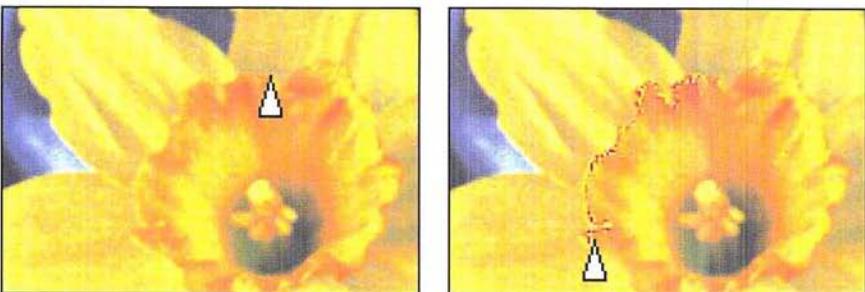
The sharpen tool allows you to make part of an image more focused. The sharpen tool works on all types of images except bitmap and indexed color images. As you drag through part of an image, the sharpen tool increases the contrast between adjacent pixels. This results in a sharper, more focused image.

You can control the intensity of the sharpen tool using the Pressure parameter. To apply a strong sharpening effect to an image, you specify a high Pressure value; to apply a weak sharpening effect, you specify a low Pressure value.

To use the sharpen tool:

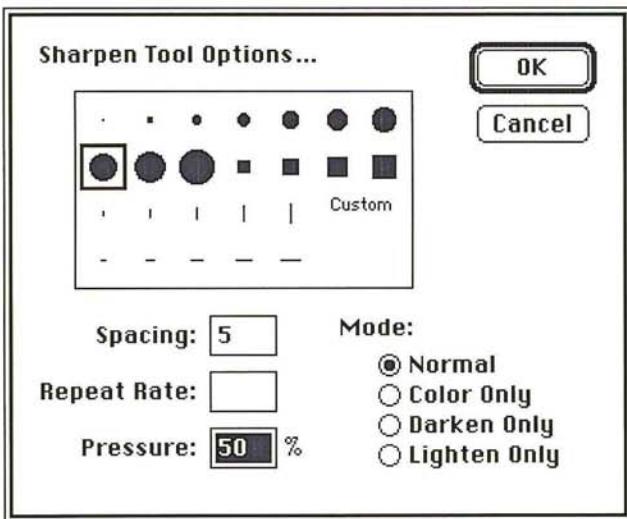
-  1. Click the sharpen tool in the tool box.
- 2. Position the sharpen pointer where you want to start sharpening the image.
- 3. Holding down the mouse button, drag to sharpen the image.
- 4. When you have finished sharpening the image, release the mouse button.

5. Release the mouse button when you have finished sharpening the image.

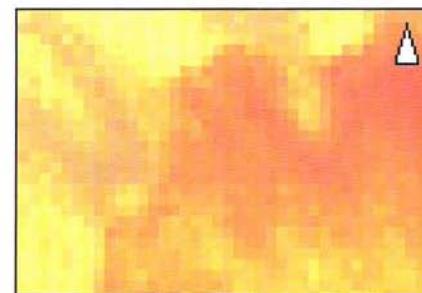


To control the intensity of the sharpen tool:

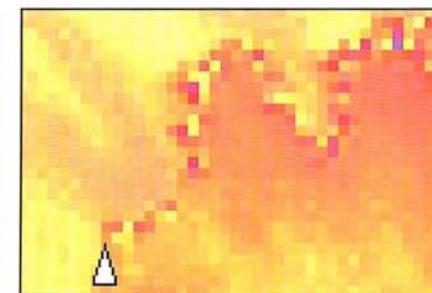
1. Double-click or Option-click the sharpen tool in the toolbox.  
The Sharpen Tool Options dialog box appears.
2. Enter a value from 1 to 100 for the Pressure.



3. Click OK.



Before sharpening



Sharpen tool: 100% pressure



## Chapter 7: *Painting and Editing Tool Options*

All of the painting and editing tools include a variety of options that allow you to achieve particular effects. For each of the painting tools, you can choose a preset brush shape or customize your own. For either the painting or editing tools, you can specify which pixels are affected by the paint. You can also paint or edit with straight lines. For certain tools, you can control the opacity, distribution, repeat rate, and fade-out rate of the paint.

Most of the options function in a similar manner. You can select a separate option for each specific tool, such as a different brush shape. The options you choose for each tool remain in effect during the current Adobe Photoshop session until you choose another option.

### Selecting a tool brush shape

Brush shapes for the painting and editing tools include round, square, and linear shapes in different sizes. You can choose a brush shape two ways: using either the tool options dialog box, which appears when you double-click the tool in the toolbox; or using the Show Brushes command in the Window menu, which displays the Brushes window.

The Brushes window allows you to select different brushes easily without having to open a dialog box each time. The Brushes window retains the brush settings for each tool. This allows you to select a different brush for each of the painting and editing tools. The active brush for the current tool is enclosed by a box.

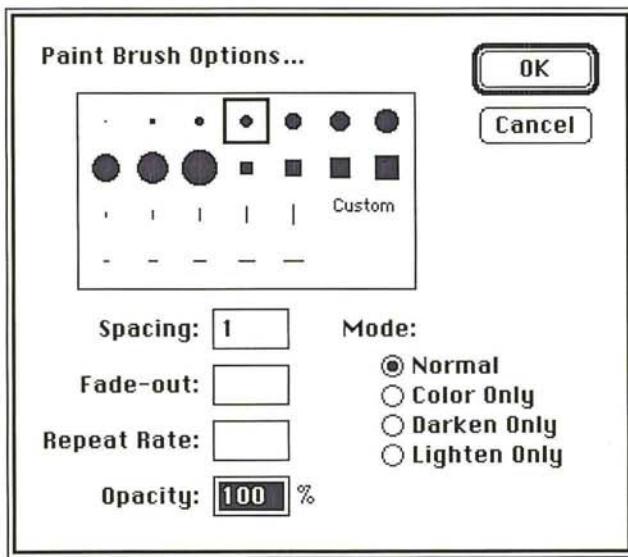
You can move the Brushes window to a convenient location on the screen by positioning the pointer on the gray bar at the top of the window and dragging.

To remove the Brushes window from view, either click the window's close box, or choose Hide Brushes from the Window menu.

#### To choose the brush shape you want for a particular tool:

1. Double-click or Option-click the painting or editing tool in the toolbox you want.

The options dialog box for that tool appears.

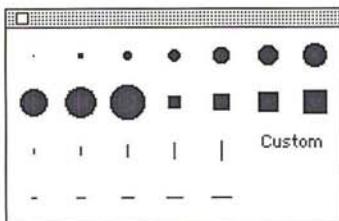


2. Click the brush shape you want to use.
3. Click OK.

**To select a brush from the Brushes window:**

1. Choose Show Brushes from the Window menu.

The Brushes window appears.



2. Click the painting or editing tool you want in the toolbox.
3. Click the brush you want.

A box appears around the brush to show it is selected.

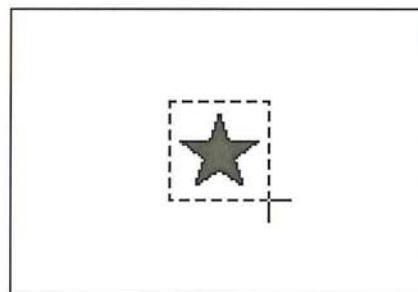
## Selecting a custom brush shape

You can define a custom brush shape to suit your needs. The brush shape you define can be no more than 64-pixels-by-64-pixels in size and should appear on a solid white background. The custom brush you define is placed among the brush shape options for all of the painting tools. The brush is labeled "Custom" in the tool dialog boxes and the Brushes window.

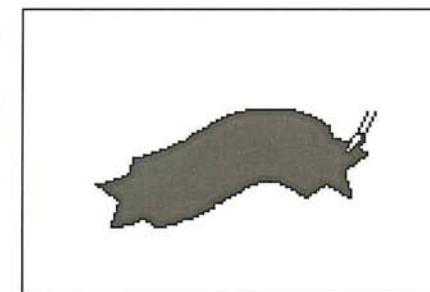
Only one custom brush shape at a time can be active for all the tools. However, you can create a variety of custom brushes, store them in a document, then open that document and select the one you want to use at a particular time. To define brushes with soft edges, you can select brush shapes composed of pixels with gray values other than 0 (black) and 255 (white).

### To define a custom brush shape:

- 1. Click the rectangular marquee tool in the toolbox.
- 2. Holding down the mouse button, drag the marquee to enclose the part of the image you want to use as a custom brush.



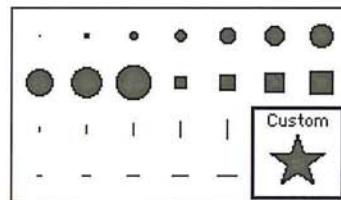
Selecting a custom brush



Painting with a custom brush

- 3. When the marquee encloses the part of the image you want, release the mouse button.
- 4. Choose Define Brush from the Edit menu.

The selected custom brush is placed in the Brushes window and in the painting and editing tools dialog boxes.

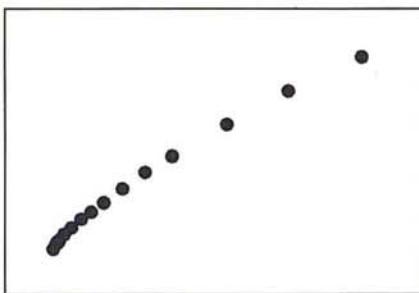


## Specifying paint distribution

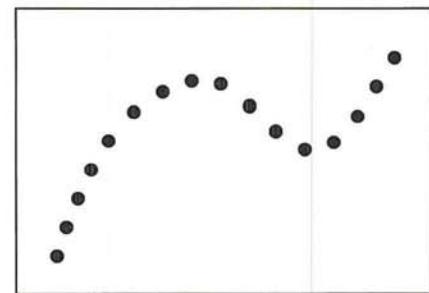
You can specify the distance between the pixels that are affected by each painting and editing tool. For example, if you specify 12 pixels as the spacing value for the pencil, the pencil lays down a mark once every 12 pixels as you drag across the image. If you specify 0, the distribution of paint is based on the speed of the mouse movement. If you drag quickly across an image, gaps probably will appear in the trail of pixels left by the tool. A spacing value other than 1 is useful when you paint with a large, custom brush.

To specify a spacing value for a painting or editing tool:

1. Double-click or Option-click the desired painting or editing tool in the toolbox. The options dialog box for the selected tool appears.
2. Click in the Spacing text box.
3. Enter a value from 1 to 999 for the spacing value you want.
4. Click OK.



Paint brush spacing parameter: 0



Paint brush spacing parameter: 40

## Specifying the paint opacity

You can specify how opaque you want the paint in your image to be using the Opacity option for the painting tools. The Opacity option allows you to use paint that ranges from nearly transparent to opaque. To use transparent paint, you specify a low percentage value; to use opaque paint, you specify a high value.

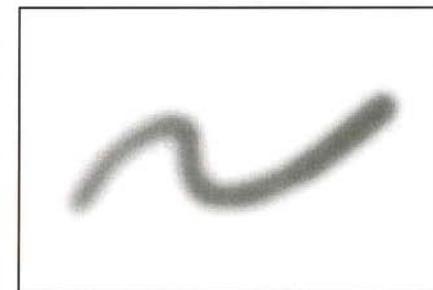
To specify a value for the opacity of the paint:

1. Double-click or Option-click the desired painting tool in the toolbox. The options dialog box for the selected tool appears.
2. Double-click in the Opacity text box.
3. Enter a value from 1 to 100.

4. Click OK.



Paint brush opacity value: 30%



Paint brush opacity value: 80%

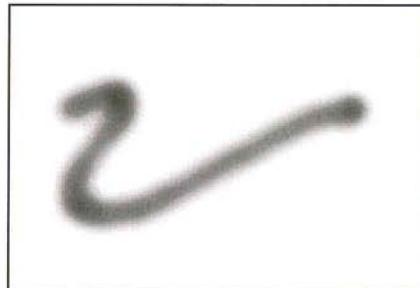
## Specifying the paint repeat rate

With the exception of the pencil, line, eraser, and rubber stamp tools, you can specify the rate at which paint is deposited on the image by the painting and editing tools when the mouse is stationary. The higher the Repeat Rate value, the more paint is deposited on the image.

In the case of the editing tools, like the blur tool, the Repeat Rate controls how fast the operation is performed when the mouse is motionless. For example, to blur an image a lot in a short time, you specify a high value for the Repeat Rate, and hold down the blur tool on the area you want to blur.

**To specify the repeat rate for a painting or editing tool:**

1. Double-click or Option-click the desired painting or editing tool in the toolbox.  
The options dialog box for the selected tool appears.
2. Click in the Repeat Rate text box.
3. Enter a value from 1 to 60.
4. Click OK.



Airbrush repeat rate: 50



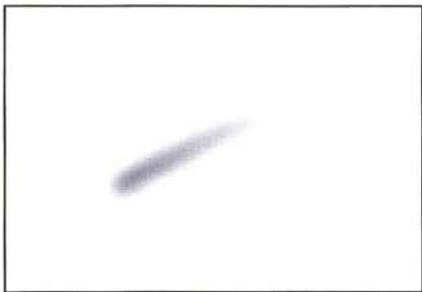
Airbrush repeat rate: 1

## Specifying the paint fade-out rate

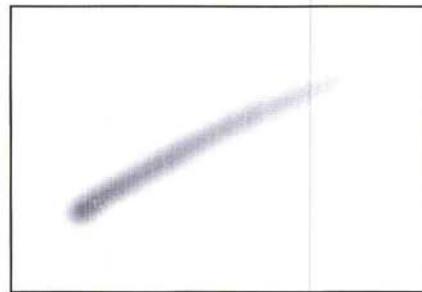
You can specify the rate at which the paint brush and airbrush fade out as you paint with them to simulate an actual brush stroke. The fade-out rate determines how many pixels are colored with each stroke before the paint fades out completely. The higher the fade-out value, the longer the paint will flow before it fades out. You can also specify a negative value to make the paint fade from the foreground color to the background color.

To specify the fade-out rate for the paint brush and airbrush tools:

1. Double-click or Option-click the paint brush or airbrush tool in the toolbox.  
The options dialog box for the selected tool appears.
2. Click in the Fade Out text box.
3. Enter a value from -999 to 999.
4. Click OK.



Airbrush fade-out rate: 60



Airbrush fade-out rate: 120

## Selecting a painting mode

You can control which pixels are affected by paint according to the painting mode you choose for a painting or editing tool. The modes include Normal, Darken Only, Lighten Only, and Color Only. In the default Normal mode, all the pixels you apply paint to are changed to the foreground color. But you can also choose to work in a mode in which only pixels lighter or darker than the foreground color are changed. Or, you can choose a mode that changes only the hue and saturation of a pixel.

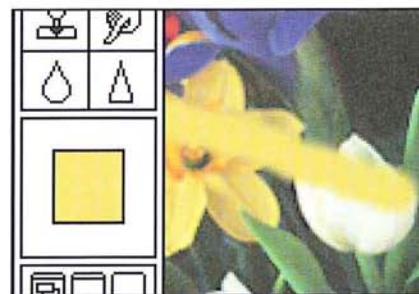
To choose the painting mode you want for a painting or editing tool:

1. Double-click or Option-click the desired painting or editing tool in the toolbox.  
The options dialog box for the selected tool appears.
2. Click the mode you want.
3. Click OK.

Following are descriptions of how the modes work.

## Normal

When the Normal mode is active, each pixel you apply paint to is changed to the foreground color. This is the default option, and how the painting and editing tools normally operate.



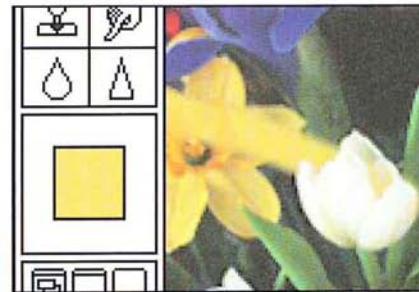
## Darken Only

When the Darken Only mode is active, only the pixels that are lighter than the foreground color are changed to the foreground color. Lightness is measured by the pixel's brightness value. The pixels that are darker than the foreground color are not changed.



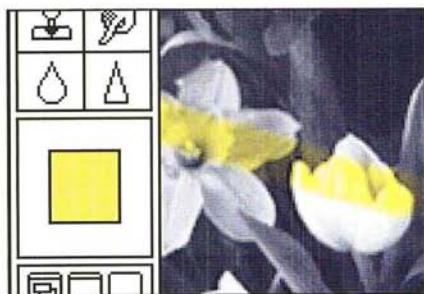
## Lighten Only

When the Lighten Only mode is active, only the pixels that are darker than the foreground color are changed to the foreground color. The pixels that are lighter than the foreground color are not changed.



## Color Only

When the Color Only mode is active, all of the pixels you apply paint to are changed to the foreground color, but their luminosity values are not changed. This preserves the texture in the image. This mode is useful for coloring monochrome images or for tinting color images.



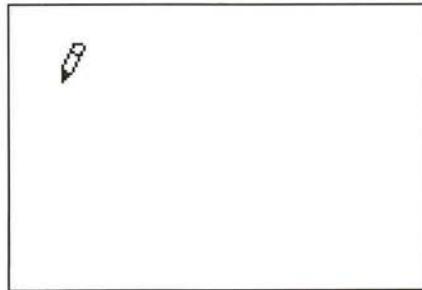
**NOTE:** Luminosity is a color parameter that measures the brightness of a color. Luminosity is expressed as a value. The value is computed as the weighted average of the pixel's RGB values, expressed as a percentage. The expression is: Luminosity = (.30 x Red) + (.59 x Green) + (.11 x Blue).

## Painting and editing with straight brush strokes

Using the Shift key, you can paint straight brush strokes with the pencil, paint brush, airbrush, and rubber stamp painting tools, and you can edit straight paths with the editing tools.

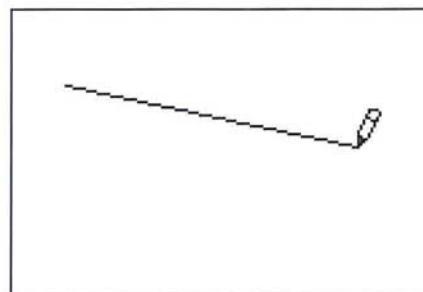
**To paint straight brush strokes or edit straight paths:**

1. Select the desired painting or editing tool from the toolbox.
2. Click the image where you want the straight brush stroke or path to start.

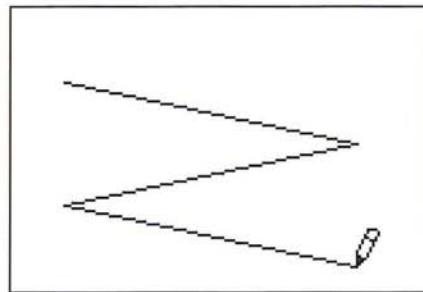


3. Hold down the Shift key.
4. Position the pointer where you want the straight brush stroke or path to end.

5. Click the mouse button.

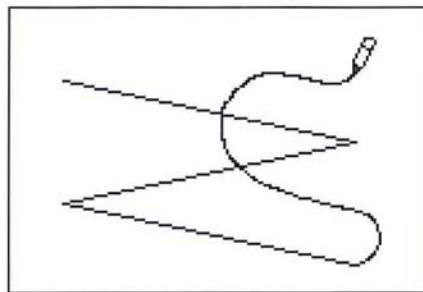


6. Continue moving the pointer and clicking the mouse button until you have defined all of the straight brush strokes or paths you want.



To resume defining freehand lines:

7. Release the Shift key.
8. Drag to define a freehand line or an irregular path.





## Chapter 8: *Using the Type Tool*

The Adobe Photoshop program allows you to enter bitmapped type on an image using the type tool. This chapter describes how to use the type tool to enter type on an image. It covers how to select type options, including typeface, size, leading, and styles; and how to add, edit, move, and align type.

Bitmapped type is different from the outline type that is generated in object-oriented applications. Bitmapped type is rendered at the resolution of the image. For example, if the resolution of the image is 100 pixels per inch, the resolution of the type in the image is also 100 pixels per inch.

Outline type is rendered at the resolution of the output device. If the output device's resolution is 2500 dpi, then the outline type is rendered at 2500 dpi. Also, you can edit (delete and change the font, size, and style of characters) outline type, but you cannot edit bitmapped type in the Adobe Photoshop program after you have placed it on the image.

Normally, large bitmapped type appears jagged on the screen. But if you use Adobe Type Manager™ (ATM™) software, the type appears as smooth and as well-defined as outline type.

You have a number of options to control the type you enter. You can specify the typeface and point size, and select style options like underlining and italics. The options you select remain in effect until you change them or quit the Adobe Photoshop program.

### **Using type in an image**

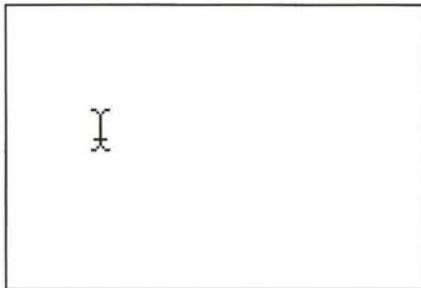
To use type in an image, you select the type tool, click on the image where you want the type to appear, then enter the type you want into the Type dialog box. The same dialog box lets you select type options. When you close the Type dialog box, the type appears selected on the image.

While the type is selected, you can move the entire text block or just individual characters. This allows you to kern, or adjust the letterspacing, in the type.

To adjust the letterspacing, you can choose to either deselect certain characters in a text block and move the remaining selected characters, or select the characters you want to move and deselect the other characters in the text block. Once you deselect the type, it becomes part of the image, and you can only change the type by editing the pixels that comprise the characters.

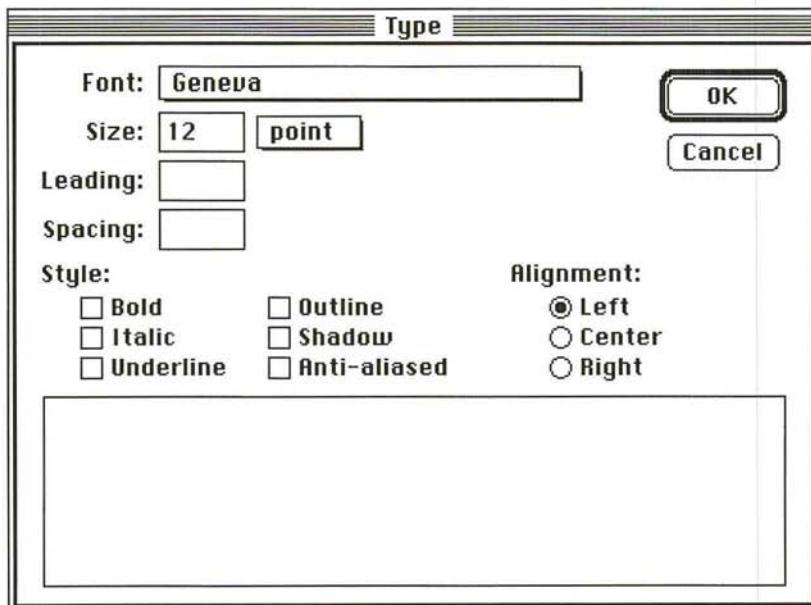
To enter type in an image:

- T 1. Click the type tool in the toolbox.
2. Position the pointer where you want the type to appear on the image.  
The pointer changes to the I-beam pointer.

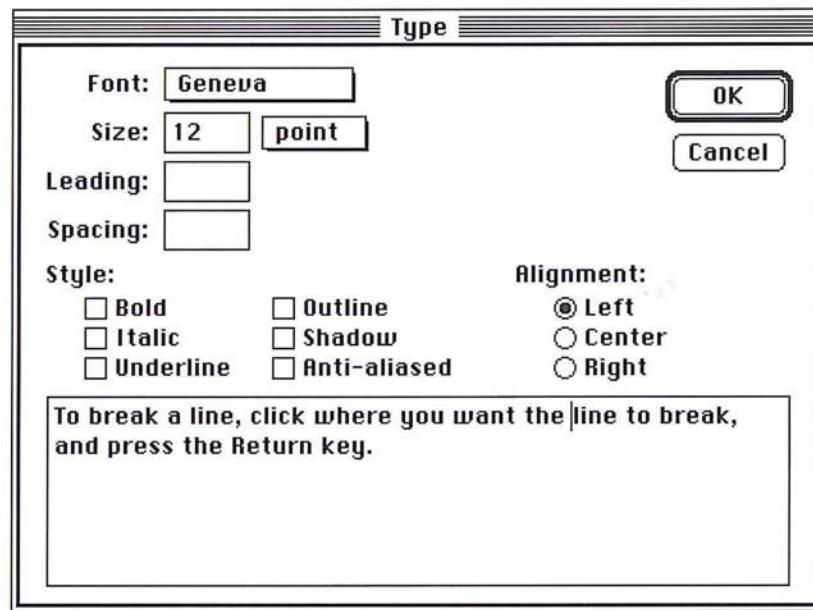


3. Click the mouse button.

The Type dialog box appears.



4. Enter the type you want in the text box, up to 255 characters at a time. The type automatically wraps at the right margin of the box, but appears as one continuous string on the image. To specify a line break, press the Return key; or click where you want the line to break, and press the Return key.



If you reach the bottom of the box while entering type, the type automatically scrolls up.

5. Click OK.

### Scrolling the type

To scroll the type up or down:

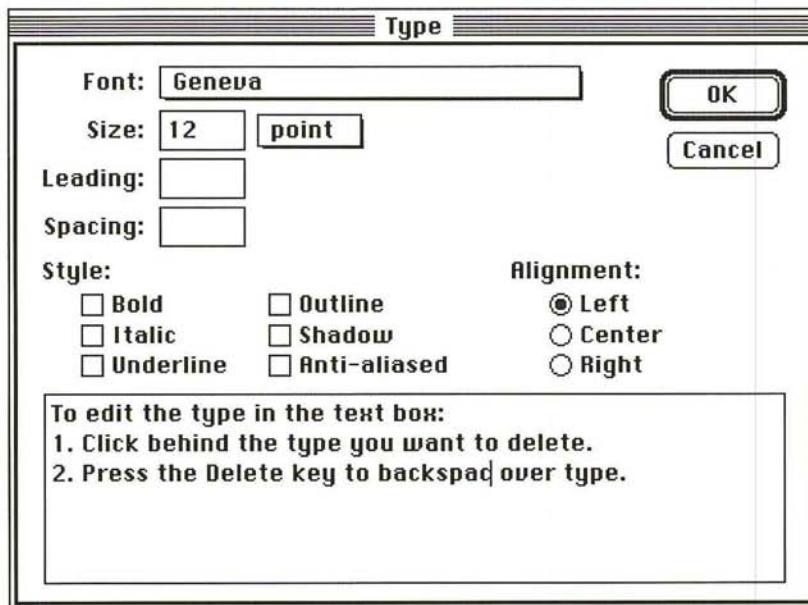
1. Click in the text box.
2. Holding down the mouse button, drag in the direction you want to scroll.  
The type scrolls in the direction you drag.
3. When the type you want is displayed, release the mouse button.

## Editing type

You can edit type in the Type dialog box using standard Macintosh text-editing procedures. There are two ways to select the type in the text box that you want to edit, described below. Once the text is placed on the image and deselected, you can no longer edit it.

### To delete type in the text box:

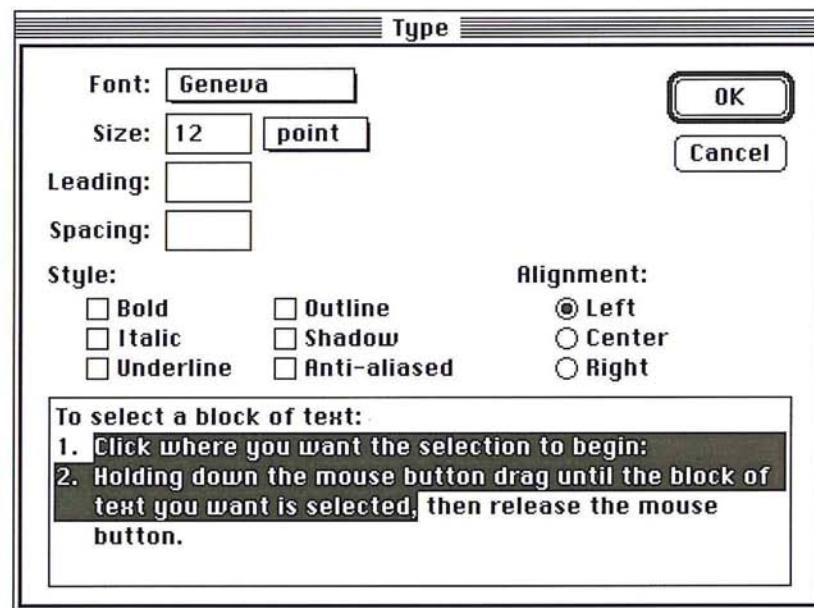
1. In the text box in the Type dialog box, click to the right of the type you want to delete.
2. Press the Delete key to backspace over type.



To select a single word, double-click the word.

To select a block of text, method 1:

1. In the text box in the Type dialog box, click where you want the selection to begin.
2. Holding down the mouse button, drag until the block of text you want is selected, then release the mouse button.



To select a block of text, method 2:

1. Click where you want the selection to begin.
2. Without pressing down the mouse button, position the pointer to the right of the text you want to select.
3. Hold down the Shift key, and click the mouse button.

The block is selected from the starting point to the end point you specified.

The steps below describe how to choose attributes for type, including font, size, leading, and style.

## Choosing a font

To choose the font you want to use:

1. In the Type dialog box, position the pointer on the box next to Font.
2. Hold down the mouse button.

A pop-up menu listing the fonts available in your system appears.



3. Drag until the font you want is highlighted, and release the mouse button.

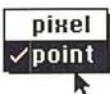
The name of the font you chose appears in the box.

## Choosing a font size

You can choose to specify the size for the type in either points or pixels, from 4 to 1000. The size range may be less if points are the unit of measure and resolution is not 72 dpi.

**To specify the unit of measure you want to use for the type:**

1. In the Size text box in the Type dialog box, position the pointer on the box labeled either "point" or "pixel."
  2. Hold down the mouse button.
- A pop-up menu appears.
3. Drag to highlight the unit of measure, and release the mouse button.



The chosen unit of measure appears on the box.

**To specify the size of the type:**

1. Double-click in the Size text box.
2. Enter a value from 4 to 1000.

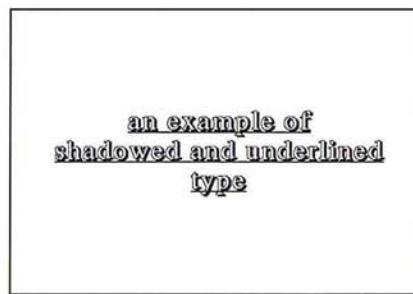
## Selecting style options for type

You can apply Style options to type so that it appears underlined, in italics, shadowed, outlined, and bold.

The Style options have a cumulative effect on type. For example, if you select Shadow and Underline, the type appears both shadowed and underlined on the image.

To select the Style options you want, click the desired style options in the Type dialog box.

As you select an option, the box beside it is checked. To revert to plain type, uncheck all of the Style options.

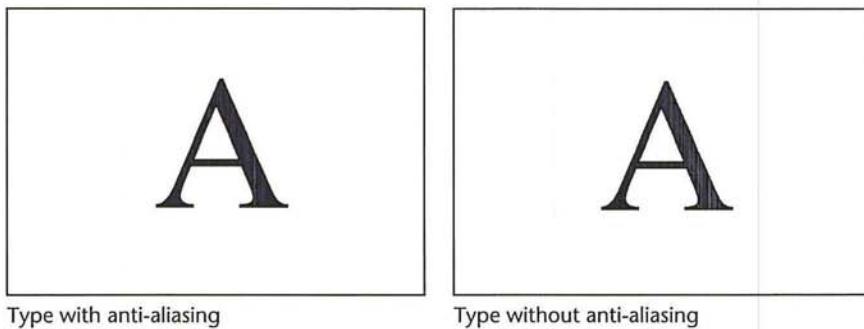


## Entering anti-aliased type

The anti-aliased Style option lets you enter type with edges that appear smooth. The smooth edges allow the type to blend into the background. You will probably want to use anti-aliased type in an image, except when you enter type in small point sizes.

The anti-aliased Style option requires that you use a font that has a bitmapped screen font that is two, three, or four times the size of the type you are entering, unless you are using ATM software and the desired font is installed in your system. For example, if you apply the anti-aliased option to 12-point Times, you must have installed on your system a 24-point, 36-point, or 48-point size Times screen font.

To apply the anti-aliased type option to your type, click the Anti-aliased Style option.



Type with anti-aliasing

Type without anti-aliasing

### Choosing the character spacing

You can control the spacing between characters, called kerning, in a text block using the type tool's spacing parameter. The spacing parameter uses the same unit of measure that you specified for the font size. Enter positive values to increase the spacing; enter negative values to decrease the spacing. Spacing increments can be as small as tenths of a point or pixel.

#### To specify a value for character spacing:

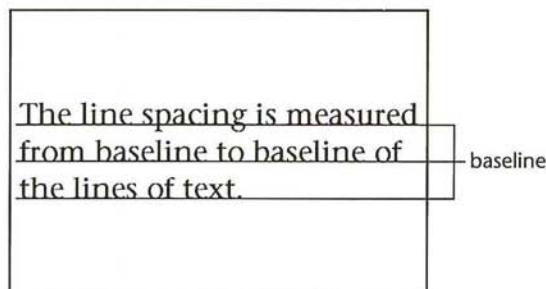
1. In the Type dialog box, click the Spacing text box.
2. Enter a value from -99.9 to 999.9.

### Choosing the line spacing

You can choose the line spacing, called leading, you want for type. The line spacing is measured from baseline to baseline of the lines of text. By default, the leading built into the font is used. The leading uses the same unit of measure you specify for the font size, either points or pixels.

#### To specify the amount of line spacing you want to use:

1. Click in the Leading text box in the Type dialog box.
2. Enter a value from 1 to 1000 to specify the spacing between lines of text.



## Aligning type

You can choose how to align type according to the point you clicked on with the type tool pointer. If you want to align the type so that it is centered on the image, choose the type tool, click on the center of the image, then choose Center alignment in the Type dialog box.

To choose the type alignment option you want, click the Left, Center, or Right button.

left aligned type	center aligned type	right aligned type
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## Completing the type selection

When you have selected the type options you want to use and you have finished entering the type, click OK.

The type appears selected on the image and is filled with the current foreground color. While the type is selected, you can modify it as you can any other selection. That is, you can fill it, rotate it, transform it, and so on.



Once you deselect the type, it becomes part of the image. You can select the pixels in the type as you would other pixels in the image, then modify the pixels. However, you cannot change the type attributes of type once it is placed on the image.

## Moving type on the image

You can move the text block, as long as it is still selected, to where you want it to appear on the image.

To move the type:

1. Position the pointer on one of the characters in the text block until the arrow pointer appears.
2. Holding down the mouse button, drag the text block to where you want the text to appear.
3. When you have positioned the type as desired, release the mouse button.



## Special type selection options

While a text block is selected on an image and the type tool is active, you can deselect individual characters and words in the text block, and move the characters that are still selected. This allows you to move characters closer to adjust the letterspacing, or kerning, or simply move certain characters to another position on the image.

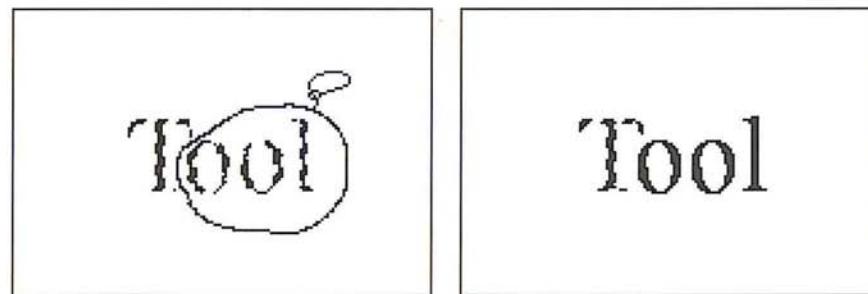
The type tool allows you to select the parts of an image you want to modify. While the type is still selected, the type tool is active, and when you press down the Command key and mouse button, the Type tool pointer changes to the lasso tool. The lasso tool then works in a special way to allow you to deselect characters in a text block.

To deselect characters in a text block:

1. Make sure that the type tool is selected.
2. Hold down the Command key.  
The pointer turns into the lasso.
3. Holding down the mouse button, drag the lasso around the character or characters you do not want to adjust.

- When the characters are enclosed by the lasso, release the mouse button and the Command key.

The characters you encircled with the lasso are deselected.



You can now move or modify the other characters in the text block without affecting the characters you deselected.

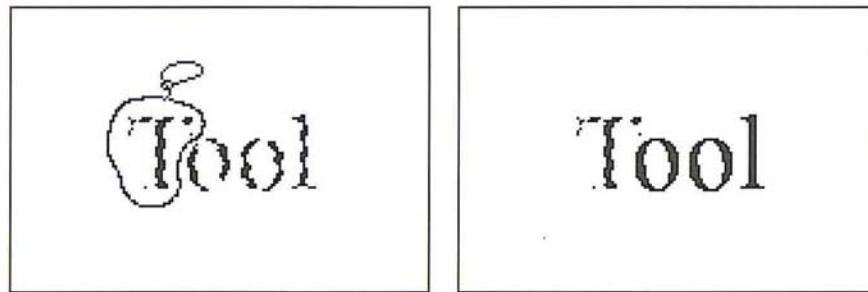
If you want, you can use a similar procedure to select the characters you want to move and deselect the other characters.

**To select the characters you want to move:**

- Hold down the Shift and Command keys.
- Holding down the mouse button, drag the lasso tool around the characters you want to remain selected.

The characters you encircled with the lasso tool remain selected, and the other characters are deselected. You can now move the selected characters closer to the deselected characters to kern the type.

- When the characters you want are enclosed by the lasso tool, release the mouse button and the Shift and Command keys.



**NOTE:** Make sure that you encircle the entire character you want to select; any portion of a character outside the lasso tool will not be selected.

**To adjust the letterspacing:**

1. Position the pointer on one of the selected characters.
2. Hold down the mouse button.
3. When the arrow pointer appears, drag the characters until you are satisfied with how the type looks. To constrain the movement to a straight line, hold down the Shift key.
4. If you constrained the movement, release the mouse button and the Shift key.
5. Deselect the type.

**NOTE:** You can use the arrow keys to move the selected characters in 1-pixel increments. Simply press the arrow key that points in the direction you want to move the type.

## Chapter 9: *Making Selections*

This chapter describes how to use the Adobe Photoshop program selection tools and commands to select parts of an image. The Adobe Photoshop program selection tools allow you to select images in a variety of ways and with a range of precision. The chapter also describes alpha channels and how to modify, edit, and store selections. An alpha channel is an 8-bit, gray-scale representation of an image.

In addition to the standard lasso and marquee selection tools, you can also use the magic wand tool to automatically select images. This tool lets you select parts of an image based on the similarity of colors. This way, you can easily select a specific part of an image without having to laboriously trace its outline. You can also add to and subtract from a selection.

The selection remains in effect until you deselect it. Once you select a portion of an image, you can modify it without affecting the rest of the image. For example, if you drag the eraser through a selection and continue through a part of the image that isn't selected, the non-selected portion of the image remains unchanged. You can flip, rotate, and freely move selections, as well as adjust their color characteristics.

### Using the selection tools

The selection tools include the lasso tool, the rectangular and elliptical marqueses, and the magic wand. These tools and their commands are described in the following section.

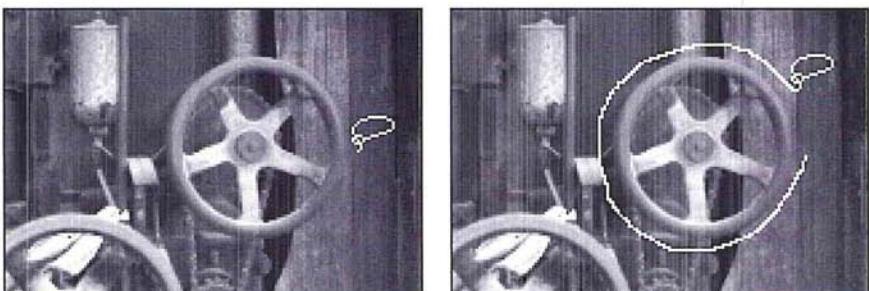
#### Using the lasso tool

The Adobe Photoshop program lets you isolate areas of an image using several selection tools, including the marquee and lasso tools. The lasso tool is a freehand tool that lets you define any arbitrary selection area. You can use the lasso tool to trace the outline of a selection. Once you make a selection, you can add to it or subtract from it. You can also use the lasso tool to select straight line segments, or a combination of straight and freehand lines. The pixels in the selection will be affected by the changes you specify.

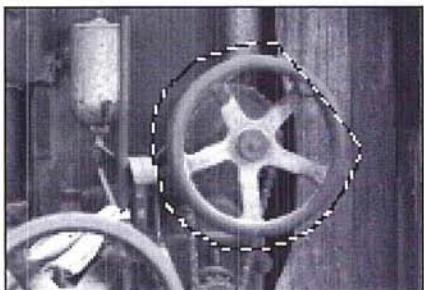
##### To use the lasso tool:

- 
1. Click the lasso tool in the toolbox.
  2. Position the lasso pointer where you want the selection to begin.
  3. Holding down the mouse button, drag to trace the outline of the selection area.

4. To close the selection border, release the mouse button.



You can either drag to the starting point of the selection and release the mouse button to complete the selection, or release the mouse button when you have enclosed most of the selection. When you release the mouse button before the selection is completed, a straight line is projected to the beginning of the selection to complete the selection for you automatically.



#### **Adding to and subtracting from a selection**

If you have not selected the area you wanted, you may alter the selection by adding to it or subtracting from it.

##### **To add to a selected area:**

1. Holding down the Shift key, then press the mouse button, drag to trace the outline of your selection to add it to the original lassoed selection.

**NOTE:** If you click the mouse button without first pressing the Shift key, you will lose the first selection.

2. When you have finished making your selection, release the Shift key and the mouse button.

A new lasso appears around the two selections.

**To subtract from a selected area:**

1. Hold down the Command key, and press the mouse button.
2. Trace the outline of the selection. Make sure that you completely surround the first lasso border. If you do not connect the end points of the new lasso that is selecting the area to be removed, you will bisect the lasso into two, separate lassos.
3. Release the Command key and the mouse button. The new, reduced lasso appears around the selection.

**Selecting a combination of straight and freehand lines with the lasso tool**

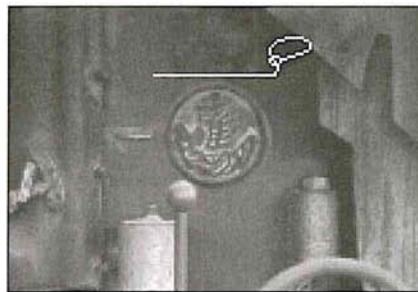
While you use the lasso tool, you can use the Option key to define straight line segments. This feature is useful for selecting parts of an image that contain rectilinear shapes, such as a window, a door, or a box.

You can use a combination of straight line segments and freehand drawing with the lasso tool. This is useful on objects that combine straight lines and curves. As you select a combination of straight and freehand lines, you must continue holding down the Option key. Click to define starting and end points of straight line segments; to draw freehand lines, hold down the mouse button and drag.

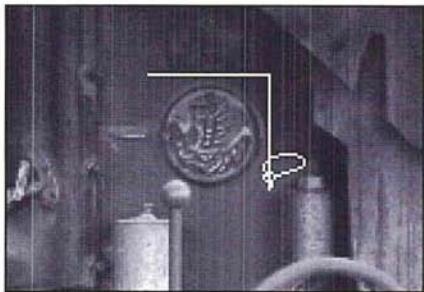
**To select a combination of straight and freehand lines using the lasso tool:**

1. Press down the mouse button.
2. To define the selection area, hold down the Option key.
3. Release the mouse button where you want the straight line to start.
4. Position the pointer where you want the line to end, and click the mouse button.

A selection line is attached to the pointer.

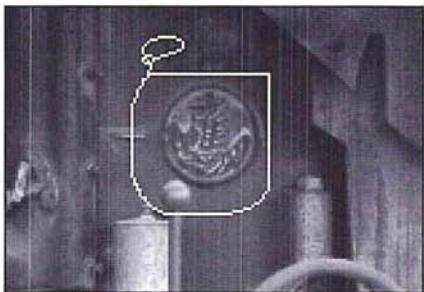


To define additional straight line segments, continue repositioning the pointer and clicking the mouse button.



**NOTE:** You must continue to hold the Option key or a straight line will automatically be drawn between the two ends of the lasso.

5. To resume defining freehand parts of the selection, press down the mouse button and drag instead of moving the pointer and clicking.



6. When you have finished making your selection, release the mouse button and the Option key.

**NOTE:** You can move a lassoed selection. To do so, position the lasso pointer inside the selection, press the mouse button, and drag the selection to the desired location. Release the mouse button. To undo the move, choose Undo from the Edit menu.

### Using the marquee tools

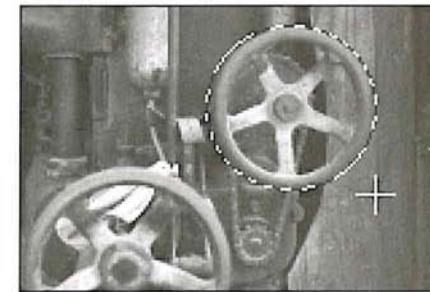
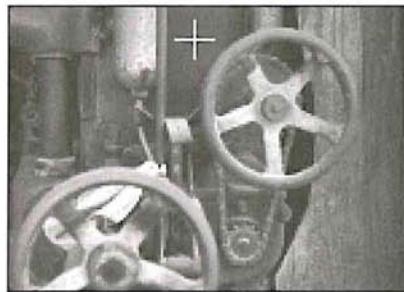
The Adobe Photoshop program includes a rectangular marquee to make rectangular-shaped selections and an elliptical marquee to make elliptical-shaped selections. The options available for both tools are very similar. You can specify a fixed size in pixels, as well as a height-to-width ratio, when using these tools. Both tools include the option of specifying the horizontal and vertical dimensions of the selection marquee.

The rectangular marquee tool also lets you select a single row or column of pixels on the image. The options you select for the tools remain in effect throughout your Adobe Photoshop session or until you change the options.

**To use the rectangular or elliptical marquee tool:**

1. Click the desired marquee tool in the toolbox.
2. Position the marquee pointer where you want to begin the selection.
3. Hold down the mouse button, and drag in a diagonal direction to enclose the selection with the selection border.

The selection border appears around the selection.



4. When you have enclosed the selection with the border, release the mouse button.

**Selecting a single row or column of pixels**

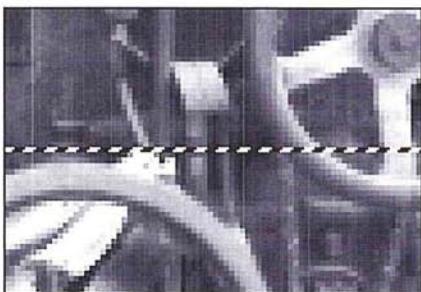
You can use the rectangular marquee tool to select either a single row or a column, one-pixel wide, on the image. You can cut, copy, and otherwise modify the one-pixel line as you would any other selection.

**To select a row or column of pixels on the image using the rectangular marquee:**



1. Double-click the rectangular marquee tool in the toolbox.
2. Click Single Row to select a single horizontal row of pixels or click Single Column to select a single vertical column of pixels.
3. Click OK.
4. Position the marquee pointer near the row or column you want to select.
5. Hold down the mouse button.
6. Drag to position the selection border on the row or column you want to select, then release the mouse button.

A single selection line appears on the drawing.



#### **Creating selections from a corner or from the center**

You can define a selection from either a corner or from the center of the rectangular or elliptical marquee. By default, when you define a marquee selection, you define it from a corner. You use the Option key to define the selection from the center.

To create a marquee selection from the center:

1. Click either the rectangular or elliptical marquee tool in the toolbox.
2. Position the pointer where you want the center of the selection to appear.
3. Hold down the Option key and mouse button, and drag to define the selection marquee.
4. When you have defined your selection, release the mouse button.

#### **Defining a fixed size for the marquee tools**

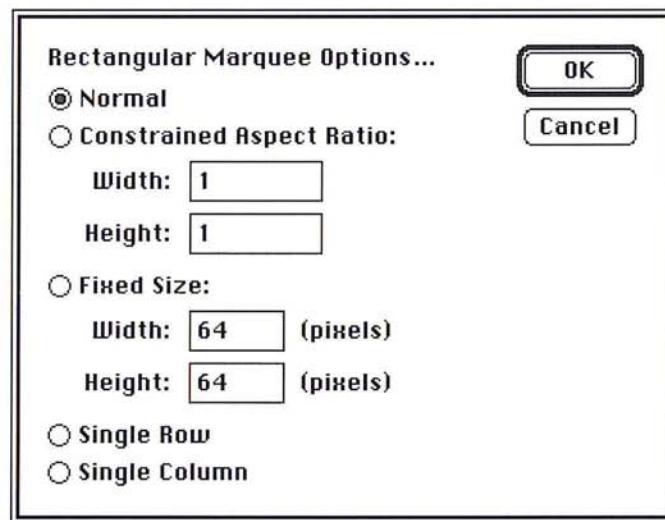
You can define a fixed size for each of the selection marquees. Instead of defining the size of the selection border by dragging with the mouse, you can use this option to specify values for the height and width of the selection marquee. This option is useful when you want to select an area of a specific size.

To specify a fixed size for a marquee tool:

1. Double-click or Option-click either the rectangular or elliptical marquee tool in the toolbox.



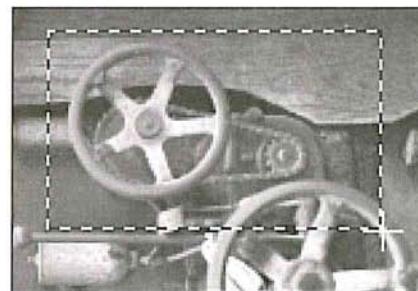
The dialog box for the selected marquee tool appears.



2. Click Fixed Size.
3. Enter the value you want for the width (in pixels).
4. Press the Tab key or double-click in the Height text box.
5. Enter the value you want for the height (in pixels).
6. Click OK.

To define a marquee with the dimensions entered above:

1. Position the marquee pointer in the lower-right corner of the area you want to select.
2. Holding down the mouse button, drag to position the marquee where you want it.



Fixed size of 125 by 75 pixel marquee

3. Release the mouse button.

## **Defining a size ratio option for the marquee tools**

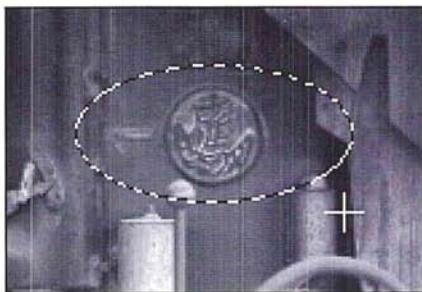
The Adobe Photoshop program lets you specify a height-to-width ratio, called the "aspect ratio," for each type of marquee. To define a square-shaped marquee or a round marquee, you enter the same values for the height and width. If you want to use a marquee that is twice as wide as its height, you would enter 2 for the width and 1 for the height. You can use decimal values (2.5, for example) for the width and height.

### **To specify the aspect ratio for either marquee tool:**

1. Double-click or Option-click the desired marquee tool in the toolbox.  
The options dialog box for the selected marquee tool appears.
2. Click Constrained Aspect Ratio.
3. Double-click in the Width text box, and enter the value for the width.
4. Press the Tab key or double-click in the Height text box, and enter the value for the height.
5. Click OK.

### **To define a selection marquee with the ratio entered above:**

1. Position the marquee pointer where you want the selection to begin.
2. Holding down the mouse button, drag the marquee to the desired position.
3. When you have defined your selection, release the mouse button.



Constrained aspect ratio of 2 by 1

A selection marquee with the specified aspect ratio appears on the image.

## Defining a feather edge using the lasso and marquee tools

You can apply a feather edge to a selection. A feather edge is an area around the border of a selection to which a change is partially applied. Both the lasso and marquee tools allow you to create a feather edge. If you fill a selection that has a feather edge, the color in the fill gradually blends in with the colors surrounding the selection and the colors within the feather edge radius inside the selection.

A feather edge can range in width from 1 to 64 pixels. The value you specify for the feather edge indicates how far inside and outside the selection border you want the change to extend until it blends into the surrounding pixels. The value you enter for the feather edge must be less than the width of the selection. The lasso tool will not make the selection if the feather edge is larger than the selection area.

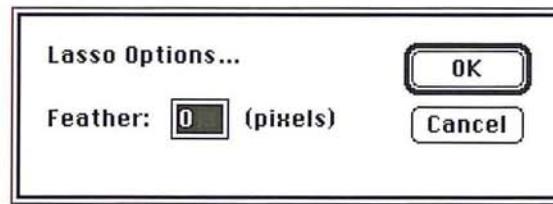
You can use the feather edge feature on a selection on which you are adjusting the contrast or color balance. In this case, the feather edge will soften the transition between the selection and the surrounding pixels. You can also use the Feather command in the Select menu to feather a selection.

The feather edge feature works on all image types except bitmapped and indexed color images. To use the feather edge feature on an indexed color image, first convert the image to an RGB image, make your selection and modifications, and then convert the image back to the indexed color format.

### To define the feather edge for the lasso tool:

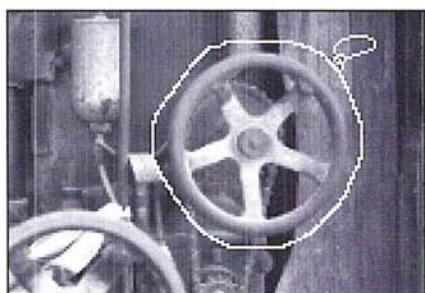
1. Double-click or Option-click the lasso tool.

The Lasso Options dialog box appears.

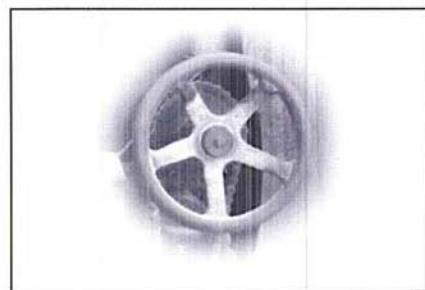


2. Enter the range (in pixels) around the selection border that you want to be affected by changes.

3. Click OK.



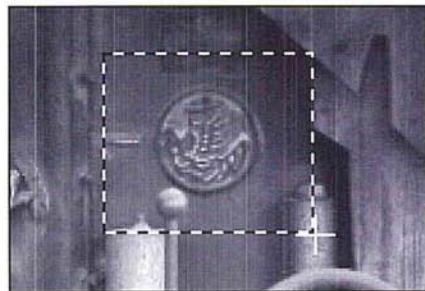
Feather value: 5



Feather value: 25

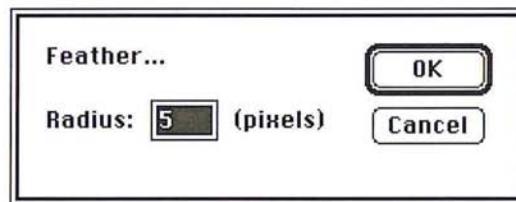
To specify the range (in pixels) of the feather edge for the marquee tools:

1. Click either the rectangular or elliptical marquee tool in the toolbox.
2. Select the part of the image to be modified.



3. Choose Feather from the Select menu.

The Feather dialog box appears.



4. Enter a value from 1 to 64 (pixels) for the feather edge.

The illustration below shows how a change is applied to the feathered edge of a selection.



Feather value: 5



Feather value: 15

### Using the magic wand

The magic wand tool is a versatile selection tool that allows you to select portions of images by simply clicking on them. The Adobe Photoshop program compares the color values of adjacent pixels to determine if they are within the color range (or “tolerance”) specified for the magic wand. The pixels within that color tolerance are selected. In addition, the magic wand tool allows you to control the amount of feathering, or anti-aliasing, applied to a selection with the Fuzziness parameter.

Because the pixels that form a specific part of an image may have similar color values, the magic wand tool allows you to select part of an image simply by clicking on it. In addition, specifying the tolerance value for the color comparison enables you to choose how extensive you want the selection to be. For example, you can choose either to select just the dark hair of a person in an image, or the person’s lighter clothing as well.

The color comparison is based on three values: the color value of the pixel you click with the magic wand pointer, the tolerance value, and the adjacent pixels. If you specify a tolerance value of 25 and click a pixel with a color value of 100, the adjacent pixels with color values in the range 75 to 125 will be selected. Tolerance ranges from 0 to 255.

**To make a selection using the magic wand tool:**

1. Click the magic wand tool in the toolbox.
2. Position the magic wand pointer on the part of the image you want to select.
3. Click the mouse button.

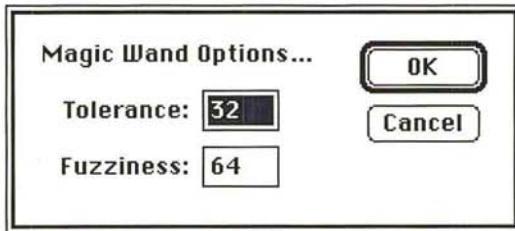
**Specifying the color tolerance**

The Tolerance parameter for the magic wand tool specifies the color range of the pixels you will select using the wand. Enter a value close to 0 to select pixels with very similar colors; enter a value close to 255 to select pixels with dissimilar colors.

**To specify the color tolerance parameter:**

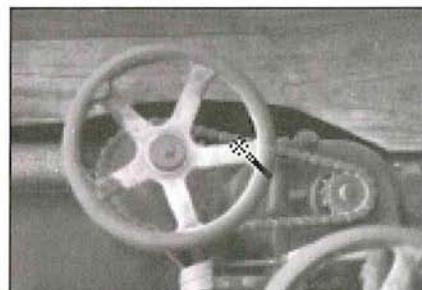
1. Double-click or Option-click the magic wand tool in the toolbox.

The Magic Wand Options dialog box appears.

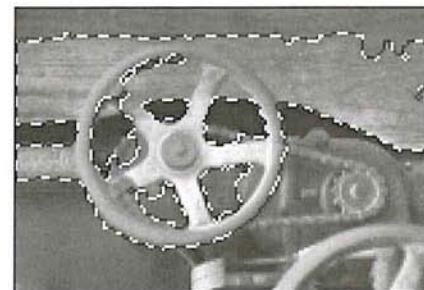


2. Enter a value from 0 to 255 for the tolerance level.

3. Click OK.



Tolerance value: 45



Tolerance value: 100

### Controlling the amount of anti-aliasing in a selection

The Fuzziness parameter controls the amount of anti-aliasing that is applied when you make a selection with the magic wand tool or fill in an image with the paint bucket tool. Whereas the Tolerance parameter controls how similar the colors in pixels have to be for the pixels to be selected, the Fuzziness parameter controls the amount of anti-aliasing that is applied to the edge of the selection. The amount of anti-aliasing is determined by the extent to which the pixels just beyond the selected pixels are partially selected. Fuzziness ranges from 0 to 255.

You can experiment with different fuzziness values on your image, or you can determine a precise amount of fuzziness to apply, as described below.

Normally, when you apply a change to an image, such as filling an image with a color or changing the colors in a selection, all of the change is applied to the selected pixels. When a pixel is partially selected, on the other hand, the changes you apply only partially affect that pixel.

If the fuzziness value is 0, the pixels surrounding the selected pixels, called the edge pixels, are not selected at all, and the edges around the selection are jagged. As you increase the fuzziness value, the edges become progressively less jagged, up to a certain point; after that point, the edges become jagged again because the edge pixels become selected to the point where all their color becomes visible and they form a new jagged edge.

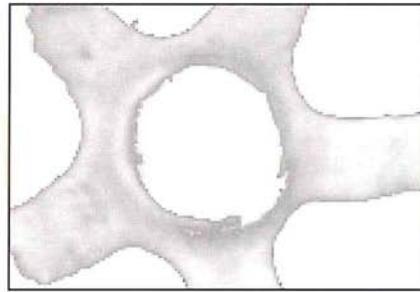
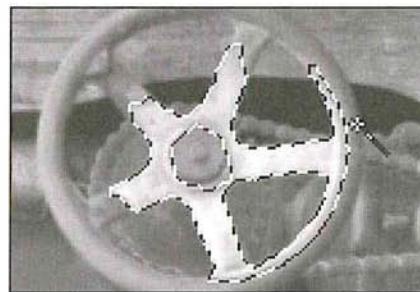
Several factors affect the fuzziness including the color value of the pixel you click, the color value of the edge pixels, and the fuzziness value itself. The extent to which the edge pixels are selected is determined using the following formula:  
(fuzziness value - out of tolerance band value)/fuzziness value = the extent to which an edge pixel is selected.

The tolerance band is the range from the highest value to the lowest value of the pixels that are selected. For example, if the highest color value of the pixels in the selection is 100 and the lowest color value in the selected pixels is 50, the tolerance band is from 100 to 50. The pixels outside the tolerance band but within the fuzziness range are partially selected.

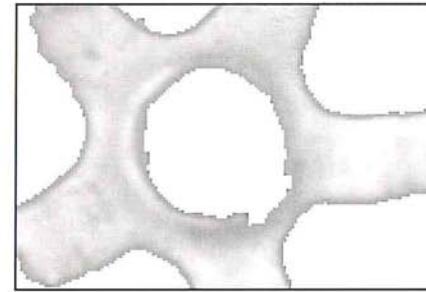
When using the magic wand, you should specify a value for the fuzziness parameter that produces a smooth edge along the selection. In most cases, the default fuzziness value (64) should produce acceptable results. Selections that contrast sharply with the background require higher fuzziness settings than selections that only contrast slightly with the background. If the selection is too jagged, you can experiment by entering higher or lower color values for the fuzziness.

To specify the amount of fuzziness to be applied to a selection:

1. Double-click or Option-click the magic wand tool in the toolbox.  
The Magic Wand Options dialog box appears.
2. Press the Tab key or double-click in the Fuzziness text box.
3. Enter a value from 0 to 255.
4. Click OK.



Fuzziness value: 10



Fuzziness value: 150

## Deselecting all selections

You can deselect all current selections by using the None command in the Select menu, or by clicking on the image with any of the selection tools except the magic wand tool.

To deselect everything in the image:

1. Choose None from the Select menu, or click one of the selection tools in the toolbox (except the magic wand tool).
2. Click the image.

All of the selections are deselected.

## Editing selection borders

A selection border is a border that defines a selected area. The selection tools allow you to edit a selection border. You can move the selection border, hide or show it, delete part of the selection border or add to it, or select intersecting borders to expand a selection.

In addition, you can define the width of the border around a selection using the Fringe command in the Select menu.

### Selecting a border around a selection

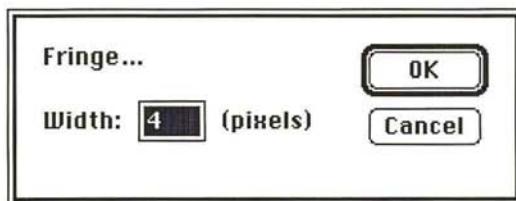
Once you make a selection, you can define the width of the border surrounding the selection. The Fringe command in the Select menu allows you to select a fringe area around the current selection. The fringe area is an area of a specified width around the selection border.

The Fringe command works only on part of an image. If you select all of an image, the option will be dimmed.

#### To specify the width of the selection border:

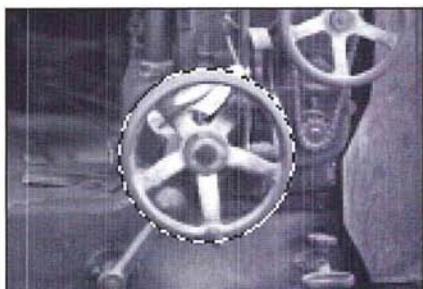
1. Choose Fringe from the Select menu.

The Fringe dialog box appears.

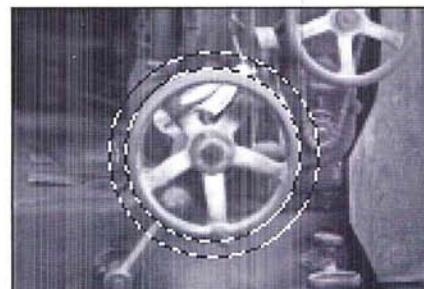


2. Enter the width for the fringe border in pixels.
3. Click OK.

The selection border with the specified width appears around the selection. The area inside the selection border is not selected.



Selection without fringe border



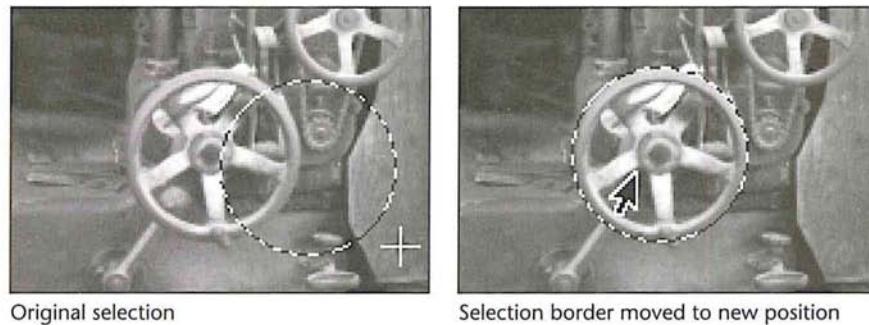
Fringe value: 5

## Moving a selection border

Once you define a selection on an image, you can move the selection border around the image without moving the pixels inside the selection border. If you create a selection border that is the size you want, but you want to position it around another part of an image, this feature allows you to place the selection border where you want it, without having to define it again.

### To move a selection border:

1. Click one of the selection tools in the toolbox.
2. Position the pointer within the selection border.  
The pointer changes to the arrow pointer.
3. Hold down the Command and Option keys and the mouse button, and drag the selection to the position you want it.
4. Release the mouse button.



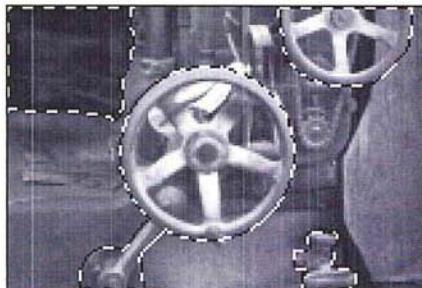
5. As an option, to move the selection border in 1-pixel increments, hold down the Command and Option keys and press the arrow key pointing in the direction you want to move the selection border.

## Hiding and showing the selection border

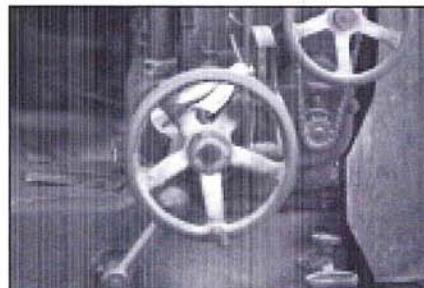
If you find the flashing black-and-white selection border distracting, or if it obscures changes that affect the edges of selections, you can use the Hide Edges command in the Select menu to temporarily hide the selection border. Any changes you specify, such as fills or color adjustments, are still applied to the current selection.

The Hide Edges command only affects the current selection. The selection border reappears when you make another selection, and new selection borders appear around any additional selections you make. As with making any selection, once you hide a selection border, you must hold the Shift key before making a second selection. Otherwise, your first selection will be deselected. When you select the Hide Edges command and then make a second selection, both selections will be displayed.

To hide the selection border around the current selection, choose Hide Edges from the Select menu; the selection border is hidden from view.



Selection borders visible



Selection borders hidden

To redisplay the selection border around the current selection, choose Show Edges from the Select menu.

### Editing a selection border

If you have not selected the exact area you want, you can alter the selection by adding to the border using the magic wand tool, or subtracting from it using the magic wand, lasso tool, or type tool. You can use these tools to edit a selection border created with any of the selection tools.

The magic wand tool also allows you to both add to or subtract from a selection border. You use the magic wand tool to add to a selection border, whether the original selection was made with the magic wand tool or another selection tool. The magic wand tool works differently than the lasso or type tool in subtracting from a selection. When you use the magic wand tool to subtract from a selection, the pixels that are subtracted are within the color tolerance value specified for the magic wand tool.

The lasso and the type tool only subtract from a selection border. When you use the lasso tool to delete part of a selection, the pixels you enclose with the lasso tool are deselected, regardless of their color values. You use the lasso tool to delete part of a selection border from a non-floating selection.

If a selection is floating, you use the type tool to subtract a portion of it. A floating selection is a selection you moved or pasted into an image. If you're working with a floating selection and use the lasso tool to deselect a portion of it, you'll actually delete the selection, not deselect it. Once you select the type tool and hold down the Command key and drag, the lasso pointer appears automatically.

**To add to a selection using the magic wand tool:**

1. Double-click or Option-click the magic wand tool in the toolbox.  
The Magic Wand Options dialog box appears.
2. Enter a value from 0 to 255 for the tolerance value. Click OK.
3. Position the magic wand pointer on the part of the selection you want to expand.
4. Holding down the Shift key, click the mouse button.

The selection border is expanded for the pixels that have color values within the tolerance range.

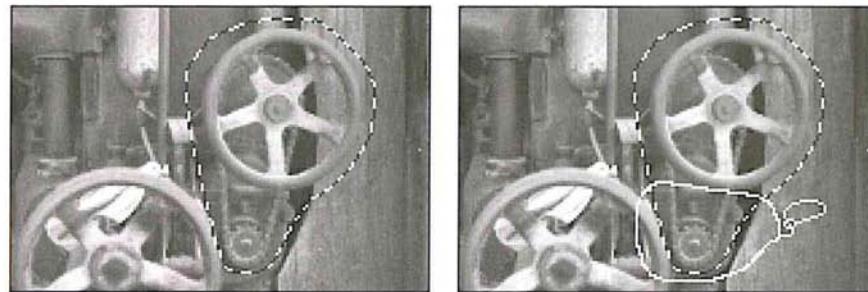
**To subtract from a selection using the magic wand tool:**

1. Double-click or Option-click the magic wand tool in the toolbox.  
The Magic Wand Options dialog box appears.
2. Enter a value from 0 to 255 for the tolerance value. Click OK.
3. Position the magic wand pointer on the part of the selection you want to deselect.
4. Holding down the Command key, click the mouse button.

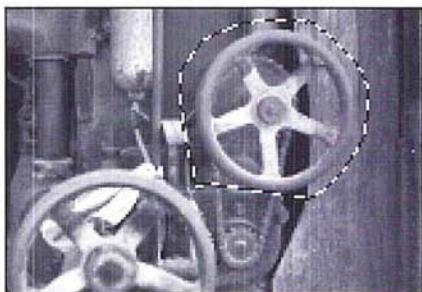
The selection border is removed from the pixels that fall within the tolerance range specified for the magic wand tool.

**To subtract from a border around a non-floating selection using the lasso tool:**

1. Click the lasso tool in the toolbox.
2. Position the lasso pointer where you want to start subtracting from the selection border.
3. Holding down the Command key and the mouse button, drag to define the part of the selection border you want to deselect.
4. When you have finished making your selection, release the mouse button and the Command key.



The area you defined is subtracted from the selection border.



To subtract from a border around a floating selection using the type tool:

1. Click the type tool in the toolbox.
2. Position the I-beam pointer where you want a selection to begin.
3. Hold down the Command key and the mouse button.  
The type tool turns into the lasso pointer.
4. Drag to define the part of the selection border you want to deselect.
5. When you have finished making your selection, release the mouse button and the Command key.

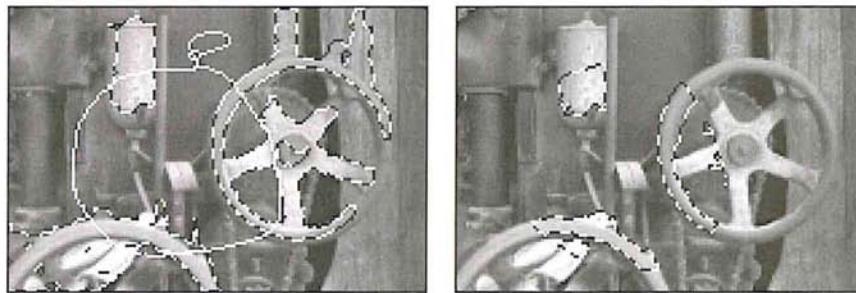
### Selecting the intersection of selections

The Adobe Photoshop program allows you to use any selection tool to select the intersection of two or more selections. (You make multiple selections by holding down the Shift key and clicking the areas you want to select, then releasing the Shift key.) If you have two or more selections on an image, you can use this feature to select an area that is common to the current selections. You can use the magic wand to select the intersection of selections. However, when you use the magic wand, you click on the image to define the area of intersection, instead of dragging on the image.

**To select common areas using a selection tool:**

1. Click one of the selection tools (except the magic wand tool) in the toolbox.
2. Position the pointer where you want the selection to begin.
3. Hold down the Command and Shift keys and the mouse button.
4. Drag to define the area of intersection that you want to select.
5. When you have finished making your selection, release the mouse button and the Command and Shift keys.

The areas in the selections that are within the selection border are selected, as illustrated below.

**Extending selections**

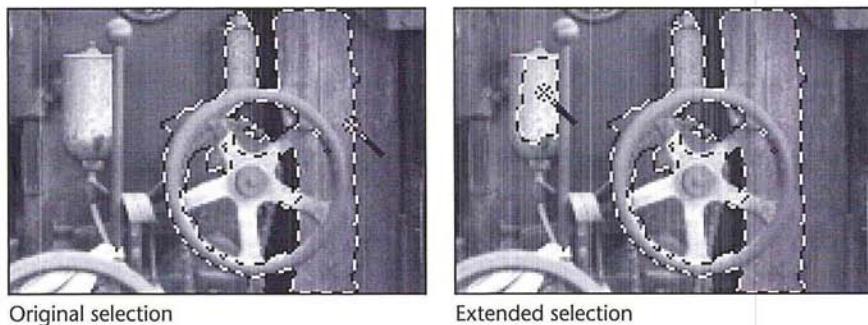
The Adobe Photoshop program provides many different ways to select several parts of an image at the same time. This extended selection feature lets you add to the current selection. You can use the lasso and marquee tools to select parts of an image that are widely separated and have no color similarities, or the magic wand tool to select parts that are similar in color. You can also use the selection commands to select all of an image at once, to select parts of the image that are similar in color to the current selection, or to select only the border around an image.

You can use the selection tools with the Shift key to select different parts of the image that have nothing in common with the current selection.

**To extend a selection:**

1. Click one of the selection tools in the toolbox.
2. Hold down the Shift key and the mouse button.
3. Use the selection tool to select the other part of the image.

The selection border appears around the second selection.



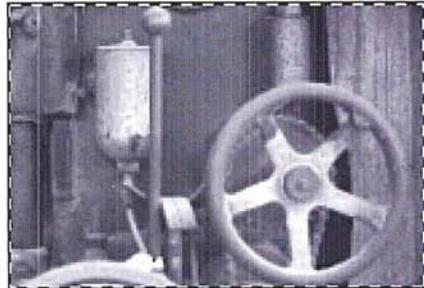
- When you have finished making your selections, release the mouse button and the Shift key.

### Selecting an entire image

When you want to cut, copy, fill, or otherwise edit an entire image, you can use the All command in the Select menu.

To select all of the image at once, choose All from the Select menu.

The selection border surrounds the entire image.



### Selecting similar colors

The Grow and Similar commands in the Select menu allow you to expand a selection to include parts of the image that are similar in color to the current selection. The color comparisons are based upon the Tolerance and Fuzziness settings in the Magic Wand Options dialog box.

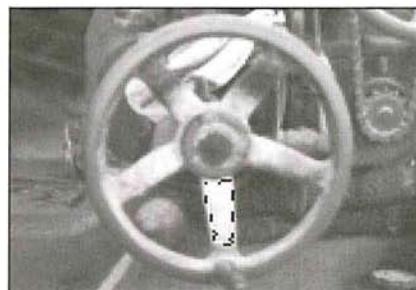
The Grow and Similar commands compare the colors of pixels based on the range of color values of the pixels within the current selection.

The Grow command extends the selection to include pixels adjacent to the selection that fall within the specified Tolerance and Fuzziness range, as illustrated below. The Similar command selects pixels throughout the image, not just the ones next to the selection, that fall within the specified range. If the Similar command does not select all the areas you want, you can select a part of the image that contains colors that are representative of the colors you want to select, and then choose the Similar command again.

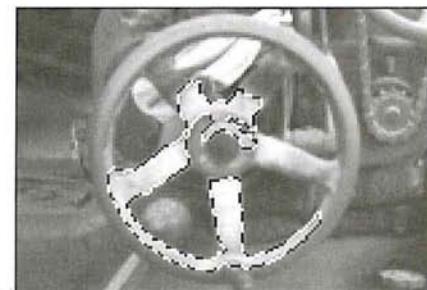
The Similar and Grow commands do not work on bitmap-type images.

To extend the selection to include adjacent pixels within the color range specified for the magic wand in the Magic Wand Options dialog box, choose Grow from the Select menu.

The selection border appears around the adjacent pixels within the color range.



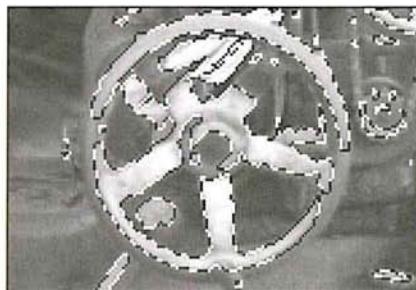
Original selection



Grow command applied

To extend the selection to pixels anywhere on the image that fall within the specified color range, choose Similar from the Select menu.

The selection border appears around all of the pixels throughout the image that fall within the color range.

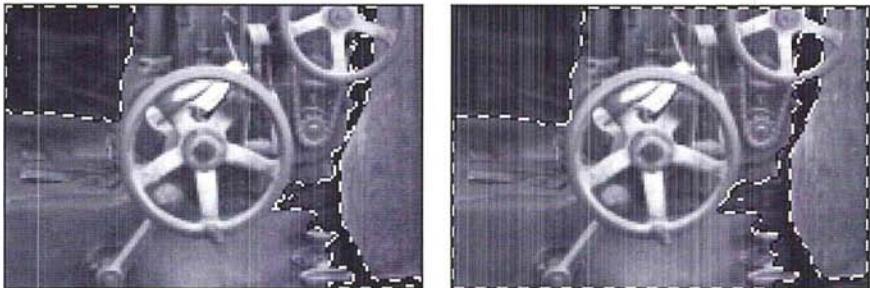


Similar command applied

## Selecting the non-selected parts of an image

At times, it might be more convenient to select large parts of an image by first selecting the parts you don't want to modify, and then automatically selecting the larger portions of the image. The Inverse command in the Select menu allows you to do this.

To select the part of the image that is not currently selected, choose Inverse from the Select menu. The remaining, unselected portion of the image is selected. The originally selected part of the image is deselected.



## Removing "fringe" around a selection

When you make a selection, some of the surrounding pixels normally are included. Once you copy the selection and paste it elsewhere, some of the surrounding pixels are copied and pasted along with the selection, which is now called a floating selection. At times, you may want to eliminate the excess pixels, called "fringe," around a floating selection. (A floating selection is a selection that was moved or pasted on in image. It floats above the pixels in the underlying image until you deselect it.)

For example, if you select part of an image and paste it onto a white background, you may want to trim the fringe or excess pixels around the selection. The fringe pixels contain a mixture of the colors in the selection and background colors around the selection.

The Defringe command in the Select menu allows you to remove the fringe around a floating selection. The Defringe command replaces the color of the fringe pixels with the colors of nearby pixels that contain the pure colors in the selection. The pixels with pure colors are the pixels that do not contain any of the background colors.

You can specify how far within the selection you want the Adobe Photoshop program to look for the pixel colors that will be extended outward to replace the fringe pixels. In most cases, a distance of one or two pixels is sufficient to locate pixels that will effectively remove a fringe.

### To use the Defringe command:

1. Move the selection that contains the fringe you want to remove to make it a floating selection.
2. Choose Defringe from the Select menu.
3. Enter a value for the distance used to locate fringe pixels.
4. Click OK.

The colors of the fringe pixels are replaced by the color of the pixels within the selection.



Original selection



Before Defringe



Defringe value: 5

### Moving a selection

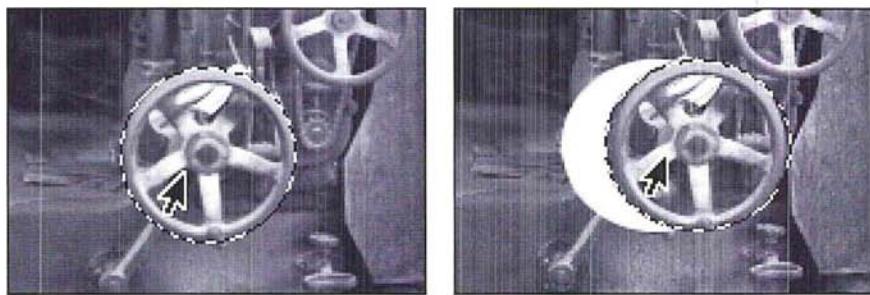
You can move a selection around an image by dragging the selection. When you drag a selection, its outline remains visible to provide a reference for placing it. You can use the Shift key to constrain a selection to 45-degree increments as you move it. You can also automatically create a duplicate of a selection and move a selection in 1-pixel increments using the keyboard. See the next section “Moving a selection in 1-pixel increments.”

Once you move a selection, it covers up the part of the image beneath it. The current background color fills the area left by the moved selection. The default background color is white; if white is the current background color, the area appears to be blank.

You can use the paste controls to control the effect of the pixels in the floating selection on the underlying image when you deselect the floating selection. See Chapter 12, “Cutting and Pasting Selections” for information about using paste controls.

**To move a selection:**

1. Click one of the selection tools in the toolbox.
2. Position the selection pointer on the selection.  
The selection pointer turns into the arrow pointer.
3. Holding down the mouse button, drag the selection into the position you want it.
4. When you have moved the selection to the desired position, release the mouse button.



If you drag one selection while there are multiple selections, all of the selections follow the movement of the mouse.

**NOTE:** If you are using one of the painting or editing tools or the eyedropper tool, you can temporarily activate the arrow pointer to move a selection by pressing down the Command key and positioning the tool pointer on the selection.

**Moving a selection in 1-pixel increments**

The arrow keys allow you to move a selection in 1-pixel increments. To move a selection using the arrow keys, press down the arrow key pointing in the direction you want to move the selection. The selection moves in the direction of the arrow key you press.

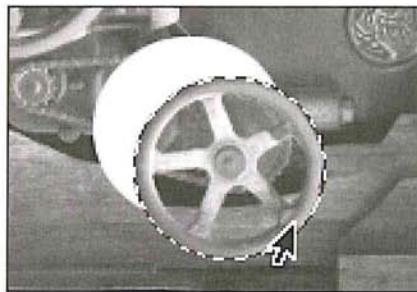
## Constraining the movement of a selection

You can constrain the movement of a selection to a 45-degree angle by pressing the Shift key.

**To constrain the movement of a selection to a 45-degree angle:**

1. Click one of the selection tools in the toolbox.
2. Position the selection pointer on the selection you want to move.  
The selection pointer turns into the arrow pointer.
3. Holding down the mouse button, begin dragging in the direction you want to move the selection.
4. Hold down the Shift key.

The selection moves along a straight line in the direction you drag.



Selection moved at a 45° angle

5. Release the mouse button and the Shift key when the selection is in the position you want it.

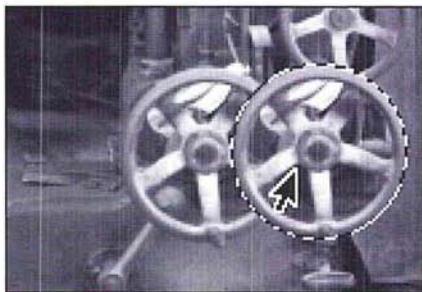
## Duplicating a selection

You can use the Option key to automatically make a copy of a selection as you drag it. You can either drag the selection to duplicate it, or press an arrow key.

**To make a duplicate of a selection:**

1. Click one of the selection tools in the toolbox.
2. Position the selection pointer on the selection you want to duplicate as you move it.  
The selection pointer turns into the arrow pointer.
3. Press and hold first the Option key, then the mouse button. Drag the duplicate to the position you want it.

4. When you have positioned the duplicate as desired, release the mouse button and then the Option key.



To create multiple duplicates of a selection using the arrow keys:

1. Hold down the Option key.
2. Press the arrow key pointing in the direction you want to project the duplicates from the selection.  
Each time you press the arrow key, a duplicate of the selection is created and offset by 1-pixel from the last duplicate.
3. When you have finished making duplicates, release the Option key.

### Using alpha channels to alter selections

At times you may want to adjust part of an image while you are working on it. In the previous image of a pump in a barn, you might want to edit the wheel on the pump or the wooden boards in the barn. To alter the image, you can use the Adobe Photoshop program selection tools to select a component of your image, and copy it into an individual alpha channel. You create an alpha channel using the Selection->Alpha command in the Select menu.

An alpha channel is a “scratch channel”—essentially a separate, 8-bit gray-scale image within a document, used for isolating, modifying, and storing masks. The alpha channels and masks you create are saved automatically with a document unless you delete them, so you can create and reuse masks for all the components of the image you want to edit. For example, you can create a separate mask for the wheel and the wooden boards. But note that alpha channels substantially increase the disk space required by an image. If you have a shortage of disk space, you may want to delete alpha channels before saving your document.

An alpha channel is one of many types of channels that can comprise an image. The Adobe Photoshop program treats images as a series of channels. Bitmapped, gray-scale, and indexed color images are single-channel images. RGB, HSL, and HSB images have three channels, and CMYK images have four channels.

The Adobe Photoshop program lets you view the individual channels of an image so that you can work on each channel separately. You can work on just an individual channel. You can also create an alpha channel to work on a selected part of an image.

An image can have up to 16 channels per document. The red, green, and blue channels are the first three channels of an RGB image; you, therefore, can create 13 alpha channels. The first alpha channel in an RGB image is labeled 4 at the top of the screen because it is the fourth channel. If you create additional alpha channels, they will be numbered 5, 6, and so on.

The section “About channels and image types” in Chapter 15, “Converting Images and Working With Channels,” discusses channels in greater detail.

Working on a selection in an alpha channel has several advantages. You can easily see a selection independently of the surrounding image, edit the selection, and store the selection so that you don’t have to reselect it. You can alter a selection in an alpha channel using any of the painting and editing tools. You can paint on a selection, change its borders, use filters, and so on.

By placing a selection in an alpha channel, you create a mask that covers the precise area you want to edit; you can then transfer the mask in the alpha channel back into the originally selected part of the image to edit the exact area you want. In this way, you can easily select and apply changes to specific parts of an image without affecting the rest of the image.

A mask is similar to a ruby-lith used to mask a mechanical. The mask floats above the underlying image. What you have selected appears transparent over the underlying image; the remainder of the mask is opaque. As long as a selection is active, it is called a selection mask; once stored in an alpha channel, it is called a mask.

The alpha channel displays a mask as a gray-scale representation. When you view the selection mask superimposed on any image, you see only the flickering black-and-white edges of the mask. When you transfer the selection to an alpha channel using the Selection->Alpha command, however, you see the selection in white, and the rest of the image in black. If the selection is feathered, the feather edge will appear as a gray area.

The black area is masked off from the selection, and is impervious to painting and filtering. The gray areas are partially affected by any image manipulations. (The partially selected pixels are the pixels with color values that fall within the fuzziness range specified for the magic wand tool, or the pixels that fall within the feather radius specified for the selection tool you used.) Only the white selection is affected by editing, painting, and filtering.

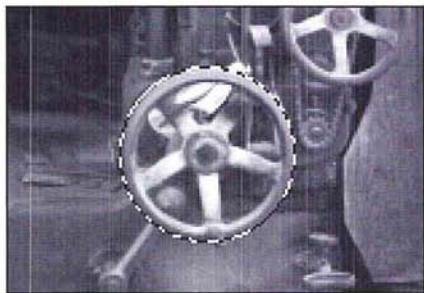
You can think of the black areas as the mask that protects the areas you want to remain unaffected by the changes you make. You can use the painting tools to apply black paint in the areas you want to include in the mask. The masked areas are excluded from the selection and will not be affected by changes you make.

If you use gray paint in the alpha channel, the areas covered with gray paint will be partially transparent to painting or filtering. The degree of transparency depends on the gray paint's color level.

If you want to select all the pixels inside the selection border, you can use the eraser tool to convert the non-selected and partially selected pixels to white to include these pixels in the selection. The partially selected pixels are partially affected by changes you make. How much the pixels are changed depends on the extent to which they are selected. The extent to which a pixel is selected is indicated by its gray level value. A pixel that is one-half selected has a gray level value of 128; this pixel will be affected 50 percent by changes you make.

**To create a mask and place it in an alpha channel:**

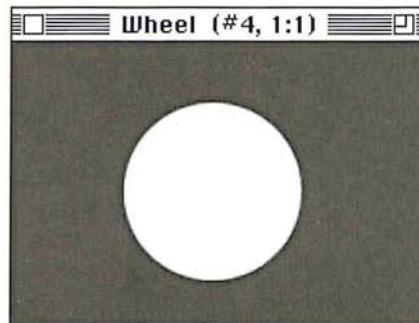
1. Select the part of the image for which you want to create the mask, using one of the selection tools.



**NOTE:** The magic wand tool is especially useful in selecting areas for selection masks because it is designed to allow you to select discrete parts of an image.

2. Choose Selection->Alpha from the Select menu.

The selected area appears in an alpha channel. The alpha channel is assigned a number as its name, which appears in the title bar.



Mask of selected area

**To define the masked areas:**

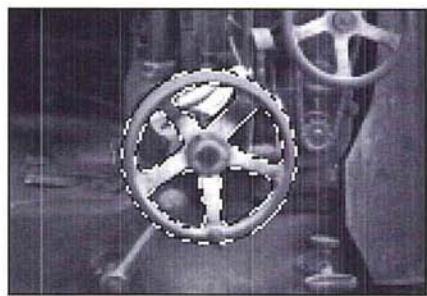
1. While still in the alpha channel, select black as the foreground color by clicking the foreground color square in either the toolbox or color palette.
2. Select one of the painting tools in the toolbox.
3. Position the pointer on the image where you want to start painting.
4. Hold down the mouse button.
5. Paint in the white area you want to protect from change.

Only the white area is affected by the paint, and pixels within the white area will be selected. The black area is impervious to paint.



6. When you have finished painting, release the mouse button.
7. To copy the mask back to the selection in the image, choose Alpha->Selection from the Select menu.

The selection border appears on the image. The changes you now make to the image are applied only to the specific areas inside the selection border.



## Chapter 10: *Using the Fill Tools*

This chapter describes how to use the fill tools, including the paint bucket and blend tools, and the Fill command to fill selected parts of an image with the current foreground color or with a selected pattern. The paint bucket tool lets you fill a selection with the foreground color. The blend tool lets you create gradient fills that show a transition from the foreground color to the background color. The default foreground color is black, and the default background color is white.

You can also use the Fill command to fill a selection with a color or pattern, and to fill the borders of a selected area.

### Using the paint bucket tool

Like the magic wand tool, the paint bucket tool includes options for specifying how similar the colors of pixels must be to be filled (tolerance), and how much anti-aliasing (fuzziness) is applied when a selection is filled. Anti-aliasing prevents jagged edges from appearing in a filled selection. You can use the default tolerance and fuzziness values in most cases. If you want to change these values, you must do so before you use the tool to fill a selection.

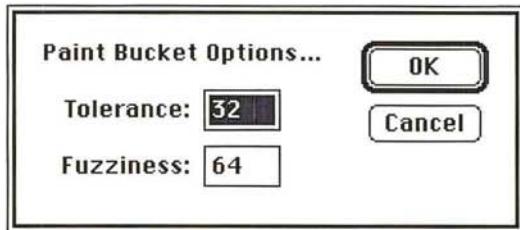
Because you can specify the tolerance value, you can choose the extent to which you want the image filled. For example, you can choose either to fill just the dark trim of a building, or to fill the building's light-colored walls, as well.

### Specifying the color range (tolerance) for selections

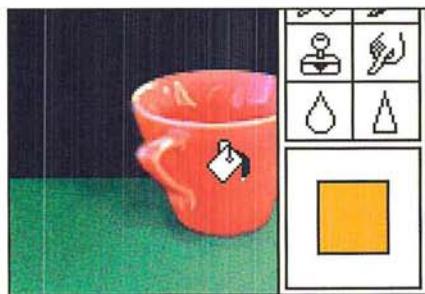
The paint bucket tool fills pixels that display similar colors. The Tolerance parameter determines how similar pixels have to be in order to be filled. Specify a low value to fill only pixels with very similar colors; specify a high value to fill pixels that are dissimilar in color.

To specify the color range for the paint bucket using the Tolerance parameter:

1. Double-click or Option-click the paint bucket tool in the toolbox.  
The Paint Bucket Options dialog box appears.



2. Enter a value from 0 to 255 for the tolerance level.
3. Click OK.



Tolerance value: 15; Fuzziness value: 64

Tolerance value: 150; Fuzziness value: 64

#### Specifying the amount of anti-aliasing for the paint bucket

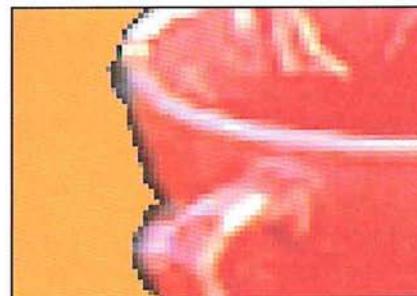
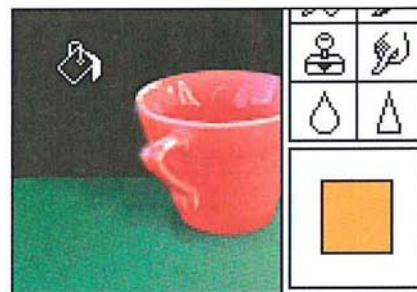
The Fuzziness parameter controls the amount of smoothing, or anti-aliasing, that is applied when you make a selection with the magic wand tool or fill an image with the paint bucket tool. You specify the fuzziness for the magic wand tool and the paint bucket tool separately.

When used with the paint bucket tool, the Fuzziness parameter softens the transition from the filled areas to the unfilled areas by applying some of the color in the fill to a one-pixel boundary around the selection. This, in turn, allows you to make changes to portions of an image without making the changed areas stand out from the rest of the image.

See the section, "Controlling the amount of anti-aliasing in a selection," in Chapter 9, "Making Selections," for more information about how the Fuzziness parameter works.

**To specify a fuzziness value for the paint bucket tool:**

1. Double-click or Option-click the paint bucket tool in the toolbox.  
The Paint Bucket Options dialog box appears.
2. Press the Tab key or double-click in the Fuzziness text box.
3. Enter a value from 0 to 255.
4. Click OK.



Tolerance value: 32; Fuzziness value: 25



Tolerance value: 32; Fuzziness value: 200

**To use the paint bucket tool:**

1. Click the paint bucket tool in the toolbox.
2. Position the paint bucket pointer on the part of the image you want to fill.
3. Click the mouse button.

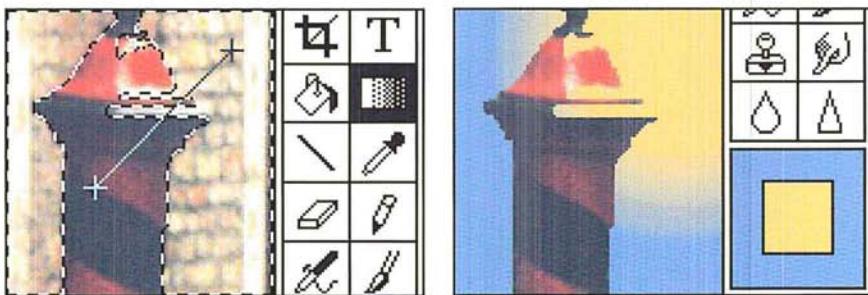
The Adobe Photoshop program fills the pixels that fall within the Tolerance and Fuzziness parameters you specified.

## Using the blend tool

The blend tool lets you create a gradient fill. A gradient fill displays a gradual transition from the foreground color to the background color. If you haven't selected a specific part of the image, the blend tool applies the fill to the entire image.

A blend fill can be applied either as a radial or linear fill. Each type of blend fill has several options, which are accessed from the Blend Tool dialog box. A linear fill is a fill that projects from one point to another, in a straight line. A radial fill is a fill that radiates from a center point outward in all directions. For a linear fill, you specify the starting point and direction for the fill; for a radial fill, you specify the center point for the radial fill.

For both types of fills, if you drag beyond the selection border while creating a blended fill, the fill shows only part of the transition from the foreground color to the background color. The selected areas before the specified starting point are filled with the foreground color; the selected areas after the specified end point are filled with the background color.



Options for the blend fill include midpoint skew; an RGB or HSB transition of colors; and for a radial fill, an offset value. If you don't select options for the blend tool, the Adobe Photoshop program uses the default settings for the tool or the last defined settings. The default settings are Linear, RGB fill, with a 50-percent midpoint skew.

For either type of fill, you can define the midpoint (or "skew") of the blend. The midpoint skew is the point at which the color is an even mix of the foreground color and the background color. For example, enter 25 to make the midpoint appear near the beginning of the fill (one-quarter of the way across the fill).

For both linear and radial fills, you can define the transition from the foreground color to the background color. You can either make the transition pass from the foreground color through intermediate gray levels to the background color (the RGB color space option). Or you can make the transition pass from the foreground color through the hues that lie between the foreground color and the background color (the HSB color space options).

For the HSB color transition, you can select either a clockwise (HSB-CW) or counterclockwise (HSB-CCW) option. Either option causes the blend to display a transition from the foreground color through the hues displayed on a hue wheel (analogous to the color wheel in the Color Wheel dialog box) to the background color; the direction is either clockwise (CW) or counterclockwise (CCW) around the hue color wheel from which the intervening hues are to be taken.

For example, suppose you select pure red as the foreground color and cyan (which is a mixture of pure green and pure blue) as the background color. Open the Color Wheel dialog box by Option-clicking the color indicator box on the toolbox. You will notice that these colors are opposite each other on the color wheel. If you select the HSB-CW option for the blend tool, then create a blend fill, the blend displays a transition from red to magenta to blue to cyan; the intermediate hues are derived by traversing the color wheel in the clockwise direction. (The Color Wheel dialog box is sometimes referred to as the Apple Color Picker. In this guide, the dialog box used to select colors, which is unique to the Adobe Photoshop program, is called the Photoshop Color Picker dialog box.)

For a radial fill, you can also specify an offset value. The offset value defines the distance from the starting point where the radial fill displays the foreground color without any gradations of color. The radial offset value is the percentage of the total distance from the starting point to the end point of the line you create when you drag with the blend tool. A radial offset value of 50 causes the foreground color to appear as a solid color without gradations of color for 50 percent of the distance from the starting point to the end point of the fill.

### Creating a linear fill

When you create a linear fill, the foreground color appears where you started to drag, and the colors display a transition to the background color, which appears at the selection border. The portion of the selection before the specified starting point is filled with the solid foreground color; the portion after the specified ending point is filled with the solid background color.

#### To create a linear fill with the blend tool:

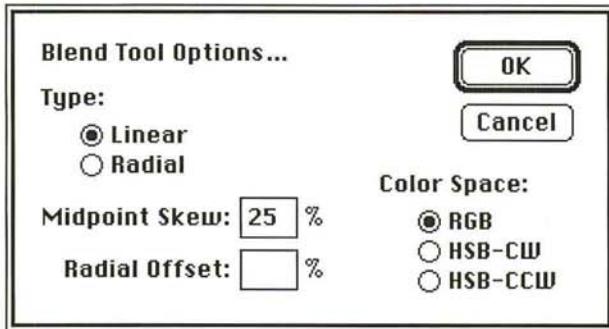
1. Select the part of the image you want to fill.





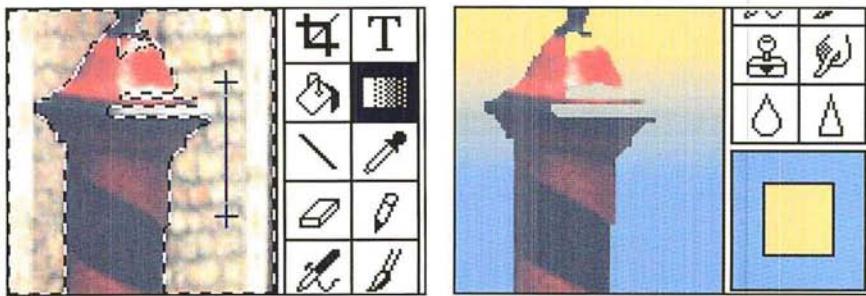
2. Double-click or Option-click the blend tool in the toolbox.

The Blend Tool Options dialog box appears.



3. Select the Linear option from the Blend Tool Options dialog box.
4. As an option, select a Color Space option by clicking RGB, HSB-CW, or HSB-CCW; the default is RGB. To specify the midpoint, or skew, for the blend, enter a percentage value from 13 to 87; the default is 50.
5. When you have finished specifying the desired options, click OK.
6. Position the blend pointer where you want the blend to start and where you want the foreground color to appear.
7. Holding down the mouse button, drag in the direction you want to project the blended fill. To constrain the line to a 45-degree angle, hold down the Shift key.  
A line is projected from the starting point to the pointer.
8. When you reach the edge of the selection border, release the mouse button.

The selection is filled.



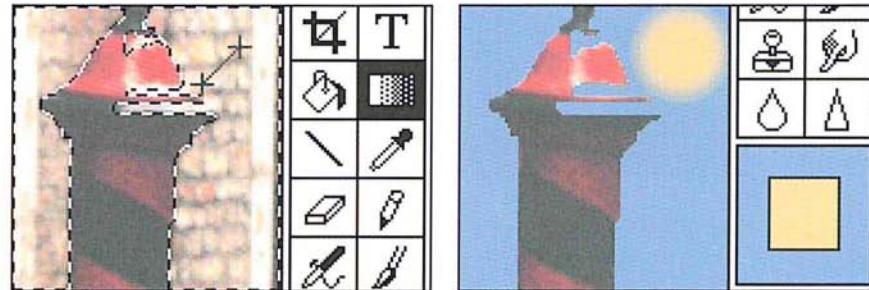
## Creating a radial fill

When you create a radial fill, the foreground color appears where you started to drag and the colors display a transition to the background color, which appears at the selection border. The portion of the selection before the specified starting point is filled with the solid foreground color; the portion after the specified starting point is filled with the solid background color.

### To create a radial fill:

1. Select the part of the image you want to fill.
2. Double-click or Option-click the blend tool in the toolbox.  
The Blend Tool Options dialog box appears.
3. Select the Radial option from the Blend Tool Options dialog box.
4. As an option, select a Color Space option by clicking RGB, HSB-CW, or HSB-CCW; the default is RGB. To specify the midpoint, or skew, for the blend, enter a percentage value from 13 to 87; the default is 50.
5. Press the Tab key or double-click the Radial Offset text box.
6. Enter a value from 0 to 99 to specify the offset for the radial fill.
7. When you have finished defining options for the blend tool, click OK.
8. Position the blend pointer where you want the center of the radial fill, and the foreground color, to appear.
9. Holding down the mouse button, drag in any direction.  
A line is projected from the starting point to the pointer.
10. When you reach the edge of the selection border, release the mouse button.

The selection is filled with a radial fill.



## Using the Fill command

The Fill command in the Edit menu allows you to fill a selection with the current foreground color; to specify an area around a selection border, and fill that area with the current foreground color; and to fill a selection with a pattern. You define a pattern using the Define Pattern command in the Edit menu. To select the parts of an image you want to fill, you can use any of the selection tools or commands.

For all of these options, you can specify how the fill (the foreground color or a pattern) affects the pixels in the selection. You can control the opacity of the fill. You can replace only pixels that are lighter or darker than the pixels in the selection. You can also replace the hue and saturation values of the pixels in the selection with the hue and saturation values of the fill, without affecting the luminosity values of the pixels in the selection.

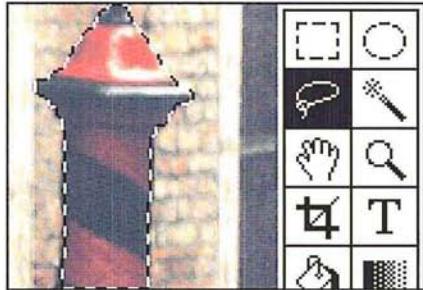
**NOTE:** In the Indexed Color Mode, feathering around a selection is ignored when you fill it.

### Filling a selection with the current foreground color

Unlike the paint bucket tool, which fills only pixels that are within a specified color range, the Normal option of the Fill command fills the entire selection with the foreground color.

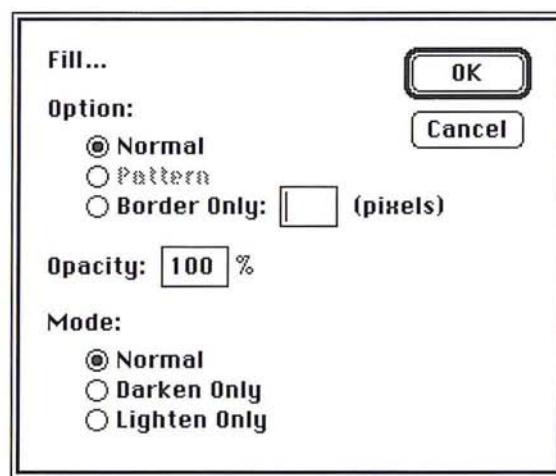
#### To fill a selection with the current foreground color:

1. Select the part of the image you want to fill.



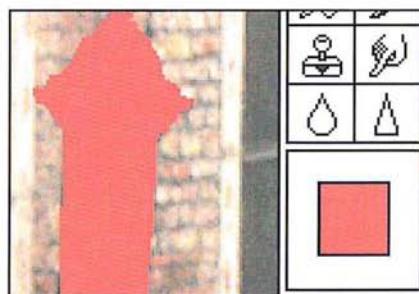
2. Choose Fill from the Edit menu.

The Fill dialog box appears.



3. Click Normal. Click OK.

The selection is filled with the current foreground color.



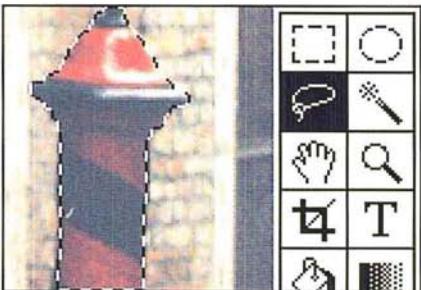
**NOTE:** You can also fill a selection with the current foreground color by typing Option-Delete at any time, except when a dialog box is active. You can fill a non-floating selection with the current background color by pressing Delete or by choosing Clear from the Edit menu. Floating selections are deleted when you press Delete or Choose Clear.

## Filling a border around a selection

You can use the Fill command to define an area of a specific width around a selection border and fill that area with the current foreground color.

To define the area around a selection border and fill it:

1. Select the part of the image you want.

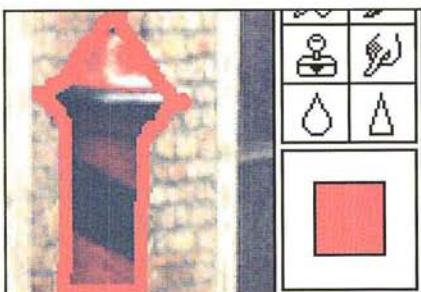


2. Choose Fill from the Edit menu.

The Fill dialog box appears.

3. Click Border Only.
4. Enter a value from 1 to 10 for the width (in pixels).
5. Click OK.

A border of the specified width, filled with the current foreground color, appears around the selection.

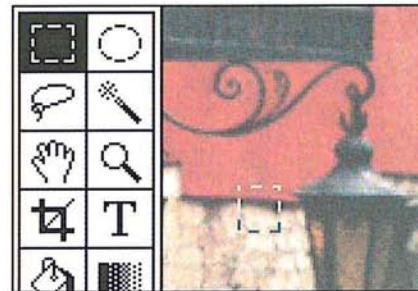


## Filling a selection with a pattern

In addition to colors, you can also fill selected parts of an image with a pattern. Before you fill a selection with a pattern, you must first select the pattern you want to use. To do so, you select the Define Pattern command in the Edit menu.

**To define a pattern to be used for a fill:**

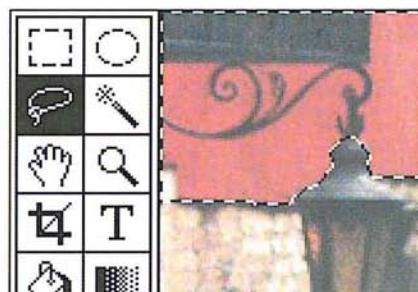
-  1. Click the rectangular marquee tool on the toolbox.
- 2. Holding down the mouse button, drag to select the part of the image you want to use as the pattern.
- 3. When you have selected a pattern, release the mouse button.



- 4. Choose Define Pattern from the Edit menu.

**To fill a selection with a pattern:**

- 1. Select the part of the image you want to fill.

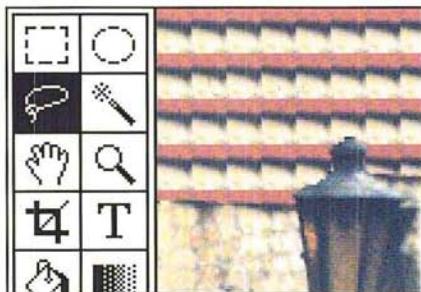


- 2. Choose Fill from the Edit menu.

The Fill dialog box appears.

- 3. Click Pattern.
- 4. Click OK.

The selection you defined as the pattern is repeated as tiles within the selection to create a pattern effect.

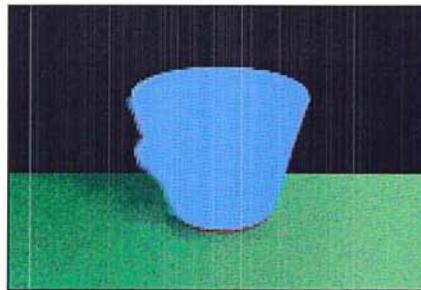
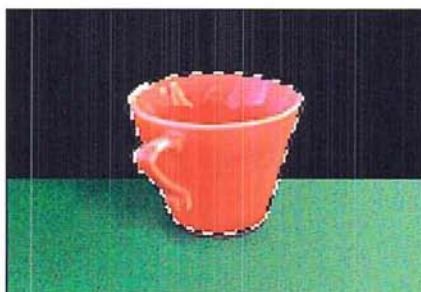


### Specifying the opacity of the fill

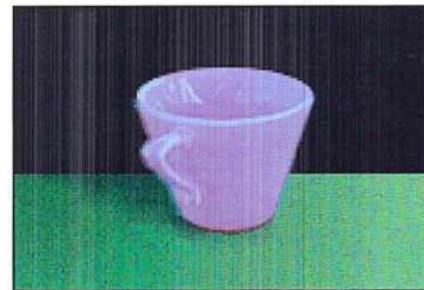
Using the Fill command, you can specify the opacity of the fill or how transparent the pixels in the fill are. Specify a value near 100 to make the fill pixels nearly opaque; specify a value near 1 to make them nearly transparent.

#### To specify the opacity of the fill:

1. Choose Fill from the Edit menu.  
The Fill dialog box appears.
2. Double-click the Opacity text box.
3. Enter a value from 1 to 100 for the opacity.
4. Click OK.



Opacity value: 100%



Opacity value: 50%

## Using color modes

Using the Fill command, you can control how the fill is applied to the selection. You can choose to have the pixels in a fill appear only if they are lighter than the pixels in the selection (Lighten Only), or only if they are darker than the pixels in the selection (Darken Only).

By default, an entire selection is filled when you use the Fill command in the Normal mode. However, you can choose to apply the hue and saturation values of the pixels in the fill to the selection without affecting the luminosity values of the pixels in the selection. These options are called color (painting) modes. The Color Mode options are applied to pattern fills as well as solid color fills.

For more information about the color modes see “Selecting a painting mode,” in Chapter 7, “Painting and Editing Tool Options.”

**To select the color mode option you want:**

1. Choose Fill from the Edit menu.  
The Fill dialog box appears.
2. Click the Color Mode option you want.
3. Click OK.



## Chapter 11: *Selecting Colors*

This chapter describes how to select the foreground and background colors. The Adobe Photoshop program provides a number of ways to select the foreground and background colors. You can use the eyedropper tool to select the foreground and background colors from the colors in the active document, and even from open, inactive documents.

You can also use the color palette, a floating palette accessed from the Window menu, to select the foreground and background colors. The color palette offers a fast and convenient way to select colors based on percentages of color values. Using the color palette, you can specify a color, or mix your own using the scratch pad.

You can also use either the Color Picker or Color Wheel dialog box to select colors. (The color wheel also is referred to as the Apple® Color Picker.) Using either the color picker or color wheel, you can select a color from a color spectrum, or specify a mixture of colors using one of three color models, either HSB, RGB, or CMYK.

The RGB model defines colors in terms of the mixture of the three additive primary colors, red, green, and blue, that combine to form colors; this is the model your color monitor uses. The HSB model defines colors in terms of the values of hue, saturation, and brightness in the color. This model typically is used in special effects. Hue is color: blue, yellow, orange, and so on. Saturation is the amount of gray in a color. Brightness is the intensity of light reflected from or transmitted by the image. The CMYK color model defines colors in terms of the levels of cyan, magenta, yellow, and black in a color. The CMYK color model is commonly used for images that will be printed on a printing press.

The foreground and background colors you select are displayed in the toolbox, as well as where you selected the color—either in the color palette, color picker, or color wheel.

The various methods for selecting the foreground and background colors are described in the sections that follow.

### Using the eyedropper tool

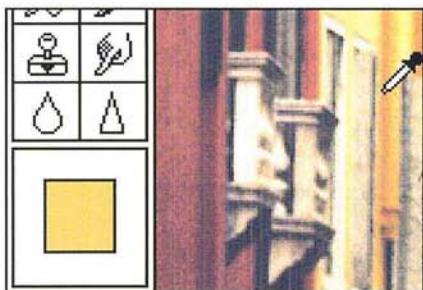
The eyedropper tool is a color selection tool. It lets you select the current foreground and background colors for an image. You can select colors from any open document without making it the active document (bringing it to the front). This allows you to use other documents as color tables that store collections of colors from which you can make color selections. When you use the eyedropper tool to select the foreground or background color, the color you select appears in the color palette only if the Fore mode is active when you select the foreground color, or if the Back mode is active when you select the background color.

You can also temporarily activate the eyedropper tool while using the paint bucket, pencil, line, airbrush, paint brush, and blend tools. This allows you to choose the foreground color without actually selecting the eyedropper from the toolbox.

**To select the foreground color:**

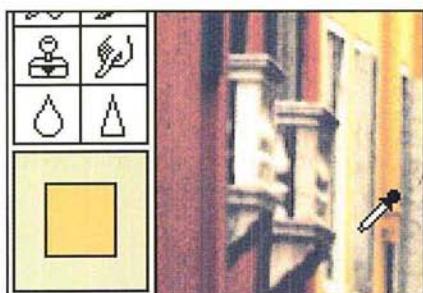


1. Click the eyedropper tool in the toolbox.
2. Position the pointer on the color in the image you want to use as the foreground color.
3. Click the mouse button.



**To select the background color:**

1. Click the eyedropper tool in the toolbox.
2. Position the pointer on the color in the image you want as the background color.
3. Hold down the Option key.
4. Click the mouse button.



The new foreground or background color appears in the color indicator area on the toolbox of the active document.

**To activate the eyedropper while using a painting or fill tool:**

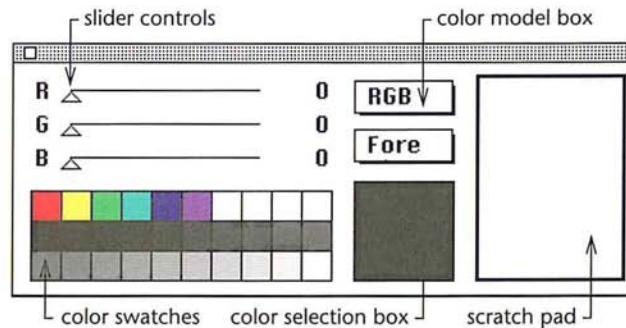
1. Hold down the Option key.  
The pointer turns into the eyedropper.
2. Click the color you want to use as the foreground color.
3. Release the Option key.

You also can use the eyedropper tool to reset the foreground color to black, and the background color to white by double-clicking the eyedropper tool.

## Using the color palette

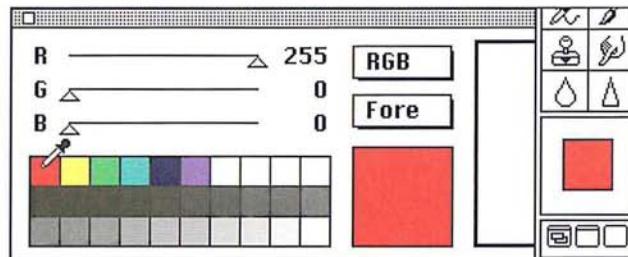
You can use the color palette to select the current foreground and background colors. The color palette is a floating window that you can display on-screen. You can move the color palette to a more convenient place on-screen, and you can hide it when you have finished using it.

The color palette lets you select colors using slide controls from one of three available color models: RGB, HSB, and CMYK. You can use the color palette to select the color values you want for the foreground and background colors. The palette also includes a scratch pad area for mixing various colors to create the colors you want to use and to define a custom brush and the current pattern.



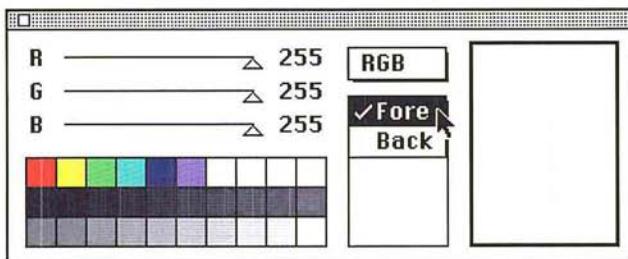
You can also use the color palette to access the Color Picker and the Color Wheel dialog boxes to select a foreground or background color, as described in the sections, "Using the color picker" and "Using the color wheel" that appear later in this chapter.

Once you select a foreground or background color, the color selection box beside the three-tiered rows of color swatches displays a sample of the color you selected. Also, the current foreground or background colors appears in the color indicator area in the toolbox as the new foreground or background color.



To select the foreground or background color using the color palette:

1. Choose Show Palette from the Window menu.
- The color palette appears.
2. Position the pointer on the box labelled Fore or Back.
3. Hold down the mouse button.
4. Drag to highlight Fore to choose the foreground color; drag to highlight Back to choose the background color.



5. When you have selected a color, release the mouse button.

Your choice appears in the color model box. The box shows whether you are selecting the foreground or the background color.

**To select a color from one of the color swatches:**

1. Click the eyedropper tool in the toolbox.
2. Position the eyedropper pointer on the desired color swatch in the color palette.
3. Click the mouse button.

**To move the color palette to a more convenient location on-screen:**

1. Position the pointer on the gray bar at the top of the palette.
2. Hold down the mouse button and drag until the palette is where you want it.
3. Release the mouse button.

To hide the color palette, click the close box on the color palette, or choose Hide Palette from the Window menu. The color palette disappears from view.

### Using different color models with the color palette

You can also select the foreground and background colors by choosing a color model on the color palette, and dragging the slider controls to define the desired color values.

When the CMYK color model is active in the color palette, the color sample may appear different from the color you selected from the image or from the color indicators on the toolbox and the color swatches on the color palette. This is because in CMYK mode, the color selection box displays the colors that can be printed, whereas the colors in the color swatches, the color indicators, and RGB images display RGB (or screen) colors.

Some RGB colors cannot be printed as CMYK colors (the bright green color swatch on the color palette, for example) because there is not an equivalent color in the CMYK color model. If you select an RGB color that can't be printed, the Adobe Photoshop program displays the closest color that can be printed in the color selection box.

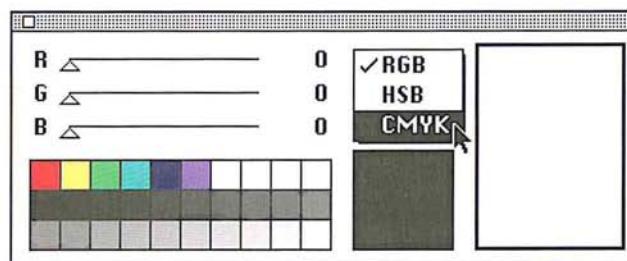
#### To choose the color model you want:

1. Choose Show Palette from the Window menu.

The color palette appears.

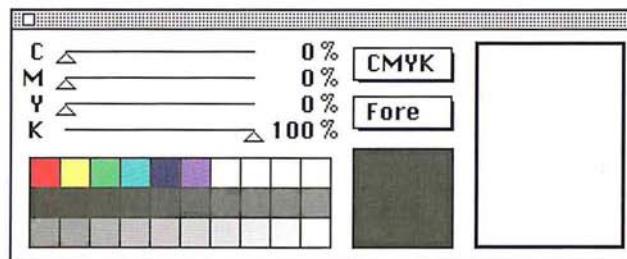
2. Position the pointer on the box labelled RGB, HSB, or CMYK.

3. Holding down the mouse button, drag to highlight the color model you want.



4. When you have selected the desired color model, release the mouse button.

The color model you choose appears in the box. The slider controls change to reflect the color levels of the color currently displayed in the color sample box.

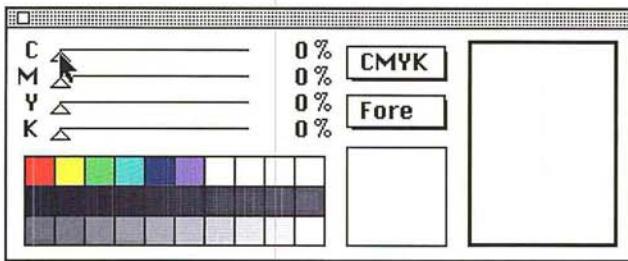


#### Specifying RGB or CMYK colors using the color palette

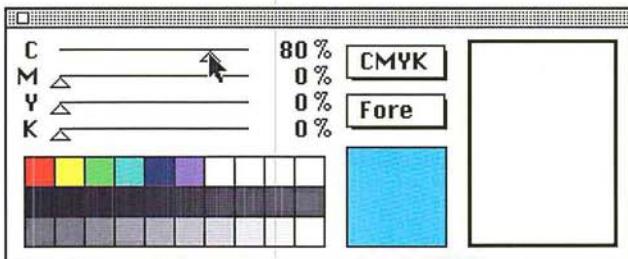
When RGB or CMYK is the active color model in the color palette, you select a color by using the slider controls to specify the percentages of red, green, and blue or cyan, magenta, yellow, or black in the color.

**To specify the color values:**

1. Choose Show Palette from the Window menu.  
The color palette appears.
2. Select the color model you want, either RGB or CMYK.
3. Position the pointer on the triangle beside the color parameter you want to adjust.



4. Holding down the mouse button, drag to the right to increase the percentage of the color; or drag to the left to decrease the level.
5. When you have selected the desired color, release the mouse button.

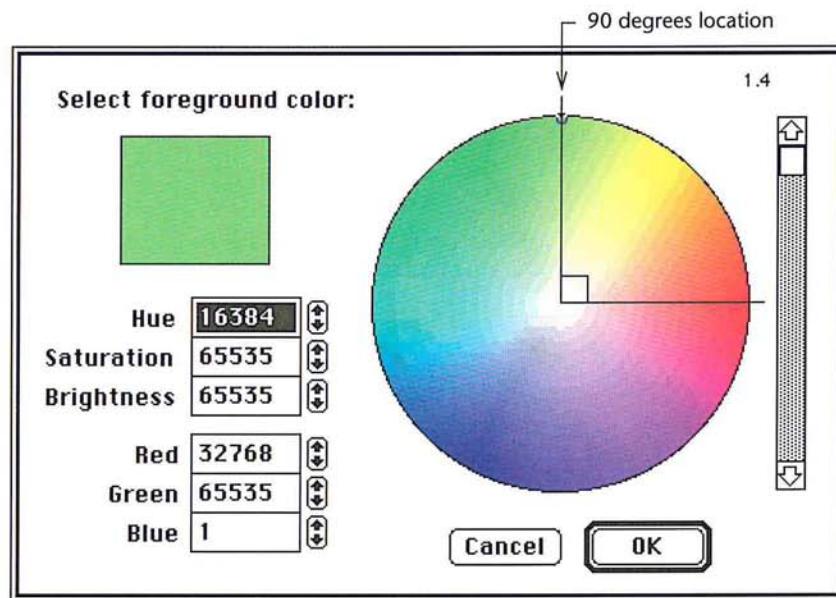
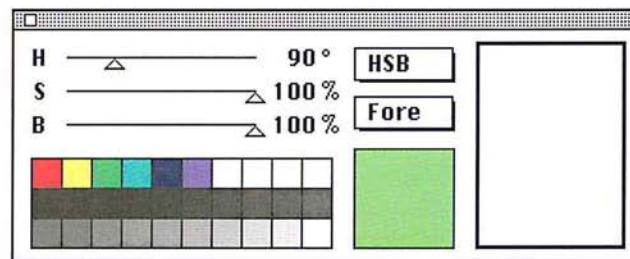
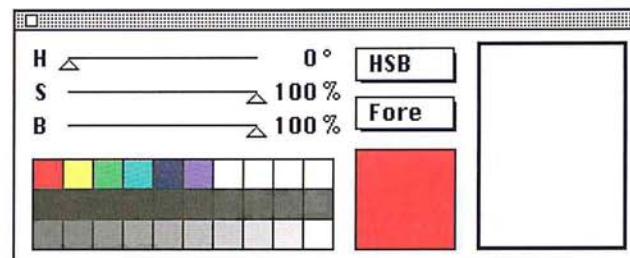


**Specifying an HSB color using the color palette**

When HSB is the active color model, you specify the percentage values for saturation and brightness the same way as you specify the color levels for the RGB and CMYK models, but the hue control works differently. With the hue control, you specify the angular location of a color on the color wheel. The angular location is measured relative to the pure red color on the wheel.

For example, if you set the saturation and brightness levels to 100 percent, and you drag the hue slider until 90 degrees is displayed, the color green appears in the color sample box because green is located 90 degrees from red (in the counterclockwise direction) on the color wheel.

For more information on the color wheel, see the section later in this chapter, "Using the color wheel."



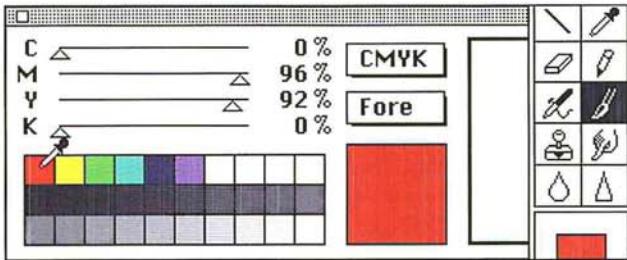
## Using the scratch pad to mix colors

A scratch pad area on the right side of the color palette allows you to mix colors then select them for the foreground color. You can use all of the painting tools, including the rubber stamp tool, to paint on the scratch pad. You can also use the zoom and grabber tools to change your view within the scratch pad area. You can also use the scratch pad area to select the current pattern and custom brush shape.

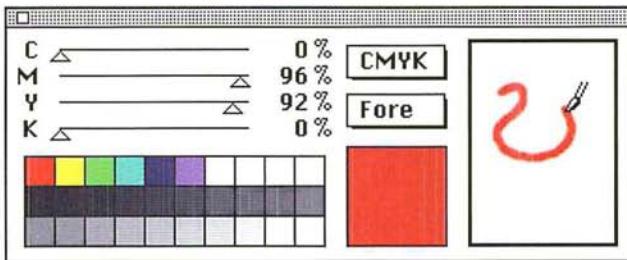
For information on selecting a custom brush shape, see the section, "Selecting a custom brush shape" in Chapter 7, "Painting and Editing Tool Options." For information on selecting the current pattern, see the section, "Filling selections with patterns" in Chapter 10, "Using the Fill Tools."

### To use the scratch pad to mix colors:

1. Click one of the painting tools in the toolbox.
2. Select the color you want to paint in the scratch pad.



3. Position the tool inside the scratch pad area.
4. Holding down the mouse button, drag to paint in the color.

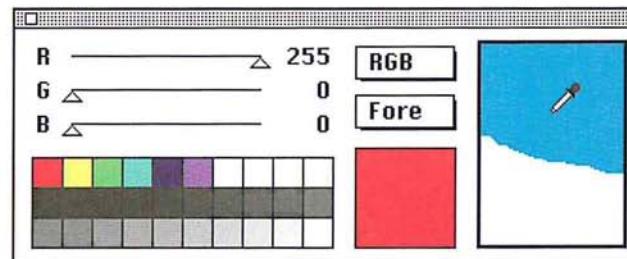


5. Release the mouse button when you are finished.

To select a color from the scratch pad as the foreground or background color:

1. Position the pointer on the scratch pad.
2. Hold down the Option key.

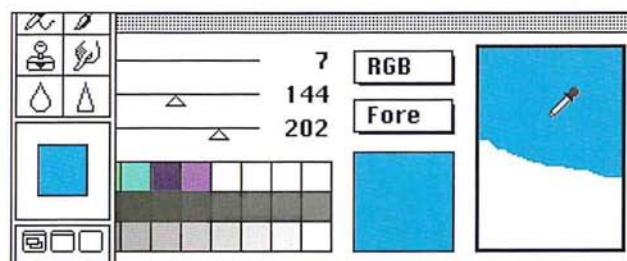
The pointer turns into the eyedropper.



3. Click the color you want on the scratch pad.

**NOTE:** This capability is not available when the rubber stamp tool is active because the rubber stamp tool is used to sample and paint textures, not just colors.

The color appears in the color sample box and in the color indicator area in the toolbox.



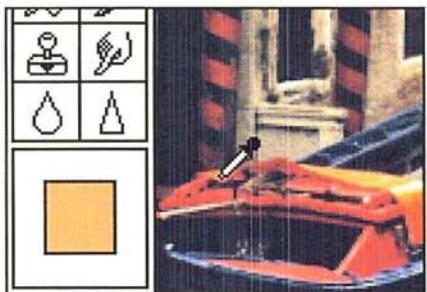
## Adding colors to the color palette

You can add new colors to the color palette so you can use them again during the current Adobe Photoshop session. The color palette contains blank swatches for new colors, but new colors can be placed in any of the color swatches on the palette.

**To add a color to the color palette:**

1. Use the eyedropper tool, the color picker, or the color wheel to select the color you want to add.

The color appears in the color selection box.

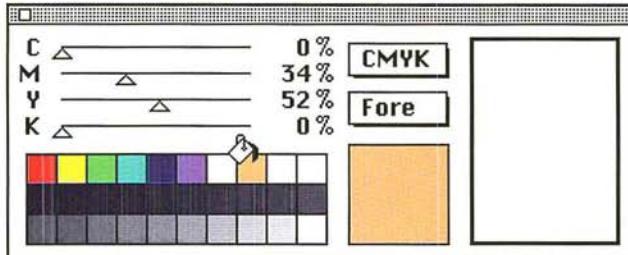


2. Position the pointer on the color swatch where you will place the color.
3. Hold down the Option key.

The arrow pointer turns into the paint bucket pointer.

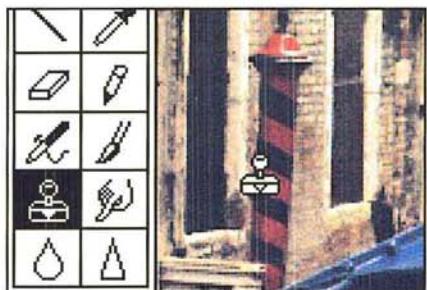
4. Click the mouse button.

The selected color appears in the color swatch.

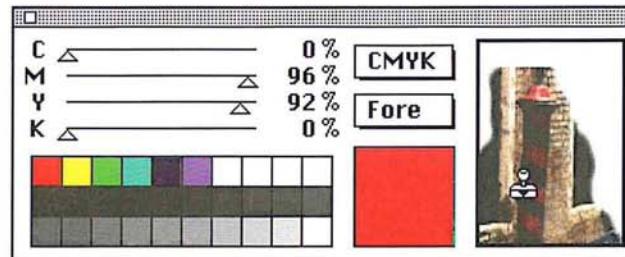


**If you want to paint using the rubber stamp tool:**

1. Click the rubber stamp tool in the toolbox.
2. Option-click on the part of the image you want to sample.



3. Position the rubber stamp pointer inside the scratch pad area.
4. Holding down the mouse button, drag to paint in the sampled image.



You can continue to select other colors and paint them in to mix with the existing colors on the scratch pad.

## Reading color information on the image

Using the color palette, you can display the color values of any pixel. The color palette shows the information for the current foreground or background color.

To determine the color values for a pixel on an image, you use the eyedropper tool to select the pixel you want, then view that pixel's color values in the color palette.

This information is useful when you make color corrections based on the color values of pixels using such options as the Adjust and Paste Controls commands, and the Trace Contours filter.

The color of the pixel appears in the color indicator in the toolbox. Notice that the values and sliders in the color palette change to display the color levels of the selected color.

When RGB is the active color model on the color palette, the sliders and color values on the color palette reflect the red, green, and blue color values of the pixel beneath the pointer. The color values are measured on a 256-step scale. The scale ranges from 0 to 255, where 255 represents the maximum brightness of a color. The reading 0 0 0 represents the color black, and the reading 255 255 255 represents the color white.

When the CMYK or HSB color model is active, the color values are evaluated according to percentages of color, or, in the case of hue, a color's angular location on the color wheel.

### To display color information about a certain point on the image:

1. Click the eyedropper tool in the toolbox.
2. Position the tip of the eyedropper on the pixel in the image whose color levels you want to display.
3. Click the mouse button.

## Using the color picker

The color picker, as well as the color wheel allow you to select the foreground or background color. Both are accessed from either the color sample box in the color palette, or from the foreground and background color rectangles in the toolbox.

The color picker and color wheel work in a similar manner. Both allow you to select a foreground and background color based on a particular color model, and both allow you to enter numerical value for a color. Both the Color Picker and the Color Wheel dialog boxes allow you to select a foreground or background color from a color spectrum, or to specify the mixture of colors that, once combined, creates the color you want. Unlike the Color Wheel dialog box, the Color Picker dialog box allows you to select colors based on the CMYK color model.

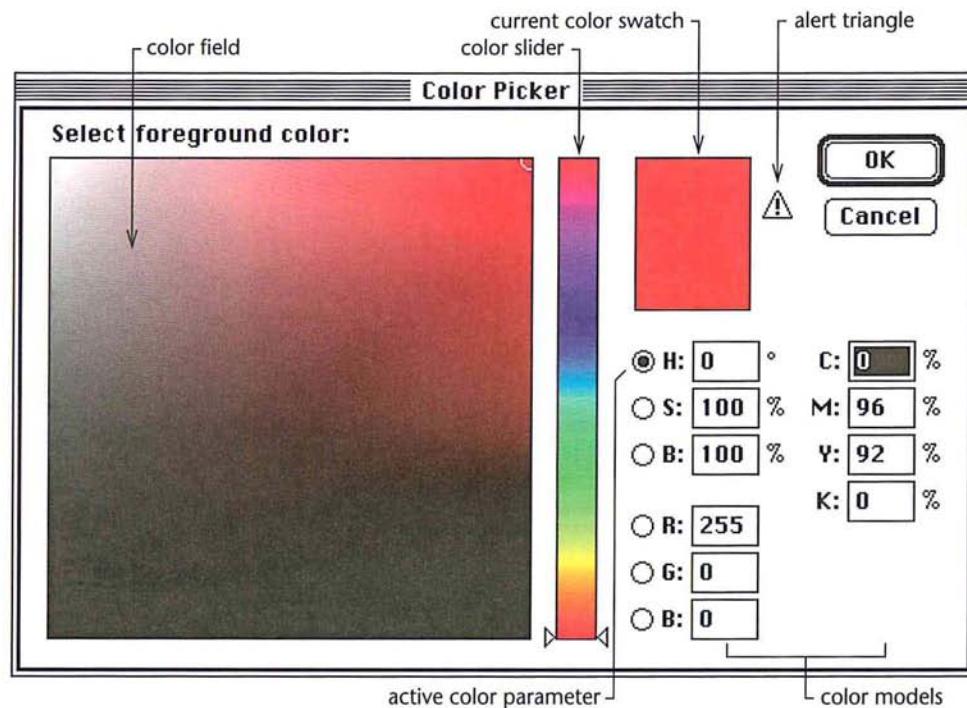
The Color Picker dialog box contains several controls you can use to select a color: the color field, a large box that you drag a pointer through to change the color selection; a rectangle in the upper right of the dialog box, which displays two color swatches; and three color model options, HSB, RGB, and CMYK. The color components (such as hue) are called color parameters. The parameter you select becomes the active color parameter. The color slider, the thin rectangular control to the left of the color models, displays the range of color levels available for the selected color parameter.

When you open the Color Picker dialog box, both color swatches display the same color. The title in the upper left corner of the dialog box shows whether you are selecting the foreground or the background color. The color in the lower color swatch shows the current foreground or background color, depending on which option is active; once you select a new foreground or background color, the top color swatch displays it.

You can select a color using one of three color models, HSB, RGB, and CMYK. To define the mixture of primary colors that make up the color, you enter values in the text box next to the color parameter of the appropriate color model. To select a color using the HSB and RGB color models, you can also use the color field and the color slider, which changes the display of colors according to the color model and color values you specify. With the CMYK color model, you can only select colors by specifying the mixture of cyan, magenta, yellow, and black that comprise the color you want.

To access the Adobe Photoshop Color Picker dialog box, click either the color sample box in the color palette, or click the foreground or background color rectangle in the toolbox.

The Adobe Photoshop Color Picker dialog box appears.



### Selecting a color by color values

With the exception of the HSB model, you specify the color you want in the color picker by defining the levels of the primary colors that are combined to create the color. With the HSB model, you specify the saturation and brightness levels as a percentage, and the hue in degrees.

### Selecting printable colors

Some colors in the RGB and HSB color models, such as pure green or neon colors, cannot be printed, because they have no equivalents in the CMYK model. The non-printable color you see on-screen will not appear the same on press. If you select a non-printable color, an alert triangle with an exclamation point appears beside the color swatches in the Color Picker dialog box. If you click the triangle, the Adobe Photoshop program automatically selects the printable color closest to the color you selected.

## Using the color field and color slider

With the HSB and RGB color models, you can use the color field and the color slider in the Color Picker dialog box to select a color. The options within the color field and the color slider are dependent upon the color model and color parameter you select. The color slider displays the range of color levels available for the selected color parameter. For example, if you select the saturation parameter (S), the color slider displays the saturation range for the selected color, where 100 percent saturation appears at the top of the slider and 0-percent saturation appears at the bottom of the slider.

The color field allows you to select a color based on the two other color parameters in the color model. For example, if you select hue (H) as the active color parameter, the color field displays the range of saturation and brightness levels available for the current hue value. The saturation values are distributed along the horizontal axis, saturation values increase from left to right. Brightness values are distributed along the vertical axis; brightness values increase from bottom to top. When you click on the color field, a circular marker appears on the color field to mark the position on the field.

The color slider shows the range of the active color parameter (for example, hue) within the other color parameters (for example, saturation and brightness). The color values in the text boxes change to reflect the selections you make using the color field and the color slider.

The options and how you select a color are described below in terms of the currently selected model and color parameter.

### Selecting an HSB color using the color picker

When you select a color using the HSB model, you select either hue, saturation, or brightness as the active color parameter in the Color Picker dialog box. Following are descriptions of the adjustment you make, depending on which color parameter you selected.

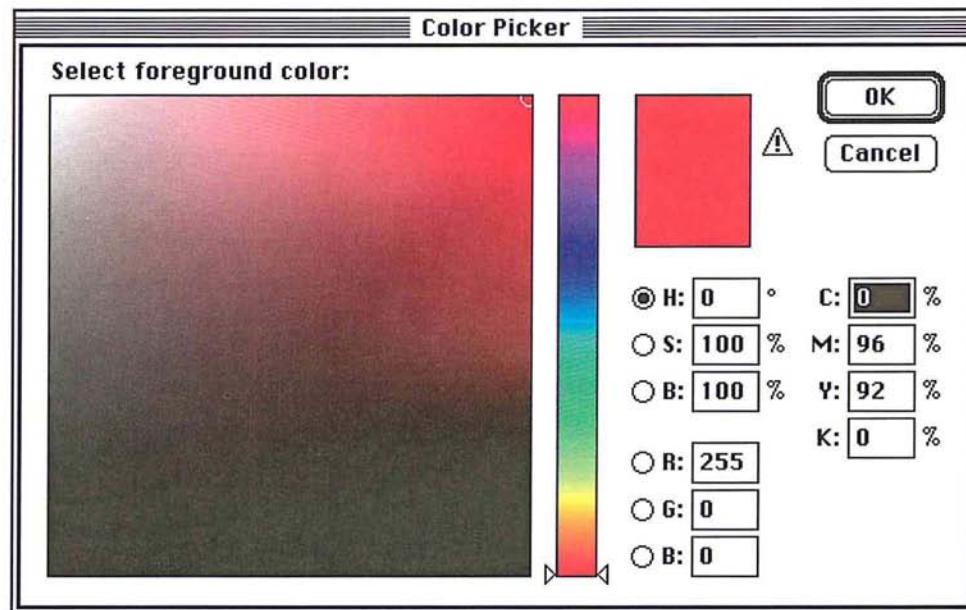
### Using hue as the active parameter

To select an HSB color with hue as the active parameter:

1. Click either the color sample box in the color palette, or the foreground or background color rectangle in the toolbox.

The Color Picker dialog box appears.

2. Click the H (hue parameter) radio button in the Color Picker dialog box, if it is not already selected.



3. To select the hue, click the hue you want in the color picker, or position the pointer on one of the triangles on the color slider. Holding down the mouse button, drag to select the hue you want. When you have finished selecting the hue, release the mouse button.
4. To select the saturation level, click near the left side of the color field to specify a low saturation value, or click near the right side of the color field to specify a high saturation value.
5. To select the brightness level, click near the bottom of the color field to specify a low brightness value, or click near the top of the color field to specify a high brightness value.
6. When you have finished selecting the desired color parameter, click OK.

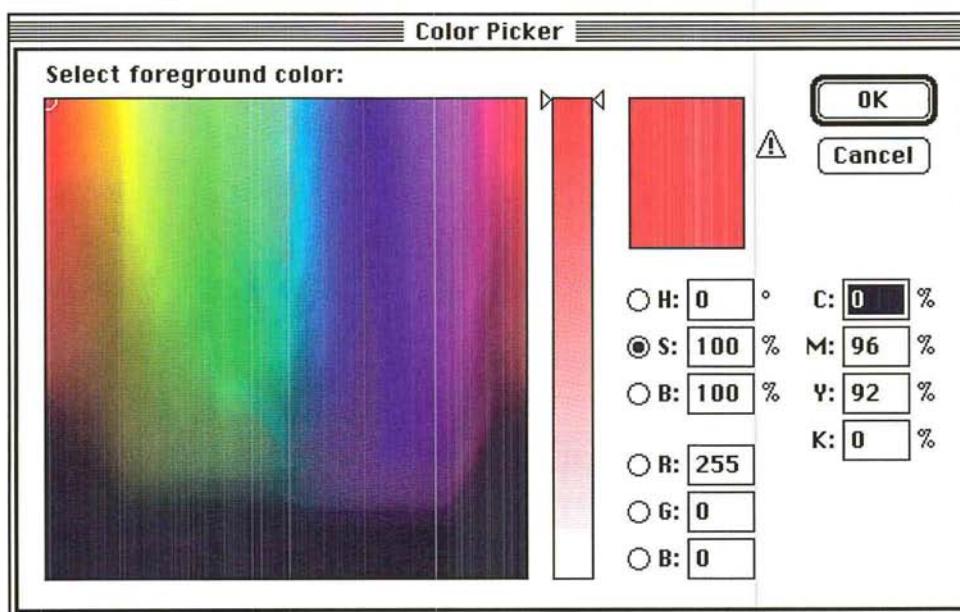
### Using saturation as the active parameter

When saturation is the active color parameter in the Color Picker dialog box, the color slider controls the saturation, and the color field controls the hue and brightness.

To select an HSB color with saturation as the active parameter:

1. Click either the color sample box in the color palette, or the foreground or background color rectangle in the toolbox.
- The Color Picker dialog box appears.

2. Click the S (saturation parameter) radio button in the Color Picker dialog box, if it is not already selected.



3. Holding down the mouse button, drag the triangle on the color slider down to decrease the saturation; drag the triangle up to increase the saturation.
4. To select the hue, click the hue in the color field you want.
5. To select the brightness, click near the bottom of the color field to specify a low brightness value; click near the top of the color field to specify a high brightness value.
6. When you have finished selecting the desired color parameters, click OK.

### Using brightness as the active parameter

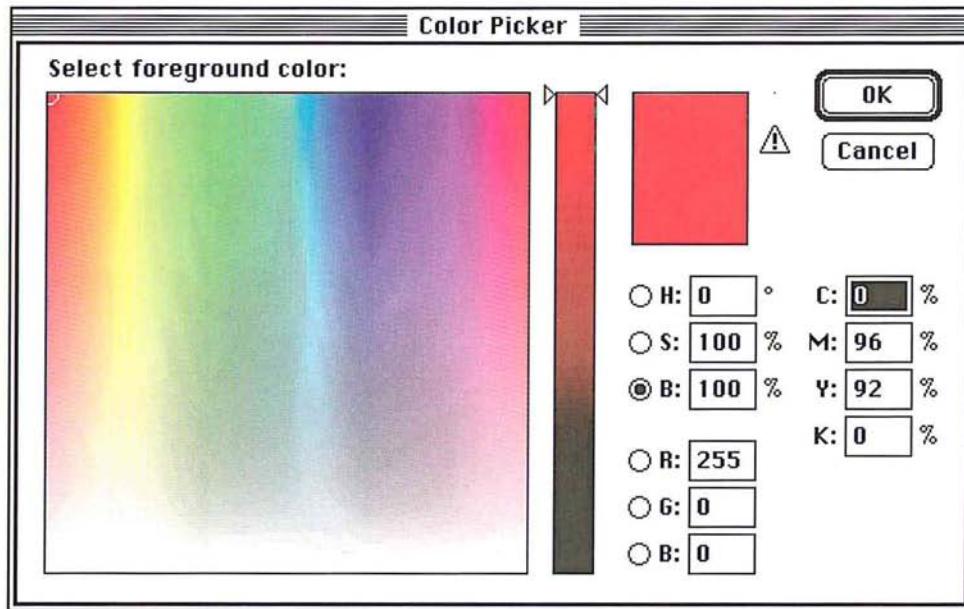
When brightness is the active color parameter in the Color Picker dialog box, the color slider controls the brightness, and the color field controls the hue and saturation.

To select an HSB color with brightness as the active parameter:

1. Click either the color sample box in the color palette, or the foreground or background color rectangle in the toolbox.

The Color Picker dialog box appears.

2. Click the B (brightness parameter) radio button in the Color Picker dialog box, if it is not already selected.



3. Holding down the mouse button, drag the triangle on the color slider down to decrease the brightness; drag the triangle up to increase the brightness.
4. To select the hue, click the hue in the color field you want.
5. To select the saturation level, click near the bottom of the color field to specify a low saturation value; click near the top of the color field to specify a high saturation value.
6. When you have finished selecting the desired color parameters, click OK.

## Selecting an RGB color using the color picker

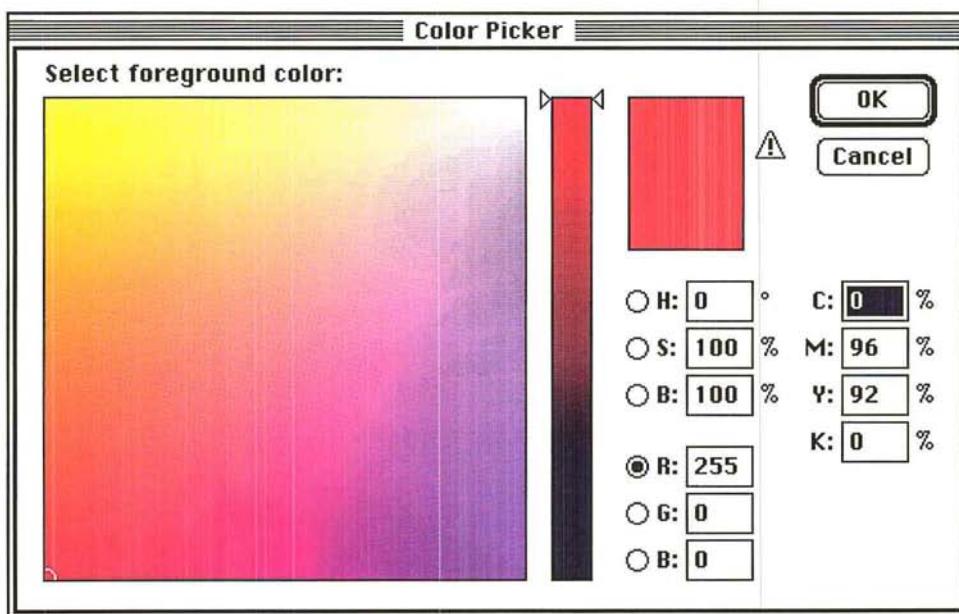
When you select a color using the RGB model, you select either red, green, or blue as the active color parameter. Following are descriptions of the adjustment you make, depending on which color parameter you selected. With the RGB model, you specify the values of color on a scale of 0 to 255, where 255 is the pure color.

### Using red as the active parameter

When red is the active color parameter in the Color Picker dialog box, the color slider controls the red value, and the color field controls the blue and green values.

#### To select an RGB color with red as the active parameter:

1. Click either the color sample box in the color palette, or the foreground or background color rectangle in the toolbox.
- The Color Picker dialog box appears.
2. Click the R (red parameter) radio button in the Color Picker dialog box, if it is not already selected.



3. Holding down the mouse button, drag the triangle on the color slider down to decrease the red value; drag the triangle up to increase the red value.
4. To adjust the green value, click to the bottom of the color field to specify a low green value; click to the top of the color field to specify a high green value.
5. To adjust the blue value, click to the left side of the color field to specify a low blue value; click to the right side of the color field to specify a high blue value.
6. When you have finished selecting the desired color parameters, click OK.

### Using green as the active parameter

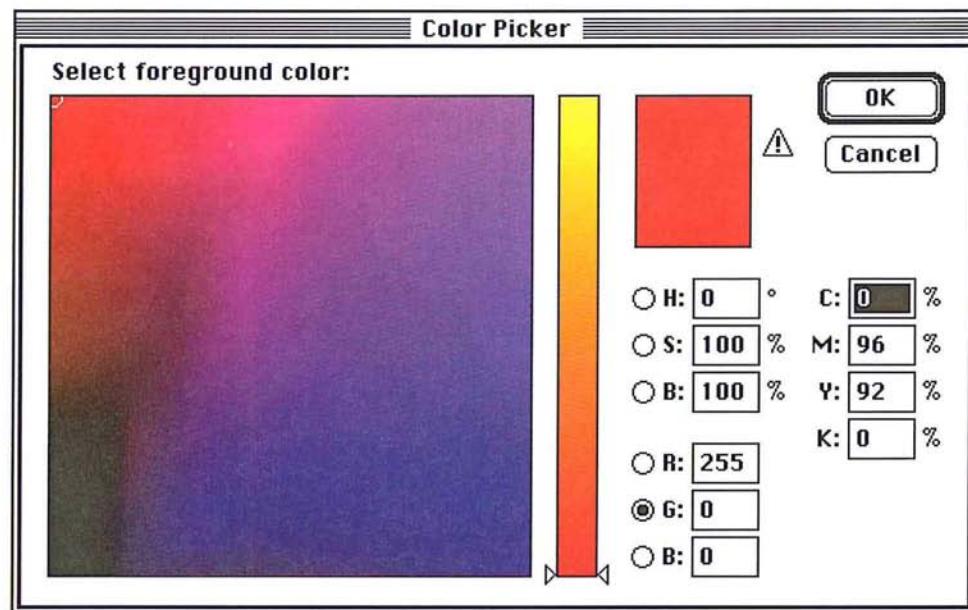
When green is the active color parameter in the Color Picker dialog box, the color slider controls the green value, and the color field controls the blue and red values.

To select an RGB color with green as the active parameter:

1. Click either the color sample box in the color palette, or the foreground or background color rectangle in the toolbox.

The Color Picker dialog box appears.

2. Click the G (green parameter) radio button in the Color Picker dialog box, if it is not already selected.



3. Holding down the mouse button, drag the triangle on the color slider to decrease the value of green; drag the triangle up to increase the value of green.
4. To adjust the red value, click near the bottom of the color field to specify a low red value; click near the top of the color field to specify a high red value.
5. To adjust the blue value, click to the left side of the color field to specify a low amount of blue; click to the right side of the color field to specify a high blue value.
6. When you have finished selecting the desired color parameters, click OK.

### Using blue as the active parameter

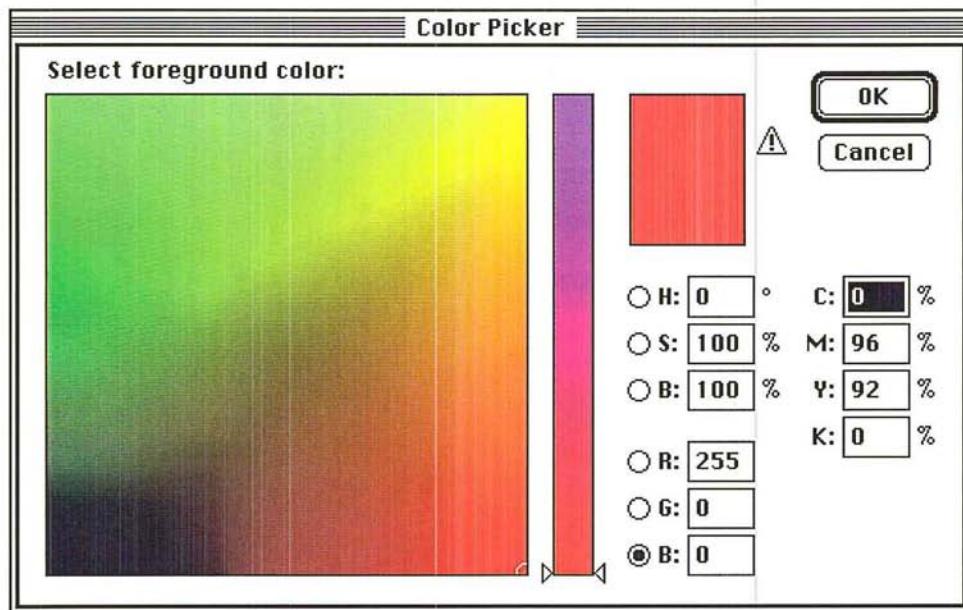
When blue is the active color parameter in the Color Picker dialog box, the color slider controls the blue value, and the color field controls the green and red values.

#### To select an RGB color with blue as the active parameter:

1. Click either the color sample box in the color palette, or the foreground or background color rectangle in the toolbox.

The Color Picker dialog box appears.

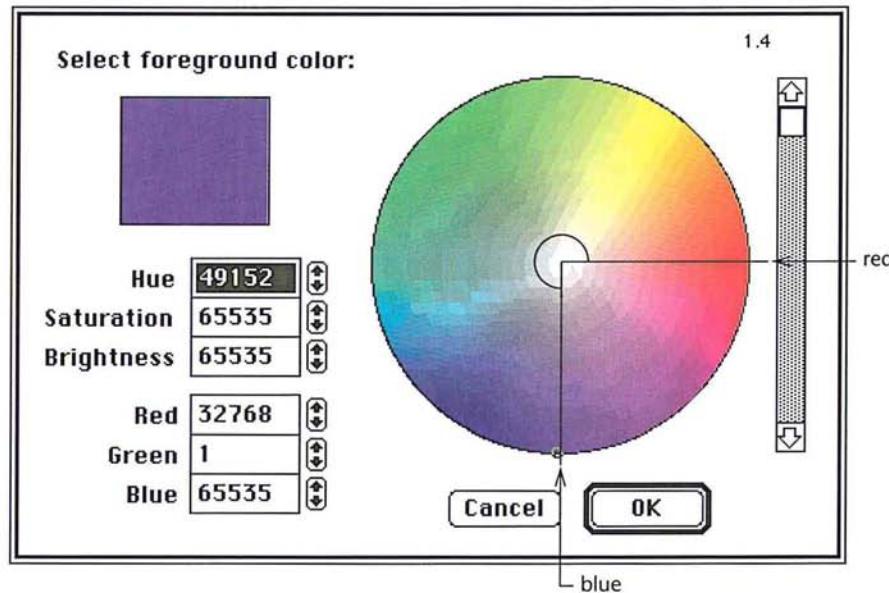
2. Click the B (blue parameter) radio button in the Color Picker dialog box, if it is not already selected.



3. Holding down the mouse button, drag the triangle on the color slider to decrease the blue value; drag the triangle up to increase the blue value.
4. To adjust green value, click near the bottom of the color field to specify a low green value; click near the top of the color field to specify a high green value.
5. To adjust the red value, click to the left side of the color field to specify a low red value; click to the right side of the color field to specify a high red value.
6. When you have finished selecting the desired color parameters, click OK.

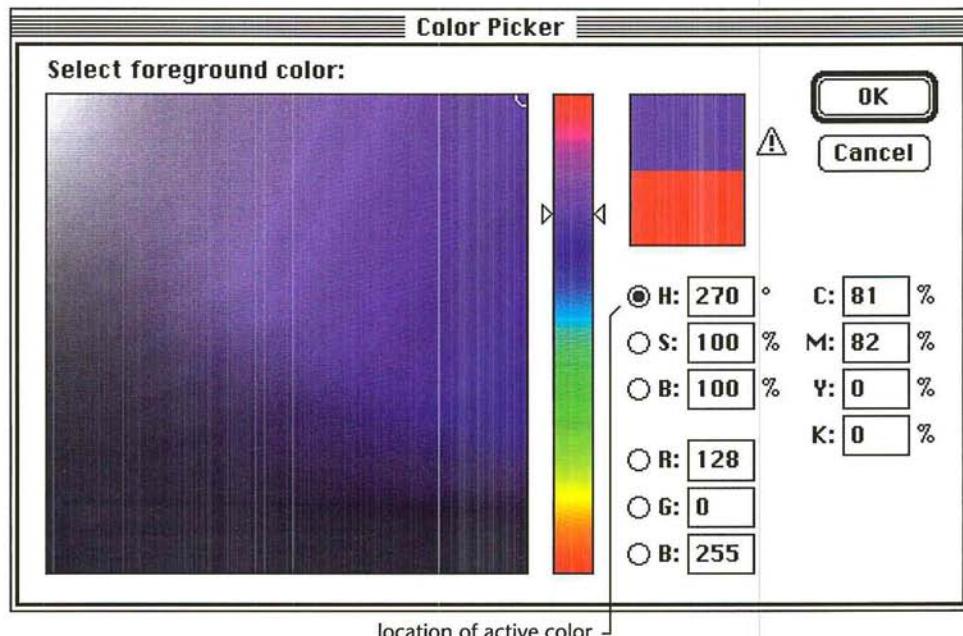
## Specifying a color value

The color picker lets you specify numerical values for the RGB, HSB, and CMYK color models. When you specify a value for hue in the Color Picker dialog box, you define a location on the color wheel in the Color Wheel dialog box that contains the color you want. Pure red is defined as the 0-degree point on the wheel. For example, if you enter a value of 270 degrees for the hue (and 100 percent for both the brightness and saturation parameters), dark blue appears in the color indicator rectangle because the dark blue color is located 270 degrees from the pure red color on the hue color wheel.



## Selecting a CMYK color using the color picker

When you select a color in the Color Picker dialog box using the CMYK model, you specify the color values as a percentage of a given color. To specify the color value you want, double-click in the text box beside the desired color parameter (C, M, Y, or K), and enter a value from 0 to 100.



### To enter color values:

1. Double-click in the text box beside the color parameter you want.
2. Type the value you want.
3. Press the Tab key or double-click in the next text field you want.

### To specify a value for the hue:

4. Double-click in the Hue text box.
5. Type a value (in degrees) from 0 to 360 to specify the location on the color wheel of the color you want.

## Using the color wheel

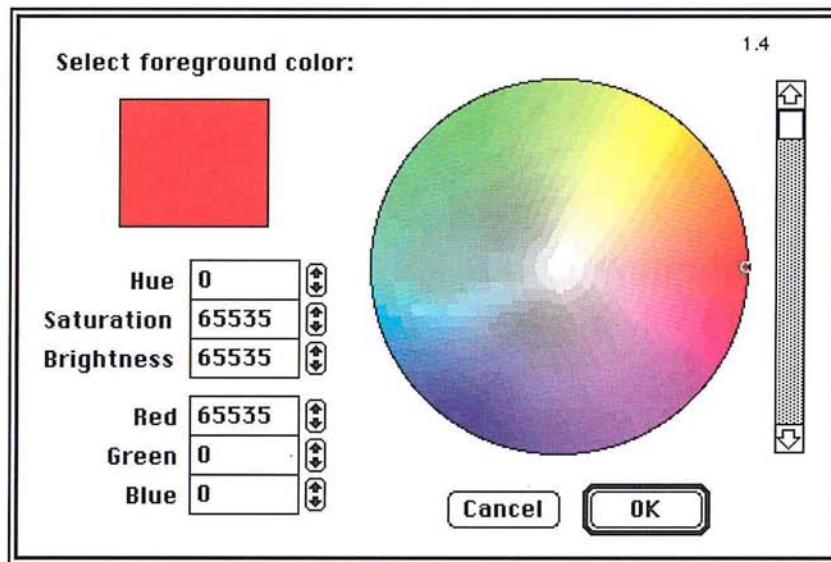
Like the color picker, you can enter numerical values into the color wheel's text boxes to specify the mixture of colors that combine to form the color you want, and you can click the color on the color wheel to select the desired color. The color wheel lets you select colors based on the HSB or RGB color models. The colors at the outer edge of the wheel are the purest in hue. As you move toward the center of the wheel, you increase the amount of gray added to the pure hue (or saturation).

The text boxes in the Color Wheel dialog box display a numerical representation of any color you choose from the color wheel. Each color value can range from 0 to 65,535. You can specify a color value using either HSB or RGB color models by entering a number in the text box. You can record the numbers to reproduce the color.

To access the Color Wheel dialog box:

1. Hold down the Option key.
2. Click either the color sample box in the color palette, or the foreground or background color rectangle in the toolbox.

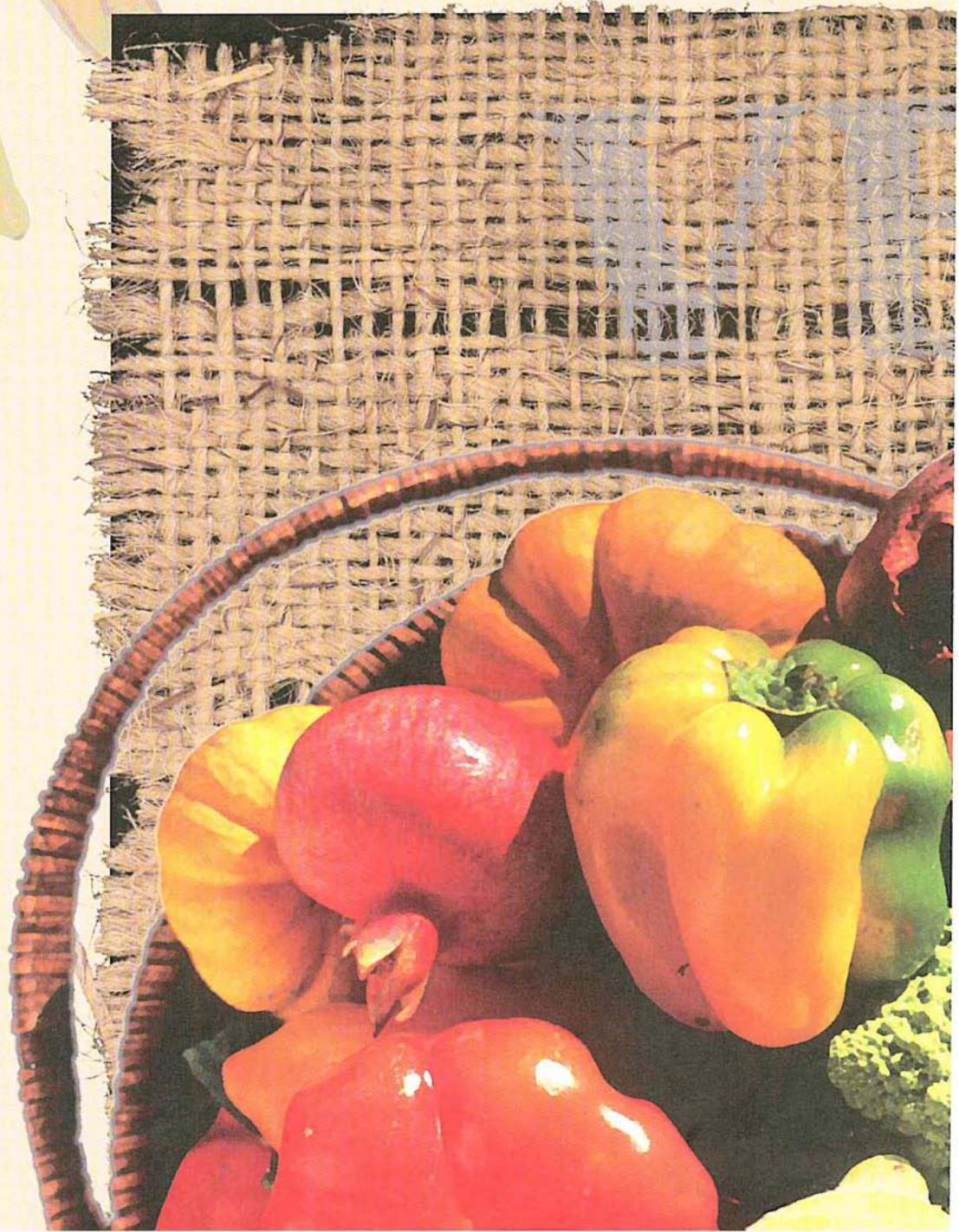
The Color Wheel dialog box appears.



3. To adjust the brightness of the colors, use the scroll bar to the right of the color wheel. Move the scroll bar down to darken the colors, up to make them brighter.
4. When you have selected the color you want, click OK.



## Section 3: *Basic Image Editing*





After scanning a 35mm slide of the vegetable basket, the designer corrected the colors using the Adjust Levels command. The Unsharp Mask filter was applied to the vegetables to create shiny, saturated colors, and the Facet filter was used to achieve a painted effect. The burlap in the image was scanned directly on a flatbed scanner, selected with the magic wand tool and pasted onto the background. Adobe's Stone Informal type was added to the burlap; paste controls were used to allow the burlap to show through the type. The 3 chili peppers were also scanned directly on a flatbed scanner, posterized to create flat colors, and then toned down using the Adjust Levels command.

## Chapter 12: *Cutting and Pasting Selections*

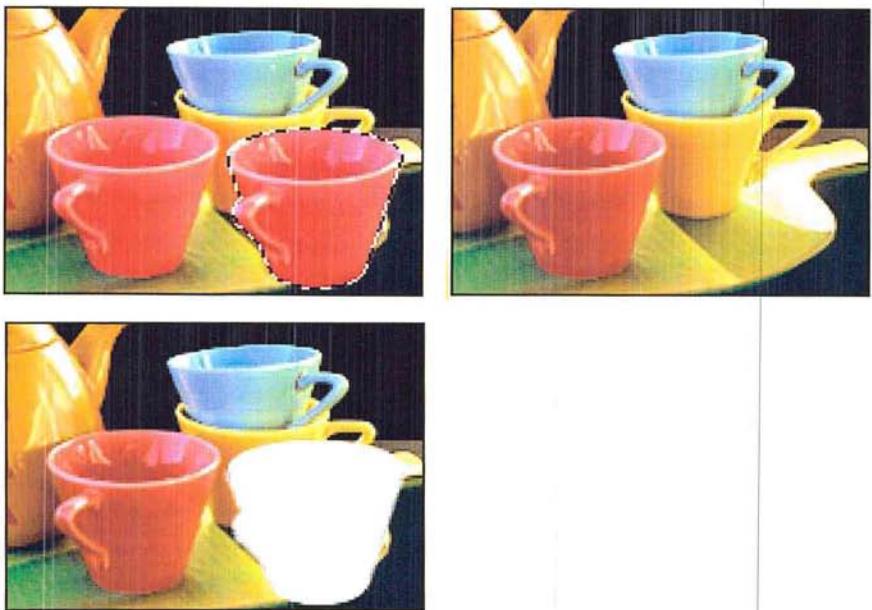
The Adobe Photoshop program contains many tools and features that allow you to edit an image in different ways. A selection on an image can be cut, copied, pasted, or deleted, as well as transformed by skewing, distorting, stretching, rotating, and flipping. You can change the perspective of an image and crop and resize an image. More advanced editing techniques allow you to convert one type of image to another, edit the channels that comprise an image, and alter the color in an image; these techniques are discussed in Section 4, “Advanced Image Editing and Color Correction.” This chapter discusses how to edit an image by deleting a selection, and by cutting, copying, and pasting it.

An important concept in image editing is a floating selection. A floating selection is a selection that you have moved or pasted into an image. The selection is “floating” because it sits on a plane above the underlying image. The pixels in the floating selection do not replace the pixels in the underlying image until you deselect the floating selection. If you cut or delete a floating selection, only the pixels in the floating selection are affected; the underlying image is not affected.

Almost any editing command can be undone. You use the Undo command in the Edit menu (Command-Z) to reverse changes to an image. If the change cannot be reversed, the Edit menu will display Can’t Undo.

## Deleting selections

You can use the Clear command in the Edit menu or press the Delete key to delete the current selection on the image. If the selection was pasted into the image or moved in any way, it is deleted and the underlying image remains intact. Otherwise, the selection disappears, and is replaced by the current background color.



To clear the current selection, choose Clear from the Edit menu, or press the Delete key.

**NOTE:** In the Indexed Color Mode, the feathering around the selection is ignored when you clear the selection. Feathering refers to partially selected pixels that appear on either side of the selection border.

## Cutting selections

When you use the Cut command (Command-X), the program removes the current selection from the image and places it on the Clipboard. The selection stays on the Clipboard until you cut or copy another selection. After you cut a selection, you can paste it elsewhere on the image or into another document.

To cut the current selection, choose Cut from the Edit menu. The current selection is removed from the image and placed on the Clipboard.

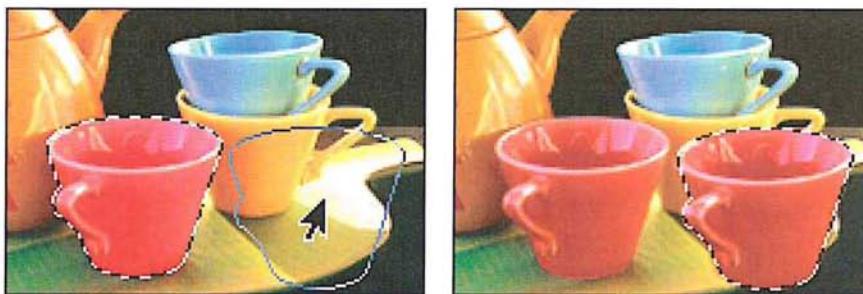
## Copying selections

The Copy command (Command-C) lets you create a copy of the current selection. You can paste the copy elsewhere on the image or into other documents.

To copy the current selection, choose Copy from the Edit menu.

A copy of the selection is placed on the Clipboard. The copy remains on the Clipboard until you copy or cut another selection.

You can create a duplicate of a selection by pressing and holding down the Option key and dragging the selection. This method does not place a copy of the selection on the Clipboard, however.



## Exporting selections

When you cut or copy a selection on an image, the selection is placed on the Clipboard. When you quit the Adobe Photoshop program or switch to another application using MultiFinder, the contents of the Clipboard are converted by default to the PICT format. This conversion allows you to paste the Clipboard's contents into a document created by another application.

So that you can export an image to another application, the Adobe Photoshop program allows you to specify the bit resolution of the selection on the Clipboard and use the System color table for the selection. You can choose a resolution from 1 bit to 32-bits per pixel. For applications that only accept 8-bit images, you should select 8-bits or fewer per pixel.

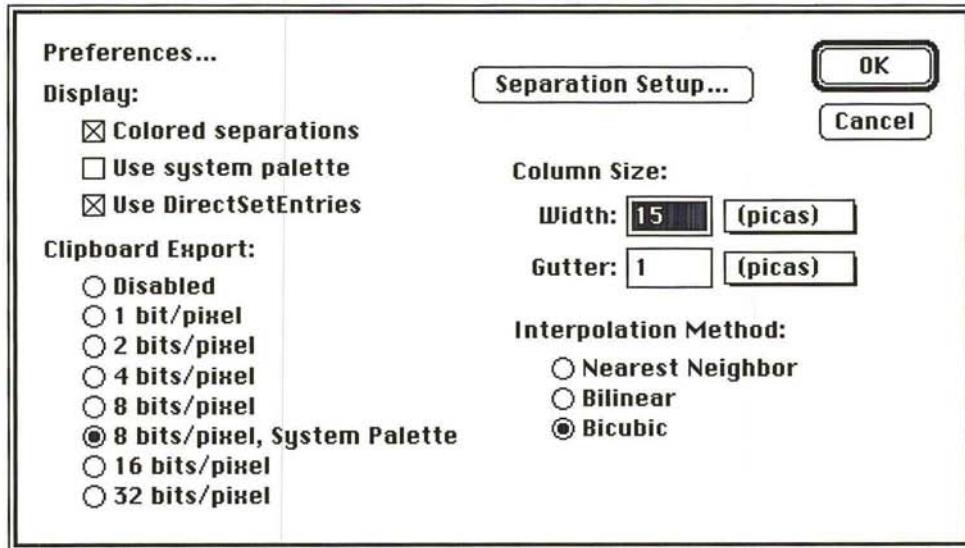
You can disable the automatic conversion feature to save time if you do not intend to paste the contents of the Clipboard into another application's document. If you disable this feature, the contents of the Clipboard are deleted when you exit from the Adobe Photoshop program. The automatic conversion feature does not affect the pasting of selections between Adobe Photoshop documents. These selections are always transferred at the highest possible resolution. You can also choose to use the System color palette (also called the color table) for the selection. This option allows you to make sure that the colors in the selection are displayed properly within applications that don't recognize custom color tables.

You use the Preferences dialog box, accessed via the Preferences command in the Edit menu, to choose the resolution option for selections on the Clipboard. The resolution option you select is saved in your preferences file and remains the default for all Adobe Photoshop documents until you select another option.

**To select the resolution and color table options you want for selections on the Clipboard:**

1. Choose Preferences from the Edit menu.

The Preferences dialog box appears.



2. Click the Clipboard Export option you want. Click Disabled to disable the automatic conversion to the PICT format. Click 8-bits/pixel, System Palette to use the System color table as the color table for the selection.
3. Click OK.

## Pasting selections

The Adobe Photoshop program offers a range of pasting options. You can simply paste a selection on an image, or exercise fine control over how the pasted selection appears on the image. When you paste, you can place the pasted selection inside or behind a selected part of an image, or allow part of the underlying image to show through. You use paste controls to control the appearance of the pasted selection and the underlying image. Some of the paste controls described in this section are not available with certain image types. In these cases, the controls do not appear in the Paste Controls dialog box.

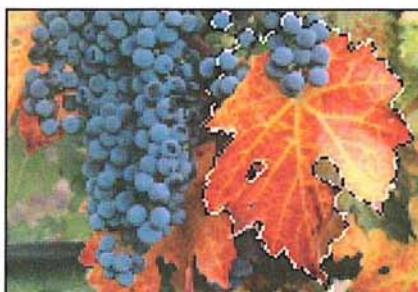
The Paste command in the Edit menu (Command-V) allows you to paste a selection into another part of an image or into another document. When you choose the Paste command, the last selection you cut or copied appears in the center of the active window as the current selection. If a selection already appears on the image, the pasted selection is placed on top of it.

You can paste indexed color images only into other indexed color images that use the same color table. For information about indexed color images and color tables, see the section, “Converting an RGB image to an indexed color image” in Chapter 15, “Converting Images and Working With Channels.”

This section refers to the selection you cut or copied as the “source selection,” and where you paste the selection (the source) as the “target selection.”

### To paste an image:

1. Select the part of the image you want.
2. Choose either the Cut or Copy command from the Edit menu to transfer the image to the Clipboard.
3. Choose Paste from the Edit menu.

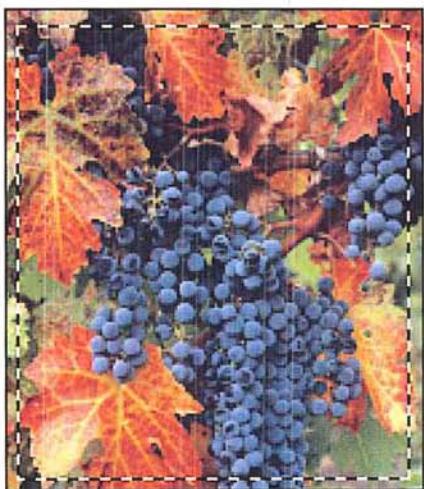


## Pasting into another selection

You can paste a cut or copied selection inside the current selection on the image and automatically crop the source selection to fit inside the target image. The Paste Into command in the Edit menu allows you to do this.

### To paste an image into a selection:

1. Select the part of the image you want.
2. Choose Cut or Copy from the Edit menu.
3. Click one of the selection tools in the toolbox.
4. Use the selection tool to select the part of the image into which you want to paste the source selection.



Source Selection



Target selection

5. Choose Paste Into from the Edit menu.

The source selection appears as the current selection inside the target selection.  
The source selection is cropped to fit into the target selection.



6. Drag the source selection to display the part of it you want within the target selection. When the part you want is displayed, deselect the image.



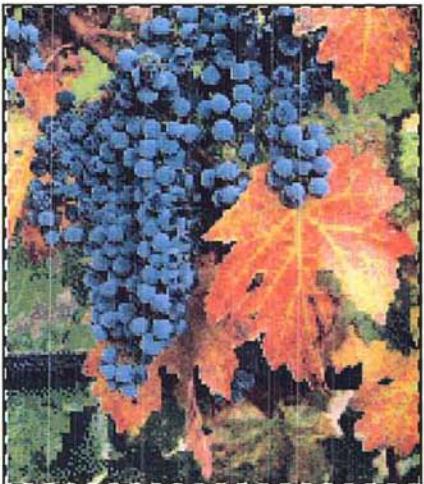
The source is cropped to fit within the border of the target.

## Pasting behind another selection

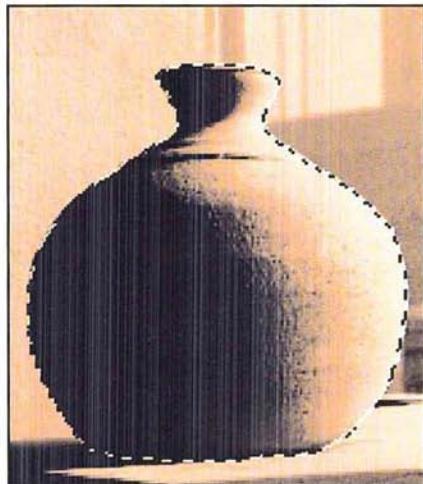
Instead of pasting part of an image inside the current selection, you might want to paste it behind the current selection so that the target selection covers part of the source selection. You use the Paste Behind command in the Edit menu to accomplish this.

### To paste an image behind the current selection:

1. Select the part of the image you want to cut or copy.
2. Choose Cut or Copy from the Edit menu.
3. Select the part of the image behind which you want to paste the source selection.



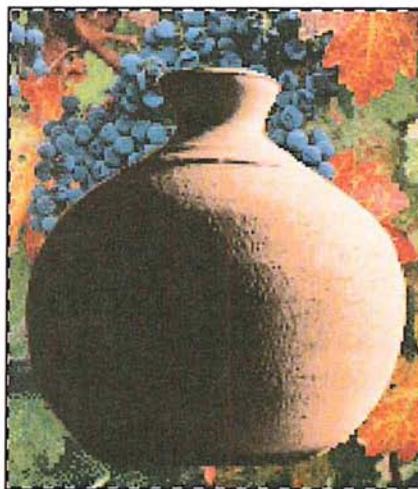
Source selection



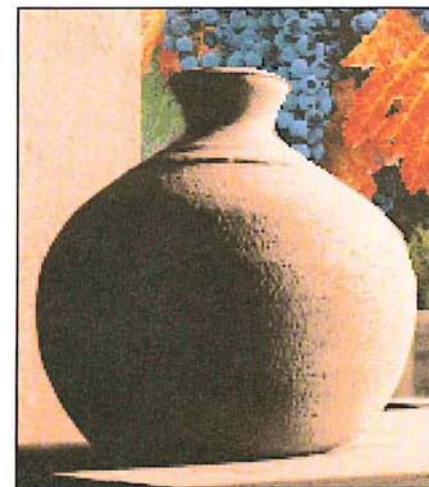
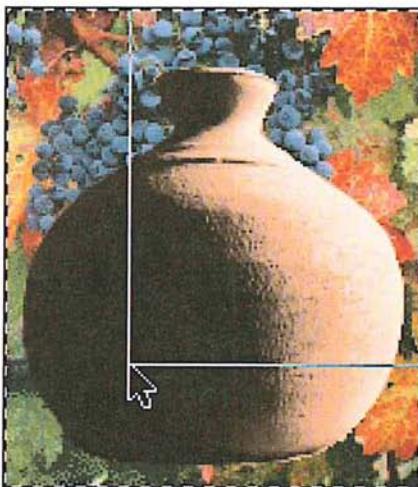
Second selection

4. Choose Paste Behind from the Edit menu.

The source selection appears as the current selection behind the target selection.



5. Drag the source selection to reveal the part of it you want to display. When the part of the source selection you want is displayed, deselect the image.



The source selection appears behind the target selection.

## Using paste controls

When you paste a selection into an image, the selection appears on the image and lies on a plane above the underlying image ("floats") until you deselect the image; the pasted selection is a floating selection. A floating selection is a selection you paste or move. The Paste Controls command in the Edit menu allows you to control the appearance of a floating selection.

Normally, every pixel in the floating selection that overlaps the underlying image appears. However, the Adobe Photoshop program lets you specify which pixels in a floating selection appear in place of the pixels in the underlying image. You can specify color modes to determine whether all the pixels in the floating selection appear, or just the pixels that are lighter or darker than the underlying image. The modes compare the colors of the pixels in both the floating selection and underlying image. You can also make the floating selection opaque or transparent, and make smooth transitions between colors in the floating selection and the underlying image.

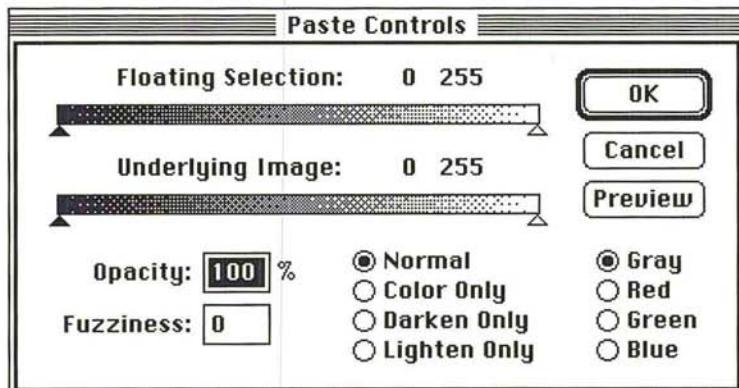
To see how the pixels in the image are affected by your choices before you apply the changes, click the Preview button in the Paste Controls dialog box.

**NOTE:** The full range of paste controls discussed here are available only in RGB mode. Some of the paste controls discussed here do not appear in the Paste Controls dialog box when you are working on other image types.

To select options for a floating selection:

1. Choose one of the paste commands from the Edit menu to paste a selection into an image, or move a selection.
2. Choose Paste Controls from the Edit menu.

The Paste Controls dialog box appears.



To open the Paste Controls dialog box automatically:

1. Press down the Option key.
2. Choose a Paste command from the Edit menu.

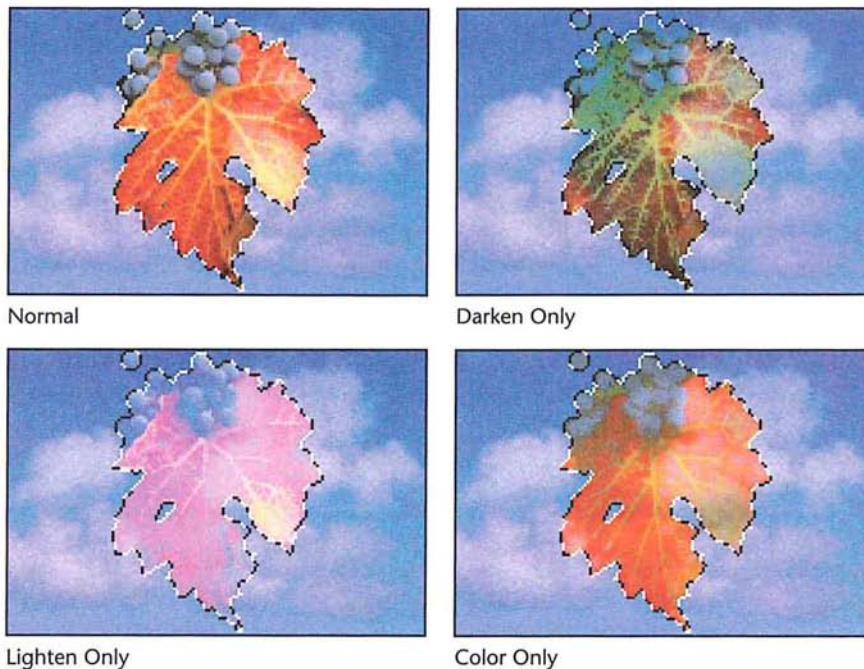
## Using color modes when pasting

The sliders in the Paste Controls dialog box allow you to control which pixels in the floating selection replace those in the underlying image. The Normal mode causes all of the pixels in the floating selection to appear in the image unless other conditions that affect pasting are specified. The Darken Only and Lighten Only modes let you compare the brightness values of pixels in the floating selection and the underlying image to determine which pixels in the floating selection will appear. The Color Only mode applies only the hue and saturation values of the pixels in the floating selection to the pixels in the underlying image, without affecting their luminosity.

You select Normal to paste the entire floating selection into the image. You select Darken Only to replace only the pixels in the underlying image that are lighter than the corresponding pixels in the floating selection. You select Lighten Only to replace only the pixels in the underlying image that are darker than the corresponding pixels in the floating selection. You select Color Only to apply the hue and saturation of the floating selection's pixels to the underlying image without changing the luminosity of the underlying image's pixels.

To select the color mode you want:

1. Choose Paste Controls from the Edit menu.  
The Paste Controls dialog box appears.
2. Click the option you want.



## Specifying a color range for pasting

You can further refine what pixels in the floating selection or underlying image appear in an image by specifying a color range for the pixels. You use the sliders at the top of the Paste Controls dialog box to specify the color value range.

You can select a color, then select a high and low range for the color values. The color values are measured on a scale from 0 (black) to 255 (white). You can specify a color range for both the floating selection and the underlying image.

If the color values of the pixels in the floating selection are inside of the color range specified on the Floating Selection slider in the Paste Controls dialog box, they are pasted into the image. If the color values of the pixels in the underlying image are outside of the color range specified by the Underlying Image slider, they will replace the pixels in the floating selection.

Therefore, if you want the pixels in the underlying image to replace some of the pixels in the floating selection, specify color values that are above or below the color values of the pixels in the underlying image. You use either the Floating Selection or Underlying Image slider, respectively, in the Paste Controls dialog box, to specify the range of color values.

With RGB and indexed color images, you can choose to base the color comparison on the gray values of the pixels (which takes into account the values of red, green, and blue in the pixel), or on the specific red, green, or blue values in the pixels. Gray is the default option.

If you are working on an RGB or indexed color image and you want to base the color criteria on a particular color, click Red, Green, or Blue to select the color of interest.

**To determine which pixels in either the floating selection or the underlying image appear in the image:**

1. Position the pointer on the left, black triangle of either the Floating Selection or the Underlying Image slider to set the low end of the color range.
2. Holding down the mouse button, drag the black triangle to the right.  
The left value above the slider increases as you drag the slider to the right.
3. When the desired value is displayed, release the mouse button.
4. Position the pointer on the right, white triangle on the same slider to set the high value of the range.
5. Holding down the mouse button, drag the white triangle to the left.  
The right value above the slider decreases as you drag the slider to the left.
6. When the desired value is displayed, release the mouse button.

If you used the Floating Selection slider, the pixels in the pasted image that have color values between the two values in the Floating Selection line will be pasted into the image. Pixels outside the range will not be pasted when you click OK.

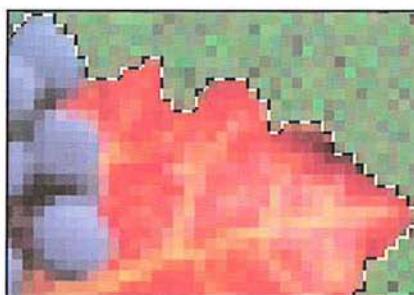
If you used the Underlying Image slider, only the pixels with color values outside of the specified color range will show through. All of the pixels within the range will be pasted over by the floating selection.

### Controlling color transitions when pasting

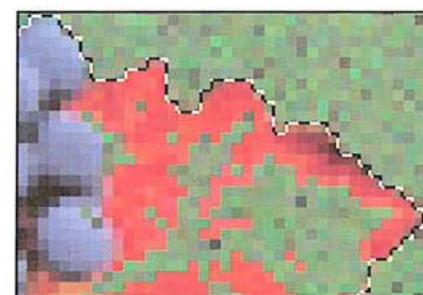
You can control the transitions between colors in the floating selection and the underlying image using the Fuzziness parameter. The Fuzziness parameter works differently than the paint bucket tool's Fuzziness parameter; the Paste Controls' Fuzziness parameter allows you to avoid sharp transitions in colors between pixels. Other parameters you select in the Paste Controls dialog box will affect the extent of the fuzziness you achieve. The Fuzziness parameter is only applied when you use the Floating Selection and/or the Underlying Image sliders to specify a color range for the floating selection and/or the underlying image. When you specify color ranges using the sliders, the pixels that do not fall inside or outside the specified range (depending on whether you specify a range for the floating selection or the underlying image) normally do not appear on the image. However, if you specify a high fuzziness value, these pixels will appear, but only part of their original color will appear.

#### To specify the fuzziness of the floating selection:

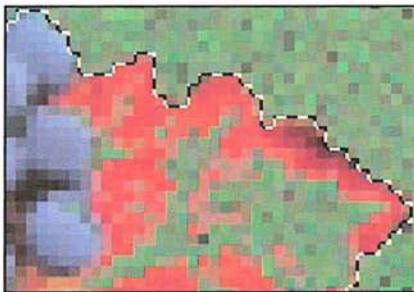
1. Press the Tab key or double-click in the Fuzziness text box.
2. Enter a value from 0 to 100.



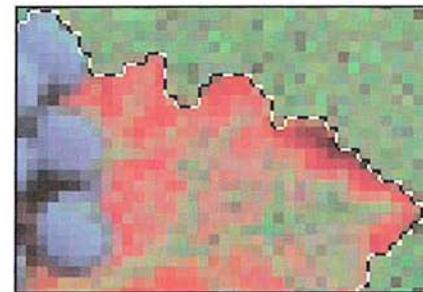
Without Paste Controls adjustments



Fuzziness value: 0;  
Floating Selection parameter: 140



Fuzziness value: 25;  
Floating Selection parameter: 140

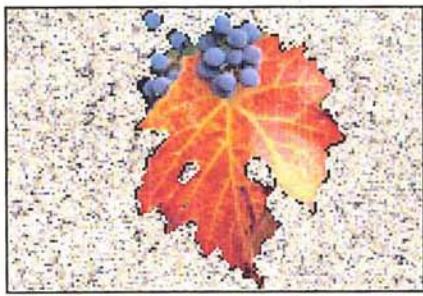


Fuzziness value: 100;  
Floating Selection parameter: 140

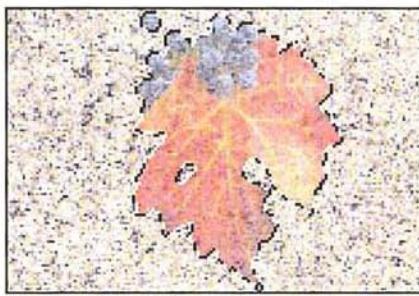
## Controlling the opacity of a floating selection

You can control how much the underlying image shows through a floating selection using the Opacity parameter in the Paste Controls dialog box. Specify a high percentage value to make a pasted image opaque; specify a low value to make a floating selection transparent.

To specify a value for the opacity of a floating selection, enter a value from 1 to 100.



Opacity value: 100%



Opacity value: 50%

## Completing the pasting operation

When you have selected the various Paste Controls options, click OK. The options apply only to the current selection. Once a selection is deselected, the options in the Paste Controls dialog box revert to their default settings.

## Chapter 13: *Transforming Images*

The Adobe Photoshop program lets you transform selections to create special effects and accurately position parts of an image. You can flip, rotate, and apply such special effects as skew and perspective to selections. To transform selections, you use the commands in the Image menu.

Unless noted, all of the transformations start from a point of origin, which you specify. The point of origin is a fixed spot in your image. The Adobe Photoshop program applies the chosen transformation or special effect to the current selection. If nothing is selected, the effect is applied to the entire image.

When you perform certain transformations, including arbitrary rotation and special effects, the Adobe Photoshop program uses the currently chosen interpolation method to calculate the color values of pixels that are added or deleted as a result of the transformation. Interpolation is the process used to determine the appropriate color of a pixel that is inserted between two other pixels. For information on selecting an interpolation method, see the section “Selecting an interpolation method” in Chapter 14, “Resizing Images.”

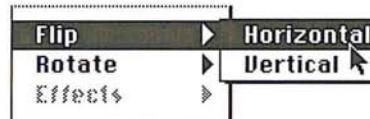
### Flipping a selection

You can flip a selection in either the horizontal or vertical direction. You use the Flip command in the Image menu to flip a selection.

#### To flip a selection horizontally:

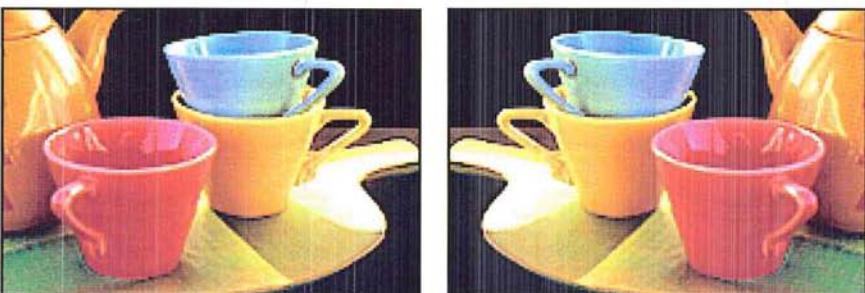
1. Select the part of the image you want to flip.
2. Choose Flip from the Image menu.

The Flip submenu appears.



3. Holding down the mouse button, drag through the submenu until Horizontal is highlighted.
4. Release the mouse button.

The selection is flipped along the horizontal axis.

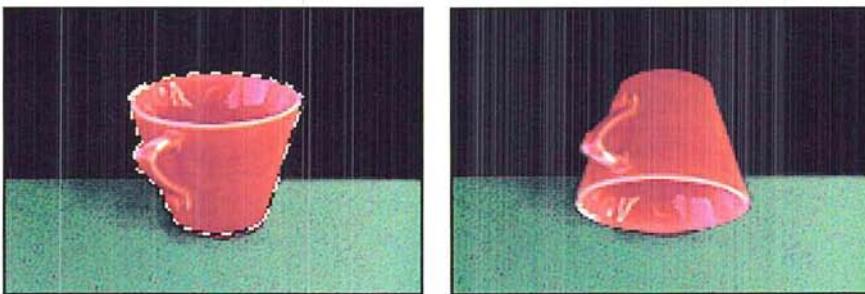


Original image

Flipped horizontally

**To flip a selection vertically:**

1. Select the part of the image you want to flip.



Original image

Flipped vertically

2. Choose Flip from the Image menu.

The Flip submenu appears.

3. Holding down the mouse button, drag through the submenu until Vertical is highlighted.

4. Release the mouse button.

The selection is flipped along the vertical axis.

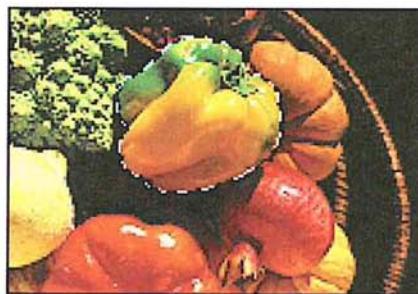
## Rotating a selection

Rotating a selection moves it around a fixed point that you designate. You can rotate a selection by a precise number of degrees using the Rotate command in the Image menu, or you can rotate a selection by hand using the mouse. The Rotate commands allow you to rotate a selection 180 degrees, 90 degrees in the clockwise or counterclockwise direction, or to any angle. If nothing is selected, and you choose the Arbitrary, 180 degree, or 90 degree rotation command, you can rotate the entire image.

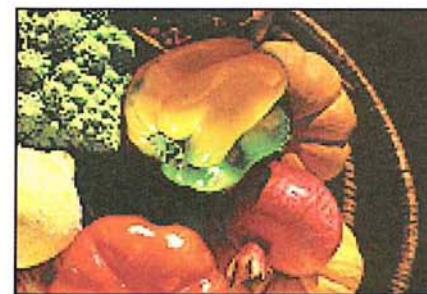
**To rotate a selection 180 degrees, or 90 degrees in the clockwise (CW) or counterclockwise (CCW) direction:**

1. Select the part of the image you want to rotate.
2. Choose Rotate from the Image menu.
3. Holding down the mouse button, drag to highlight the option you want.
4. Release the mouse button.

The selection is rotated according to the option you specified.



Original selection



Selection rotated 180°

## Rotating a selection precisely

For precise positioning of selections, the Adobe Photoshop program lets you specify the number of degrees you want to rotate a selection. Negative values cause the selection to rotate in the direction opposite to the currently selected rotation direction.

**To specify the number of degrees of rotation for a selection:**

1. Select the part of the image you want to rotate.
2. Choose Rotate from the Image menu.
3. Choose Arbitrary from the Rotate submenu.

The Arbitrary Rotate dialog box appears.



4. Enter a value from -359.9 to 359.9 degrees.
5. Click the direction you want to rotate the selection, either CW (clockwise) or CCW (counterclockwise).
6. When you have finished making your rotation choices, click OK.

The selection is rotated to the degree and in the direction you specified.

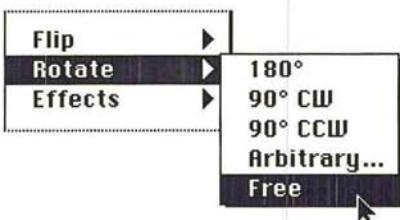


### Rotating a selection by hand

Rather than rotate a selection by specifying the amount of rotation in a dialog box, you may want to rotate it using the mouse.

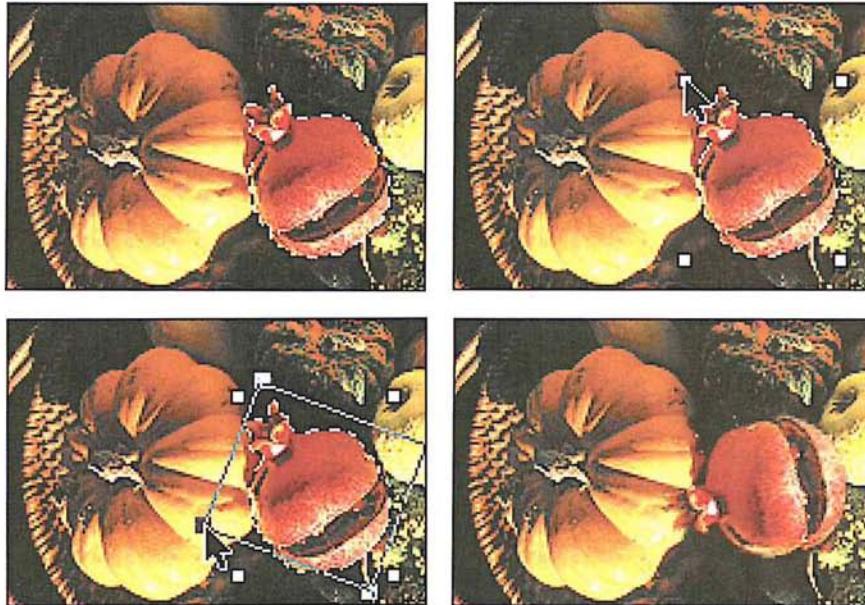
#### To freely rotate a selection to any angle:

1. Select the part of the image you want to rotate.
2. Choose Free from the Rotate submenu.



Edit handles appear around the selection marquee.

3. Position the pointer on one of the handles surrounding the selection.
4. Holding down the mouse button, drag the handle in a circular direction.
5. When the selection is oriented as desired, release the mouse button.
6. When the image appears rotated as desired, deselect it.



## Using special effects

The Adobe Photoshop program includes commands for creating such special effects with an image as stretching, skewing, distorting, and creating a perspective effect. Special effects are controlled by the Effects commands in the Image menu.

The Effects commands in the Image menu all work essentially the same way. You select the desired part of the image and choose the Effects command you want from the Effects submenu. Four handles appear on the selection. You drag the handles to produce the effect you want.

Once you choose one of the Effects commands, the command remains active until you choose another command or deselect the image. This allows you to continue dragging handles to reshape an image until you achieve the desired effect. If you want to undo all the changes you've made using that command, simply choose Undo from the Edit menu.

**NOTE:** You can suppress the redrawing of the screen until you have finished applying a special effect to the selection by holding down the Option key while you drag handles. You can also press Command-period(.) to cancel the operation.

#### To choose an Effects command:

1. Select the part of the image to which you want to apply the effect.
2. Choose Effects from the Image menu.  
The Effects submenu appears.
3. Holding down the mouse button, drag through the submenu until the desired Effects command is highlighted.
4. Release the mouse button.

Four handles appear around the selection. Drag the handles to produce the effect you want.

#### Stretching a selection

Stretching either extends or shrinks the length or width of a selection. (This process is also known as “scaling.”) You can also constrain the selection’s height-to-width ratio to prevent it from becoming distorted. To stretch or shrink a selection, you use the Stretch command.

#### To stretch a selection:

1. Select the part of the image you want to stretch.

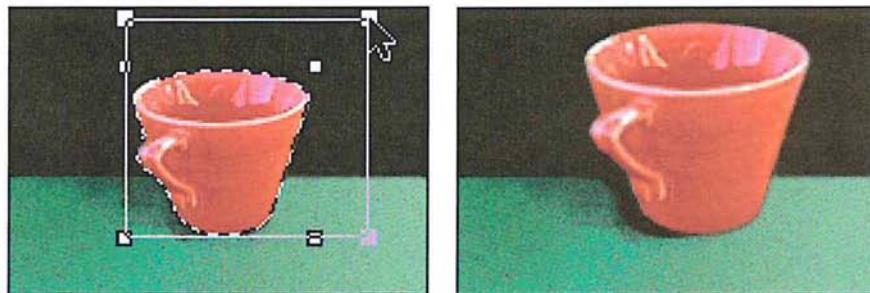


2. Choose Effects from the Image menu.
3. Choose Stretch from the Effects submenu.

Four handles appear around the selection. You drag the handles to produce the effect you want.

4. Position the pointer on one of the handles surrounding the selection.
5. As an option, hold down the Shift key to maintain the selection’s height-to-width ratio and prevent it from becoming distorted.
6. Drag the handle until the selection appears as desired.

- When the selection appears the way you want, deselect it.



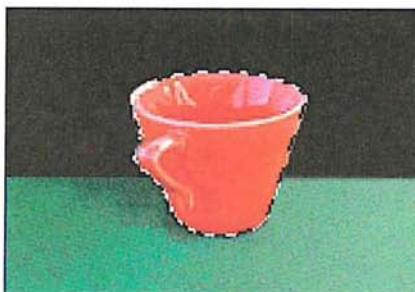
### Skewing a selection

Skewing slants a selection vertically or horizontally along the edge of a selection. To slant a selection in one direction, you use the Skew command. You can also use the Skew command to create a perspective effect.

When you use the Skew command, four handles appear that you can drag to produce a desired effect. You can achieve a perspective effect by dragging one of the handles, releasing it, and then dragging the same handle or another handle. When you drag a handle after first skewing a selection, the handle is decoupled from its partner, allowing you to move it independently. Before you deselect a selection you have skewed, you can achieve the Skew effect again; to do so, hold down the Shift key, and drag one of the handles.

#### To skew a selection:

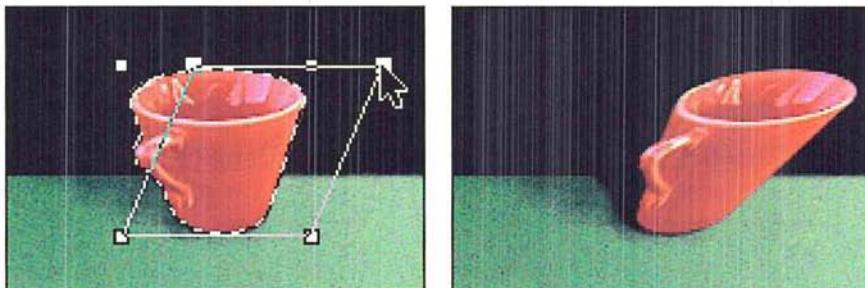
- Select the part of the image you want to skew.



- Choose Effects from the Image menu.
- Choose Skew from the Effects submenu.

Four handles appear around the selection. Drag the handles to produce the desired effect.

4. Position the pointer on one of the handles around the selection.
5. Holding down the mouse button, drag the handle in the direction you want the selection to slant.
6. When the selection appears skewed as desired, deselect it.



### Creating perspective

Perspective makes a selection appear like a three-dimensional image. You can use the Perspective command to create a perspective effect by moving two edit handles in opposite directions at the same time while changing the height of the selection.

#### To use the Perspective command:

1. Select the part of the image to which you want to apply the Perspective effect.



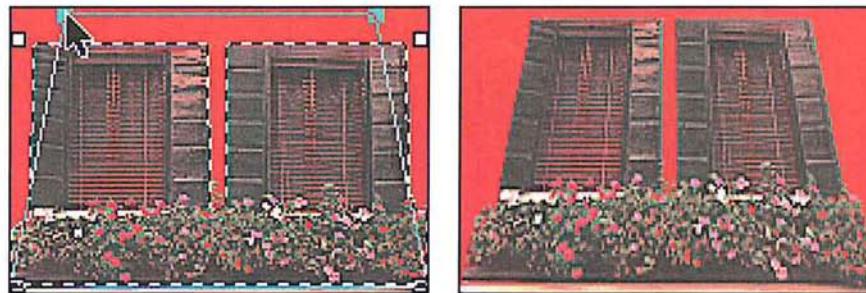
2. Choose Effects from the Image menu.
3. Choose Perspective from the Effects submenu.

Four handles appear around the selection. You drag the handles to produce the desired effect.
4. Position the pointer on one of the handles surrounding the selection.

5. Holding down the mouse button, drag the handle up or down, and inward or outward, depending on the effect you want to create.

As you drag a handle with the mouse, the handle opposite the selected handle on the horizontal axis responds to the mouse movement as well; it moves the opposite direction to dragging. This causes one end of the selection to expand as you drag away from the selection, or to become condensed as you drag toward the selection. The two handles move in tandem as you drag up or down.

6. When the selection appears altered as desired, deselect it.



**NOTE:** To create a perspective effect with a vanishing point at an angle other than 90 degrees, rotate the selection, apply the perspective effect, then rotate the selection back to its original orientation.

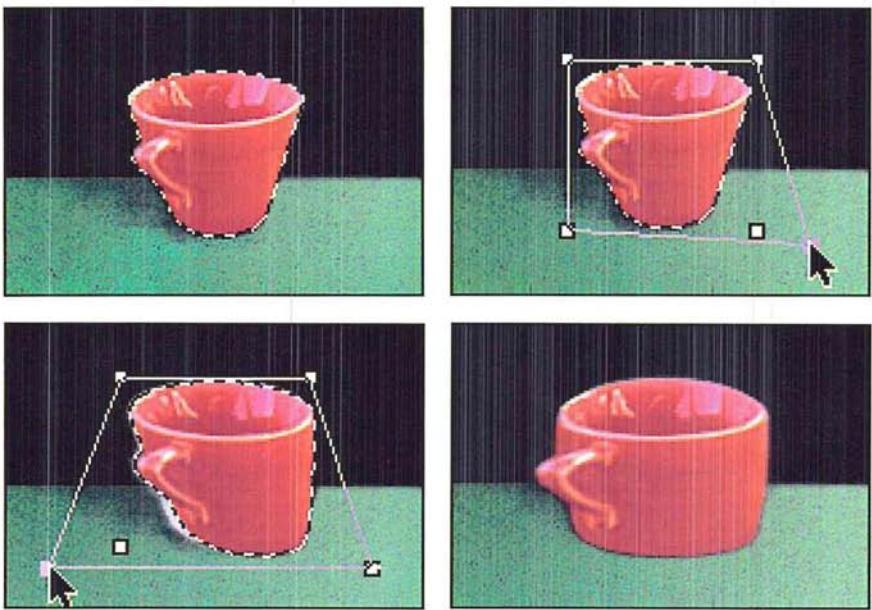
### Distorting a selection

Distorting reshapes a selection in one direction at a time. The Distort command allows you to drag each edit handle independently.

#### To distort a selection:

1. Select the part of the image you want to distort.
2. Choose Effects from the Image menu.
3. Choose Distort from the Effects submenu.  
Four handles appear around the selection.
4. Position the pointer on one handle at a time.
5. Holding down the mouse button, drag each handle to produce the effect you want.

6. When the selection appears distorted as desired, deselect it.



## Chapter 14: *Resizing Images*

The Adobe Photoshop program provides a number of ways to change the size of an image; you can resize an image by cropping, resizing, and resampling it. Many of these options allow you to change the size and resolution of an image at the same time.

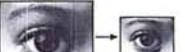
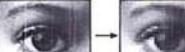
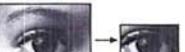
This chapter covers changing the size of an image by cropping it, resizing it, or resampling it. It explains when you might want to resample an image at the same time you resize it, and when you would not want to resample an image. Resampling changes the resolution of an image to correspond with a scanner or output device; resampling down reduces the image resolution, while resampling up increases the image resolution.

Both the Crop command and the cropping tool allow you to select part of an image and discard the rest. The cropping tool also allows you to change the image's resolution as you crop it. The Resize command allows you to add blank space around the image in terms of a certain percentage or absolute size values. The Size/Rulers option in the Page Setup dialog box under the File menu allows you to change the size and resolution of an image only when it is output; the option does not affect the number of pixels, or the amount of information in the image. The Resample command allows you to change the image's size and resolution independently.

When you transform an image by resizing, arbitrarily rotating it, or resampling it, or using such special effects as skew or perspective, the Adobe Photoshop program evaluates the color values of pixels that are added or changed by the transformations. The Adobe Photoshop program evaluates color through the process of interpolation, which determines the color of a pixel that is inserted between two other pixels.

Before resizing an image, or if you want to determine the image's size or resolution, you can preview it.

The following chart shows when you might choose a particular resizing option.

Option	Location	When to use
Resize command  	Image menu	<ul style="list-style-type: none"><li>• Add working space around existing image without changing dimensions of image</li><li>• Reduce or enlarge overall size of image (Note: this will also cause resampling)<ul style="list-style-type: none"><li>-by percentage</li><li>-by specific dimensions<ul style="list-style-type: none"><li>• uniformly</li><li>• non-uniformly</li></ul></li></ul></li></ul>
Resample command 	Image menu	<ul style="list-style-type: none"><li>• Change the resolution of an image<ul style="list-style-type: none"><li>-adjust (increase or decrease) resolution of image to reflect output device</li><li>-reduce the dimensions of the image and at the same time increase the resolution for higher quality output</li></ul></li></ul>
Cropping tool 	Toolbox	<ul style="list-style-type: none"><li>• Delete unwanted areas from an image</li><li>• Crop an image to specific dimensions<ul style="list-style-type: none"><li>-change or retain the resolution of an image while cropping</li></ul></li></ul>
Size/Rulers 	Page Setup File menu	<ul style="list-style-type: none"><li>• Change either the dimensions or the resolution of the image only when it is printed</li></ul>

## About resolution

There are four types of resolution that are important in the Adobe Photoshop program: bit resolution, screen resolution (or screen ruling), device resolution, and image resolution. The resolution of the monitor, which is normally 72 dpi, is fixed and is not controlled through Adobe Photoshop software.

The bit resolution is a measure of the number of bits of information per pixel. This resolution determines how many colors can be displayed at one time on-screen. The common options for this resolution range from 1 bit per pixel to 32 bits per pixel. This is the resolution that is discussed with the Clipboard export and file format options.

The screen resolution refers to the number of dots per inch in the halftone screen or the screens used to produce a color separation. Generally, the dots are arranged in lines on the screen, and this resolution is measured in lines per inch.

The device resolution refers to the number of dots per inch that the output device (such as an imagesetter or laser printer) can produce. This resolution is measured in dpi.

The image resolution refers to the amount of information in an image. The information is measured in pixels per inch. The image resolution affects the size of the document stored on disk and in memory, as well as the quality of the output. The higher the image resolution, the more space on disk the image requires and the more time it takes to print. The image resolution is the resolution of the image that is output.

If you scan an image at a fairly high resolution, such as 300 pixels per inch, the size of the document will tend to be large. An RGB image 3.2-inches-by-2.5-inches that has an image resolution of 72 pixels per inch occupies about 200K in memory and on disk. The same image at a resolution of 300 pixels per inch takes up about 3,469K of space. You might not need all that information to print the image with a satisfactory level of quality.

If you have too much information, the image may occupy too much space in memory and on disk, and take a long time to print. When you reduce the image resolution, called resampling down, you discard the extra information. However, if you have too little information, the pixels will be too large and will be visible in the printed result. As a general rule, to produce a high-quality image, the image resolution should be twice the screen resolution of the halftone screen that you will use to print it. For example, to print a high-quality image using a 133-line-per-inch screen, you would need an image resolution of approximately 266 pixels per inch.

It is important to understand how resampling affects image resolution. Resampling allows you to change the resolution of an image to fit your disk space and memory and to conserve memory while outputting the best quality results. To conserve memory and speed printing, you can reduce the image resolution by resampling down; but in doing so, you may have to compromise the output quality.

It is possible to increase the output quality by increasing the image resolution, by resampling up. However, if you increase the original image resolution, you may not achieve the results you expect. When you increase the original image resolution, the Adobe Photoshop program must create pixels to achieve that higher resolution. To do so, the program interpolates where it must create pixels, and adds that information to your image. The result will be less sharp than the original, high-resolution, scanned image.

## Previewing the page size and layout

Before you change the size of an image, you may want to preview it to see how the image will appear when you print it. To do so, you can display a page preview, which displays a box showing how the image will appear on the page. You can also display a size preview, which displays the dimensions of the image, its resolution, and the number of channels in the image.

Both the page preview and size preview appear in the lower-left corner of the document window.

The dimensions of the page in the page preview correspond to the page size selected in the Page Setup dialog box. The Adobe Photoshop program outputs only a single page per image. If your image extends over several pages, only one page of the image will be output; the rest of the image will be clipped.

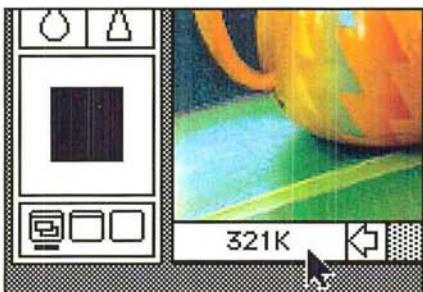
The page preview shows the optional information you have selected in the Page Setup dialog box that will appear on the image when it is printed, including registration marks, calibration bars, labels, and captions. Calibration bars, labels, and captions are represented by gray boxes on the previewed page.

The size preview displays the height and width of the image, both in terms of pixels and in terms of the units of measure currently selected for the rulers.

For example, if you preview the size of a 5-inch-by-5-inch, 72-pixel per inch image, and the units of measure for rulers are inches, the height is displayed as 360 pixels, which represents the number of pixels in the vertical direction when the image is printed, times 5 inches, which is the image's physical height measured in inches.

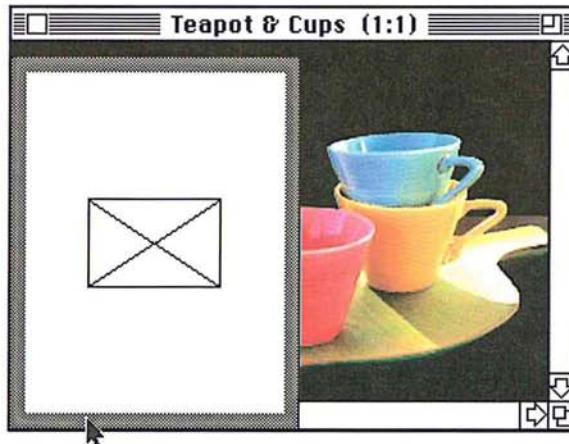
### To preview a page:

1. Position the pointer on the box in the lower left corner of the document window, where the document size is displayed.



2. Press down the mouse button.

The page preview box appears.



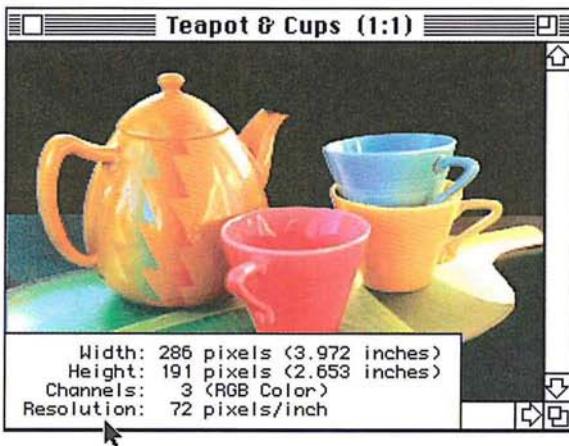
3. Release the mouse button when you have finished previewing the page.

**To display the size preview information:**

1. Position the pointer on the page preview box.

2. Hold down the Option key and the mouse button, in that order.

The size preview box appears.



3. When you have finished viewing the size information, release the mouse button and the Option key.

**To select the page size you want:**

1. Choose Page Setup from the File menu.  
The Page Setup dialog box appear.
2. Click the page size (Paper) option you want.
3. Select any other options you want.
4. Click OK.

## Cropping images

Many times you will want to select only part of an image and discard the rest. This process, called “cropping,” can be done using the Crop command in the Edit menu or the cropping tool in the toolbox.

The cropping tool allows you to rotate and resample the cropped area. When you use the Crop command, you define the area you want to save with the rectangular marquee tool. The Crop command doesn’t allow you to rotate and resample the cropped area, so it does not give you as much flexibility in cropping an image as the cropping tool.

**To use the Crop command to crop an image:**

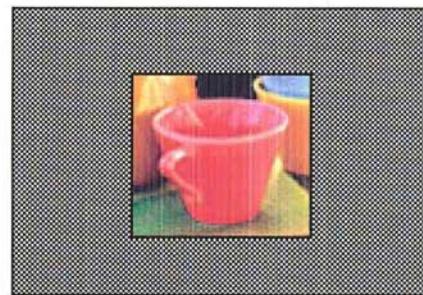


1. Click the rectangular marquee tool in the toolbox.
2. Select the part of the image you want to save.
3. Choose Crop from the Edit menu.

The part of the image surrounding the selected area is deleted.



Original selection



Cropped image

## Using the cropping tool

You can use the cropping tool to select part of an image and discard the unselected portion. You define the cropping area by dragging a special rectangular marquee around the image that defines the cropped area. The marquee you use is unique to the cropping tool and automatically appears when you drag the cropping pointer on an image.

The cropping tool includes options that allow you to define the aspect ratio (height-to-width ratio) for the rectangular marquee used to crop images, as well as define the resolution of the cropped image.

If you specify both a resolution and size for the cropped area, the cropped area will be resampled to adjust to the specified resolution. If you specify just a resolution value, the size will change to compensate for the change in resolution. If you specify just a size for the cropped area but not a resolution, the cropped area will not be resampled, but the resolution will change to compensate for the size change.

Options for the cropping tool appear in the Cropping Tool Options dialog box. Once you have defined the selection area, you can move and resize the rectangular marquee, and also rotate the selection. If you define values for the width and height in the Cropping Options dialog box, the rectangular marquee maintains the specified height-to-width ratio. To remove the constraints on the cropping tool, you delete the values in the Cropping Tool Options dialog box.

### Specifying the size of a cropped area

To define the cropping area using the mouse to enclose the area with a rectangular marquee:

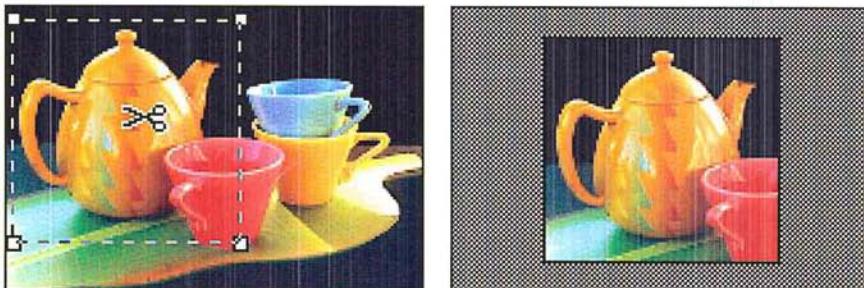
1. Click the cropping tool in the toolbox.
2. Position the cropping pointer where you want to start the selection.
3. Holding down the mouse button, drag to enclose the selection.



4. When you have selected the area to be cropped, release the mouse button.

**To crop the image:**

5. Position the pointer inside the selected area.  
The pointer turns into the scissors pointer.
6. Click the mouse button.



**Defining the aspect ratio and resolution of the cropped area**

An aspect ratio defines the relationship between the height and the width of a cropped area. This helps you to select an image of a specific size to fit in your layout, and of a specific resolution to suit your output needs. The image resolution you specify determines the resolution at which the image will be output. The dimensions you specify for the cropped area determine the overall size of the image.

After you specify the overall size for an area to be cropped, you use the cropping tool to select the part of the image that will remain once the cropping is performed. The dimensions of the cropped area are determined by the size value you enter. As an example of how the aspect ratio works, to define a selection area that is twice as high as it is wide, you could enter 2 inches into the Height text box and 1 inch into the Width text box. The size of the cropped image would be 2-inches-by-1-inch.

A general guideline for specifying the resolution, is to specify a resolution that is twice the screen ruling. So for a screen ruling of 133 lines per inch, you would specify a resolution of 266. You specify the screen ruling in the Halftone Screens dialog box, which you can access from the Page Setup dialog box, under the Page Setup command in the File menu. For more information about screen rulings, see "Selecting screen attributes" in Chapter 19, "Printing Halftones."

If you specify a size but not a resolution with the cropping tool, the image will be printed at the specified size, and the resolution will also change to compensate for the size change. As an example, if you have a 1-inch-by-1-inch image with an image resolution of 100 and you specify a size of 2-inches-by-2-inches, the image will be printed at a size of 2-inches-by-2-inches and a resolution of 50.

If you specify a resolution but not a size with the cropping tool, the image will not be resampled, but its size will change to compensate for the change in resolution. Using the above example, if you specify a resolution of 50 and no size values for the 1-inch-by-1-inch image with an image resolution of 100, the image will be printed at a size of 2-inches-by-2-inches and a resolution of 50. If you specify size values and a resolution value, the image will be resampled to the specified size and resolution. For information about resampling, see the section, "Resampling images precisely" later in this chapter.

When you select the resolution, height, and width of the cropped image, you can also select units of measure for these dimensions. You can specify the resolution in either pixels per inch or pixels per centimeter. For the width and height, you can choose inches, centimeters (cm), points, or picas. You can also define the width in terms of columns. The columns unit uses the column and gutter size specified in the Preferences dialog box under the Edit menu. (For information about specifying the column size, see the section, "Specifying the column size" in Chapter 4, "Controlling the Artwork and Screen Display.")

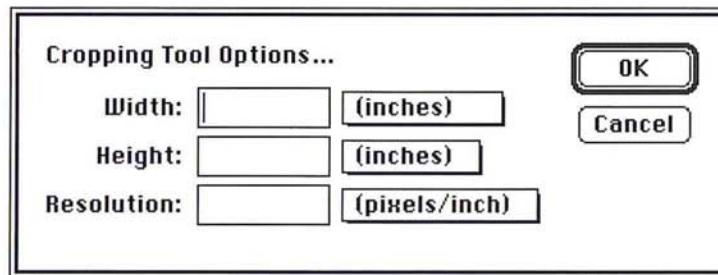
To deactivate the cropping tool, click any tool in the toolbox or click outside the selected area.

To cancel the cropping operation once it has started, type Command-period (.).

**To choose options for the cropping tool:**

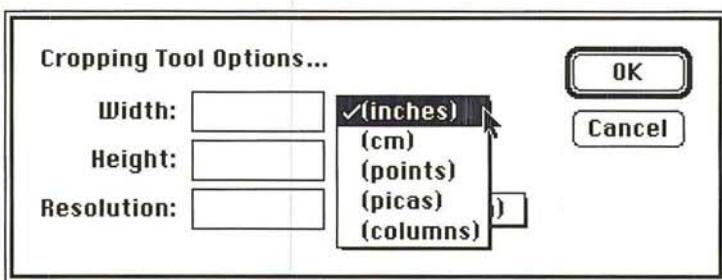
1. Double-click or Option-click the cropping tool in the toolbox.

The Cropping Tool Options dialog box appears.



2. Choose the cropping tool size units for the width, height, or resolution by positioning the pointer on the shadowed box beside the text box for the option you want, and pressing down the mouse button.

A pop-up menu listing the units options appears.



3. Holding down the mouse button, drag until the units option you want is highlighted. Release the mouse button.
4. Enter a value for the width. (You can enter decimal values, for example, 3.625, for the width and height.)
5. Press the Tab key or click in the Height text box.
6. Enter a value for the height.
7. To enter a value for the image resolution, press the Tab key or click in the Resolution text box.
8. Enter a value for the resolution.
9. When you have finished configuring the cropping tool, click OK.

**To create the rectangular marquee that defines the cropping area:**

1. Click the cropping tool in the toolbox.
2. Position the cropping pointer where you want to start the selection.
3. Holding down the mouse button, drag to select part of the image you want to crop. If you entered values for the width and height in the Cropping Tool Options dialog box, the rectangular marquee will be constrained to the aspect ratio you defined.



4. When you have selected the cropped image, release the mouse button.

5. To crop the image, click inside the selected area.

If you specified a size and resolution, the image is resampled when you crop it.

### Manipulating the cropped selection

You may want to rotate a selection before you crop it, or change the size of the rectangular marquee used with the cropping tool. You can change the size of the rectangular marquee, or rotate the selection after you create the rectangular marquee and release the mouse button.

#### To resize the rectangular marquee:

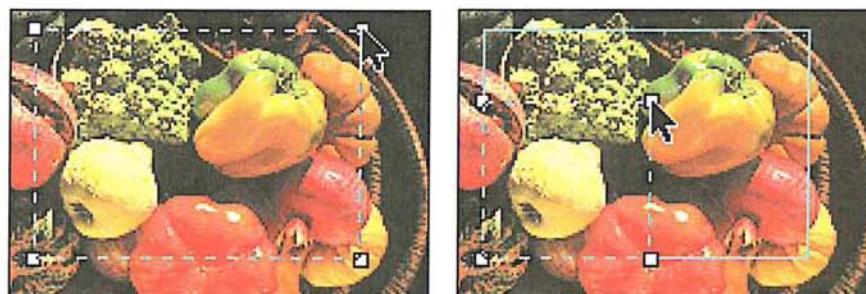
1. Click the cropping tool in the toolbox, and define the area to be cropped.

2. Position the cropping tool on one of the handles on the marquee.

The tool changes into the arrow pointer.

3. Holding down the mouse button, drag until the rectangular marquee is the size you want.

4. Release the mouse button.



#### To move the rectangular marquee:

1. Position the cropping tool pointer on one of the edit handles on the rectangular marquee.

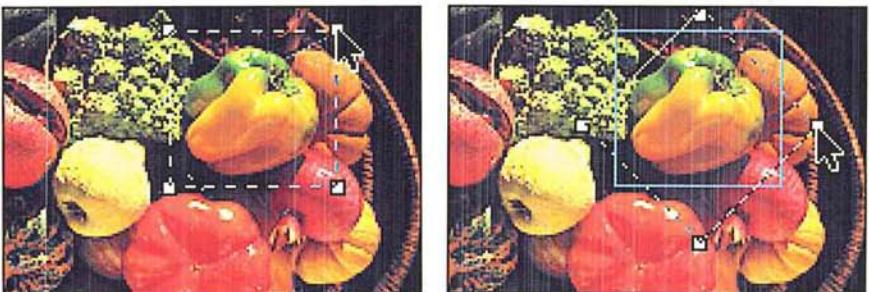
2. Holding down the Command key and the mouse button, drag the edit handle to enclose the area you want to crop, then release the mouse button.

3. When you have moved the rectangular marquee to the desired position, release the Command key and the mouse button.

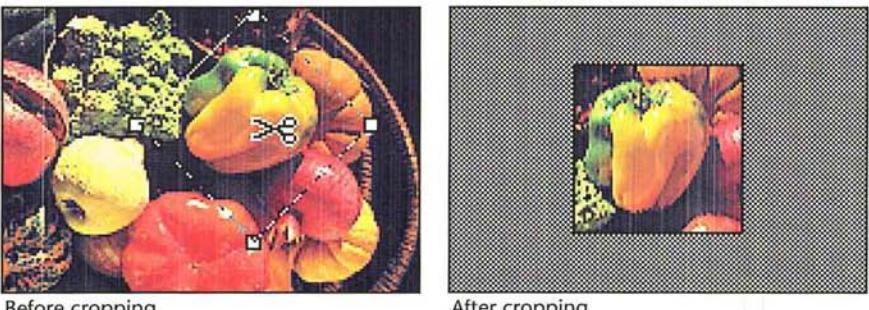


**To rotate the selection:**

1. Position the cropping tool pointer on one of the edit handles on the marquee.
2. Holding down the Option key and the mouse button, drag the edit handle in a clockwise or counterclockwise direction to rotate the selection.
3. When you have finished rotating the selection, release the Option key and the mouse button.



To crop the image, click inside the selected area.



## Selecting an interpolation method

When you transform an image by resizing, arbitrarily rotating it, or resampling it, or using such special effects as skew or perspective, the Adobe Photoshop program must create new color values for pixels that are added or changed by the transformations. The Adobe Photoshop program evaluates color through the process of interpolation, which determines the color of a pixel that is inserted between two other pixels.

You can choose the interpolation method you want to use, either nearest neighbor, bilinear, or bicubic. The options involve a tradeoff between speed and precision. The more precise the method used to determine pixel colors, the longer it takes the Adobe Photoshop program to produce the result. The options appear in the Preferences dialog box, which you access via the Preferences command in the Edit menu.

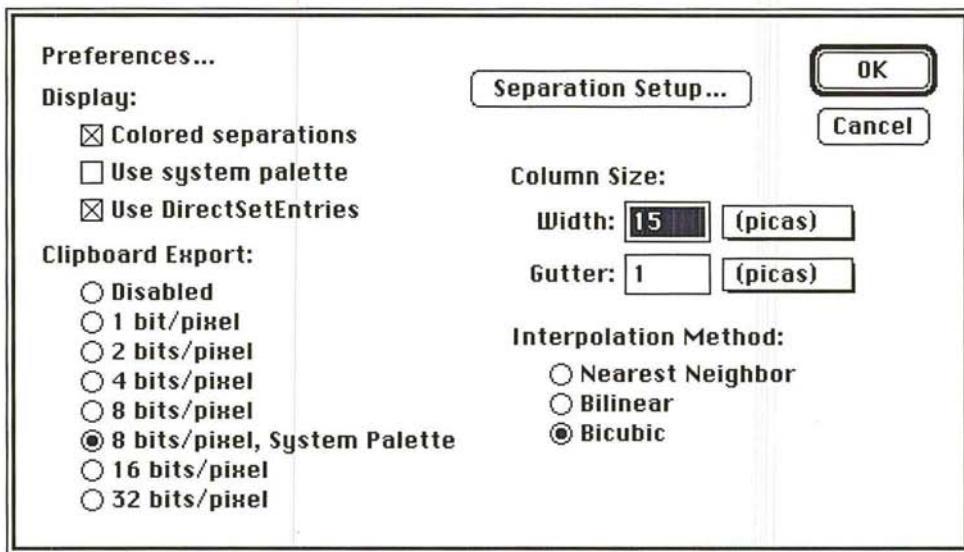
The Bicubic method is the most precise form of interpolation; however, it is also the slowest because it involves more complex calculations than the other two methods. It takes approximately twice as long as bilinear interpolation. The Bilinear method is somewhere between Nearest Neighbor and Bicubic methods in terms of speed and precision. The imprecision is seen in a slight blurring of the selection, particularly when you rotate it.

The Nearest Neighbor method is the fastest method, but it is also the least precise of the three methods. Nearest Neighbor interpolation is always used, however, with indexed color images to ensure that no new colors are added to the image's color table. The lack of precision is evident in the jagged appearance of the modified selection. The inaccuracies that result from using the Nearest Neighbor and Bilinear methods are especially noticeable when you perform multiple transformations on a selection.

### To select the interpolation method you want:

1. Choose Preferences from the Edit menu.

The Preferences dialog box appears.



2. Click the interpolation method you want.

## Using the Resize command

The Resize command allows you to add working space, or extra canvas area, around the existing image without changing the dimensions of the image. You can increase the canvas area in two ways: by specifying the percentage you want the overall canvas area to grow, or by specifying the overall height and width you want the canvas to be.

Resize can also be used to crop an image; however, if you want to adjust the size and resolution of an image, you should use the Resample command. If you use the Resize command to crop an image, for example, you might inadvertently resample the image down and lose important image information that you cannot recover.

The Resize command includes options to allow you to display the dimensions of the screen and window before you resize the image; constrain the image's proportions when resizing; and resize by either dimensions or percentages.

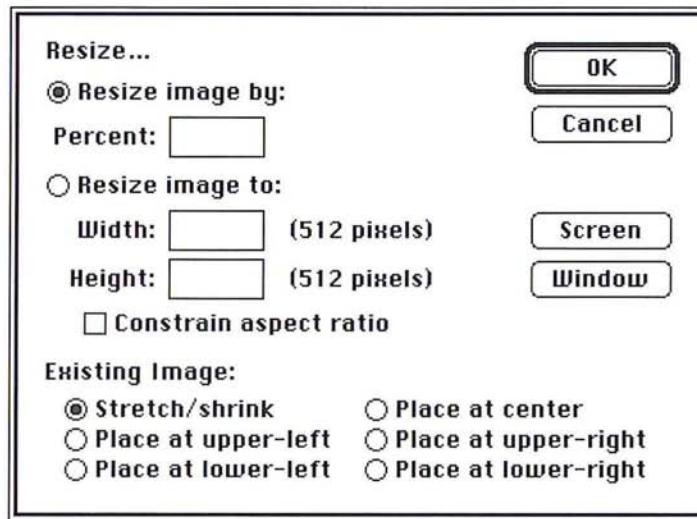
## Displaying the screen and window dimensions

Before resizing an image, you can use the Screen and Window buttons in the Resize dialog box to display the dimensions of the screen and the active window. This information can help you determine what size an image needs to be for it to be entirely visible at a certain view, such as 1:1.

To display the screen or window size using the Resize command:

1. Choose Resize from the Image menu.

The Resize dialog box appears.



2. To display the screen size, click Screen.

The dimensions (in pixels) of the screen appear in the Width and Height text boxes.

3. To display the size of the window containing the image, click Window.

The dimensions (in pixels) of the active window appear in the Width and Height text boxes.

4. Click OK.

## Maintaining proportions when resizing

You can make sure that the original proportions of the image are maintained when the image is resized. To do so, you use the Constrain aspect ratio check box in the Resize dialog box. If you check the Constrain aspect ratio box, then enter a value for either the height or width, the Adobe Photoshop program automatically enters the value for the other dimension. The value entered maintains the image's original height-to-width ratio.

You can also check the Constrain aspect ratio box in the Resize dialog box to maintain the image's original proportions when resizing by a percentage. In this case, the Adobe Photoshop program calculates the size values that will enlarge the image's size and still maintain the correct aspect ratio.

**To maintain the image's original height-to-width ratio:**

1. Choose Resize from the Image menu.  
The Resize dialog box appears.
2. Click Constrain aspect ratio.
3. Enter a percentage value in the Percent text box, or enter a value for either the height or width.
4. Click OK.

If you specify a percentage value, the correct size values are entered. If you specify a value for the height or width, the width or height value, respectively, is entered.

## Resizing by percentages

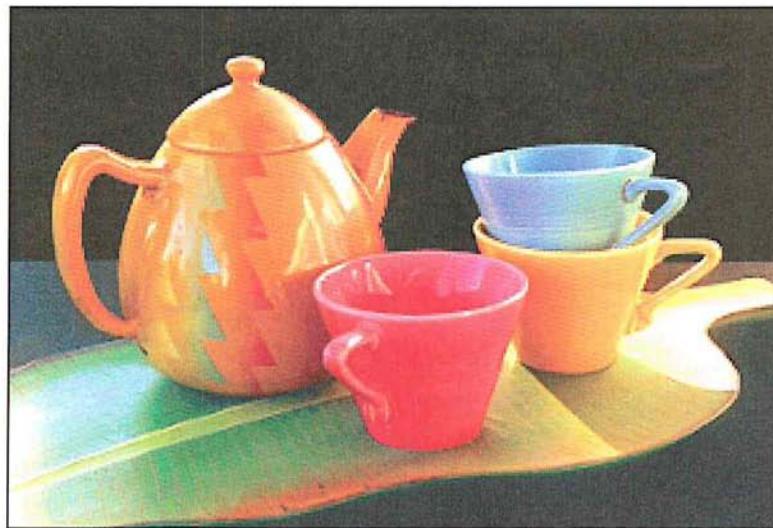
You can resize an image by a certain percentage. The maximum size of enlargement depends on the original size of the image. When you specify a percentage by which to enlarge an image, values appear in the Width and Height text boxes. These values show you what the size of the image will be after resizing. The option enlarges the image by the specified percentage.

**To specify the percentage by which you want to increase the size of an image:**

1. Choose Resize from the Image menu.  
The Resize dialog box appears.
2. Enter the desired percentage value in the Percent text box.
3. Click OK.

## Resizing by dimensions

If you know the dimensions you want the image to be, you can specify the desired height and width (in pixels). The values in parentheses are the current dimensions of the image.

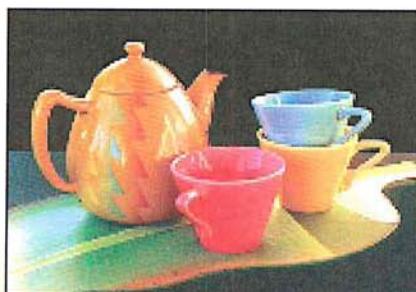


Original image

### To specify the height and width:

1. Choose Resize from the Image menu.  
The Resize dialog box appears.
2. Click the Resize image to option, or click the Width text box.
3. Enter a value (in pixels) for the width you want.
4. Press the Tab key or click in the Height text box.
5. Enter a value (in pixels) for the height you want.
6. Click OK.

The image is resized to the specified dimensions.



Resized image

## Enlarging the canvas area

You can use the Resize command to enlarge the canvas, to add blank space around an image. To enlarge a canvas, you use the Existing Image options in the Resize dialog box. These options enlarge the canvas around the existing image without affecting the size of the existing image, and define where the additional blank area is placed relative to the existing image.

Here are some examples of how the Existing Image options work. If you enlarge the image by 150 percent and select the Place at upper-right option, the original image remains the same size, and the additional canvas area is placed to the bottom-left of the image. The result is that the existing image appears in the upper-right corner of the enlarged canvas. If you select the Place at center option and enlarge the image, the existing image is placed in the center of the enlarged canvas.

To increase the image's overall size:

1. Choose Resize from the Image menu.  
The Resize dialog box appears.
2. Enter a percentage value more than 100, or enter height and width values greater than the image's current dimensions.
3. Click the Existing Image option you want.
4. Click OK.

The dimensions of the image remain the same. The image is placed on the specified position on the page; the extra area you specified is placed around it and filled with the background color.

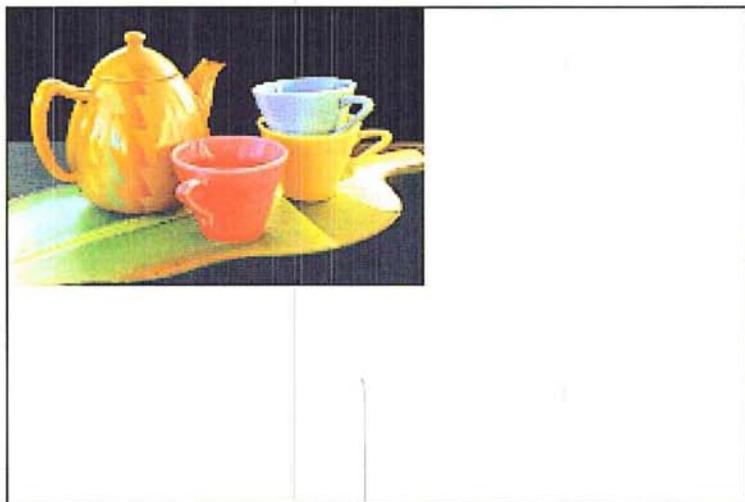


Image resized by 175% using Place at upper-left option

## Resampling images precisely

You can resize an image and control its resolution at the same time by resampling the image. To do so, you use the Resample command in the Image menu.

When you resample an image to change its resolution, you change the amount of information used in the image. This does not affect the screen display of the image, which is normally a static 72 dpi, but it does affect the image when it is printed. The image resolution determines the amount of information (measured in pixels per inch) that is sent to the output device.

In general, it is inadvisable to resample down an image for a low-resolution device, such as a 300 dpi laser printer, then resample up the image for a higher resolution output device because when you resample down, you delete some of the original color information in your image. This original color information cannot be recovered once it is deleted. If you resample up, interpolation will be used to add the additional information. The resulting image will not be as sharp as the original, high-resolution, scanned image.

The Resample dialog box displays information about the image, including the current size of the document in memory (in kilobytes), and the image's current width, height, and image resolution (Current Size).

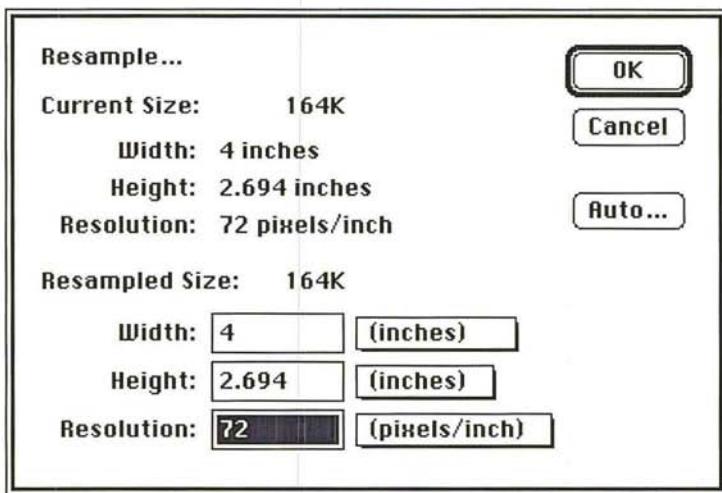
The Resample dialog box also shows you the projected size of the document based upon the changes you propose to make to its height, width, and resolution (Resampled Size). The Resampled Size information changes when you change any of the parameters in the Resample dialog box. The size of the document is calculated and placed in the dialog box before you resample the image. This allows you to decide whether you have enough disk space to hold the resampled image.

When you resample an image, you can specify the height and width in inches, centimeters, points, or picas, and the resolution in pixels per inch or pixels per centimeter (cm).

To use the Resample feature to resample and resize an image:

1. Choose Resample from the Image menu.

The Resample dialog box appears.



2. Select the options you want for the resampled image.
3. To resample and resize the image, click OK.

### Choosing the size units for the resampled image

You can choose the size units you want to use for the dimensions and image resolution of the image that will be resampled. The size units you choose are used until you make another size units choice.

Inches, centimeters (cm), points, or picas, are the available size units for the width and height. You can also define the width in terms of columns. The column unit refers to the size you specified for columns in the Preferences dialog box which is accessed via the Page Setup command in the Edit menu. You can specify values for the resolution in either pixels per inch or pixels per centimeter.

#### To choose the size units for the resampled image:

1. Choose Resample from the Image menu.

The Resample dialog box appears.

2. Press down on the shadowed box beside the text box for the option you want. A pop-up menu listing the units options appears.
3. Holding down the mouse button, drag until the units option you want is highlighted, then release the mouse button.
4. Click OK.

## Specifying the height, width, and resolution

When you use the Resample command to resize an image, the Adobe Photoshop program makes sure that the image's proportions (the height-to-width ratio) are maintained. If you enter a value for either the height or the width, the Adobe Photoshop program automatically enters the value for the other dimension that will maintain the image's proportions.

You can resample an image to discard image information that doesn't appreciably affect the output quality of the image. The amount of information necessary to produce an image depends to a large extent on the resolution at which you plan to output the image, the quality you want to achieve in the output, and the screen ruling used to produce halftones and color separations.

The Adobe Photoshop program can help you determine the appropriate resolution for resampling an image. To determine the suggested resolution for resampling, you use the Auto Resolution dialog box accessed from the Resample dialog box under the Image menu.

The Auto Resolution dialog box includes the resolution of the device you plan to use to output the image (the device resolution), the ruling for the halftone screen to be used, and the quality you want for the output. After you enter the necessary information and click OK, the Adobe Photoshop program enters the suggested resolution for resampling in the Resample dialog box. You can choose dots per inch or dots per centimeter (cm) for the printer resolution and lines per inch or lines per centimeter (cm) for the screen resolution.

(You must use the Halftone Screens dialog box, accessed through the Page Setup dialog box, to specify the screen ruling for the halftone screen or screens to be used. For more information about defining screen rulings, see the section, "Selecting screen attributes" in Chapter 19, "Printing Halftones," or Chapter 20, "Producing a color separation.")

The suggested resolution is based on a simple formula: The suggested resolution is two times the screen frequency if high quality is selected, 1-1/2 times the screen frequency if medium quality is selected, and one times the screen frequency (at the most, 72 pixels per inch) if draft quality is selected. If the device resolution is too low to support the required resolution for the medium and high-quality options, the Adobe Photoshop program will enter a suggested resolution based on the resolution of the output device.

**NOTE:** When you resample an image, you should base the image resolution on the resolution of the final output device you will use. For example, if you plan to produce the final output on a device with a maximum resolution of 2400 dpi, you should base the image resolution on 2400 dpi.

### To choose the size units for the resampled image:

1. Choose Resample from the Image menu.

The Resample dialog box appears.

2. To enter values for the width and height, click in either the Width or Height text box, depending on which dimension is most important to you. Enter the desired value for that dimension. (You can enter decimal values, for example, 3.625, for the width and height.)

The Adobe Photoshop program automatically enters a value for the other dimension.

3. To enter a value for the image resolution, click in the Resolution text box, and enter the value you want for the resolution.
4. To resample and resize the image, click OK.

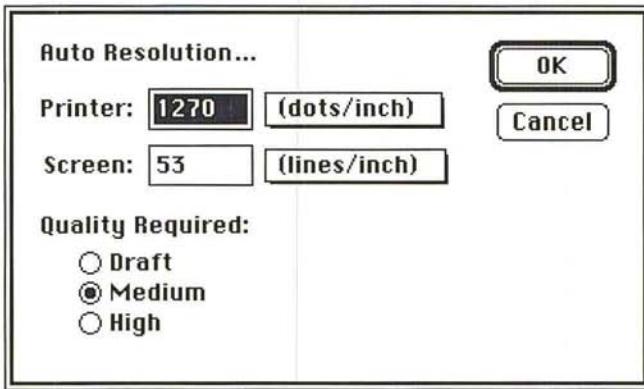
**To determine a suggested resolution for resampling an image:**

1. Choose Resample from the Image menu.

The Resample dialog box appears.

2. Click Auto.

The Auto Resolution dialog box appears.



3. Use the pop-up menus beside the Printer and Screen text boxes to choose the size units you want for the resampled image.
4. Enter the resolution in the Printer text box at which you plan to output the image.
5. Press the Tab key or click in the Screen text box. Enter the ruling for the screen you will use when you output the image.
6. Click the quality of the output you want.
7. Click OK.

The suggested image resolution appears in the Resample dialog box.

8. To resample and resize the image, click OK.

## Adjusting the size of the printed output

You can control the size and resolution of your printed output using the Size/Ruler option in the Page Setup dialog box, which is accessed through the File menu. The Size/Ruler option allows you to change the size and resolution of a printout without affecting the image in memory and without resampling the image. You could use this option to print out an image at a marginally smaller size. This would save you the time involved in resampling down the image. You could also use this option to print an enlarged image of a screen dump. If you resampled up the image, the jagged edges would be removed from the image, and you might want to preserve these jagged edges in the output.

When you use the Size/Ruler option, the image's size and resolution are adjusted in tandem to maintain the image's dimensions in terms of pixels. You should use the Resample command to adjust the image's size and the amount of pixel information in the image independently.

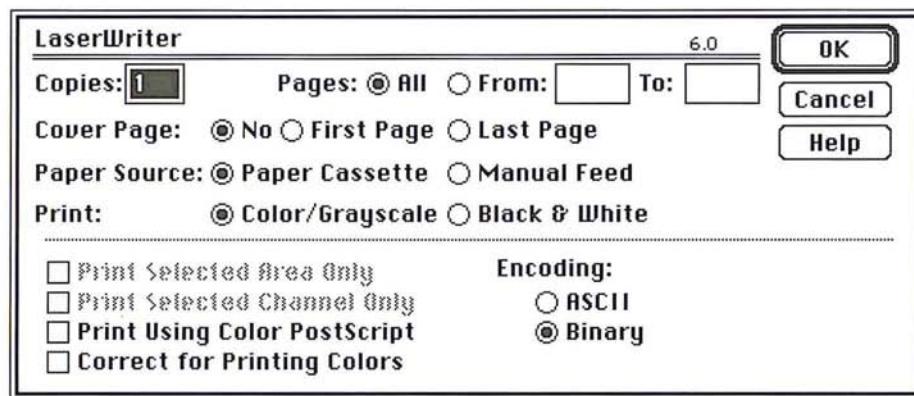
For example, you can use the Size/Ruler option to print a 300-dpi resolution image at twice the size, the resulting output will have a resolution of 150 dpi. The units of measure you specify for the Size/Rulers option also apply to the rulers.

To change the size of the image when output, you specify the height and width, or the resolution at which you want the image to be output. The Size/Rulers option maintains the proportions of the image (the height-to-width ratio) as it adjusts the image size.

If you enter a value either for the height or the width, the Adobe Photoshop program automatically enters the value for the other dimension that will maintain the image's proportions, as well as the appropriate resolution for the specified size. On the other hand, you can enter the desired output resolution, and the size values required to achieve the specified resolution will be automatically entered.

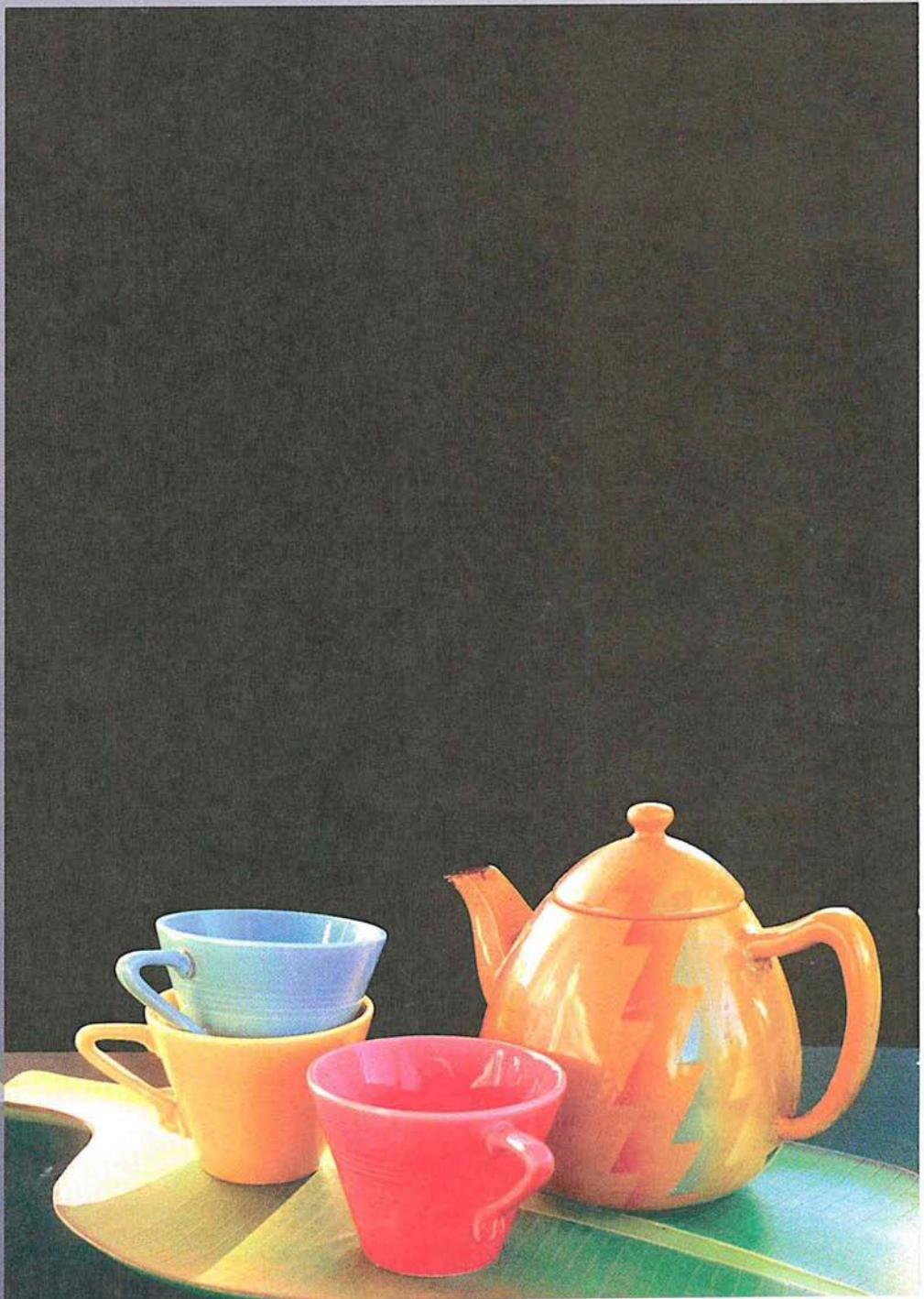
### To change the output size:

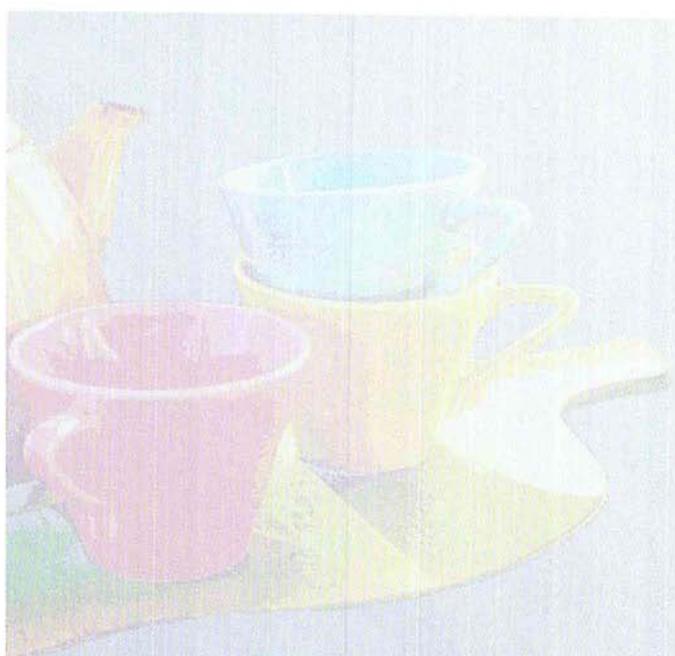
1. Choose Page Setup from the File menu.



2. Click the Size/Rulers button.  
The Image Size/Ruler Units dialog box appears.
3. To select the size units, press down on the shadowed box beside the text box for the option you want.  
A pop-up menu listing the units options appears.
4. Holding down the mouse button, drag until the units option you want is highlighted, then release the mouse button.
5. To enter values for the width and height, click either the Width or Height text box, depending on which dimension is most important to you. Enter a value for the desired dimension. (You can enter decimal values, for example, 3.625, for the width and height.)  
The Adobe Photoshop program automatically enters a value for the other dimension and the appropriate resolution for the specified size.
6. To enter a value for the image resolution, click in the Resolution text box. Enter a value for the resolution.
7. Click OK.  
When you output the image, the image will be printed at the specified size and resolution.

Section 4: *Advanced Image Editing  
and Color Correction*





From a scan of a single 35mm color slide of teacups and a pot, the designer corrected the color in the image. She selected objects with a feathered edge and pasted them onto a dark background, then copied and flipped the selection horizontally, creating a mirror image. The designer posterized this copy and pasted it with an opacity of 40% on top of a blend created in the background, and used paste controls to allow just part of the underlying color to show through. She saved both selections of the cups as separate alpha channels; after proofing the output, she accessed the alpha channels as masks to make final color adjustments.

## Chapter 15: *Converting Images and Working with Channels*

The Adobe Photoshop program treats images as a series of channels. The use of channels makes it possible to manipulate images in sophisticated ways. With channels, you can adjust the color in one channel of an image, but not another; analyze the color in two separate images by comparing and adjusting their respective channels; and easily add detail to an image, such as text, and just as easily adjust the detail or remove it later.

This chapter discusses channels, image types, and how images can be converted from one type to another. The chapter also discusses how to work with channels, including how to add channels to an image, delete channels, split channels into separate documents, merge channels, and perform calculations on channels to compare images.

How to make color corrections to images is discussed in Chapter 16, “Making Color Corrections.”

### About channels and image types

The Adobe Photoshop program supports a variety of image types, including bit-mapped, gray-scale, RGB, indexed color, CMYK, HSL, and HSB images.

In the Adobe Photoshop program, at least one channel comprises each image. For example, an RGB image has at least three channels, one for the red information, one for the green information, and one for the blue information. A channel is similar to a plate in the printing process.

In addition, channels can be added to an image as a means of easily seeing a selection as a mask, making changes to the mask and storing it, then reusing the mask without having to reselect a selection.

Additional channels are called alpha channels. An alpha channel is a separate, 8-bit gray-scale image within a document that you can use for editing and storing masks and for channel calculation commands. You can create an alpha channel using the Selection → Alpha command in the Select menu.

A document can have up to 16 channels. Bitmapped, gray-scale and indexed color all are single-channel images; RGB, HSL, and HSB have three channels; CMYK has four channels, and a multichannel image is a gray-scale image with more than one channel. Other distinctions between image types are shown in the chart following.

Mode	No. Channels	Bits/pixel per Channel	Definition/when to use:
Bitmap	1	1	Bitmapped images contain only 1 bit of color (black or white) per pixel. Since few editing options are available, it's best to convert the image to gray-scale mode, then back to Bitmap for export if necessary.
Gray Scale	1	8	This mode is used for editing and painting single channel gray-scale images. Gray-scale images contain up to 256 levels of gray and can be converted to or from color images. If a second channel is added to a gray-scale image, it becomes a Multichannel image.
Indexed Color	1  =	8	Indexed Color images contain up to 256 colors/grays stored in an editable lookup table. Limited image editing is available. Indexed Color mode is used when editing of the table is desired, or when a limited color palette is required for export.
RGB Color	3	24	Generally, this is the mode of choice for color image editing and painting. Up to 16.7 million colors can be displayed and edited on screen. Up to 13 additional alpha channels can be added. RGB images should be converted to CMYK mode to print color separations.
CMYK Color	4	8	You generally convert to CMYK mode from RGB to print color separations. Individual channels can be edited, but a composite full color image cannot be viewed.
HSL Color • hue • saturation • luminance	3	8	The hue, saturation, and luminance in a color image can be edited as separate channels in HSL mode. HSL channels appear as gray-scale, but retain all color information when converted back to a color mode.
HSB Color • hue • saturation • brightness	3	8	The hue, saturation, and brightness in a color image can be edited as separate channels in HSL mode. HSL channels appear as gray-scale, but retain all color information when converted back to a color mode.
Multichannel	2+	8	Adding a channel to a gray-scale image, or deleting a channel from an RGB, CMYK, HSL, or HSB image creates a Multichannel image. Color images converted to Multichannel mode become gray-scale images.

You can split the various channels that comprise an image into separate documents, and merge these documents to create another image. Some gray-scale scanners allow you to scan a color image through a red filter, a green filter, and a blue filter to generate red, green, and blue documents. Merging allows you to combine the channels of a color image that was scanned this way, and save the image as a single, color document.

The Adobe Photoshop program lets you select the channel you want to work on (the “active” channel) as if it were a separate document. Once you select a channel, any changes you make are applied to that channel. The Channel submenu under the Mode menu allows you to view and activate the various channels in an image. Note that the RGB command in the Channel submenu allows you to display and work on the three channels of an RGB image together.

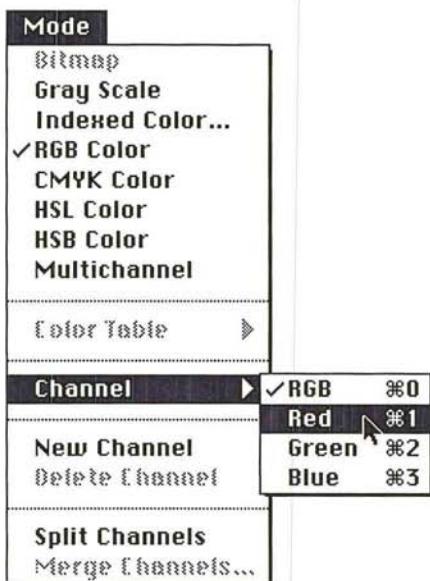
Besides selecting channels from the Mode menu, you can also select channels from the keyboard. Each channel in a multichannel image is assigned a Command-key equivalent. The Command-key equivalent reflects the channel’s position in the list of channels in the Channels submenu. For example, cyan is the first channel, magenta the second, yellow the third, black the fourth, and so on. Alpha channels added to an image are assigned the next channel number in the sequence, such as 5, 6, and so on.

To activate the channel, simply hold down the Command key and type in the channel number. For example, the cyan channel in a CMYK image is the first channel listed in the Channels submenu and is assigned the Command key equivalent Command-1. To activate the cyan channel from the keyboard, type Command-1.

**To select the active channel:**

1. Choose Channel from the Mode menu.  
A list of the available channels in the image appears.
2. Holding down the mouse button, drag to highlight the name of a channel to activate it.

3. When you have selected the desired channel, release the mouse button.



The selected channel is displayed. The name of the channel appears in the title bar of the active window.

## Display options

The Adobe Photoshop program lets you have several documents open at the same time. Each document can have a different color lookup table to hold the colors used in the image. If you display two or more images that use different color tables, such as an indexed color and a gray-scale image, the display of the colors in the inactive documents will be incorrect (unless your monitor uses more than 8 bits of information per pixel).

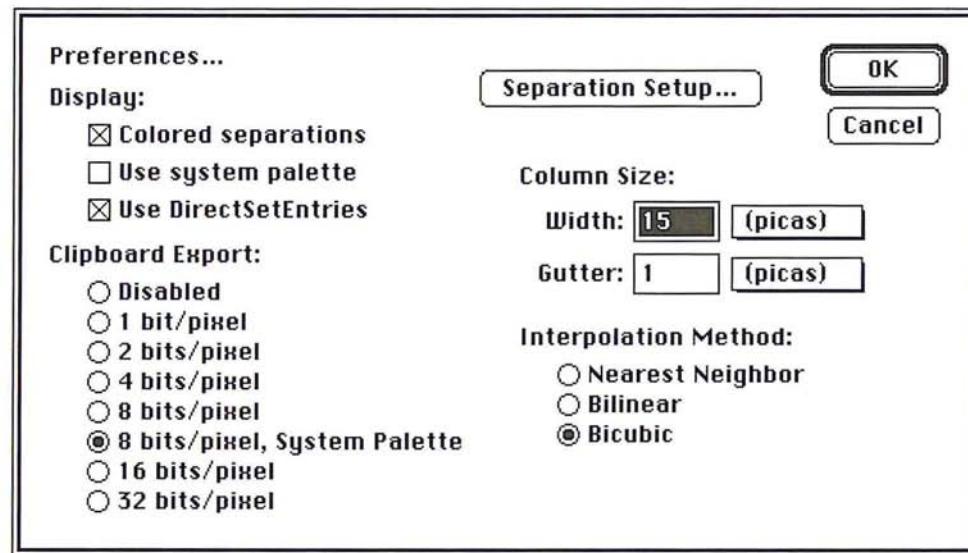
To make the colors in the inactive documents appear closer to their actual colors, you can use the Use system palette option in the Preferences dialog box, which is accessed via the Preferences command in the Edit menu. When you select this option, the colors in the system's color table, rather than the colors in the active document's color table, are used to display colors in all the open documents. This means that the colors for the active document will be less accurate than if the option is unchecked.

When you work on an RGB or CMYK image, you can choose to display the channels in their respective colors or as gray scales. Because each channel is normally printed as a halftone, gray-scale image on the file that is sent to the printer, you may want to view each channel in a gray-scale format, rather than in its color format.

To display colors using the system color table and choose a display option:

1. Choose Preferences from the Edit menu.

The Preferences dialog box appears.



2. Click the Use system palette option in the Preferences dialog box.

When the box beside this option is checked, the option is active.

To view each RGB or CMYK channel in color, click the Colored Separations option in the Preferences dialog box. When the Colored Separations check box is checked, the channels are displayed in color.

## Converting one image type to another

You can convert one type of image to another using the commands in the Mode menu. For example, you can easily convert an RGB image to a CMYK image, which is essential to producing color separations. When you perform this conversion, the red, green, and blue channels are converted to cyan, magenta, yellow, and black channels.

You have eight image type options: Bitmap, Gray Scale, Indexed Color, RGB Color, CMYK Color, HSL Color, HSB Color, and Multichannel. Certain image types cannot be converted directly to other image types; for example, an RGB image cannot be converted directly to a Bitmap image type. (However, you can convert an RGB image to a gray-scale image, and then to a bitmapped image.) The image types in the Mode menu to which you cannot convert the active document are dimmed. The following sections describe the options available for the different conversions.

**To convert an image to a different image type:**

1. Open the document containing the image you want to convert.
2. Choose the image type to which you want to convert the image from the Mode menu.

## Converting a gray-scale image to a bitmap-type image

A gray-scale image is a single-channel image consisting of various levels of gray. Depending on the number of bits of information that were saved when the image was scanned, a gray-scale image can contain up to 256 levels of gray. Thus, the gray levels can range from 0 (black) to 255 (white).

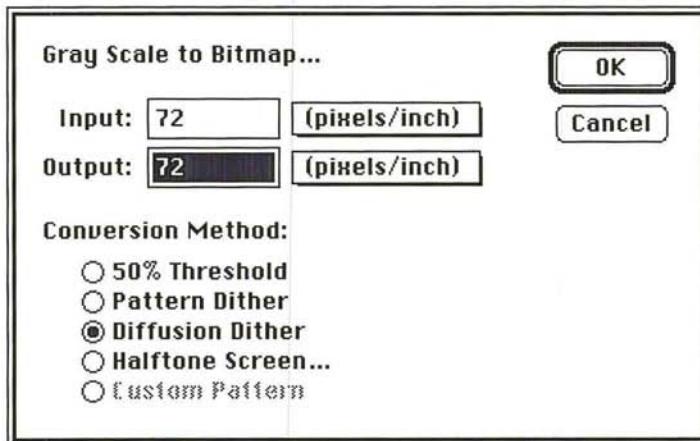
When you convert a gray-scale image to a bitmap-type image, you specify the resolution of the gray-scale image in the Input text box of the Gray Scale to Bitmap Options dialog box. You also specify the resolution you want the bitmap-type image to be in the Output text box. By default, the current image resolution is entered in the Input and Output text boxes.

You also have five options for how the image will be converted: the 50% Threshold method, Pattern Dither, Diffusion Dither, Halftone Screen, and Custom Pattern. A description of the options follows. You must select a conversion option before converting a gray-scale image to a bitmapped image.

**To convert a gray-scale image to a bitmap-type image:**

1. Choose Bitmap from the Mode menu.

The Gray Scale to Bitmap Options dialog box appears.



2. To specify the resolution of the gray-scale image and the bitmap-type image, use the pop-up menus beside the text boxes to choose the size units you want, either pixels per inch or pixels per centimeter.

3. Enter a value for the resolution of the gray-scale image in the Input text box.
4. Press the Tab key or click in the Output text box.
5. Enter a value for the desired resolution of the bitmap-type image.
6. Click OK.

### Selecting a bitmapped conversion method

You have a choice of five methods to use when converting a gray-scale image to a bitmap-type image. The options determine the quality of the new bitmap-type image, ranging from a high-contrast black-and-white image, to a textured or half-tone screen. In addition, the Halftone Screen option allows you to produce a halftone for output on non-PostScript printers; if you use this option, you also specify the screen frequency and angle, and dot shape.

**To select the bitmapped conversion method you want to use:**

1. Choose Bitmap from the Mode menu.  
The Gray Scale to Bitmap options dialog box appears.
2. In the Gray Scale to Bitmap dialog box, click the desired option, and click OK.  
The gray-scale to bitmap-type conversion options are described below.

#### The 50% Threshold option

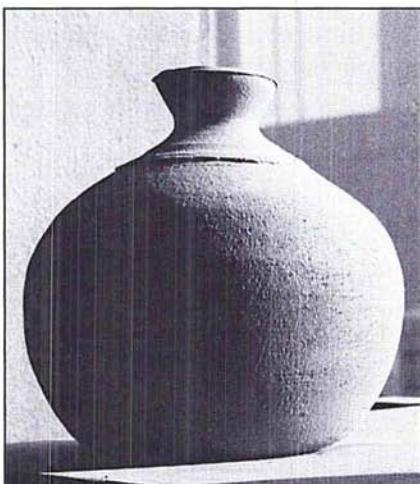
The 50% Threshold option converts pixels with a gray value above the middle gray level (128) to white, and pixels below the middle gray level to black. The result is a high-contrast black-and-white representation of the image.

#### The Pattern Dither option

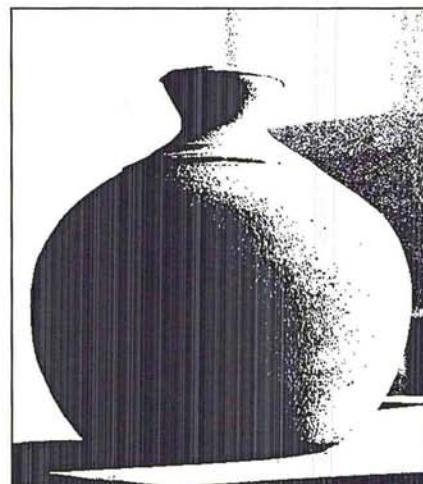
The Pattern Dither option converts an image by organizing the gray levels into patterns made up of black-and-white dots. The resulting image is made up of geometric configurations of black and white dots.

## The Diffusion Dither option

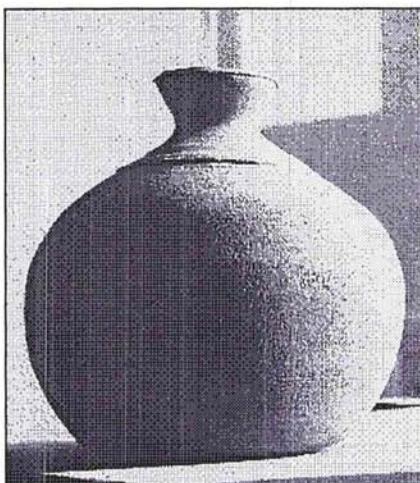
The Diffusion Dither option uses an error-diffusion process to convert the image. The diffusion option starts at the pixel in the upper-left corner of the image and evaluates its gray level value. If the value is above a certain value, it is changed to white; if it is below the value, it is changed to black. There is generally some error in the conversion because the gray pixel is originally some gray value between black and white, and the conversion changes it to either black or white. The amount of error is transferred to surrounding pixels before they are converted to black or white. In this way, the error is diffused throughout the image. The result has a grainy, film-like texture.



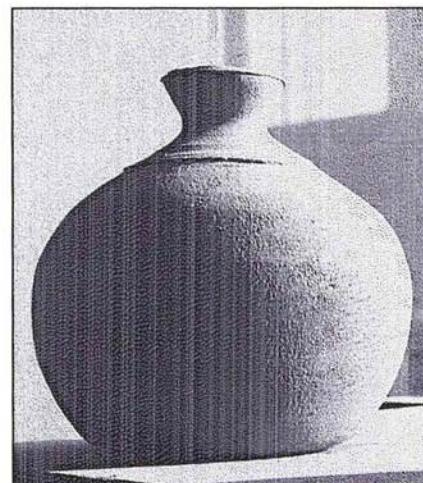
Original gray-scale image



50% threshold conversion method



Pattern dither conversion method

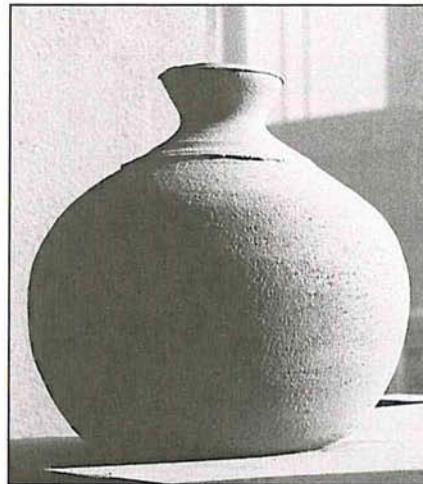


Diffusion dither conversion method

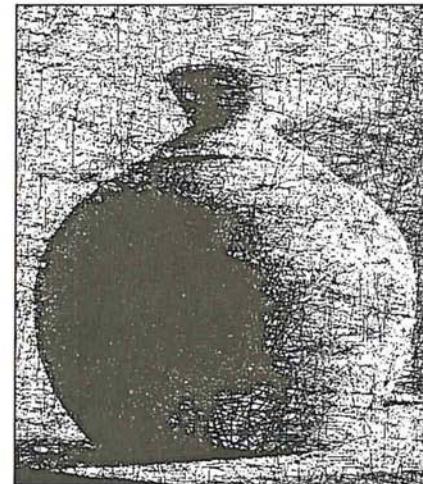
## The Custom Pattern option

The Custom Pattern option simulates the effect of printing a gray-scale image through a custom halftone screen. This method allows you to apply a screen texture, like a wood grain, to an image. The screen used is the current pattern. You can create a pattern that represents the texture you want, then screen the gray-scale image through the pattern to apply the texture to the image.

For instructions on how to define a pattern, see the section, “Filling selections with patterns” in Chapter 10, “Using the Fill Tools.”



Original gray-scale image

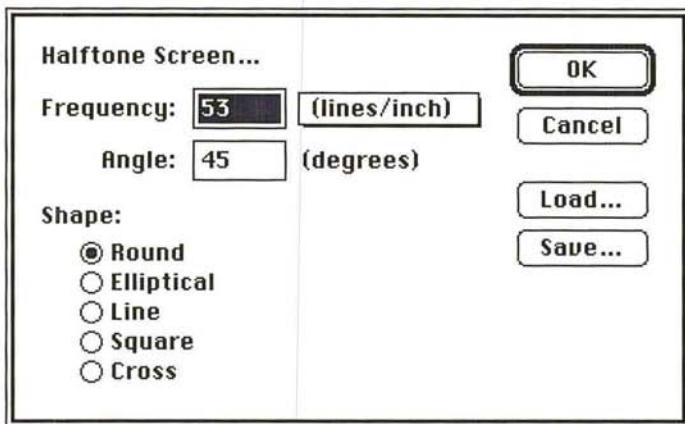


Custom pattern conversion method

## The Halftone Screen option

The Halftone Screen option simulates the effect of printing a gray-scale image through a halftone screen. This option can be used to produce a halftone on output devices that do not use the PostScript page description language.

When you select the Halftone Screen option and click OK, the Halftone Screen dialog box appears. You use this dialog box to specify the frequency and angle of the screen, as well as the dot shape.



The screen frequency is the screen ruling or screen frequency of the halftone screen. The screen frequency you use depends largely on the paper stock and type of press on which the image will be printed. Newspapers commonly use an 85-line screen, whereas magazines use higher resolution screens, such as 133-line and 150-line halftone screens.

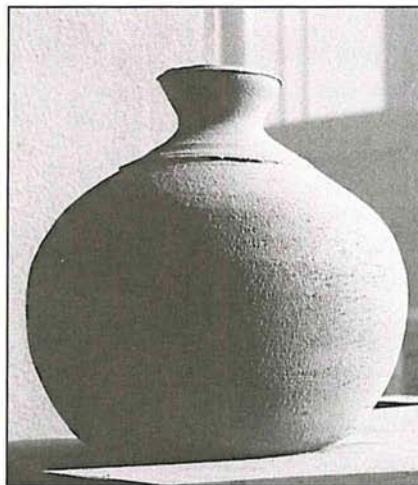
The screen angle refers to the orientation or angle of the screen. Continuous tone and black-and-white halftone screens commonly use 45-degree angles.

You can save the halftone screen settings you define in a document and reuse them with other documents. You can also save these settings as defaults to be used in other Adobe Photoshop application documents.

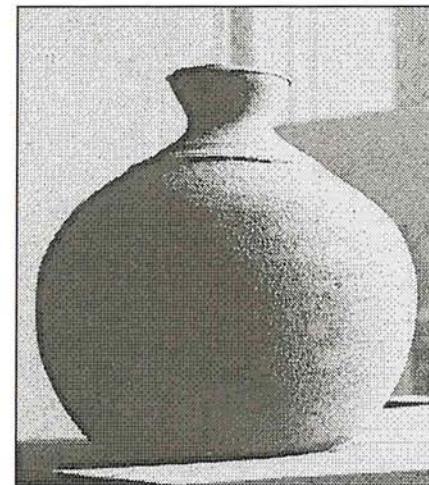
Chapter 19, "Printing Halftones," discusses how to produce a halftone in greater detail.

To specify the halftone screen:

1. Choose Bitmap from the Mode menu.  
The Gray Scale to Bitmap dialog box appears.
2. Select the Halftone Screen option and click OK.  
The Halftone Screen dialog box appears.
3. Use the pop-up menu beside the Frequency text box to choose the size units you want, either lines per inch or lines per centimeter.
4. Double-click in the Frequency text box.
5. Enter the pixels per inch or pixels per centimeter (from 1.0 to 999.9) for the screen frequency you want to use.
6. To specify the screen angle, press the Tab key or click in the Angle text box. Enter a value from -180 to 180 degrees for the screen angle.
7. To select the dot shape you want, click the name of the dot shape. The available dot shapes are round, elliptical, line, square, and cross.
8. To convert the image once you have made your choices, click OK.



Original gray-scale image



Halftone screen conversion method

## Making gray-scale conversions

You can convert either a bitmapped image or a multichannel image to a gray-scale image. When you convert any image containing several channels of color, Adobe Photoshop discards the color information and the extra channels in the original image. The conversion methods are described below.

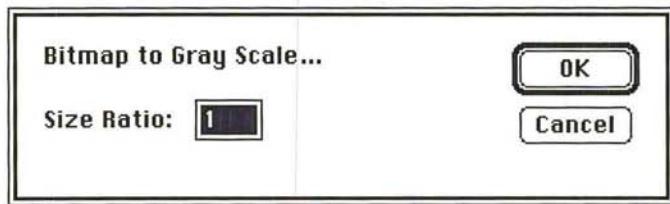
### Converting a bitmap-type image to a gray-scale image

You can convert a bitmap-type image to a gray-scale image that consists of one gray level (black). When you choose this option, you can also choose to scale down the size of the image by a specified scale factor or "size ratio." The default size ratio is 1, which results in a gray-scale image that is the same size as the bitmap-type image. As an example, to reduce the size of the gray-scale image by 50 percent, enter 2 for the size ratio. If a number greater than 1 is entered for the size ratio, multiple pixels in the bitmap-type image are averaged together to produce a single pixel in the gray-scale image. This allows you to create a gray-scale image from an image scanned on a 1-bit scanner.

To convert a bitmap-type image to a gray-scale image:

1. Choose Gray Scale from the Mode menu.

The Bitmap to Gray Scale dialog box appears.



2. Enter a value for the size ratio you want.
3. Click OK.

The bitmap-type image is converted to a gray-scale image.

## Converting a multichannel image to a gray-scale image

Any image that has more than one channel can be converted to a gray-scale image. A multichannel image is one that contains more than one channel, such as an RGB or CMYK image. Reference here is not to the specific Multichannel image type.

When the Adobe Photoshop program converts an image to a gray-scale image, it discards all color information and extra channels in the original image. When you convert from an RGB or indexed color image to a gray-scale image, the program converts the color pixels to levels of gray based on the color values of the pixels, and discards the other color information.

If the RGB channel is active in an RGB image, the gray levels of the converted pixels represent the luminosity of the pixels. If the red, green, or blue channel is active, the gray levels of the converted pixels represent the color values of the pixels in the active channel only.

When you convert from an HSL, HSB, CMYK, or Multichannel type image to a gray-scale image, the program uses the active channel as the gray-scale image and discards the other channels.

Before you complete a conversion, an alert box will appear to confirm your action.

### To convert a multichannel image to a gray-scale image:

1. Choose Gray Scale from the Mode menu.
2. Click OK to proceed.

The image is converted to a gray-scale image.

## Making color conversions

You can convert an image to any of the color image types that the Adobe Photoshop program supports: indexed color, RGB, HSL, HSB, CMYK, and Multi-channel. When you convert an RGB image to an indexed color image, you can specify a color table for the new image. Descriptions of the conversions follow.

With the exception of converting an RGB image to an indexed color image, the procedures for converting an image to color are similar. You simply choose the image type from the Mode menu to which you will convert your image; the image is automatically converted.

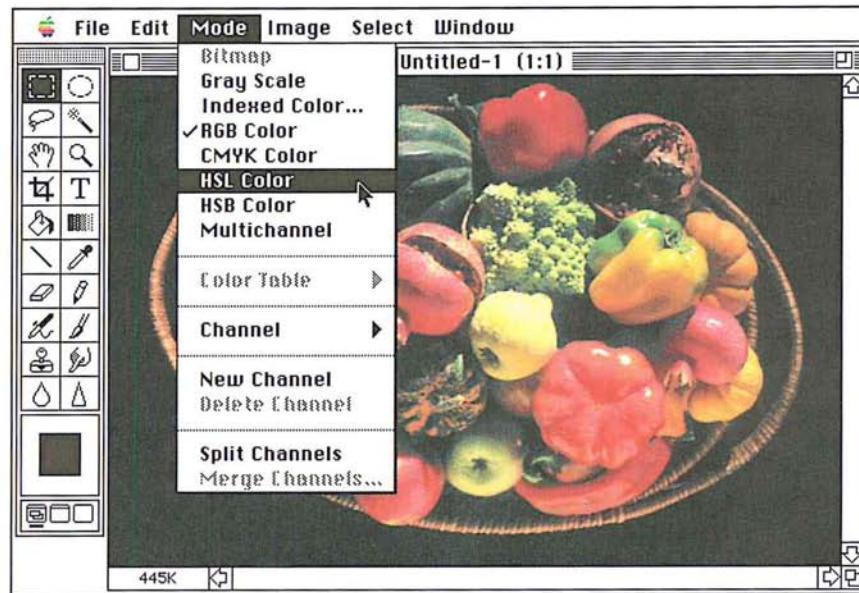
### Converting a gray-scale image to an indexed color or RGB image

When you convert a gray-scale image to an indexed color or RGB image, the red, green, and blue values for any given pixel become the same. For example, a pixel that had previously been described as having a gray value of 231 is now converted to a pixel having a red value of 231, a green value of 231, and a blue value of 231.

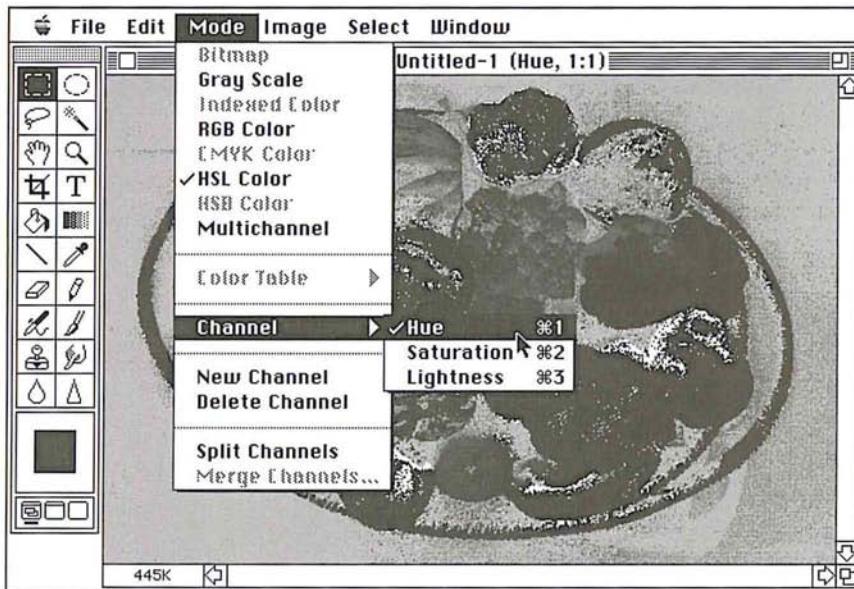
### Converting an indexed color or RGB image to an HSL or HSB image

You might want to convert an image with RGB colors to an HSL or HSB image type to adjust the lightness or brightness of the image without changing the hue or saturation. When you convert an indexed color or RGB image to an HSL image, the image is split into three channels called hue, saturation, and luminance; when you convert to an HSB image, the image is split into hue, saturation, and brightness channels.

Brightness is defined as the additive primary color (red, green, or blue) with the highest color value. Luminance is defined as the highest of the RGB values plus the lowest of the RGB values divided by two. With HSL and HSB images, you can only view one channel at a time. This differs from an RGB image. You can view the red, green, and blue channels together at one time on an RGB image.



RGB image



HSL color, hue channel showing

## Converting HSB and HSL images to RGB images

Once you have adjusted an HSL or HSB image, you may want to convert it back to an RGB image to perform other color corrections on it. When you convert an HSB or HSL image to an RGB image, the three channels are converted into red, green, and blue channels.

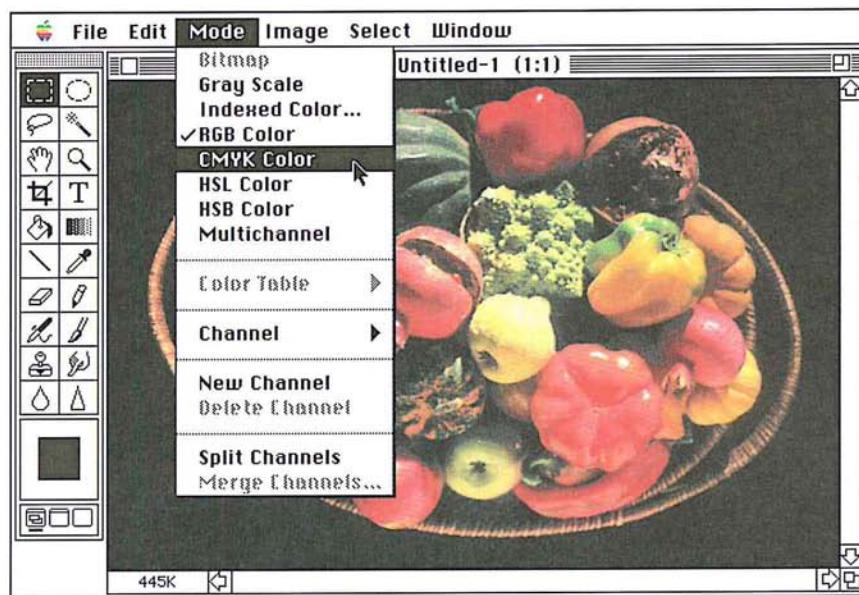
## Converting color images to multichannel-type images

You can convert images composed of more than one channel, such as RGB, HSL, and HSB images, to the Multichannel image type. When you convert an image to the Multichannel image type, the original channels with names assigned such as Red, Hue, Brightness, and so on, are renamed 1, 2, 3, and so on. The channels in a Multichannel image are gray-scale channels. You can view and edit each channel individually.

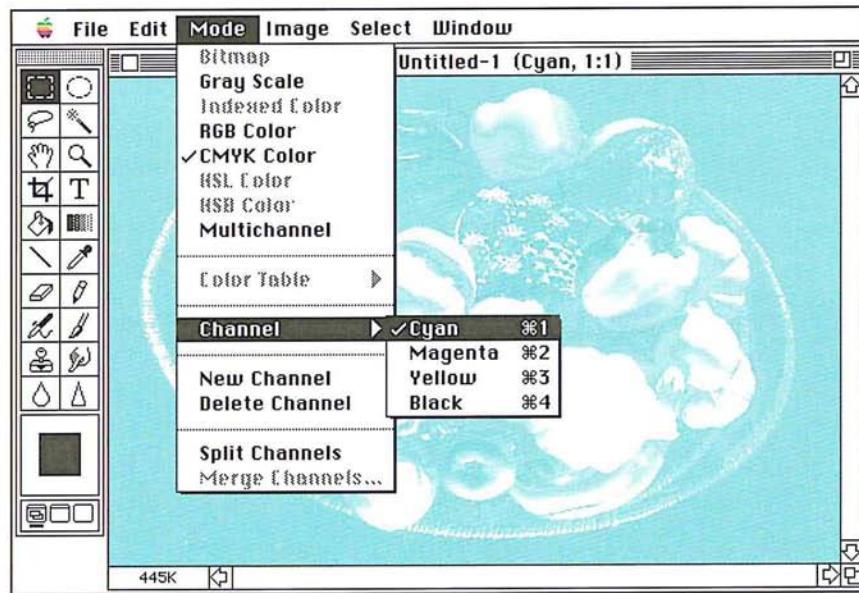
In the case of an RGB image, the red, green, and blue channels are converted to gray levels that reflect the color values of the pixels in each channel. Likewise, each of the CMYK channels is converted to a gray-scale channel. If you add a new channel to a gray scale image or delete a channel from an RGB image, the image is automatically treated as a Multichannel image.

## Converting RGB and indexed color images to CMYK images

To print a color separation, you convert an RGB or indexed color image to a CMYK image. The conversion splits the RGB colors into the four colors commonly used for printing color separations. The channels are cyan, magenta, yellow, and black. This conversion process uses the Separation Setup parameters defined in the Preferences dialog box. For more information on the CMYK conversion process, see Chapter 20, “Producing a Color Separation.”



RGB image



CMYK color, cyan channel showing

## Converting an RGB image to an indexed color image

At times, you might want to convert an RGB image to an indexed color image to edit an image's color table or export an image to an application that only supports 8-bit color.

When you convert an RGB image to an indexed color image, a color table is built for the indexed color image. The color table stores the colors used in the document and holds the maximum number of colors that can be displayed at once. The resolution option you choose affects the number of colors that can be displayed at one time. If you select 4 bits per pixel, 16 colors can be displayed at a time; if you select 8 bits per pixel, 256 colors can be displayed at one time.

The term "indexed color" refers to the fact that colors in the image are mapped or "indexed" to the colors in the color table. Color tables are also called "color lookup tables" because when a request for a color is made, the Adobe Photoshop program looks up the requested color in the table. If the color is not present in the color table, the program must match the requested color to the closest color in the color table, or simulate the requested color through dithering.

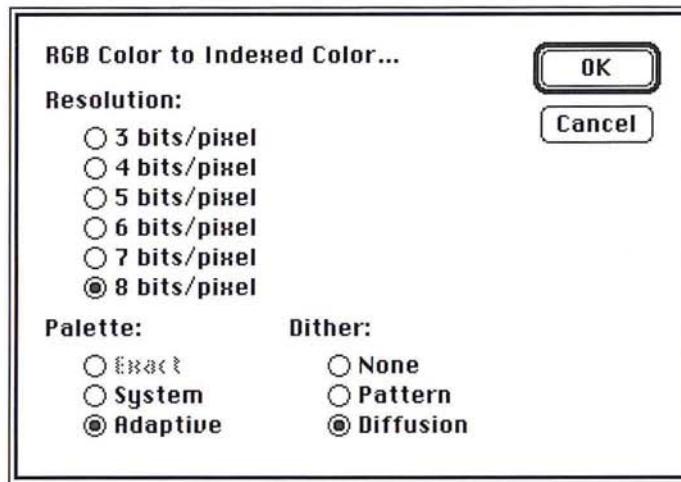
"Dithering" juxtaposes colors to simulate another color. This is important to keep in mind when you want to convert an RGB image to an indexed color image. An RGB image can contain millions of colors, whereas an indexed color image can directly reference only 256 colors. As a result, the transitions between dithered colors in an indexed color image are not as smooth as the transitions between colors in an RGB image.

To simulate the color that is not present in the color table, the Adobe Photoshop program puts together pixels with colors that are in the color table. When you convert an RGB image to an indexed color image, you have several options for how colors will be dithered. You can select the options for the conversion to an indexed color image in the RGB to Indexed Color Options dialog box. The options include the number of bits of information per pixel (the resolution), the type of color table, and the dithering option (if any) to be used.

To convert an RGB image to an indexed color image:

1. Choose Indexed Color from the Mode menu.

The RGB to Indexed Color dialog box appears.



2. Select the options you want by clicking the button beside the option.



RGB image



Indexed color image

## **Specifying the resolution**

You can specify the resolution you want the image to be. Resolution here refers to the number of bits of color information per pixel that are used in the image.

## **Specifying a color table option**

You have three choices for the type of color table that your indexed color image will use: Exact, System, and Adaptive.

You can use the Edit Table command in the Color Table submenu, which is accessed via the Mode menu, to view the results of the Palette (color table) options. For more information, see the section that follows in this chapter, "Manipulating the indexed color table."

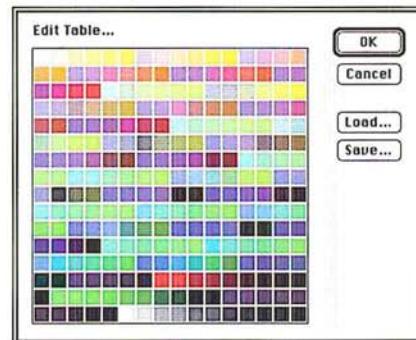
In addition, when you choose the System or Adaptive color table options, you can specify how the colors should be dithered. Descriptions for the options follow.

**Exact** The Exact table option is available only if 256 or fewer colors are used in the RGB image, otherwise, this option is dimmed. When you select the Exact option, the Adobe Photoshop program uses the exact same colors for the color table that appear in the RGB image. Since all of the colors in the image are present in the document's color table, there is no need to use dithering. Therefore, the Dither options are all dimmed.

**System** The System color table option uses the Macintosh system's default, 8-bit color table, called the System palette. This color table is based on a uniform sampling of RGB colors. This option is labeled Uniform if the resolution is set to less than 8 bits per pixel. With this option, you also specify a dithering option.



Indexed color image converted using System color table option



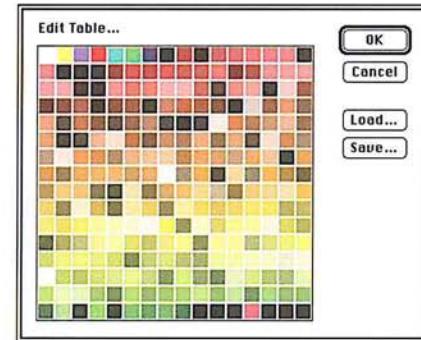
Resulting system color table

The system color table is useful when you plan to transfer the Adobe Photoshop software images to another application, or when you need to ensure that a consistent color table is used for different images. For example, if you are creating images for an animation sequence to be generated in another application, the other application might require the Macintosh system color table for the images. Also, for the sake of consistency, you might want to use the system color table to ensure that all images use the same colors.

**Adaptive** The Adaptive color table option creates a color table that is an adaptation of the colors used in the image. If you have an RGB image that has only the colors green and blue and select the Adaptive option, the resulting color table will be made up primarily of the colors that appear in the image—that is, green and blue colors. The Adaptive color table works by sampling colors from the more commonly used areas of the color spectrum. Because the colors in most images are concentrated in particular areas of the spectrum, it can be more effective to use an Adaptive color table. With this option, you also specify a dithering option.



Indexed color image converted using Adaptive color table option



Resulting adaptive color table

### Specifying dithering options

When you select either the System or Adaptive color table option, the color table might not contain all of the colors used in the image. To simulate the colors that are not in the color table, you can choose to dither colors. There are three dithering options: None, Pattern, and Diffusion.

**None** When you select None as the dithering option, the Adobe Photoshop program does not juxtapose pixels with colors in the color table to simulate a color absent from the table. Instead, the color in the table that is closest to the absent color is used in the image. This tends to result in sharp transitions between shades of color in the image.

**Pattern** When you select the Pattern dithering option, the Adobe Photoshop program arranges pixels in patterns to simulate the colors that are not in the color table.

**Diffusion** When you select the Diffusion dithering option, the Adobe Photoshop program uses a less structured method than the method used with the Pattern option to dither colors. This option generally results in the most accurate conversion.



RGB image



Indexed color image converted using  
Adaptive Palette/Diffusion dithering options



Indexed color image converted using  
System Palette/Pattern Dithering options



Indexed color image converted using  
System Palette/None Dithering options

## Manipulating the indexed color table

If you convert an RGB image to an indexed color image, or if you are working on an original indexed color image, you may want to adjust the color table for the image. Only indexed color images use a color table. Adjusting the color table allows you to change a single color, or many colors in an indexed color image's color table. You can also choose to structure a color table according to a particular color system, like blackbody radiation or a color spectrum. A color table is specific to each indexed color document, and can be saved and reused with other indexed color images.

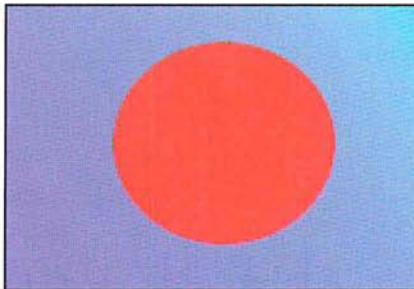
There are two types of indexed color images: color images that have a limited number of colors (less than 256) and pseudocolor images, which are gray-scale images that display variations in gray levels with color, rather than shades of gray. This type of image is often used in scientific and medical applications. The color table editing features discussed in the following sections are most useful with pseudocolor indexed color images. These features can also be used to produce special effects with indexed color images that have a limited number of colors.

The Color Table submenu in the Mode menu allows you to access either the Color Picker or Color Wheel dialog box used to view and edit the document's color table. The Color Table submenu is active only when you are working on an indexed color image.

Changing the colors in a document's color table changes the colors in an image. The colors in an indexed color image are mapped to the colors in the table, and reference a specific position in the table. Therefore, if you change the color in the table, and a color in the image is mapped to that color's position, the color in the image is changed to the modified color in the table.

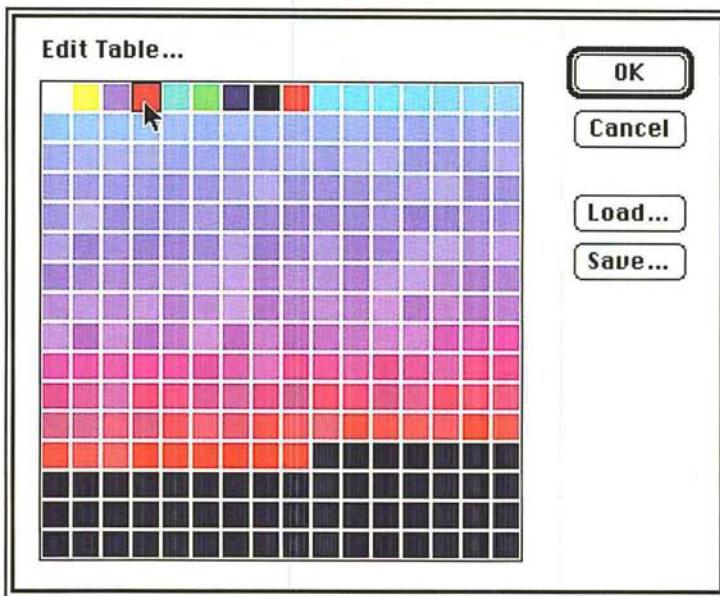
What follows is an example of how changing a color in a color table affects a color in the image that references that color in the color table. Note that to change colors in an image, you should use the color correction commands in the Map and Adjust submenus, which are accessed via the Image menu. Chapter 16, "Making Color Corrections," describes these commands in detail.

As an example of manipulating the color table, suppose there is a red circle in your image, and the red color in the image references a red color in the color table.



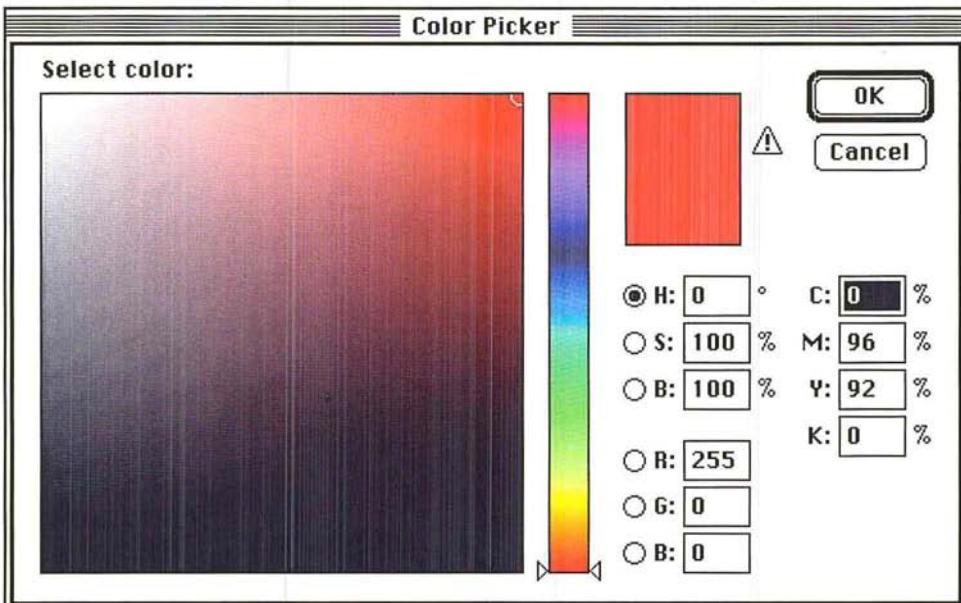
Before editing table

The red color in the color table occupies the fourth position from the left in the top row of the table.

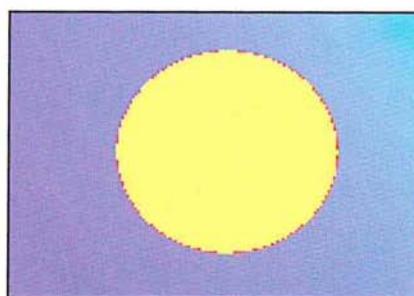
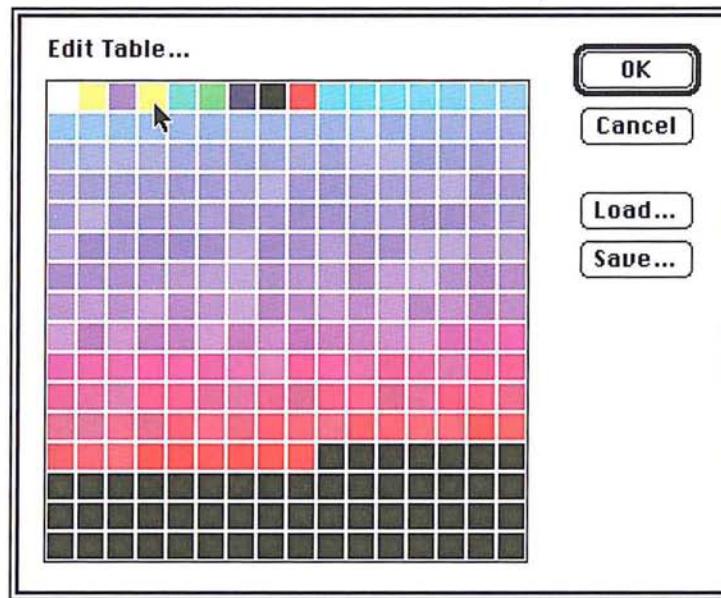


Red reference in color table

Suppose you change the red color in that position to yellow using the Color Picker or Color Wheel dialog box.



Red color referenced in Color Picker before being changed to yellow



The red circle changes to yellow because the red in the circle referenced the color in that particular position, and the color in the referenced position has been changed.

#### To display an indexed color document's color table:

1. Choose Color Table from the Mode menu.  
The Color Table submenu appears.
2. Holding down the mouse button, drag until Edit Table is highlighted, then release the mouse button.  
The document's color table appears in the Edit Table dialog box.

## **Editing colors in the indexed color table**

Either the Color Picker or Color Wheel dialog box allows you to edit a document's color table. The color picker and color wheel allow you to select the colors that will replace the colors in the color table. You select either the Color Picker or Color Wheel dialog box through the Color Table dialog box, which is accessed via the Color Table command in the Edit menu.

For more information about using the color picker, see the section, "Selecting a color using the color picker," in Chapter 11, "Selecting Colors." For more information about using the color wheel, see the section, "Selecting a color using the color wheel," in Chapter 11, "Selecting Colors."

### **To use the Color Picker dialog box to edit a color in the color table:**

1. Choose Color Table from the Mode menu.
2. Choose Edit Table from the Color Table submenu.  
The document's color table appears.
3. Click the color you want to change.  
The Color Picker dialog box appears.

### **To use the Color Wheel dialog box:**

1. Choose Color Table from the Mode menu.
2. Choose Edit Table from the Color Table submenu.
3. Option-click the color you want.  
The Color Wheel dialog box appears.

### **To select a color from the color picker or color wheel:**

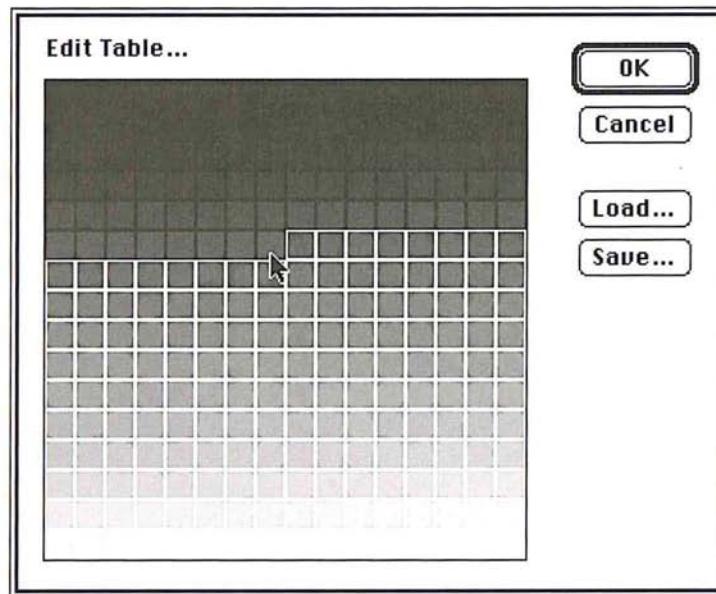
1. Use the controls in the Color Picker or Color Wheel dialog box to select the color you want.
2. Click OK.  
The color you selected appears in the position you clicked in the color table.
3. Click OK.  
The colors in the image that reference the selected position in the color table are changed to the new color.

## Editing a range of colors

The Adobe Photoshop program lets you select a range of colors—including multiple rows—in the color table and select a starting and ending color from the color picker or color wheel. The range of colors you selected in the color table displays a smooth transition from the starting color and ending color you selected from the color picker or color wheel. The transition proceeds from left to right and top to bottom.

To select the range of colors in the color table:

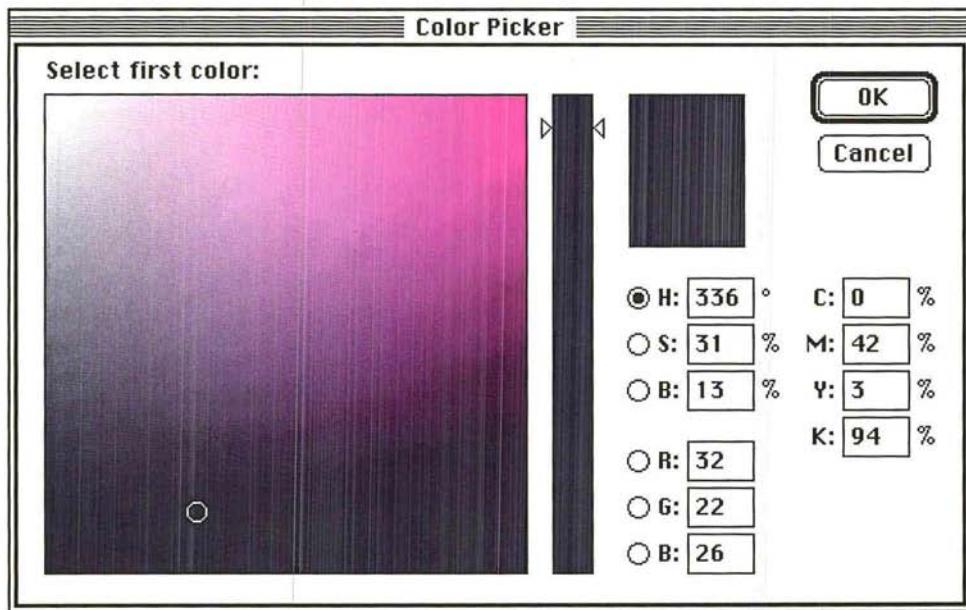
1. Choose Color Table from the Mode menu.
2. Choose Edit Table from the Color Table submenu.
3. Position the pointer on the first color in the range.
4. Holding down the mouse button, drag to the last color in the range.



5. Release the mouse button.

The Color Picker dialog box appears.

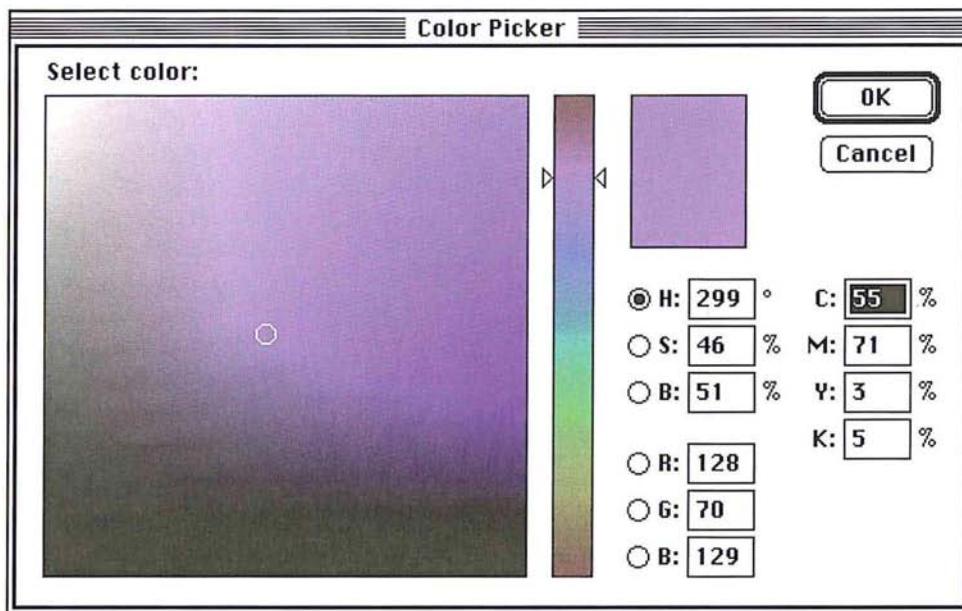
6. Use the controls in the Color Picker dialog box to pick the starting color for the blend.



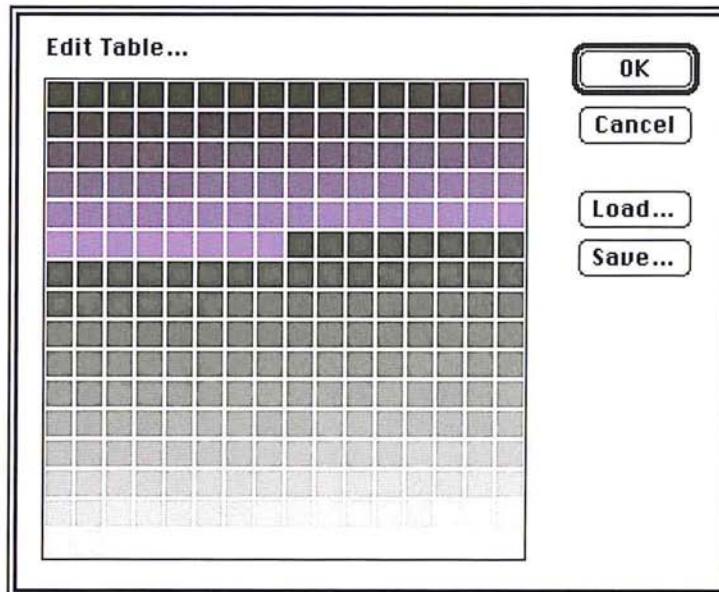
7. Click OK.

The Color Picker dialog box disappears, then reappears.

8. Use the controls in the Color Picker dialog box to pick the ending color for the blend.

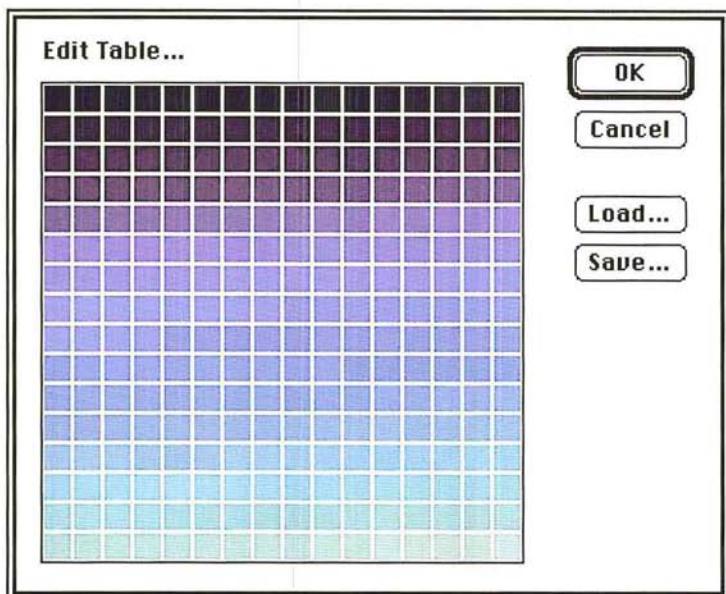


9. Click OK.



Edited color table

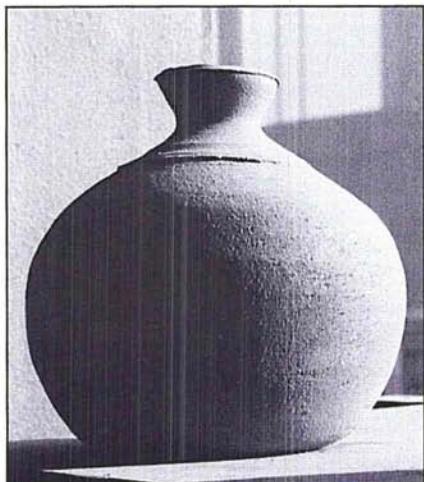
You can continue to modify the colors in the color table.



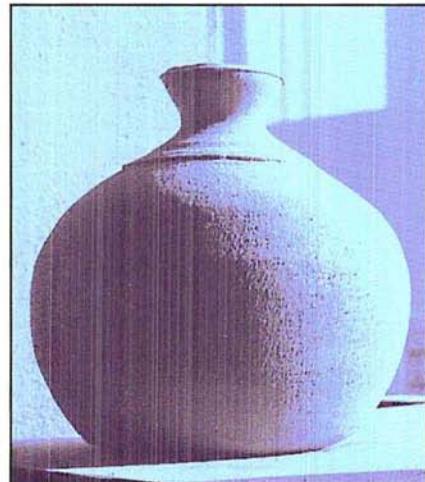
Final edited color table (multiple blends)

10. When you have finished editing colors in the table, click OK to close the Color Table dialog box.

All the colors in the image that referenced the colors in the positions you changed are changed to the new colors.



Original indexed image



After color table change

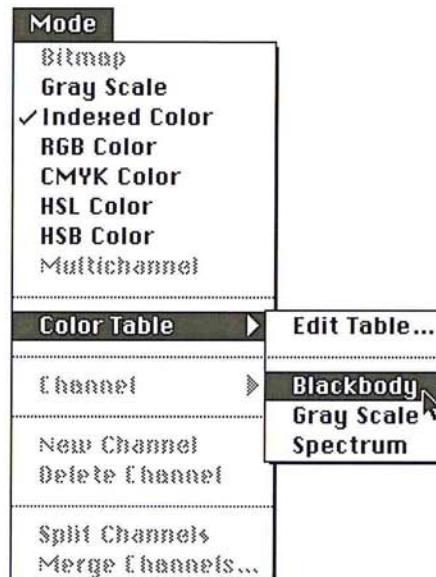
## Structuring the color table

The indexed color table can be structured according to a specific color system, such as blackbody radiation, gray scale, or color spectrum. The colors in the color table will then display a uniform transition of colors based on the selected color system. You can use the Edit Color command in the Color Table submenu, which is accessed via the Mode menu, to display the image's color table and view the changes you made to it.

The three color system options are described below.

To select the color system on which to base the color table:

1. Choose Color Table from the Mode menu.
2. Choose Blackbody, Gray Scale, or Spectrum from the Color Table submenu.



The colors in the image display the new colors to which they are mapped in the color table.

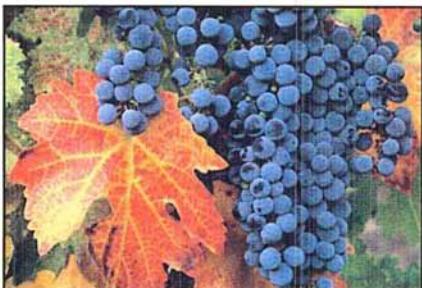
**Blackbody** When you choose the Blackbody option, the color table displays a transition of colors that is based upon the different colors a blackbody radiator emits as it is heated: from black, to red, orange, yellow, and white.

**Gray Scale** When you choose the Gray Scale option, the color table is changed to display a smooth transition from black to white in 256 levels of gray.

**Spectrum** When you choose the Spectrum option, the color table is changed to display a smooth transition between the colors in the spectrum. The spectrum displays the color transitions that result when white light passes through a prism: violet, blue, green, yellow, orange, red.

#### Saving and reusing a color table

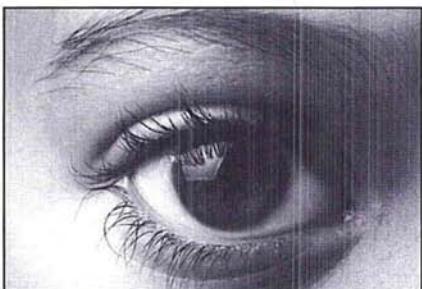
A color table can be saved, and subsequently loaded into another document. Once you load a color table into a document, the colors in the document are changed to reflect the color positions they reference in the new color table.



Original image



Image with new color table



Original image

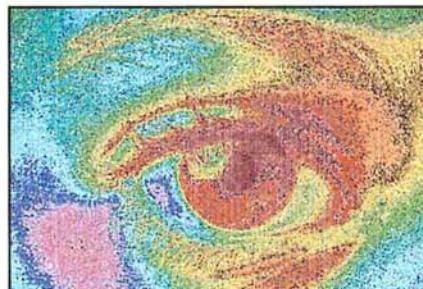


Image with new color table

#### To save a color table in another document:

1. Choose Color Table from the Mode menu.
2. Choose Edit Table from the Color Table submenu.  
The Color Table dialog box appears.
3. Click Save.  
The Save As dialog box appears.
4. Enter the name of the file in which you want to save the color table.  
If necessary, use the drive and directory buttons to access the folder in which you want to save the table.

5. Click Save.
6. The color table is saved under the file name and in the location you specified.

To load a previously saved color table into the active document:

1. Choose Color Table from the Mode menu.
  2. Choose Edit Table from the Color Table submenu.
- The Color Table dialog box appears.
3. Click Load.

The Open dialog box appears.

If necessary, use the drive and directory buttons to open the folder that contains the color table you want to load.

4. Click the color table you want.
5. Click Open.

6. To load the colors in this table into your document, click OK.

## Working with channels

You are not limited to working with only the default channels that make up an image. You can add, delete, and merge channels in a document. You can also automatically split up the various channels of an image to create a separate document for each channel. After you split the channels in a document into separate documents, you can merge the channels into a new document to create composite images and produce special effects.

You can also perform operations that involve two or more channels. You can add two channels together, subtract one channel from another, and compare the brightness values of the pixels in two channels. These types of operations involve mathematical calculations and comparisons of two channels, and are called calculations.

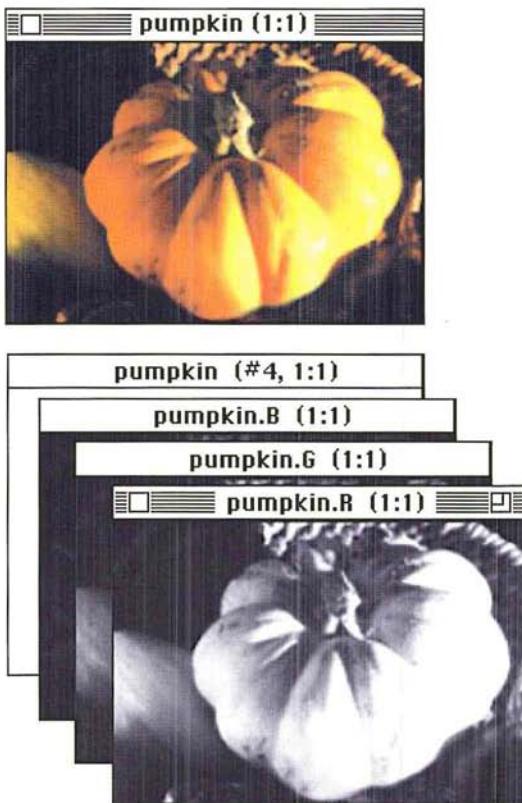
### Adding a new channel

Channels can be added to your document for use as temporary storage or scratch areas. The new channels you add are 8-bit, gray-scale, alpha channels, just like the ones created using the Selection → Alpha command. The only difference between the two channels is that the alpha channel created using the Selection → Alpha command automatically contains a copy of the current selection, whereas when you add a new channel, a gray-scale equivalent of the current background color appears as the new channel's background.

The new channel is assigned a name based on the total number of channels in the image. For example, if the last channel in the list of channels in the Channel submenu is 5, then the new channel will be named 6.

You can copy the contents of a new channel to the image's selection using the Alpha → Selection command. The white areas in a new channel represent the areas that are selected and can be edited and the black areas represent the areas that are not selected.

To create a new channel, choose New Channel from the Mode menu. A new, empty channel appears.



### **Deleting a channel**

You can delete any of the channels in an image. When you delete a channel, all information in that channel is discarded. When you delete one of the RGB channels in an RGB image, the RGB display mode option is removed from the Channel submenu and the pixels in the remaining channels are converted to their gray-scale equivalents.

#### **To delete a channel:**

1. Choose Channel from the Mode menu.
2. Choose the channel you want to delete from the Channel submenu.
3. Choose Delete Channel from the Mode menu.

The channel and all of its contents are deleted.

## Splitting channels into separate documents

You can easily split the various channels that comprise an image into separate documents using the Split Channels command in the Mode menu. When you choose Split Channels, the Adobe Photoshop program places each channel into a separate document and closes the original document; however, any changes you made to the original document before you last saved it are discarded. The changes you made since you last saved the original document appear in the separate channel documents.

A default name is assigned to each of the channel documents. The suffix ".character," where character is either a letter derived from the channel's name in the original document ("H" for Hue, for example) or the channel's identifying number in the Channels submenu (5, for example), is appended to the end of the original document name. As an example, if you split the channels of an RGB document titled "Row houses," the red channel document would be titled "Row houses.R". The channel documents are all converted to gray-scale images.

To split an image's channels into separate documents, choose Split Channels from the Mode menu. The image's channels are split into separate documents.

## Merging channels

You can use the Merge Channels command in the Mode menu to combine different channels to form a single image. The channels you merge were split into separate documents via the Split Channels command, or were channels from images that are the same size and have the same image resolution. When you merge channels, you can choose the image type of the document into which you merge the channel documents.

The image type used for merging channels must have the same number as or fewer channels than the original image. You cannot merge channels to create an image of another type with more channels than the image from which the channels were originally split. You cannot merge the split channels from an RGB image into a CMYK image, because a CMYK image requires four channels and an RGB image normally has only three channels. Also, to be available for merging, the documents to be merged must be the same size (in pixels) and must currently be open. The image types that aren't available for merging are dimmed in the Merge Mode dialog box.

After you select the image type you want, the number of channels appropriate for the selected image type appears in the Channels text box in the Merge Channels dialog box. You can change this number, but if you enter a number that is incompatible with the selected image type, the Multichannel image type will be selected automatically.

For example, if you select the CMYK image type, which by definition contains at least four channels, and enter "3" for the number of channels, the Multichannel image type will be selected.

Once you click OK in the Merge Channel dialog box, the Specify Channels dialog box appears. A single Specify Channels dialog box appears for all image types except Multichannel. The Specify Channels dialog box allows you to select the channels you want to include in the image. The names of the channels that comprise the selected image type appear in the dialog box, such as red, green, and blue for an RGB image. A text box appears beside the name of each channel. You use these text boxes to open pop-up menus that allow you to select the channels for the new image you will create by merging channel documents.

The Adobe Photoshop program automatically selects the channel documents that are currently open and assigns them to the appropriate channel. However, you can use the pop-up menus to select the channels you want to merge from the channel documents that are available.

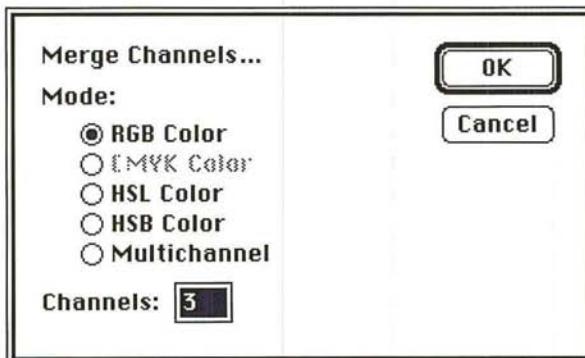
If Multichannel is the selected image type, a separate, Specify Channels dialog box appears for each of the specified number of channels. Use the pop-up menu beside the channel name to select the channel document for each of the channels to be included in the Multichannel image.

After you select the channels to be merged and click OK, the Adobe Photoshop program merges the selected channels into a new image of the specified type into an untitled document. The program also automatically closes the documents containing the channels that were merged into the new image.

**To merge channels:**

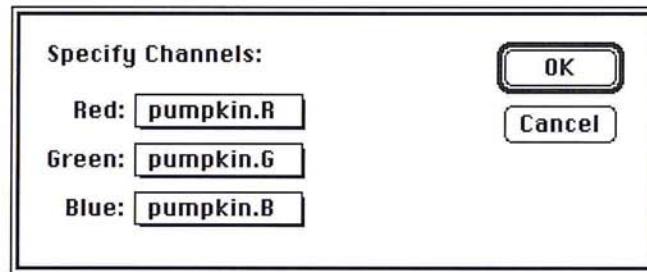
1. Click one of the channel documents you want to merge to make it the active document.
2. Choose Merge Channels from the Mode menu.

The Merge Mode dialog box appears.



3. Click the image type you want to create by merging the channels.
4. Enter the number of channels you want to include in the image.
5. Click OK.

The Specify Channels dialog box appears for all image types except Multichannel.



To select the channels you want to include in an image:

1. Position the pointer on the text box beside the name of the channel name in the Specify Channels dialog box.
2. Press down the mouse button.

A pop-up menu listing the available channel appears.

3. Holding down the mouse button, drag to highlight the channel document you want to assign to that channel.
4. Release the mouse button.

The name of the selected channel document appears in the box.

5. Repeat steps 1 through 4 to select the channel documents you want to merge into the new image.
6. When you have finished selecting the channels you want to merge, click OK.

### Using channel calculation commands

You can perform a number of operations on the channels in an image. Most of the channel calculation commands compare or perform mathematical operations on the corresponding pixels of two channels.

You can add the brightness values of the pixels in two different channels and place the pixels with the resulting brightness values into a new channel. You can quickly fill an entire channel with a specific gray level, and automatically compare the brightness values of pixels in two channels and create a new channel composed of the lightest or darkest pixels in the two channels. The calculation commands also let you copy a specific channel, such as the red channel of an RGB image, into a selection in another image, identify the differences between two image frames that show the same background, and create a composite image from two channels.

When you perform calculations on the pixels in two or more channels, the Adobe Photoshop program uses the pixels that correspond to the same position on the image for the calculations. Think of two channels being printed on separate pieces of film, then placed one on top of the other in perfect registration. The pixels on both pieces of film line up, so that a pixel on the bottom piece corresponds to the same position as the pixel on the top piece. You can have the operations performed on the red, green, and blue channels of the image by including the RGB channel in a calculation.

After you select the channel calculation command you want, a dialog box titled with the name of the calculation command appears. You use the dialog box to choose the documents and channels to be included in the calculations. For all of the channel calculation commands, with the exception of the Composite command, the documents containing the channels to be included in the calculations are called the “source documents,” and the channels to be included in the calculations are called the “source channels.” In the case of the Composite command, the channels to be included in the operation are called the Foreground, Mask, and Background channels.

In most cases, the active document will be the source document. However, if you split a document into separate documents, you can choose any of the available documents as the document you want to use in the calculations. You can also use any document that contains an image that is the same size (in pixels) as the active document.

Most calculation commands involve two source channels. The channel calculations involve a mathematical operation that uses two channels as the operands in the equation.

The results of the calculation are stored in a document called the “destination document,” and the channel in that document that contains the results is called the “destination channel.” By default, the results of a channel calculation are automatically stored in a new channel in a new document. However, you can choose an existing document and channel in which to store the results.

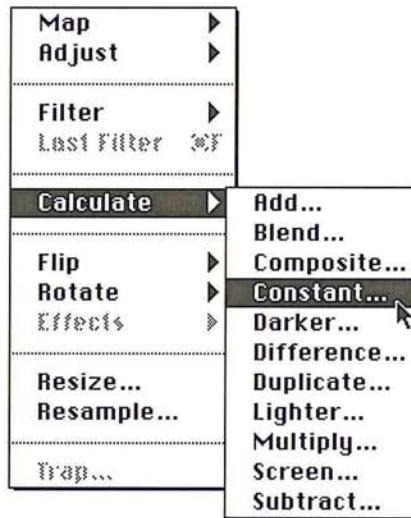
**WARNING:** If you assign the results of a channel calculation to an existing channel (the destination channel), the channel calculation results will overwrite the pixels in the existing channel.

You choose the documents and channels you want to include in a calculation using pop-up menus in the dialog box that appears when you choose a channel calculation command. Throughout this section, the instructions for making a choice from a pop-up menu are described as “Use the ‘(name)’ pop-up menu to choose”—where “(name)” is the title that appears beside the box used to access the pop-up menu. For example, when you choose the destination document for a calculation, the pop-up menu used to choose the document is titled, “Destination.” Following are the instructions for choosing a channel calculation command and for making a choice from a pop-up menu.

To choose a channel calculation command and the documents and channels to be included in the calculation:

1. Choose Calculate from the Image menu.

The Calculate submenu appears.



2. Choose the calculation command you want.

A dialog box with the title of the chosen calculation command appears.

3. To include a document or channel in the calculation, position the pointer on either the appropriate Document or Channel box, respectively.
4. Press down the mouse button.
5. Holding down the mouse button, drag to highlight the document or channel you want.
6. Release the mouse button.
7. Repeat steps 3 through 6 to select all the documents and channels to be included in the calculations.
8. Click OK.

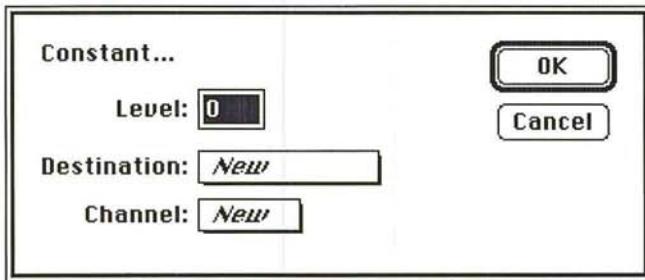
## Assigning a gray level to a channel

The Constant command allows you to assign a gray level to a channel. You specify a gray level and the channel that will contain the gray (the destination channel). The destination channel will be entirely filled with gray pixels of the specified gray level. You can use this command to quickly fill an entire channel with a specific gray level.

### To assign a gray level to a channel:

1. Choose Calculate from the Image menu.
2. Choose Constant from the Calculate submenu.

The Constant dialog box appears.



3. Enter the gray level you want to appear in the channel in the Level text box.
4. Use the Destination pop-up menu to choose the the document in which you want to place the gray fill.
5. Use the Channel pop-up menu to choose the channel you want.
6. Click OK.

The specified gray level appears in the specified channel.

## Copying one channel to another

The Duplicate command creates a copy of a channel and automatically places the copy into another channel. The destination channel can be an existing channel or a new channel. This allows you to copy an existing channel, such as the blue channel in an RGB image, and transfer it to an alpha channel for editing.

You can also copy a selection to a specified channel. The Adobe Photoshop program creates a copy of the selection and places it into the chosen destination channel. This procedure is analogous to copying a selection into an alpha channel using the Selection → Alpha command. The difference is that the Selection → Alpha command automatically creates a new channel to hold the mask, whereas the Duplicate function allows you to copy the selection to any channel in the image.

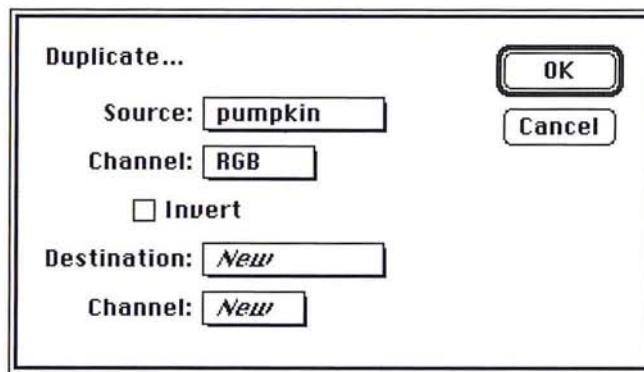
You can place a copy of a channel into the selection of the destination image. This procedure is analogous to copying the contents of an alpha channel into an image's selection using the Alpha → Selection command. To do this, simply choose Selection as the destination channel in the Duplicate dialog box. This option is useful for copying a specific channel, such as the red channel of an RGB image, into a selection in another image.

You can also choose to invert the pixels in the duplicate channel before they are copied and placed in the destination channel.

**To duplicate a channel and place it into another channel:**

1. Choose Calculate from the Image menu.
2. Choose Duplicate from the Calculate submenu.

The Duplicate dialog box appears.



3. Use the Source pop-up menu to choose the document that contains the channel you want to duplicate.
4. Use the source Channel pop-up menu to choose the channel you want to duplicate.
5. As an option, to invert the pixels in the duplicate of the source channel, click Invert.  
The Invert box is checked, and a copy of the source channel will be inverted before it is placed into the destination channel.
6. Use the Destination pop-up menu to choose the document you want to receive the copy of the source channel.
7. Use the destination Channel pop-up menu to choose the channel into which you want to place the copy of the source channel.
8. Click OK.

**To place only a selection into the destination channel:**

1. Use one of the selection tools or commands to select the part of the image you want.
2. Choose Calculate from the Image menu.
3. Choose Duplicate from the Calculate submenu.

The Duplicate dialog box appears. The document containing the selection is automatically selected as the source document.

4. Use the source Channel pop-up menu to choose Selection. (This Selection refers to the part of the image you selected in step 1.)
5. Use the Destination pop-up menu to choose the destination document.
6. Use the destination Channel pop-up menu to choose the destination channel.
7. Click OK.

**Comparing brightness values**

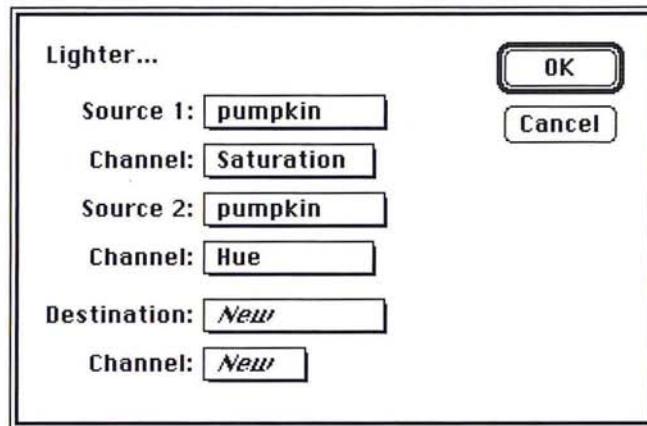
You can compare the brightness values of the corresponding pixels in two channels and automatically place a copy of the lighter or darker of the two pixels into a destination channel. The Lighter command selects the lighter of the two pixels; the Darker command selects the darker of the two. When you use one of these commands, the Adobe Photoshop program compares the pixels that correspond to the same location in the two selected channels to determine which one is lighter or darker. The Adobe Photoshop program then creates copies of the lighter or darker pixels and places the copies into the chosen destination channel. These commands are useful for creating special effects.

The method for implementing the Lighter and Darker commands is identical. You choose the channels you want to compare and the destination channel for the result.

To compare the brightness values of pixels in two channels:

1. Choose Calculate from the Image menu.
2. Choose Lighter or Darker from the Calculate submenu.

The Lighter or Darker dialog box appears.



3. Use the Source 1 pop-up menu to choose the document that contains one of the channels you want to include in the comparison.
4. Use the source 1 Channel pop-up menu to choose the first channel.
5. Use the Source 2 pop-up menu to choose the document that contains the other channel you want to include in the comparison.
6. Use the source 2 Channel pop-up menu to choose the second channel.
7. Use the Destination pop-up menu to choose the document that contains the channel into which you want to place copies of the lighter or darker pixels from the two source channels.
8. Use the destination Channel pop-up menu to choose the destination channel.
9. Click OK.

Copies of the lighter or darker pixels in the two selected channels are placed in the chosen destination channel.

## Performing mathematical operations on channels

The Adobe Photoshop program lets you perform mathematical operations on the corresponding pixels in two channels. The operations use the brightness values of the corresponding pixels in two selected channels.

You can add and multiply the brightness values from two channels, or subtract the brightness values of pixels in one channel from the corresponding pixels in another and return the actual value or the absolute value of the result. You can blend the brightness values of the pixels in two channels, or create a composite image based on a mask channel and two other channels. You can also include the pixels in two channels in a "screen" operation, which produces a result analogous to superimposing two film negatives of two source images and printing the result onto photographic paper.

You can use these commands to create composite images, highlight the differences between two images that contain the same background, and create special effects.

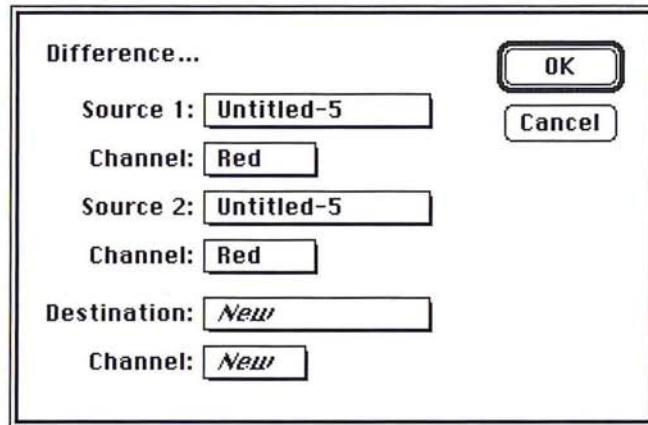
The steps for implementing the Multiply, Difference, and Screen commands are the same; you choose the two source channels you want to include in the calculations and the destination channel. The Adobe Photoshop program uses the brightness values of the corresponding pixels in the two selected source channels as arguments in an equation. The equation returns a brightness value. The Adobe Photoshop program places a pixel with the resulting brightness value in the chosen destination channel. This operation is performed for all the corresponding pixels in the two source channels.

Although the procedures for using these commands are identical, a different equation is used for each command. The equation used for each command and the results of the equation are described below.

**To use the Difference, Multiply, or Screen command:**

1. Choose Calculate from the Image menu.
2. Choose the command you want from the Calculate submenu.

The Difference, Multiply, or Screen dialog box appears.



3. Use the Source 1 pop-up menu to choose the document that contains one of the channels you want to include in the calculation.
4. Use the source 1 Channel pop-up menu to choose the first channel.
5. Use the Source 2 pop-up menu to choose the document that contains the other channel you want to include in the calculation.
6. Use the source 2 Channel pop-up menu to choose the second channel.
7. Use the Destination pop-up menu to choose the document that contains the channel into which you want to place the pixels with the brightness values that result from the calculation.
8. Use the destination Channel pop-up menu to choose the destination channel.
9. Click OK.

The results of the Difference, Multiply, or Screen operation appear in the destination channel.

#### **Difference command**

The Difference command subtracts the brightness value of the pixel in the Source 2 channel from the brightness value of the corresponding pixel in the Source 1 channel. A pixel with the resulting absolute brightness value (the absolute value means a negative value is treated as a positive value) is placed in the destination channel.

For example, suppose there is a pixel in the Source 1 channel with a brightness value of 128 and a pixel in the Source 2 channel with a brightness value of 191. The Difference command subtracts the brightness value of the pixel in Source 2 (191) from the pixel in Source 1 (128), which results in the value -63. The command takes the absolute value of the result, 63, and places a pixel with a brightness value of 63 into the destination channel.

The Difference command is useful for identifying differences between two image frames that show the same background. If you use this command to compare two frames taken from a video frame grabber that show the same background, but which contain different foreground elements, the light areas in the destination channel will show the areas in the frames where changes occurred.

**Equation:**

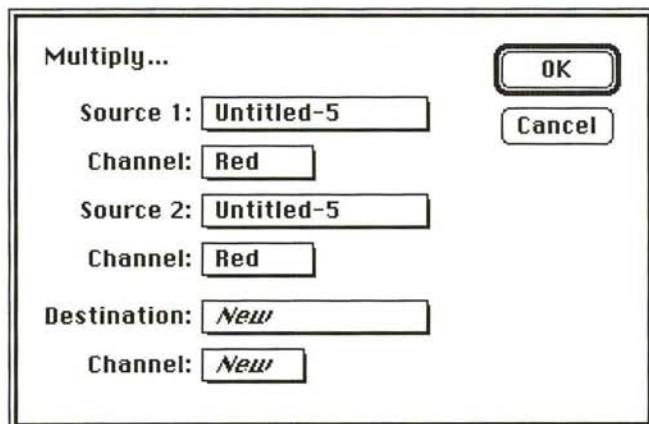
$$|\text{Source 1} - \text{Source 2}| = \text{destination}$$

**Multiply command**

The effect of the Multiply command is analogous to superimposing two positive transparencies on a light table. The Multiply command multiplies the brightness value of the pixel in the Source 1 channel times the brightness value of the corresponding pixel in the Source 2 channel; the result is divided by the maximum brightness value (255). A pixel with the resulting brightness value is placed in the destination channel.

**Equation:**

$$\frac{(\text{Source 1})(\text{Source 2})}{255} = \text{destination}$$

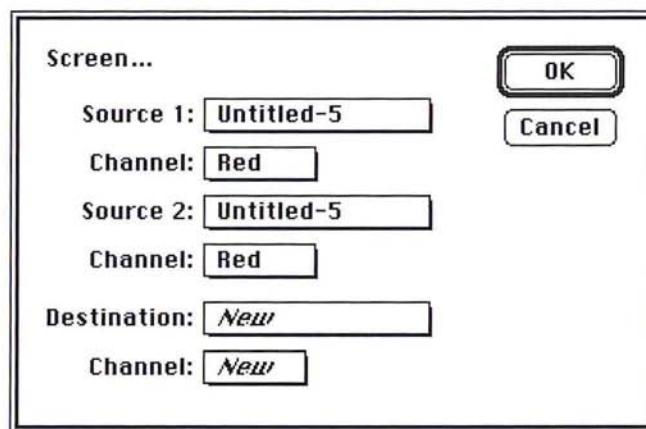


### Screen command

The effect of the Screen operation is analogous to superimposing two film negatives of two source images, and printing the result onto photographic paper. The Screen command subtracts the brightness values of the pixels in each of the two channels from the maximum brightness value (255), multiplies the resulting two values together, divides that result by 255, subtracts this result from 255, then places a pixel with the resulting brightness value into the destination channel.

Equation:

$$\frac{255 - (255 - \text{Source 1})(255 - \text{Source 2})}{255} = \text{destination}$$



## Add and Subtract commands

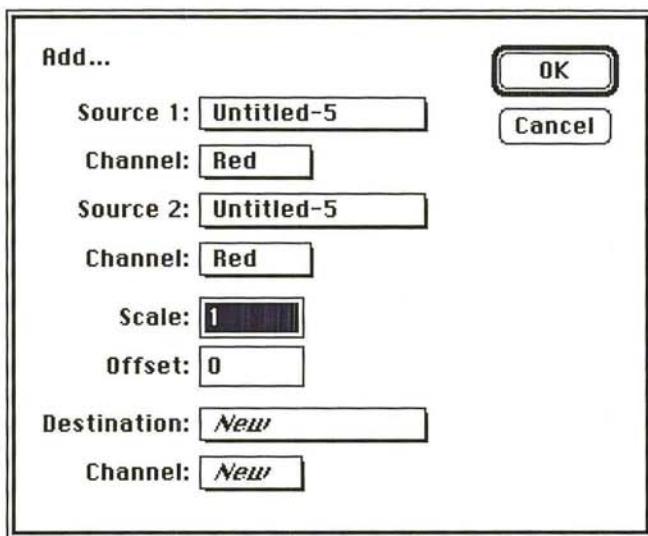
The Add or Subtract command adds and subtracts, respectively, the brightness values of the corresponding pixels in the Source 1 and Source 2 channels, then divides the result by the Scale value, and finally adds the offset value to this result.

Add equation:

$$\frac{(\text{Source 1} + \text{Source 2}) + \text{Offset}}{\text{Scale}} = \text{destination}$$

Subtract equation:

$$\frac{(\text{Source 1} - \text{Source 2}) + \text{Offset}}{\text{Scale}} = \text{destination}$$



With the Add command, the brightness values of the pixels that result from the addition operation are lighter than the pixels in either of the two source channels. This could result in a considerable loss of detail in the highlight areas of the image. You can preserve some of the highlight detail by specifying a negative value for the Offset parameter.

With the Subtract command, the brightness values of the pixels that result from the subtraction operation are darker than the pixels in the two source channels. This tends to eliminate the detail in the shadow areas. By specifying a positive value for the Offset parameter, you can preserve some of the shadow detail.

The procedures for implementing the Add and Subtract commands are the same. The major difference between the two commands is the order of the source channels. The order of the source channels is important when you use the Subtract command, because the brightness values of the pixels in Source 2 are subtracted from the brightness values of the corresponding pixels in Source 1. If the result of the Subtract operation is a negative value, a pixel with a brightness value of 0 (a black pixel) is placed in the destination channel.

**To use the Add or Subtract command:**

1. Choose Calculate from the Image menu.
2. Choose Add or Subtract from the Calculate submenu.  
The Add or Subtract dialog box appears.
3. Use the Source 1 pop-up menu to choose the document that contains one of the channels you want to include in the calculation.
4. Use the source 1 Channel pop-up menu to choose the first channel.
5. Use the Source 2 pop-up menu to choose the document that contains the other channel you want to include in the calculation.
6. Use the source 2 Channel pop-up menu to choose the second channel.
7. Enter a value from 1.000 to 2.000 to specify the Scale factor. This is the value by which the result of the Add or Subtract operation is divided.
8. Press the Tab key or double-click in the Offset text box.
9. Enter a value from -255 to 255 for the Offset. This value is added to the value that results from the Scale operation.
10. Use the Destination pop-up menu to choose the document that contains the channel into which you want to place the pixels with the brightness values that result from the calculation.
11. Use the destination Channel pop-up menu to choose the destination channel.
12. Click OK.
13. The results of the Add or Subtract operation appear in the destination channel.

## **Blend command**

The Blend command is similar to the Add command; both commands add the brightness values of the corresponding pixels in two channels. In addition, the Blend command allows you to assign a weight to the brightness values of the pixels in the source channels.

**Equation:**

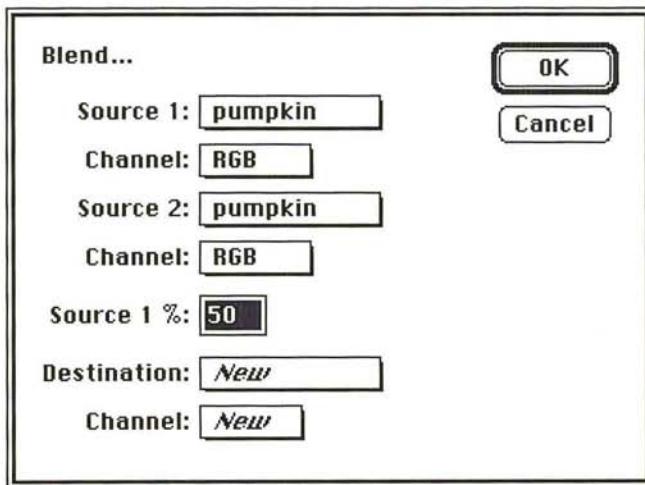
$$\frac{[(\text{Source 1}) (\text{Source}\%)] + [\text{Source 2} (100 - \text{Source}\%)])}{100} = \text{destination}$$

The weight is a percentage value. This weight value is called the Source%. The default percentage value is 50 percent. The higher the value you specify for the Source%, the more influential the brightness values of the pixels in the Source 1 channel become in the result, and the less influential the pixels in the Source 2 channel become.

**To use the Blend command:**

1. Choose Calculate from the Image menu.
2. Choose Blend from the Calculate submenu.

The Blend dialog box appears.



3. Use the Source 1 pop-up menu to choose the document that contains one of the channels you want to include in the calculation.
4. Use the source 1 Channel pop-up menu to choose the first channel.
5. Use the Source 2 pop-up menu to choose the document that contains the other channel you want to include in the calculation.
6. Use the source 2 Channel pop-up menu to choose the second channel.

7. Enter the percentage value in the Source 1% text box to determine the influence of the two source channels in the calculation.
8. Use the Destination pop-up menu to choose the document that contains the channel into which you want to place the pixels with the brightness values that result from the calculation.
9. Use the destination Channel pop-up menu to choose the destination channel.
10. Click OK.

The results of the Blend operation appear in the destination channel.

### **Composite command**

The Composite command is similar to the Blend command in that it allows you to assign a weight to the pixels in the source channels. However, instead of using a constant percentage value to weight the brightness values of the pixels in the two channels, you use a third channel (called the “mask channel”) to control the calculations. The mask channel you specify can be any channel, including an alpha channel.

**Equation:**

$$\frac{[\text{Foreground (Mask)}]}{255} + \frac{[(\text{Background} (255 - \text{Mask})]}{255} = \text{destination}$$

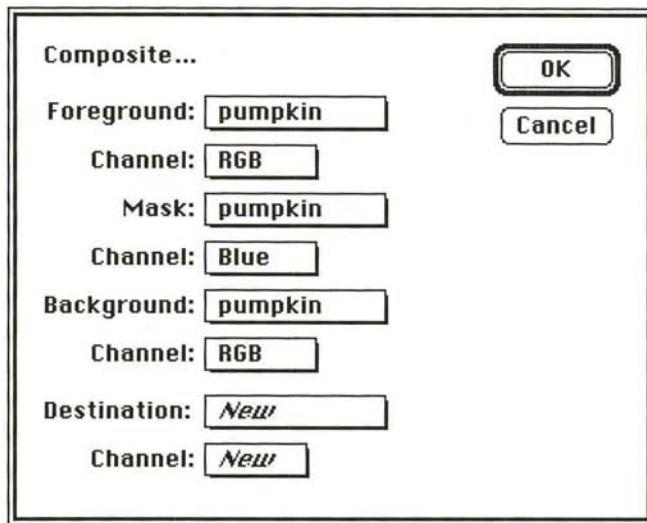
The brightness values of the pixels in the mask channel will tend to vary; the varying brightness values determine whether the pixels in the foreground or the pixels in the background channel are more influential in the calculation. The lighter areas in the mask channel tend to make the foreground pixels more influential in the equation, and the pixels in the background channel less influential. The darker areas in the mask channel have the opposite effect.

The Composite command allows you to create a composite image by applying a mask to the foreground channel, then placing the foreground and background in a destination channel. You can create a mask in an alpha channel to exclude the parts of the foreground you do not want to appear in the composite image. Then, when you use the Composite command and include the mask channel in the calculation, the foreground, without the masked portions, will appear in front of the background in the destination channel.

**To use the Composite command:**

1. Choose Composite from the Calculate submenu.

The Composite dialog box appears.



2. Use the Foreground pop-up menu to choose the document that contains the channel you want to use as the foreground channel in the calculation.
3. Use the foreground Channel pop-up menu to choose the foreground channel.
4. Use the Mask pop-up menu to choose the document that contains the channel you want to use as the mask channel in the calculation.
5. Use the mask Channel pop-up menu to choose the mask channel.
6. Use the Background pop-up menu to choose the document that contains the channel you want to use as the background channel in the calculation.
7. Use the background Channel pop-up menu to choose the background channel.
8. Use the Destination pop-up menu to choose the document that contains the channel into which you want to place the pixels with the brightness values that result from the calculation.
9. Use the destination Channel pop-up menu to choose the destination channel.
10. Click OK.

The results of the Composite calculation appear in the destination channel.

## Chapter 16: *Making Color Corrections*

This chapter discusses how to make color corrections to images, and to the channels that comprise them. Adjustments to color include inverting colors, equalizing the brightness values of colors, and converting a color image to a black-and-white image. This chapter also describes how to adjust the brightness, contrast, gamma, hue, and saturation in an image, and colorize pixels, which allows you to color pixels in a gray-scale image.

Color correction allows you to address disparities between the original or scanned image and how it displays on-screen and is printed. It also allows you to compensate for deficiencies inherent in four-color reproduction, including the varying contrast between paper and ink, the degradation of the original continuous-tone image as it is converted to a halftone or four-color separation, and the contamination of process inks and their inability to match theoretical performance.

The color correction commands in the Adobe Photoshop program let you make color corrections to adjust how the colors in an image are displayed on-screen, and how they print. In addition, the color correction commands allow you to adjust the contrast in the image when it does not cover the entire range of color values. You can also use the color correction commands to change the brightness, contrast, and hue in the image so that when you output the image, you achieve the desired results.

Some color correction commands, such as the Posterize command, let you create special effects. Other color correction commands allow you to adjust specific color components, such as brightness and contrast. The commands that allow you to adjust specific color components remap the color values of pixels to different values.

Remapping color values generally involves changing the color values in particular parts of an image, such as the highlights (light areas) or shadows (dark areas). You can remap color values to adjust the contrast, brightness, and gamma (mid-level grays) together or separately.

Although some of these commands function in a similar way, how they implement the change varies. For example, you can change the brightness and contrast in an image using either the Brightness/Contrast command or the Levels command. One of the differences between the two commands is that the Levels command displays a dialog box containing a histogram of the image, which allows you to visualize the effects of the changes you specify.

Generally, you adjust colors using a slider and dragging triangles representing the color values of pixels to different positions that represent different values. In most cases, you can preview the effect of the color correction commands before applying the changes.

With the exception of the Equalize command, all the changes you specify using the color correction commands are applied to the current selection. If there is no selection, the changes are applied to the entire image. The Equalize command allows you to specify whether you want the changes applied to the selected area or to the entire image.

## Previewing changes

You can preview color changes before you apply them when the Preview button appears in the dialog box you are using to make the change. All the commands in the Map and Adjust submenus under the Image menu, except the Invert command, display dialog boxes that include the Preview button. The Paste Controls dialog box also includes the Preview button.

When you make a change to a selection using one of these dialog boxes, the Adobe Photoshop program displays the color changes throughout the screen. This process is called color table animation; the program is modifying the monitor's color lookup table dynamically in response to the changes you specify. When you click Preview, the Adobe Photoshop program displays the change's effect on the current selection (if there is one), or to the entire image (if nothing is selected). If you do not like the change, you can cancel it by clicking Cancel.

You can temporarily turn off color table animation by clicking in the dialog box title bar. This allows you to perform quick before and after comparisons.

The color table animation feature does not work properly while you are making a change if you are using a 24- or 32-bit video card. To preview changes, you should reset the video mode and deselect the Use DirectSetEntries option.

Although the color table animation will not function when you use a dialog box that includes the Preview feature, the Preview option will work correctly. If you use one of the color correction dialog boxes in the Map or Adjust Levels submenu under the Image menu, you can display the color palette to preview the color values of the pixels affected by the change using the eyedropper tool.

While using the color adjustment controls, you still have access to the scroll controls, the grabber and zoom tools. The scroll controls, as well as the grabber and zoom tools, allow you to see how changes affect parts of the image currently outside your view. You use the keyboard to access the grabber and zoom tool. The grabber tool allows you only to scroll across images that are larger than the window. You can also use the color palette and the eyedropper tool to preview the color values of the pixels affected by the change.

### As an example of how to preview an image:

1. Select part of an image.
2. Choose Adjust from the Image menu.  
The Adjust submenu appears.
3. Holding down the mouse button, drag to highlight the color correction command you want.

4. Release the mouse button.
5. Once you have made a color change to your image, in the appropriate color correction dialog box, click Preview.

The Adobe Photoshop program shows the change's effect on the selection and suspends the color table animation.
6. To restore the color table animation, Option-click Preview.
7. When you are finished viewing the change, cancel the preview by clicking Cancel. Or, to apply the specified changes to the current selection, click OK.

**To use the eyedropper tool with a color correction dialog box:**

1. Make sure that the color palette is displayed. If it isn't, choose Show Palette from the Window menu.
2. Position the pointer on the image.
3. Click the desired pixel, and view the color values in the color palette.

**To reset the video mode to preview changes using a 24-or 32-bit video card:**

1. Close the current dialog box.
2. Choose Control Panel from the  menu.
3. Click Monitors.
4. Click one of the other color display options (such as 256 colors).
5. Click your original color display option.
6. Click the Control Panel's close box.
7. Choose Preferences from the Edit menu.
8. In the Preferences dialog box, deselect the Use DirectSetEntries option.
9. Click OK.

## Creating a histogram

You can create a histogram of an image to help you determine how to change the colors in an image, or to see how they have been changed. A histogram plots the color values of pixels in the active channel of an image against the total number of pixels with those values in the channel.

When you create a histogram of an RGB image or an indexed color image, you can plot the luminosity values of the pixels, or the color values of the pixels in individual channels. When you create a histogram of any other type of image, the Adobe Photoshop program plots the color values of the pixels in the active channel.

If part of the image is selected, the histogram is based on the pixels that are at least 50 percent selected. Otherwise, the histogram is based on the entire image.

The pointer allows you to obtain information about specific areas of the histogram. The information is displayed at the lower right side of the Histogram dialog box. The information includes the color level (Level), from 0 to 255, of a specific point on the graph; the total number of pixels at that level (Count); and the percentage of pixels with color levels darker than the level the pointer is currently on.

In the Histogram dialog box, the middle section of the graph shows the pixels with medium color values (near 128), the left side of the graph shows the pixels with dark color values (near 0), and the right side of the graph shows pixels with light color values (near 255). The X-axis represents the color values from black (0) at the far left to white (255) at the far right. The Y-axis represents the total number of pixels with that value.

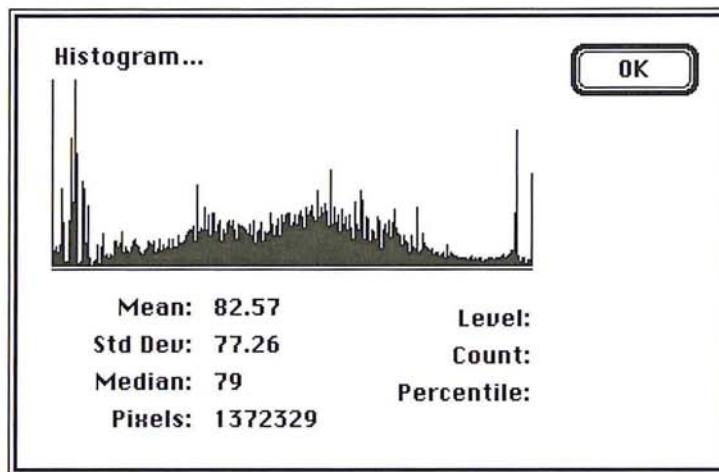
The numerical values at the lower left of the Histogram dialog box display statistical information about the color values of the pixels. The Mean is the average color value; the standard deviation (Std Dev) is a statistical calculation that represents how widely the values vary; the Median value shows the middle value in the range of color values; and the Pixels value represents the total number of pixels in the selected area or the image.

When you create a histogram of an RGB or indexed color image, an extra set of controls is available in the Histogram dialog box. These controls allow you to plot either the luminosity of the pixels (the Gray option), or the color values of the pixels in the red, green, or blue channels. Depending on the color option you choose, the color values of the pixels in the selected channel are plotted on the histogram.

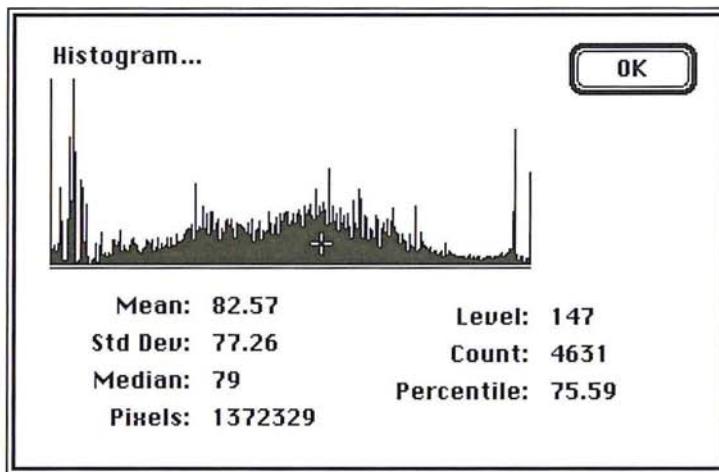
To create a histogram:

1. Choose Histogram from the Window menu.

The Histogram dialog box appears.



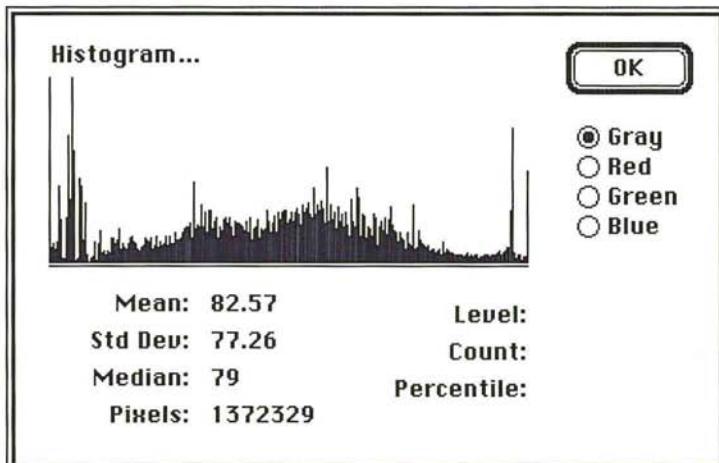
2. To obtain specific information about a point on the graph, position the pointer on the point of interest. The values at the lower right of the dialog box change to display information about the point on the graph.



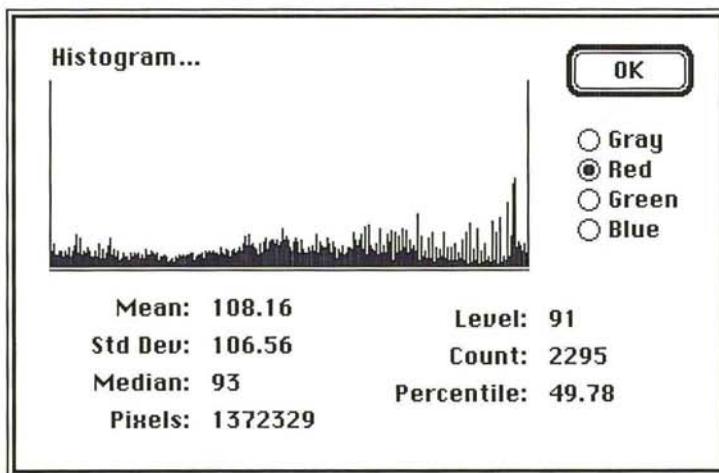
Pointer on histogram displays current values

**Creating a histogram of RGB channels:**

1. Choose Histogram from the Window menu. The Histogram dialog box appears.
2. Click Gray to plot the luminosity of the pixels; click Red, Green, or Blue to plot the selected channel's color values on the histogram.



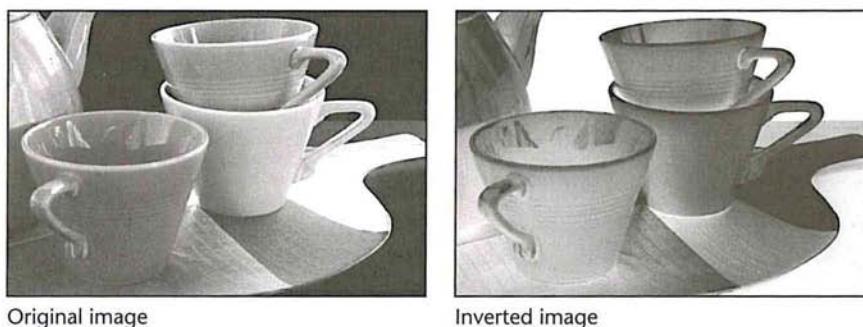
Gray color values



Red color values

## Inverting colors

The Invert command in the Map submenu of the Image menu creates a negative of an image. When you invert a multichannel image, the brightness value of each pixel in the channels are converted to the inverse values on the 256-step scale that the Adobe Photoshop program uses to evaluate color values. Inverting turns each channel into a negative of the original image. For example, a pixel in a positive image with a gray level of 255 is changed to 0, and a pixel with a gray level of 5 is changed to 250.



## Specifying the number of gray levels in an image

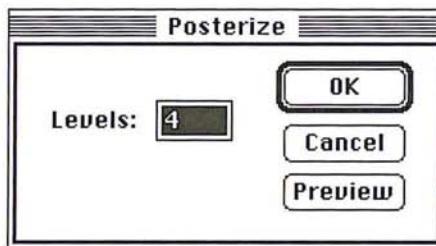
You can specify the number of gray levels in an image using the Posterize command. This is useful for creating special effects, such as large, flat areas in a photograph. The effects of this command are most evident when you reduce the number of gray levels in a gray-scale image; this command also works on color images.

The Posterize command determines the gray levels that evenly divide the image according to the number of levels you specify, and maps pixels in the image to the level that is the closest match.

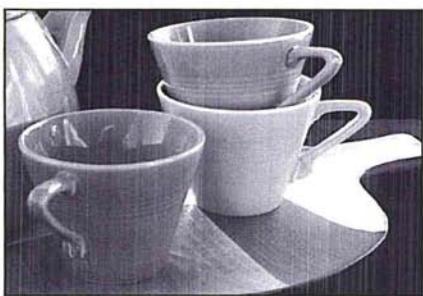
To specify the number of gray levels in an image:

1. Choose Map from the Image menu.
2. Choose Posterize from the Map submenu.

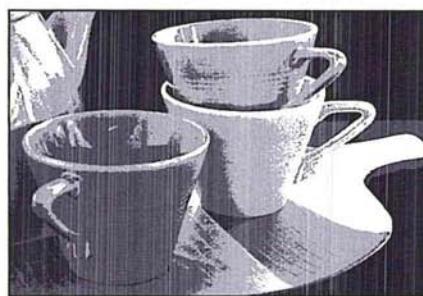
The Posterize dialog box appears.



3. Enter the number of gray levels you want.
4. Click OK.



Before Posterize: 256 gray levels

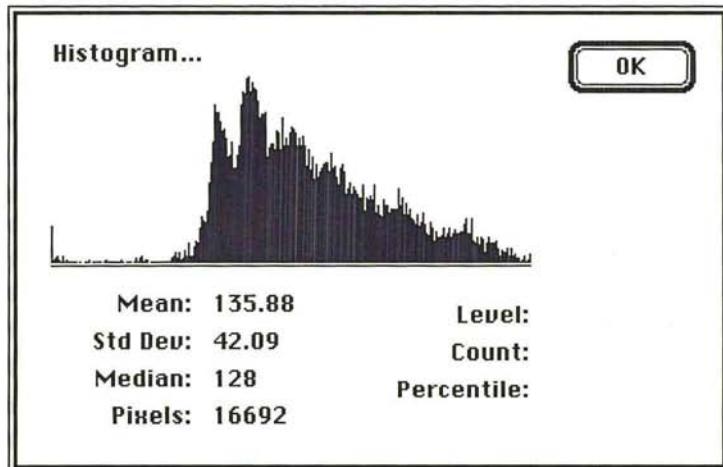


After Posterize: 4 gray levels

### Equalizing brightness values

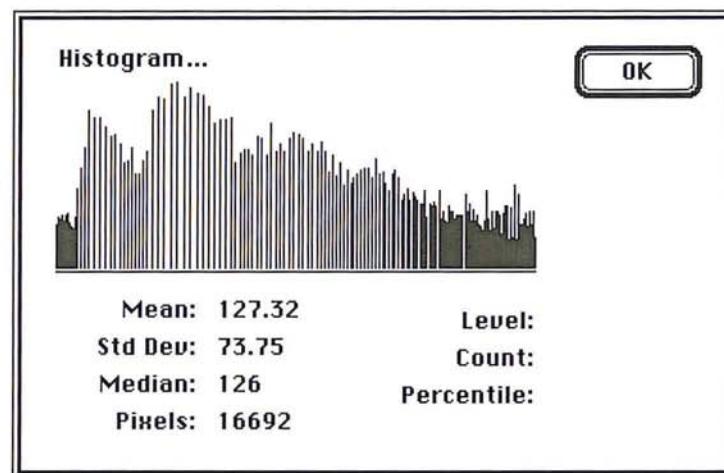
The Equalize command enhances the contrast in an image. When you use the Equalize command, the Adobe Photoshop program attempts to distribute more evenly the brightness values of the pixels throughout the range of brightness levels. The effect of this command is best understood by using a histogram.

If you created a histogram of an image before using the Equalize command, it may show most of the pixels clumped near the center of the graph (representing the middle gray levels), a few pixels near the dark end of the range (the left side of the graph), and a few pixels near the light end of the range (the right side of the graph).



Gray-scale image before Equalize command

After using the Equalize command, the histogram would show a more even distribution of the pixels throughout the range of gray levels.



Gray-scale image after Equalize command

If you choose the Equalize command while nothing is selected, the brightness values of pixels throughout the image will be equalized based on the range of brightness values throughout the entire image. If you choose the Equalize command while there is a selection on the image, a dialog box will appear. You can choose to equalize the brightness values of the pixels in the selection only, or equalize the brightness values throughout the image based on the range of brightness values in the selection, not of the range of brightness values throughout the image.



Original image

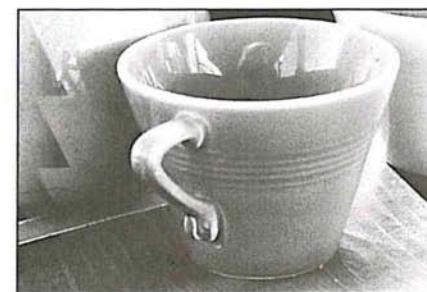


Image after using Equalize command

**To equalize the brightness values of pixels throughout an image:**

1. Choose None from the Select menu to deselect everything.
2. Choose Map from the Image menu.
3. Choose Equalize from the Map submenu.

The brightness values of pixels throughout the image are equalized.

**To equalize the brightness values of the pixels in a selection only:**

1. Select the part of the image in which you want to equalize the brightness values.
  2. Choose Map from the Image menu.
  3. Choose Equalize from the Map submenu.
- The Equalize dialog box appears.
4. Click the Selected Area Only option, and click O.K.

The brightness values of the pixels in the selection only are equalized.

**To equalize the brightness values in an image based on a selection's brightness:**

1. Select the part of the image that contains the range of brightness values on which you want to base the equalization of the brightness values.
  2. Choose Map from the Image menu.
  3. Choose Equalize from the Map submenu.
- The Equalize dialog box appears.
4. Click the Entire image based on area option, and click OK.

The brightness values of the pixels in the entire image are equalized, based upon the range of brightness values in the selection.

## **Converting an image to black and white**

You may want to convert a gray-scale image with multiple gray levels or an RGB image with to an image with only two colors: black-and-white. The Threshold command allows you to do this. You can specify a certain level of gray as a threshold, and the Threshold command automatically converts all of the pixels that are lighter than the specified level (pixels with luminosity levels higher than the specified level) to white. Conversely, the Threshold command changes all pixels that are darker than the specified level (pixels with luminosity levels lower than the specified value) to black.

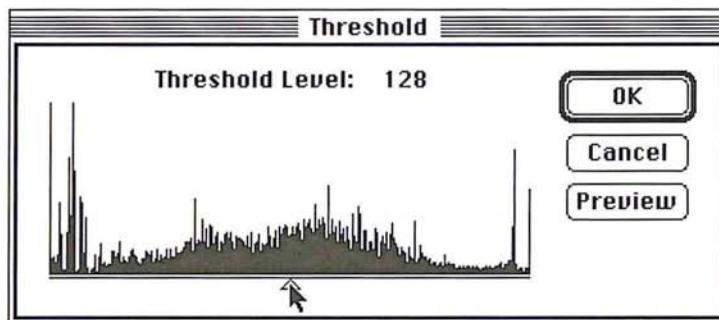
The Threshold dialog box displays a histogram of the luminosity levels of the pixels in the current selection. You drag the slider below the histogram to specify the threshold level for the image. When you drag the slider, the value at the top of the dialog box changes to display the current threshold level.

**To use the Threshold command:**

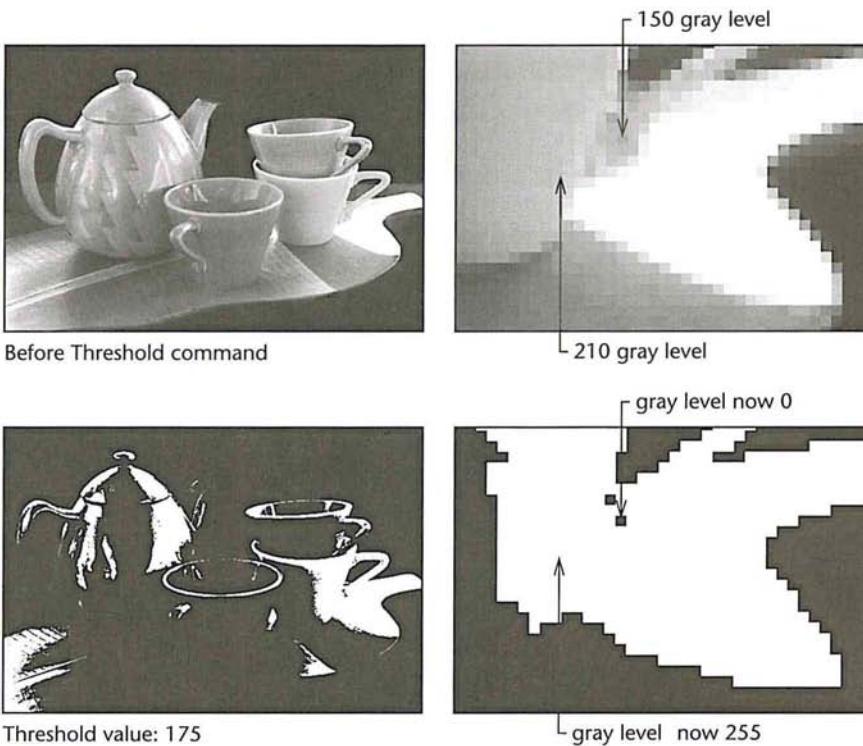
1. Choose Map from the Image menu.
2. Choose Threshold from the Map submenu.

The Threshold dialog box appears.

3. To specify the threshold level, position the pointer on the slider below the histogram.



4. Holding down the mouse button, drag the slider until the threshold level you want appears at the top of the dialog box.
5. Click OK.



## Creating a color curve

The arbitrary map feature allows you to correct the color in an image by remapping the color values of pixels with a high degree of accuracy. Remapping changes the current color values of pixels to different color values. You can define a color curve to create special effects. In conjunction with the separation setup parameters, the arbitrary map can also be used to create custom black-generation functions used to define the conversion from RGB to CMYK.

Each pixel in the image is mapped to a certain color level or levels from 0 (black) to 255 (white). The arbitrary map feature remaps the pixels' color values by defining a curve that specifies the different color values to which the pixels are to be mapped. The remapping is done through the Arbitrary Map dialog box, which is accessed through the Arbitrary command in the Map submenu.

The arbitrary map feature works on the active channel. If you open the Arbitrary Map dialog box while working on an indexed color image or the RGB channel of an RGB image, you have the option of remapping the color values for all three channels at once, or remapping the color values for individual channels separately. If you select the master channel, the changes you make are applied to all three channels. If you select the red, green, or blue channel, the changes are applied to the selected channel after the changes have been applied to the master channel's map.

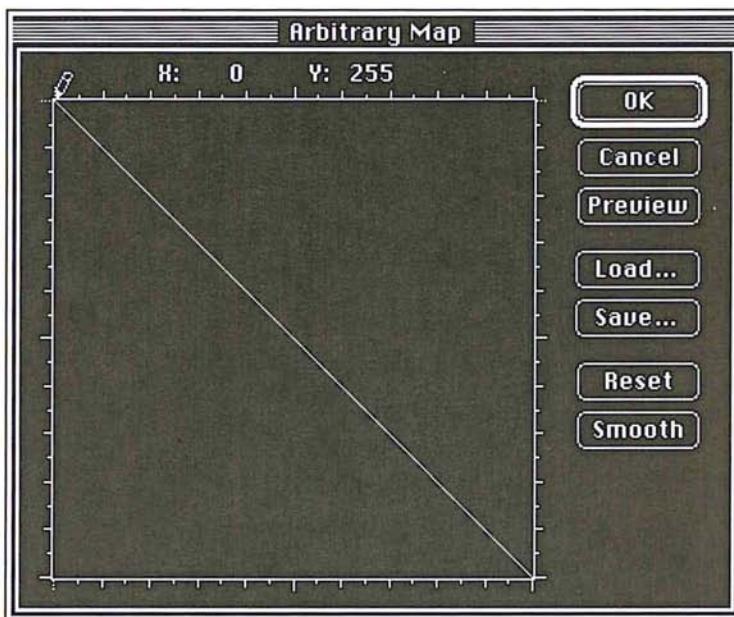
You use the large square field in the Arbitrary Map dialog box to remap the color values of pixels in the image. You remap the color values by defining a curve in which the X and Y values for a given point on the curve are different. To define the curve used to remap the pixels' color values, you drag through the square field, which functions as a graph in which X and Y coordinates represent color values.

The X axis represents the original color values of the pixels, and the Y axis represents the new color values. Both axes range from 0 (black) to 255 (white). The X values increase from left to right, and the Y values increase from bottom to top. The diagonal line that appears by default in the field shows the current status of the pixels' color values, where the X values are equal to the Y values.

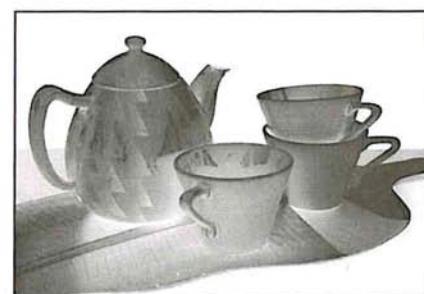
As you remap the pixels' color values, you can constrain the curve you draw to a line. After you have defined the curve, you can smooth it, or reset the curve to the diagonal line that appears when you first open the dialog box.

When the pointer is positioned at the extreme lower right corner of the field, the X value, the current color value, is 255, and the Y value, the new color value for the pixels, is 0. Markers appear on the sides of the field, and show the position of the pointer relative to the original and new color levels. Each tick mark on the side of the field represents approximately 13 steps in the 256-step scale.

In the illustration below, a straight line has been drawn from the lower right corner to the upper left corner, to create a negative of the current image, because the current color level of each pixel is remapped to its inverse value on the scale.



Gray scale image before remapping

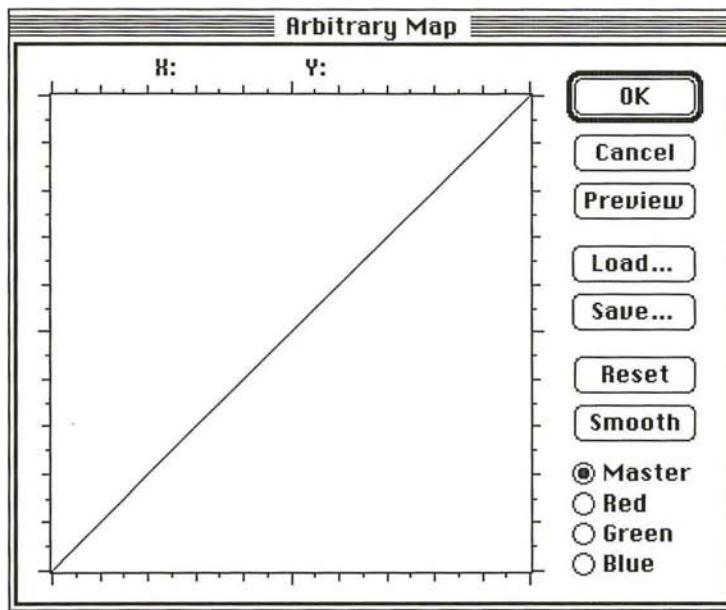


After remapping

To access the Arbitrary Map dialog box:

1. Choose Map from the Image menu.
2. Choose Arbitrary from the Map submenu.

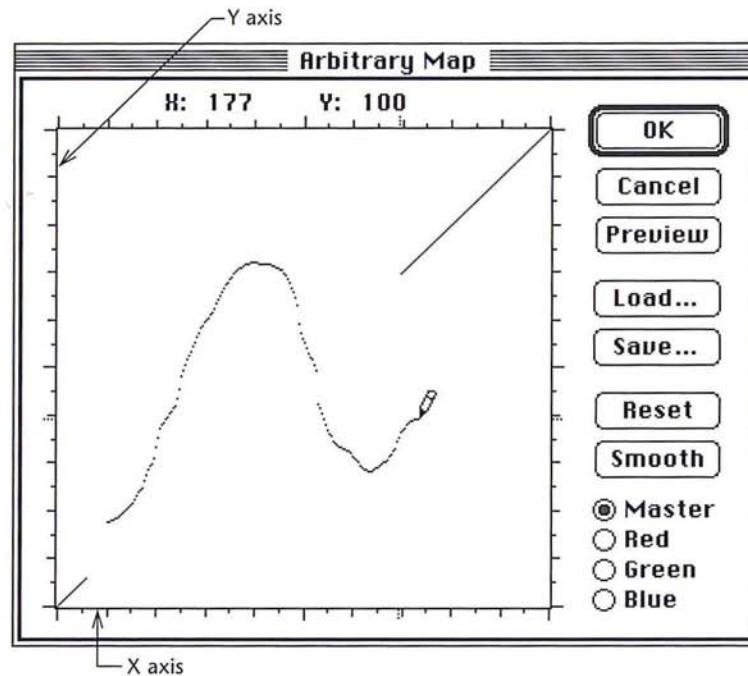
The Arbitrary Map dialog box appears.



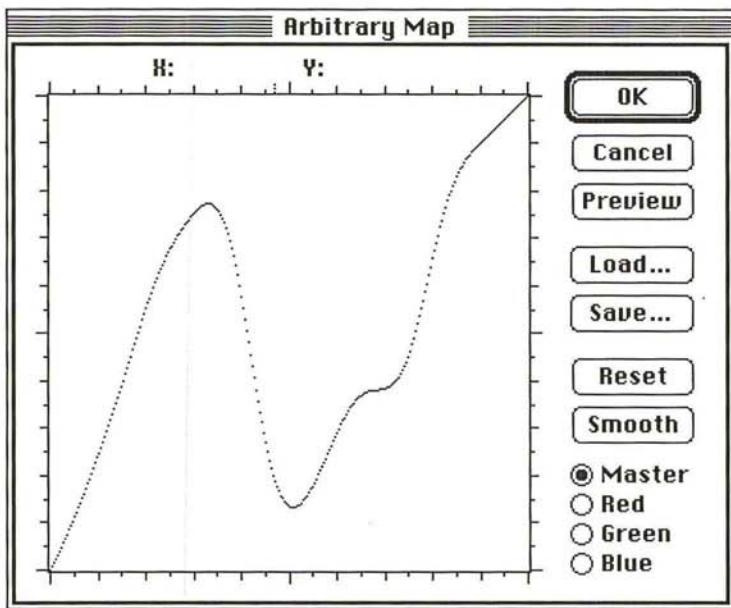
3. For RGB and indexed color images, click Master, Red, Green, or Blue to select the channel to which you want the changes applied.

To remap the current brightness levels of pixels to new levels:

1. Position the pencil pointer where you want to begin.
2. Holding down the mouse button, drag to define a curve that remaps the pixels to the brightness levels you want.
3. When you have finished defining your curve, release the mouse button.



4. To smooth the curve you've drawn, click Smooth.



To constrain the pencil pointer to draw straight lines:

1. Click in the field where you want the line to begin.
2. Hold down the Shift key.
3. Click where you want the straight line to end.
4. Release the Shift key.
5. As an option, to reset the curve to the straight, diagonal line where X axis values equal Y axis values, click Reset.
6. To apply the arbitrary map to the image, click OK.

To save the current arbitrary map:

1. Click Save in the Arbitrary Map dialog box.
2. Type the file name in which you want to save the arbitrary map.  
If necessary, use the drive and directory buttons to access the folder in which you want to save the map.
3. Click Save.

The arbitrary map is saved with the name and in the location you specified.

### To load a previously saved map:

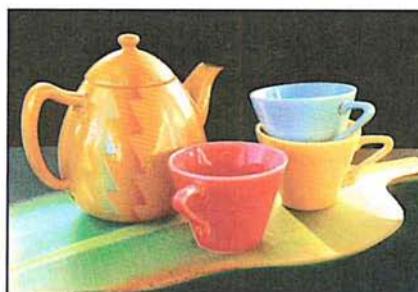
1. Click Load in the Arbitrary Map dialog box.

The Open dialog box appears.

If necessary, use the drive and directory buttons to open the folder that contains the map you want to load.

2. Click the map you want.
3. Click Open.
4. Click OK to apply the map to the image.

The selected arbitrary map is loaded into the dialog box and is used to remap the brightness levels of the pixels in the document.



Before brightness curve



After brightness curve

### Creating and using custom color correction maps

In a production environment, you may need to scan a large number of images and apply the same set of color corrections to all of them. You can do so two ways: through a keyboard enhancement program, or by creating a custom color correction map.

Keyboard enhancement programs, like Quickeys™, allow you to record the keystrokes for your first set of corrections, and play the keystrokes back for subsequent images. The playback is dependent on the sophistication of your keyboard enhancement program.

Custom color correction maps, once created, can be applied each time you need to scan and make color corrections to a batch of images.

The custom map files on the Calibration disk included in the Adobe Photoshop package can be used to adjust colors or gray values. The files, called Custom Map/RGB or Custom Map/B&W, for color or gray-scale images, respectively, contain the base color information needed to create custom, arbitrary maps.

Creating and using a custom color correction map is a two-step process. First, you adjust your image and record the adjustment values. You transfer those values to the Custom Map file, then save that file in the Raw format. Once saved, the file becomes an arbitrary map. To use the map to adjust color in a batch of images, load the new arbitrary map into the Arbitrary Map dialog box, and then apply the map to your image or series of images.

**To create a color correction map:**

1. Open the image to be used to create the custom map. This will be your calibration image.
2. Open the Custom Map/RGB or Custom Map/B&W file, depending on whether your calibration image is color or gray scale.
3. Click your calibration image to make it the active window.
4. In either the Map and Adjust submenu in the Image menu, choose any of the following color adjustment commands to run on the calibration image: Levels, Color Balance, Invert, Threshold, Posterize.
5. Record the order in which the adjustments are applied, and write down the numerical values of each adjustment. For example, if Levels adjustment is used and the Input Levels are changed to "5, 1.4, and 245," write those numbers down.
6. When you have finished making all adjustments to the calibration image, make the Custom Map file the active window.
7. Apply all of the changes you made to the calibration document to the Custom Map file, in the order in which they were made.
8. Choose Save As from the File menu, and select the Raw file format.
9. Type the document name you wish; it may be helpful to append "map" to the name. Enter 8BLT for the File Type, and 8BIM for the File Creator. Check the Non-interleaved radio button if you are saving an RGB adjustment. Click OK.

You have now created and saved a custom color correction map.

**To apply this map to other images:**

1. Open the image in which you will correct the color.
2. Choose Map from the Image menu.
3. Choose Arbitrary Map from the Map submenu. The Arbitrary Map dialog box appears.
4. Click Load to locate and load the saved color correction map. You can now correct the color in your image.
5. To apply the map to your image, click OK .

## Using the color adjustment commands

The commands used to make color corrections are in the Adjust submenu. You access the Adjust submenu via the Image menu. These commands allow you to adjust the brightness, contrast, and gamma, the balance of red, green, and blue values, and the hue and saturation in a selection.

**To choose the color correction you want:**

1. Choose Adjust from the Image menu.

The Adjust submenu appears.

2. Holding down the mouse button, drag over to highlight the color adjustment command you want.
3. When you have selected the desired command, release the mouse button.

The dialog box used to implement the command appears.

**To move the color correction dialog box to a convenient location:**

1. Position the pointer on the title bar at the top of the dialog box.
2. Holding down the mouse button, drag the dialog box to the desired location.
3. Release the mouse button.

### Adjusting the brightness and contrast

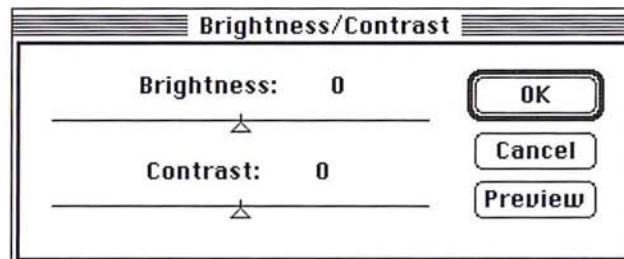
You can adjust the brightness and contrast of a selection or the entire image using the Brightness/Contrast command. You can increase the contrast in an image to improve a flat image, and adjust the brightness to lighten or darken an image.

**NOTE:** Expert users will probably prefer to use the Levels command since it offers the greatest control.

**To adjust the brightness in an image:**

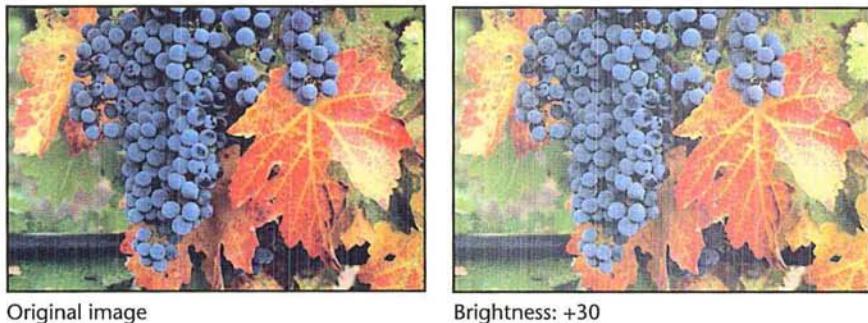
1. Choose Adjust from the Image menu.
2. Choose Brightness/Contrast from the Adjust submenu.

The Brightness/Contrast dialog box appears.



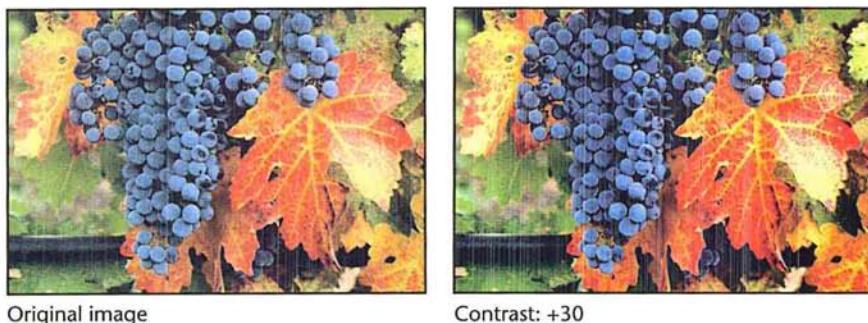
3. Position the pointer on the Brightness triangle.

4. Holding down the mouse button, drag to the right to increase the brightness; drag to the left to decrease the brightness.  
The value at the top of the dialog box displays the amount of brightness that is added to or subtracted from each pixel.
5. When the desired brightness adjustment is displayed, release the mouse button.
6. To preview the change to the selection, click Preview.
7. To apply the change to the image, click OK. To cancel the change, click Cancel.



#### To adjust the contrast in an image:

1. Choose Adjust from the Image menu.
2. Choose Brightness/Contrast from the Adjust submenu.
3. Position the pointer on the Contrast triangle.
4. Holding down the mouse button, drag to the right to increase the contrast; drag to the left to decrease the contrast.
5. When the desired contrast adjustment is displayed, release the mouse button.  
The Contrast value shows you how the increase or decrease in contrast in the image.
6. To preview the change to the selection, click Preview.
7. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



## Adjusting the brightness, contrast, and gamma precisely

The Adjust Levels command is a powerful tool that allows you to change the brightness, contrast, and gamma of an image. Like the Brightness/Contrast command, the Adjust Levels command allows you to adjust the brightness and contrast in an image. In addition, the Adjust Levels command displays a histogram that lets you see precisely how the changes you make affect the color values of pixels in an image.

Like the other color correction commands, you can use the Adjust Levels command to adjust color values to visually satisfactory standards. You can also use the Adjust Levels command to make very precise changes based upon the color values of pixels in the image.

The ability to adjust the gamma in the image allows you to change the color values of the pixels with middle gray values without dramatically changing the shadows (very dark pixels) and highlights (very light pixels). You can increase or reduce the brightness and contrast in both the highlights and shadows of an image.

The Adjust Levels dialog box displays a histogram of the image. The histogram plots the color values versus the number of pixels at each level. You use the slider controls at the bottom of the Levels dialog box (Output Levels) to reduce the contrast in the image; you use the slider controls directly below the histogram (Input Levels) to increase the contrast in the image, and to adjust the brightness and gamma.

If you are working on an RGB or indexed color image, you can select the master channel to adjust the color values and apply the changes to the red, green, and blue channels simultaneously, or you can select a single channel and apply the changes to that specific channel.

You can move the dialog box to a convenient location to view the effects of your changes by dragging the dialog box by its title bar.

## Reducing the contrast using Output Levels

You can use the slider controls on the bottom of the Adjust Levels dialog box (Output Levels) to reduce the contrast in the image. Reducing the contrast using the Output Levels control has the effect of lightening the image. The slider has two controls: the left, black triangle controls the shadows, and the right, white triangle controls the highlights. These slide bar controls allow you to remap the color values of pixels in order to narrow the tonal range of an image. The triangles' positions on the slide bar correspond to color values.

The values beside the title "Output Levels" display the range of color values in the image. The left value displays the lower end of the scale (the shadow areas) and right value displays the upper end (the highlight areas). You drag the black Output Levels slider to define the new lower limit of the scale (the 0 value); you drag the white Output Levels slider to define the new upper limit of the scale (the 255 value). The color values of pixels in the image are adjusted to the new upper and lower limits of the scale.

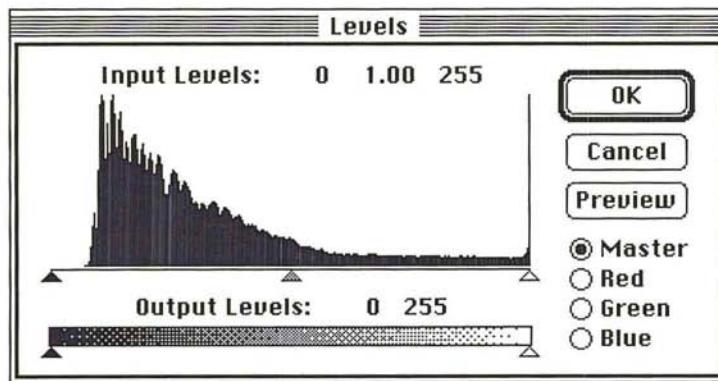
As an example, suppose your image contains colors that cover the entire 0 to 255 scale. If you drag the black Output Levels triangle to 64, a pixel with a color value of 0 is mapped to 64, and pixels with higher color values are raised to corresponding, lighter values. This lightens the image and decreases the contrast in the shadow areas. On the other hand, if you drag the white triangle to 128, a pixel with a color value of 255 is remapped to 128, and pixels with color values less than 255 are lowered to corresponding darker values. This darkens the image and decreases the contrast in the highlight areas.

If you open the Adjust Levels dialog box after decreasing the contrast, you will notice that the contrast changes are reflected in the histogram. For example, the movement of the black control to level 64 causes the histogram to show no pixels with color values between 0 and 63. This is due to the fact that the contrast change you made remapped pixels in this range to higher color values.

**To decrease the contrast in the shadow areas and lighten the selection:**

1. Choose Adjust from the Image menu.
2. Choose Levels from the Adjust submenu.

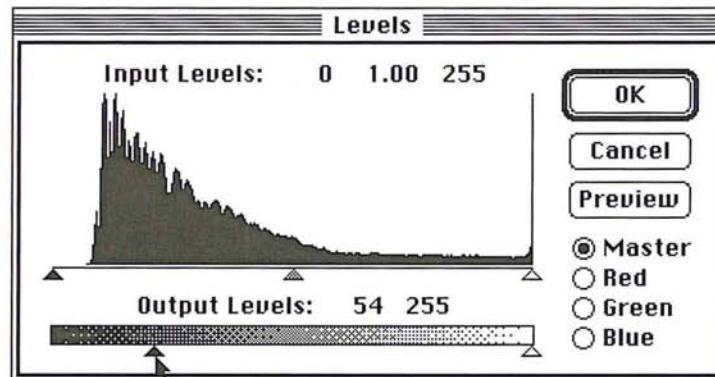
The Levels dialog box appears.



3. To work on an individual channel, click Red, Green, or Blue.
4. Position the pointer on the black triangle beneath the title "Output Levels."

5. Holding down the mouse button, drag the black Output Levels triangle to the right until the left value displays the color value you want to use as the lower limit on the scale.
6. Release the mouse button.

The left value increases as you drag to the right.



7. To preview the change to the selection, click Preview.
8. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



Original image



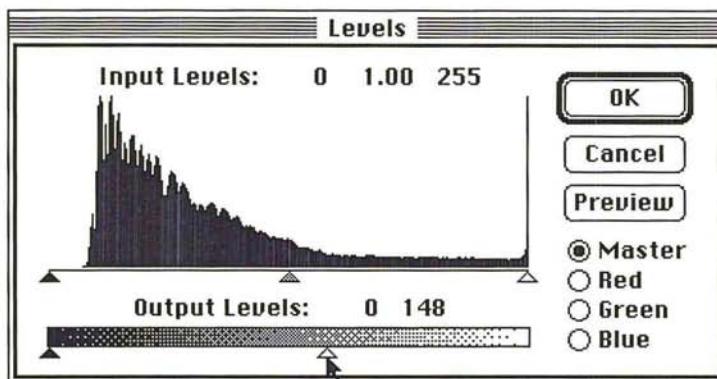
Contrast: output levels black triangle, 54

To decrease the contrast in the highlight areas, and at the same, decrease the brightness in the selection:

1. Choose Adjust from the Image menu.
2. Choose Levels from the Adjust submenu.  
The Levels dialog box appears.
3. To work on an individual channel, click Red, Green, or Blue.
4. Position the pointer on the white triangle beneath the title "Output Levels."

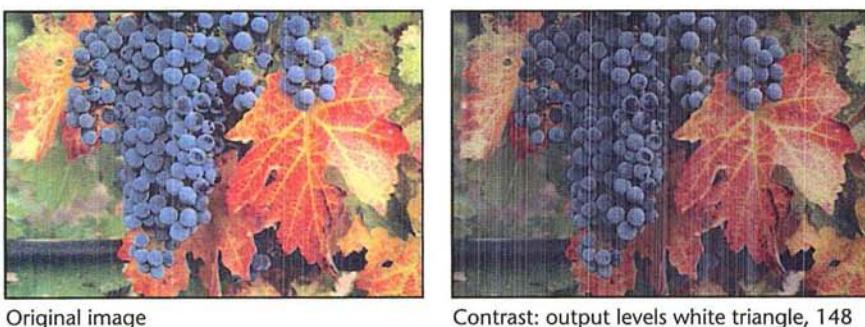
5. Holding down the mouse button, drag the white Output Levels triangle to the left until the right value displays the color value you want to use as the upper limit on the scale.
6. Release the mouse button.

The right value decreases as you drag to the left.



7. To preview the change to the selection, click Preview.
8. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.

The image reflects the contrast change.

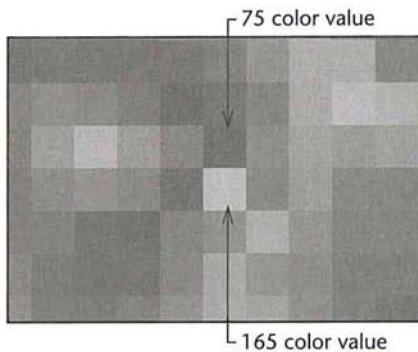


### Increasing the contrast using Input Levels

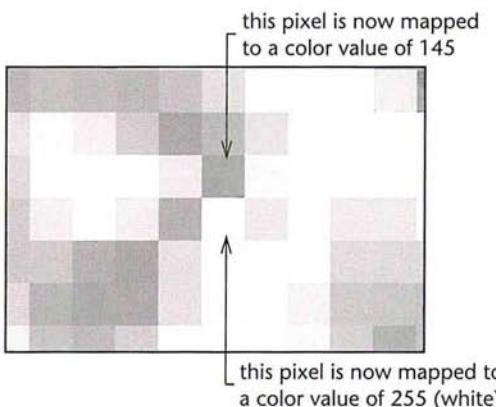
The slider controls directly beneath the histogram in the Levels dialog box (Input Levels) allow you to increase the contrast in an image. Increasing the contrast in the shadows has the effect of decreasing the effect of darkening the image; increasing the contrast in the highlight areas lightens the image. This is useful when you are adjusting a scanned image, because scanned images often do not use the entire gray scale, and thus may have too little contrast.

You can drag the black Input Levels triangle to the right to darken the image and increase the contrast in the shadow areas. By dragging the black Input Levels triangle, you specify the level where solid black (level 0) starts. Pixels with color values below the specified level are mapped to 0 (solid black). Pixels with color values higher than the specified level are remapped to the appropriate, corresponding color values.

You can drag the white Input Levels triangle to the left to lighten the image and increase the contrast in the highlights. By dragging the white Input Levels triangle, you specify the level that you want mapped to solid white (color value 255). The pixels with color values above the specified level are mapped to white, the other pixels are remapped to the appropriate, corresponding color values on the scale. For example, suppose there are two pixels in the image with brightness values of 165 and 75, respectively.



If you drag the white Input Levels triangle to 130, the pixel with the color value higher than 130 (the pixel with the 165 color value) is mapped to value 255 (white) and the pixel with the color value less than 130 (the pixel with the 75 color value) is mapped to the appropriate, corresponding color value, in this case, 154.



The values beside the title “Input Levels” display the values for the shadow color levels on the left, the gamma in the middle, and the highlight color levels on the right. The position of the Input Levels triangles is mapped to color values. As the position of the Input Levels triangles changes, the values above the slider controls change.

**To increase the contrast in the shadow areas and darken the image:**

1. Choose Adjust from the Image menu.
2. Choose Levels from the Adjust submenu.  
The Levels dialog box appears.
3. To work on an individual channel, click Red, Green, or Blue.
4. Position the pointer on the black Input Levels triangle beneath the histogram.
5. Holding down the mouse button, drag the black Input Levels triangle to the level at which you want to map the darkest color value (0). As you drag, the left value above the slide bar displays the current level.
6. When the contrast in the image is increased to the desired amount, release the mouse button.
7. To preview the change to the selection, click Preview.
8. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



Original image



Adjust levels: input levels black triangle, 30

**To increase the contrast in the highlight areas and lighten the image:**

1. Choose Adjust from the Image menu.
2. Choose Levels from the Adjust submenu.  
The Levels dialog box appears.
3. To work on an individual channel, click Red, Green, or Blue.
4. Position the pointer on the white triangle directly beneath the histogram (Input Levels).

5. Holding down the mouse button, drag the white Input Levels triangle to the level at which you want to map the brightest value (255). As you drag, the right value above the slide bar displays the current level.
6. When the contrast in the image is increased to the desired amount, release the mouse button.
7. To preview the change to the selection, click Preview.
8. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



Original image



Input levels white triangle at 200

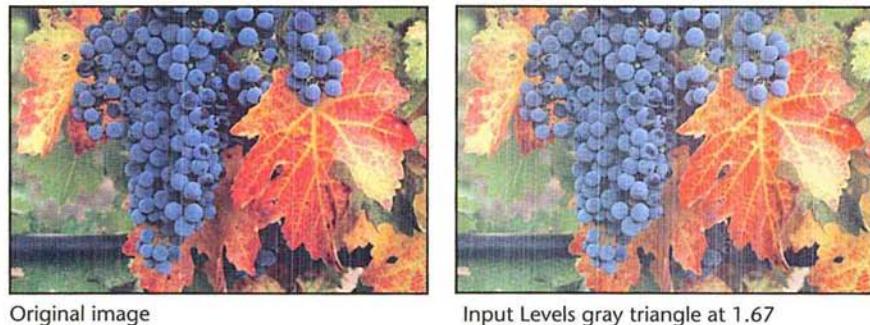
### Adjusting the gamma

At times, you might want to lighten or darken an image without substantially changing the highlights and shadows. The gamma control allows you to do this. The gamma control is the gray, middle triangle in the Input Levels controls. The gamma control primarily affects the color values of the midtones (the middle color values in an image). The solid black-and-white areas are not affected.

#### To adjust the brightness levels of the midtones:

1. Choose Adjust from the Image menu.
2. Choose Levels from the Adjust submenu.  
The Levels dialog box appears.
3. To work on an individual channel, click Red, Green, or Blue.
4. Position the pointer on the gray middle triangle directly beneath the histogram (Input Levels).
5. Holding down the mouse button, drag the gray Input Levels triangle to the right to darken the image, or drag to the left to lighten the image.
6. When the midtones are adjusted to the level you want, release the mouse button.
7. To preview the change to the selection, click Preview.

- To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



## Adjusting the color balance and color levels

The Color Balance command in the Adjust submenu of the Image menu allows you to change the mixture of colors in an RGB or indexed color image. The pixels in an RGB or indexed color image represent colors that are mixtures of the three primary colors: red, green, and blue. You can adjust or enhance one of the colors, such as the amount of red in an image of grapes and leaves, shown in the illustrations below. The Color Balance command operates only on RGB and indexed color images.

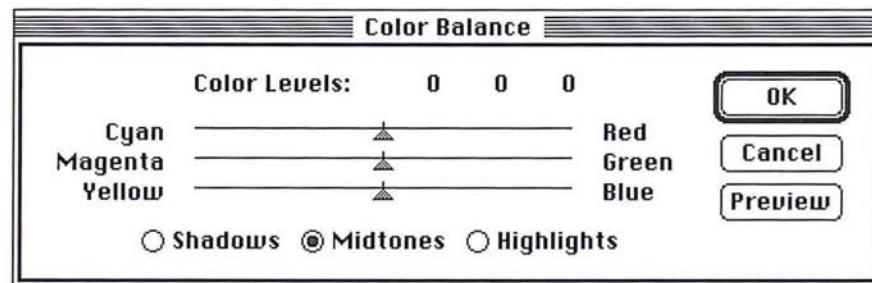
You can focus the color balance changes on the shadows, midtones, or highlights. The triangle controls in the Color Balance dialog box change their appearance to reflect your selection. When the Shadows option is selected, the triangles turn black; when the Midtones option is selected, the triangles turn gray; when the Highlights option is selected, the triangles turn white.

You can also enhance the level of a particular color by dragging a triangle control in the Color Balance dialog box toward that color. The values at the top of the Color Balance dialog box show the color changes for the red, green, and blue channels, in that order, from left to right. You enhance the green, for example, by dragging the triangle on the Green slider to the right (toward Green). Positive values show an increase in red, green, or blue; negative values show a decrease in these colors.

### To adjust the levels of a particular color in an image:

- Choose Adjust from the Image menu.
- Choose Color Balance from the Adjust submenu.

The Color Balance dialog box appears.



3. Click Shadows, Midtones, or Highlights to select the part of the selection on which you want to focus the changes.
4. Position the pointer on the triangle that controls the color you want to adjust.
5. Holding down the mouse button, drag toward the color if you want to make it more prominent in the image, or drag away from the color if you want to reduce the level of that color.
6. When the desired color adjustment is displayed, release the mouse button.
7. To preview the change to the selection, click Preview.
8. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



Color Balance: +45 cyan



Color Balance: -45 cyan

## Adjusting the hue and saturation

The Hue/Saturation command in the Adjust submenu of the Image menu adjusts the hue and saturation of an image. Hue is color: red, yellow, cyan, and so on. Saturation is the purity of the color, and the amount of gray in a color. You use slider controls to adjust the hue and saturation. In addition, the Colorize option lets you adjust the hue and saturation to specific levels.

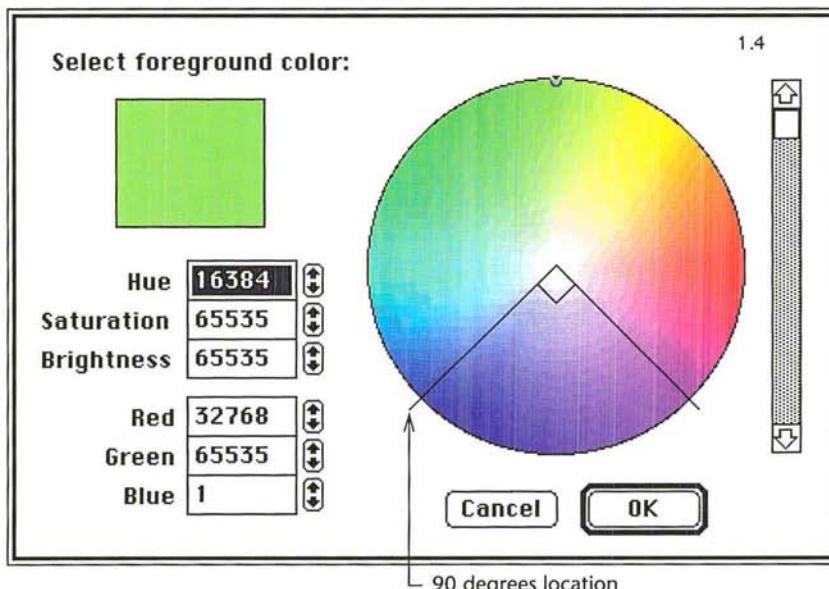
By adjusting the hue, you can compensate for shifts in hue that occur in an NTSC image (a television or video image) that was acquired using a video frame grabber. You can use the Hue/Saturation command to push the hues into the correct positions on the hue color wheel. You can use the saturation slider to increase or decrease the saturation of the colors in the image.

**NOTE:** If you adjust the hue and saturation while operating in 24-bit color mode, you cannot preview the hue changes you make unless you click Preview.

### Adjusting the hue

You use the slider controls beneath the title "Hue" in the Hue/Saturation dialog box to adjust the hue of the image. The Hue slider control remaps color levels in a unique way. When you drag the Hue triangle, the effect you achieve is analogous to rotating the colors around a hue color wheel, such as the color wheel in the Color Wheel dialog box. (The color wheel is displayed by Option-clicking the foreground or background color indicator.) The values displayed above the Hue slider reflect the number of degrees of rotation around the wheel the colors are to be rotated; the direction in which you drag the slider determines the direction of rotation around the color wheel.

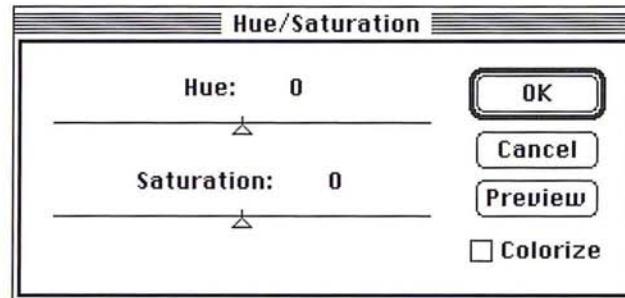
If you drag to the right, you rotate the colors in a counterclockwise direction around the color wheel; if you drag to the left, you rotate the colors in the clockwise direction. For example, if pure blue pixels are included in the selection and you drag the triangle to the right until +90 is displayed and click OK, the blue color is changed to pink. Pink is the color located 90 degrees in the counterclockwise direction from blue on the color wheel.



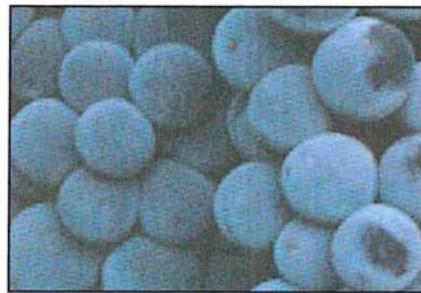
To adjust the hue of an image:

1. Choose Adjust from the Image menu.
2. Choose Hue/Saturation from the Adjust submenu.

The Hue/Saturation dialog box appears.



3. Position the pointer on the Hue triangle.
4. Holding down the mouse button, drag the triangle until the colors appear the way you want them.
5. Release the mouse button.
6. To preview the change to the selection, click Preview.
7. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



Original image



Hue: +90

## Adjusting the saturation

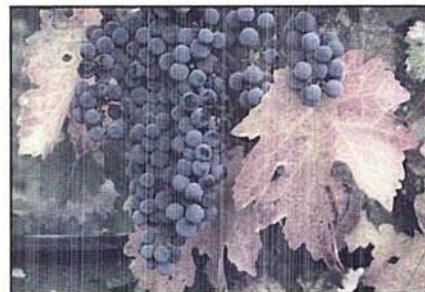
You use the triangle control beneath the title "Saturation" in the Hue/Saturation dialog box to adjust the level of saturation in an image. This operation functions in a manner similar to that of the color wheel. The change in saturation using this control is analogous to clicking on the color wheel to adjust the saturation.

To adjust the saturation of an image:

1. Choose Adjust from the Image menu.
2. Choose Hue/Saturation from the Adjust submenu.  
The Hue/Saturation dialog box appears.
3. Position the pointer on the Saturation triangle.
4. Holding down the mouse button, drag to the right to increase the saturation, or drag to the left to decrease the saturation.
5. When the saturation adjustment you want is displayed, release the mouse button.
6. To preview the change to the selection, click Preview.
7. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



Saturation: +75



Saturation: -75

## Using the Colorize option

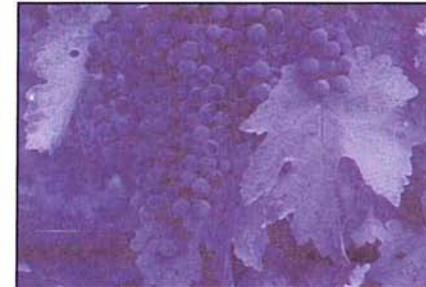
The Colorize option in the Hue/Saturation dialog box allows you to remap the hue and saturation levels of pixels to specific values. When you change the hue while the Colorize option is active, all colors are remapped to a specific location on the color wheel; also, the lightness of the pixels is maintained. The Colorize option, when active, adjusts the saturation value of pixels by a specific percentage.

This differs from the standard operation in which the hue and saturation changes are based upon the existing values of the pixels. When you change the hue in the standard mode, the colors in each pixel rotate around the color wheel the specified number of degrees relative to their current positions on the wheel.

When the Colorize option is active, red is treated as the 0 degree point on the color wheel and the rotation value you specify using the Hue slider control is measured from that point of origin. For example, if you select the Colorize option and drag the Hue triangle until -90 is displayed, the image takes on a blue cast because blue is located 90 degrees in the clockwise direction from red.



Original image



Hue: -90

**NOTE:** Because the Colorize option preserves the lightness value of each pixel, pure black and pure white are not colored, while the middle gray pixels are colored completely. If you want to color the black-and-white pixels, you must first use the Adjust Levels command to remap these pixels to middle gray.

**To use the Colorize option:**

1. Choose Adjust from the Image menu.
2. Choose Hue/Saturation from the Adjust submenu.  
The Hue/Saturation dialog box appears.
3. Click Colorize.
4. Use the Hue slider to select the hue to which you want the pixels remapped.
5. Use the Saturation slider to adjust the saturation of the pixels.
6. To preview the change to the selection, click Preview.
7. To apply the change to the image, click OK. To cancel the change or preview, click Cancel.



## Chapter 17: *Using Filters to Modify Images*

The Adobe Photoshop program includes almost two dozen filters that allow you to soften or sharpen the focus, and apply special effects to images. With filters, you can soften, sharpen, fracture, or offset a selection. You can outline an image's edges, where abrupt color transitions occur. You can also customize your own filter to create special effects, and store the filter for reuse with other images. In addition, the Adobe Photoshop program also supports plug-in filters, designed by third-party software developers. Once installed, the filters are accessed by the Filter command in the Image menu.

The softening filters include the Blur, Blur More, Despeckle, Gaussian Blur and Motion Blur filters. The Diffuse filter makes a selection look less focused by moving pixels.

Sharpening filters include the Sharpen, Sharpen More, Sharpen Edges, and Unsharp Mask filters.

The High Pass filter retains the high frequency part of an image and suppresses the low frequency parts.

Outlining filters include the Trace Contour and Find Edges filters.

The Median, Minimum, and Maximum filters change the brightness of pixels. They evaluate the area around a pixel and replace the brightness value of the current pixel with the median, minimum, or maximum brightness value of the surrounding pixels.

Filters that can be used to create special effects include the Facet, Fragment, Mosaic, Offset, and Add Noise filters. The Facet, Fragment, Mosaic, and Offset filters all displace pixels to make a selection appear as if it has been broken up.

The Custom filter allows you to create your own filter by adding values to a grid that is used to perform a mathematical equation on pixels.

Many of the filters work by evaluating the brightness value of pixels in a selection, then changing the values. Changes are determined by making calculations that affect the pixels surrounding the current pixel. The current pixel is the pixel whose color value is currently being evaluated. The Adobe Photoshop program automatically evaluates each pixel in the selection individually, calculates its new brightness value, and then evaluates the next pixel in the selection. Other filters, like the Fragment filter, make several copies of a selection, then offset them.

All the filter commands operate on the active channel. If there is a selection in the image, the changes you make using the filters are applied to the selection; if there is no selection, the changes are applied to the entire channel. In this guide, the effects are described as being applied to the selection.

Once you choose a filter, that filter appears in the Image menu. You can use the same filter again by typing Command-F.

Filters that have dialog boxes associated with them appear with an ellipsis (...) after their name. When you type Command-F, the program uses the last value you entered in a filter dialog box to control the filter. To change the value in the dialog box that controls how a filter works, you can automatically display the dialog box. To display the dialog box for the most recently used filter, type Command-Option-F, or press down the Option key and choose the filter from the Image menu.

## Using filters to soften an image

The Blur, Blur More, Motion Blur, Gaussian Blur, and Despeckle filters defocus and soften an image. Some of the filters have additional effects, or require specific values; these are described below.

All of the softening filters work in a similar manner.

### To use a softening filter:

1. Select the part of the image to which you want to apply the filter.
2. Choose Filter from the Image menu.

The Filter submenu appears.

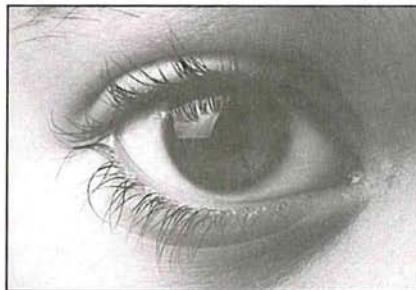


3. Holding down the mouse button, choose the softening filter.
4. Release the mouse button.

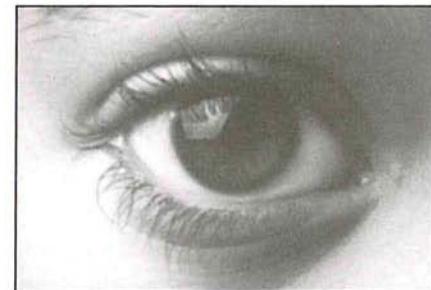
The softening filter is applied to the current selection.

## The Blur and Blur More filters

In addition to softening an image, the Blur and Blur More filters can be used to eliminate noise in the higher frequency parts of the image where abrupt color transition occur. Blur More produces a stronger blur effect (about three or four times stronger) than the Blur filter.



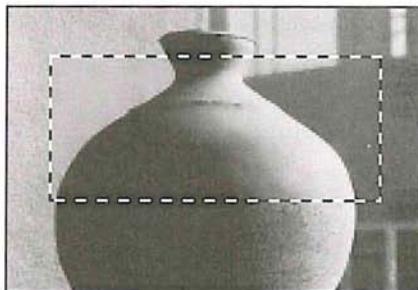
Original image



Blur More: applied four times

## The Despeckle filter

The Despeckle filter detects the edges on an image, the areas where significant color changes occur, and blurs all of the current selection, except for the edges in the selection. Because the eye tends to notice the edges more than interior areas, the effect is a subtle blurring of the selection.



## The Gaussian Blur filter

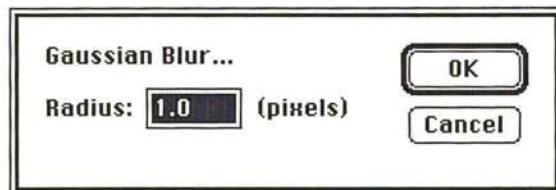
The Gaussian Blur filter quickly blurs a selection by a large amount; the effect is similar to choosing the Blur or Blur More filters several times. “Gaussian” refers to the shape of the curve of the color values of the pixels in the selection that results from implementing the filter. The resulting curve is a bell-shaped or Gaussian curve.

When you use the Gaussian Blur filter, you can specify a value that determines the degree of blurring that is to be applied to the selection. The value determines how much information from neighboring pixels is used in the blur calculations. The value you enter defines a radius (in pixels) around each pixel. The wider the radius, the more information is included in the blur calculations, and the stronger the blur effect. You can enter decimal values to specify the amount of blurring you want.

### To use the Gaussian Blur filter:

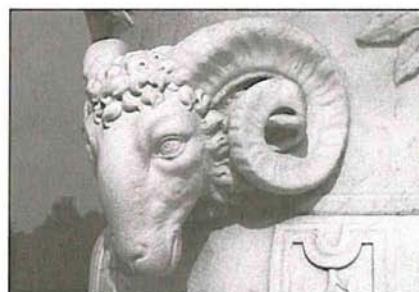
1. Select the part of the image you want to blur.
2. Choose Filter from the Image menu.
3. Choose Gaussian Blur from the Filter submenu.

The Gaussian Blur dialog box appears.



4. Enter a value from 0.1 to 100.0 to represent the amount of blurring you want.
5. Click OK.

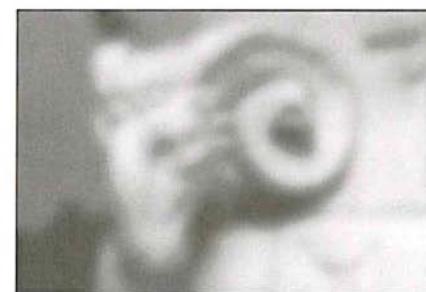
The selection is blurred.



Original image



Gaussian Blur: 2



Gaussian Blur: 8.5

### The Motion Blur filter

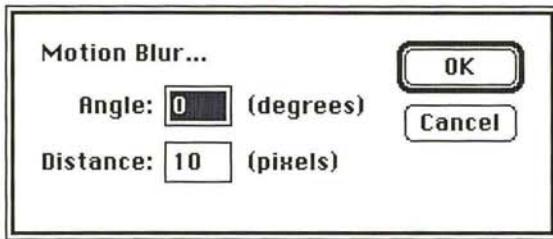
The Motion Blur filter produces a blur effect in a particular direction and of a specific intensity. The motion blur effect is analogous to taking a picture of a moving object with a fixed exposure time. You could use this filter to simulate the blurred image of a moving object.

You specify an angle and a distance with the Motion Blur filter. The Angle parameter allows you to specify the direction in which the object is moving, and the Distance parameter allows you to specify how far the object moves during the exposure. You specify an angle for the direction of the blur effect, where 0 degrees is located at 3 o'clock. The Distance parameter determines the severity of the blur effect. Enter a high value to produce a strong blur; enter a low value to produce a weak blur.

**To use the Motion Blur filter:**

1. Select the part of the image you want to blur.
2. Choose Filter from the Image menu.
3. Choose Motion Blur from the Filter submenu.

The Motion Blur dialog box appears.



4. To specify the direction for the blur effect, enter a value from -90 to 90 in the Angle text box.

**To specify the value for the distance:**

5. Press the Tab key, or click in the Distance text box.
6. Enter a value from 1 to 32 to specify the severity of the blur effect.
7. To apply the Motion Blur filter, click OK.

After a few moments, the selection will display the motion blur effect.



Original image



Motion Blur, background only: direction, 45;  
distance, 30

## Creating a diffused effect

The Diffuse filter shuffles pixels around in a selection to make the selection look less focused. There are three options associated with this filter: Normal, Darken Only, and Lighten Only. The Darken Only and Lighten Only options allow you to darken or lighten a selection, respectively, in addition to making it appear more diffused.

When the Normal mode is active, the pixels are moved around at random, regardless of their color values. When the Darken Only mode is active, the Adobe Photoshop program moves pixels around, but only replaces light pixels with darker pixels. This mode tends to accentuate the dark areas in the selection. When the Lighten Only mode is active, the Adobe Photoshop program replaces only dark pixels with lighter pixels when the pixels are shuffled around. This mode tends to accentuate the light areas in the selection.

### To use the Diffuse filter:

1. Select the part of the image you want to diffuse.
2. Choose Filter from the Image menu.
3. Choose Diffuse from the Filter submenu.

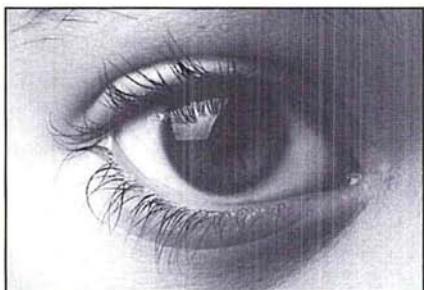
The Diffuse dialog box appears.



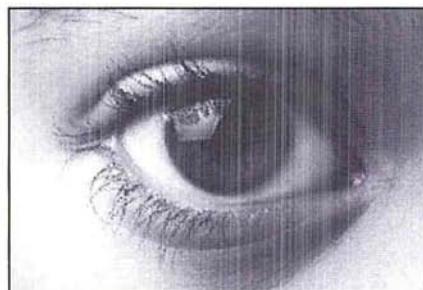
4. Click on the Diffusion mode you want.

5. Click OK.

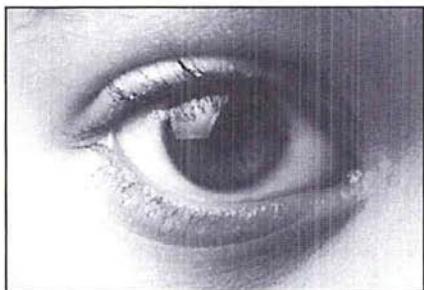
The Diffuse filter is applied to the selection.



Original image



Diffuse: Normal, applied three times



Diffuse: Lighten Only, applied three times



Diffuse: Darken Only, applied three times

## Using filters to sharpen an image

The Sharpen, Sharpen More, Sharpen Edges, and Unsharp Mask filters bring a selection into focus and improve the clarity of an image by increasing the contrast in adjacent pixels in the selection. The Sharpen More filter applies a stronger sharpening effect than the Sharpen filter.

The Sharpen Edges filter only sharpens the parts of the image where significant color transitions appear. Because the eye notices changes around the edges of images more than in other areas, you can use the Sharpen Edges filter to focus an image without sharpening the entire image unnecessarily. The Unsharp Mask filter sharpens the high-frequency areas (the areas where abrupt color transitions occur) in a selection. The effects of these filters are shown below.

All of the sharpening filters work in a similar manner.

### To use a sharpening filter:

1. Select the part of the image you want to sharpen.
2. Choose Filter from the Image menu.
3. Holding down the mouse button, choose the sharpening filter.
4. Release the mouse button.

The selection is sharpened.



Original image



Sharpen More applied



Original image



Sharpen Edges applied

## The Unsharp Mask filter

The Unsharp Mask filter increases sharpness at the edges of density change in an image. The filter is commonly used in pre-press production to enhance details in the separations by producing exaggerated density at the borders of a color change.

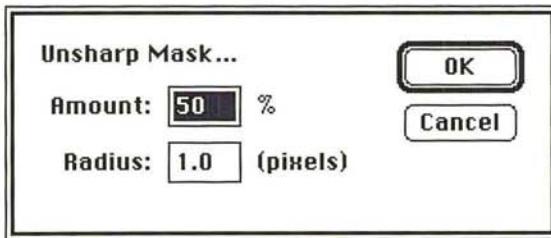
The Unsharp Mask filter is useful for sharpening high-frequency areas in an image. The filter tends to have the greatest affect on high-frequency areas, where abrupt color transitions occur. The filter also will amplify a variable amount of lower frequency detail.

The Unsharp Mask filter sharpens pixels using a variable radius. You specify a radius (in pixels) around the current pixel, which is being evaluated. The Unsharp Mask filter then blurs a selection according to the specified radius. A fraction of this blurred result is then subtracted from the original data, resulting in a sharpening effect. The larger the radius, the more information is included in the filter's calculations. If you specify a high value for the radius, the lower frequencies will be amplified; if you specify a low value, only high-frequency areas will be amplified.

You can also specify the percentage of the filter's effect. The higher the percentage, the stronger the effect of the Unsharp filter mask on a selection. If you specify a low value, only a fraction of the effect is applied; if you specify a high value, most of the effect is applied.

### To use the Unsharp Mask filter:

1. Select the part of the image to which you will apply the Unsharp Mask filter.
2. Choose Filter from the Image menu.
3. Choose Unsharp Mask from the Filter submenu. The Unsharp Mask dialog box appears.



4. Enter the percentage amount of the unsharp effect you want to be applied, from 1 to 500.
5. Press the Tab key or click the Radius text box.
6. Enter a value from 0.1 to 99.9 for the radius of pixels surrounding the current pixel that will be included in the filter's calculation.
7. Click OK.

The Unsharp Mask filter is applied to the selection.



Original image



Unsharp Mask: radius 1.0/100%



Unsharp Mask: radius 5.0/100%

### Using filters to outline areas of color transition

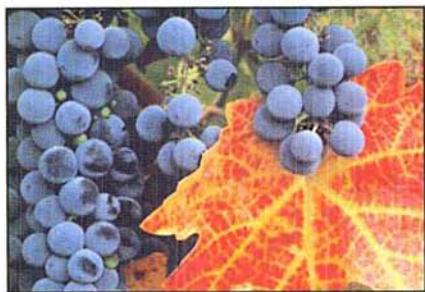
Both the Find Edges and Trace Contour filters outline areas of an image where abrupt color transitions occur.

Color transitions between pixels can be gradual or abrupt. Gradual transitions occur in areas of an image that share the same or similar colors. Abrupt transitions tend to occur at the edges of an image, where different parts of an image meet.

## The Find Edges filter

The Find Edges filter automatically outlines the edges on an image. This filter is useful for creating a border around an image. The filter marks the edges on a color image by colored lines; it marks the edges on a gray-scale image by white lines.

To use the Find Edges filter, select part of your image, choose Filter from the Image menu, and drag to select Find Edges from the Filter submenu; the filter is applied to your selection.



Original image



Find Edges applied

**NOTE:** This filter uses a standard edge-detection algorithm known as the "Sobel" operator.

## The Trace Contour filter

The Trace Contour filter outlines the areas of a selection where a given transition between color values occurs. You specify a certain color value, then the Adobe Photoshop program outlines the areas in the selection where a transition from pixels with color values above or below that level occurs. You specify whether you want the contour outline to mark the areas where the color values fall above the specified level or where the values fall below the specified level.

As an example of how this filter works, suppose you are working on an image that contains two adjacent pixels with color values of 83 and 71, respectively. If you specify 74 as the value for the Trace Contour filter and select Upper as the position for the outline marker, the outline marker appears on the pixel with the 71 color value, because the pixel with the color value of 83 is the next pixel that has a color value above the specified level (74).

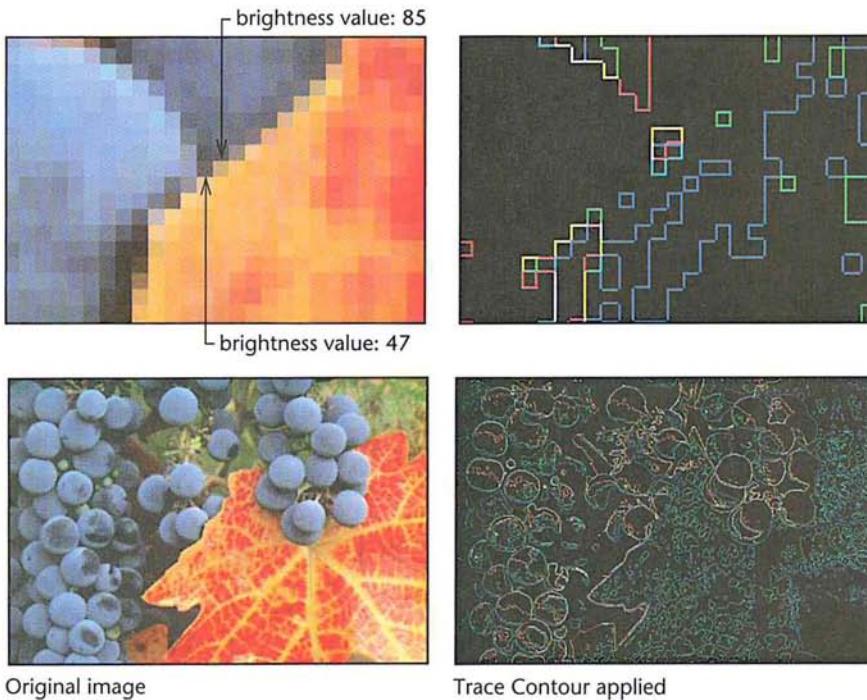
**To use the Trace Contour filter:**

1. Select the part of the image in which you want to trace the transitions in color levels.
2. Choose Filter from the Image menu.
3. Choose Trace Contour from the Filter submenu.

The Trace Contour dialog box appears.



4. Enter a value from 0 to 255 to specify the threshold value that will be used to evaluate the color values.
5. Click Lower to outline the areas where the color values of pixels fall below the specified level, or click Upper to outline the areas where the color values of pixels are above the specified level.
6. Click OK.



## Using filters to brighten an image

The Median, Maximum, and Minimum filters allow you to examine pixels in a given area of a selection, and adjust their brightness. Operating on one pixel at a time (the current pixel), these filters examine the brightness values of the surrounding pixels and replace the brightness value of the current pixel with either the maximum, minimum, or median brightness value encountered, depending on which filter you choose.

For all of these filters, you specify a radius that determines how far around the current pixel the filter looks at brightness values of surrounding pixels. The Maximum and Minimum filters use a value from 1 to 10 for the radius; the Median filter uses a value from 1 to 16 for the radius.

The Median, Maximum, and Minimum filters work in a similar manner.

**To adjust the brightness values of pixels based on the values of pixels in the area:**

1. Select the part of the image to which you want to apply the filter.
2. Choose Filter from the Image menu.
3. Choose either Maximum, Minimum, or Median from the Filter submenu.

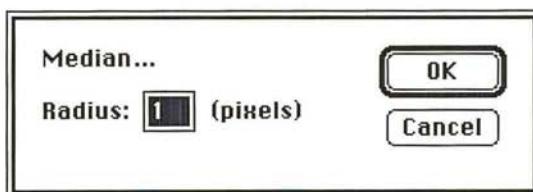
The dialog box for the filter you chose appears.

4. For the Maximum and Minimum filters, enter a value from 1 to 10. For the Median filter, enter a value from 1 to 16.
5. Click OK.

The filter is applied to the selection.

### The Median filter

The Median filter eliminates noise in an image. The Median filter normalizes the brightness levels of random noise pixels to the brightness levels of the surrounding pixels. Noise appears as pixels with random color values that are interspersed among the other pixels in an image.

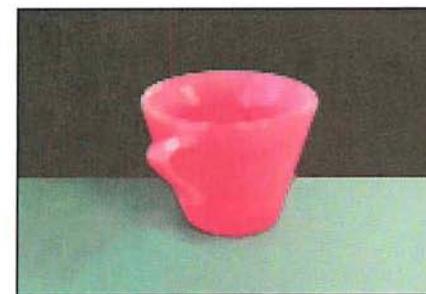


The Median filter eliminates large statistical variances in pixel brightness by replacing each pixel with the median value of its neighbors. Unlike a blur function, the Median filter eliminates noise rather than spreading it out over neighboring pixels. As a result, the Median filter can make an image appear blurred.

For each pixel in a selection, the filter determines the median brightness value of the pixels within a specified radius of the pixel and remaps the pixel to that brightness level. The larger the radius you specify, the more pronounced is the blur effect.



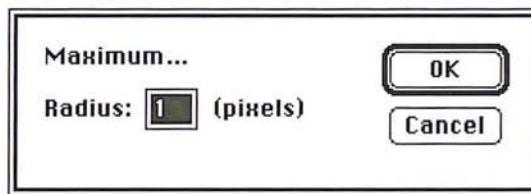
Original image



Median radius: 2 pixels

### The Maximum filter

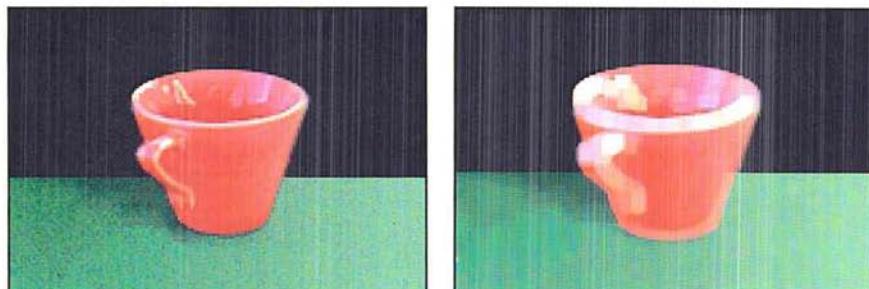
The Maximum filter expands the highlight areas in an image and shrinks the shadow areas.



For each pixel in the selection, the Maximum filter evaluates the brightness values of the pixels within a certain area around the current pixel, and then applies the highest brightness value found within that area to the pixel. The area that is evaluated is determined using the following equation:  $2n + 1$  by  $2n + 1$ , where  $n$  is the specified radius.

For example, suppose the specified radius is 5. The Adobe Photoshop program evaluates the brightness values of pixels within an 11-pixel square area around the current pixel. If the highest brightness value of a pixel within that area is 70, the program remaps the brightness value of the given pixel to 70.

In general, the larger the radius you specify, the larger the highlight areas become.

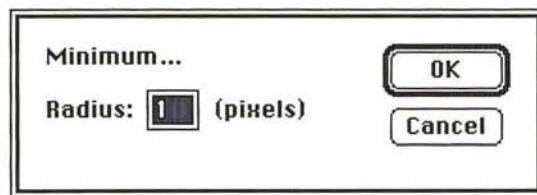


Original image

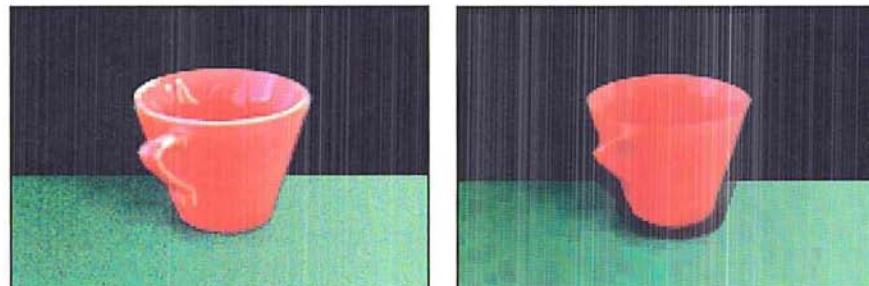
Maximum radius: 2 pixels

### The Minimum filter

The Minimum filter expands the shadow areas in an image and shrinks the highlight areas. For each pixel in a selection, the filter evaluates the brightness levels of pixels within the specified radius around the pixel and remaps the pixel to the lowest brightness level found within the area.



In general, the larger the radius you specify, the larger the shadow areas become.



Original image

Minimum radius: 2 pixels

## Using special effect filters

Many of the Adobe Photoshop program filters allow you to produce special effects in an image. For example, you can use the Mosaic filter to make the selection look like it is made up of a series of large, rectangular blocks. Along with the Facet, Fragment, and Offset filters, the Mosaic filter displaces pixels to make a selection look more broken up. Other special effects filters include the Add Noise and Diffuse filters.

The steps for implementing the Facet and Fragment filters are identical.

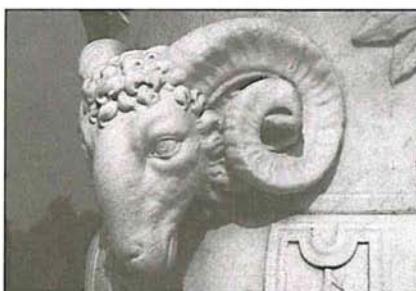
**To implement the Facet or Fragment filter:**

1. Select the part of the image to which you want to apply the filter.
2. Choose Filter from the Image menu.
3. Choose the Facet or Fragment filter from the Filter submenu.

The filter is applied to the selection.

### The Facet filter

The Facet filter tends to clump pixels into blocks of pixels. You can use the Facet filter to create sharp definition in a selection.



Original image



Facet: applied twice

### The Fragment filter

This filter creates four copies of the pixels in the selection and offsets them from each other.



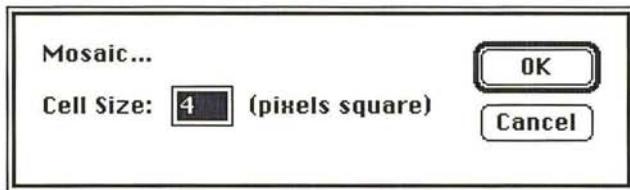
## The Mosaic filter

The Mosaic filter clumps pixels in a selection into blocks of pixels of a specified size. You specify the size of the blocks using the Mosaic Filter dialog box. The pixels in a given block are all the same color, and the colors of the blocks represent the colors in the selection.

### To use the Mosaic filter:

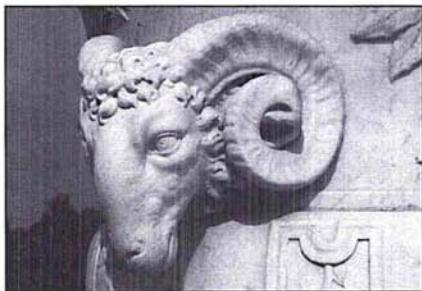
1. Select the part of the image to which you will apply the mosaic effect.
2. Choose Filter from the Image menu.
3. Choose Mosaic from the Filter submenu.

The Mosaic dialog box appears.

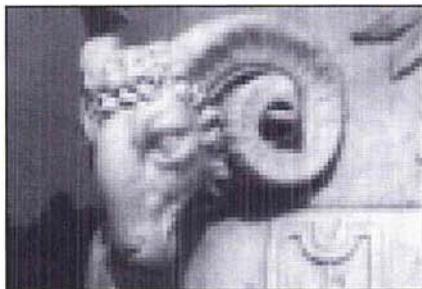


4. Enter a value (in pixels) from 2 to 64 to specify the size of the blocks that make up the mosaic.
5. Click OK.

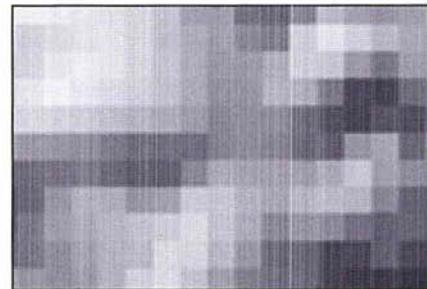
The Mosaic filter is applied to the selection.



Original image



Mosaic: 6-pixel square



Mosaic: 6-pixel square, enlarged

## The Offset filter

The Offset filter moves the pixels in a selection a specified distance in a specified direction. The area left empty by the move is replaced with an adjacent part of the image. If the selection is not located near the edge of the image, the effect of the filter is to create a duplicate of the image and place it directly beneath the original.

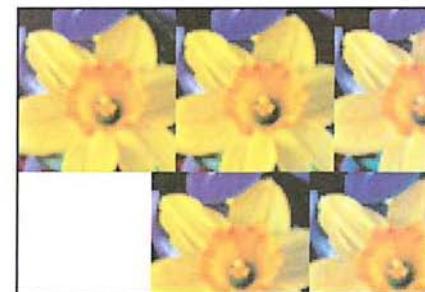
When you offset the selection, a “hole” the size of the selection is created in the top image, and the bottom image is moved over the specified distance in the specified direction while the top image remains in the same position. The bottom image shows through the hole left by the selection.

If the selection appears near the edge of an image, the area outside the image is undefined. You can specify what appears in the hole when the selection is offset. By default, the hole left by the selection is filled with the current background color.

You have three choices for what will appear in the space left behind the selection after it has been offset: Set to background, which fills the space with the current background color; Repeat edge pixels, which extends the colors of the pixels along the edge of the image through the space; and Wrap around, which causes the image to wrap to fill the space.



Original selection



Set to background, horizontal value: 50;  
vertical value: 0

When the Repeat edge pixels option is active, the pixels along the edge of the image are repeated across the space in the direction the selection is offset. This can create a banding effect if the edge pixels are different colors.



Original selection

Repeat edge pixels, horizontal value: 50;  
vertical value: 0

The Wrap around option makes the image wrap around the part of the image opposite the selected area. You can use the Wrap around option to create a pattern that tiles correctly. Often when you create a pattern, the seams where the elements of the pattern join together are visible and detract from the pattern's appearance. You can use the Offset filter and the Wrap around option to expose the seam in a pattern, adjust the pattern to remove the seam, then define the pattern as your custom pattern using the Define Pattern command in the Edit menu.

When The Wrap around option is active, the Adobe Photoshop program wraps the image in the specified direction to fill the space left by the selection. Here is an example of how the Wrap around option works. If you select the lower right corner of an image and specify 0 for the horizontal offset and -100 for the vertical offset, the Adobe Photoshop program fills the space with the part of the image that appears 100 pixels down from the upper right corner of the image. If you select the same lower right corner of the image and enter 100 for the horizontal offset (to move the selection to the left) and -100 for the vertical offset, the program fills the space with the part of the image that appears 100 pixels to the right and 100 pixels down from the upper left corner of the image.



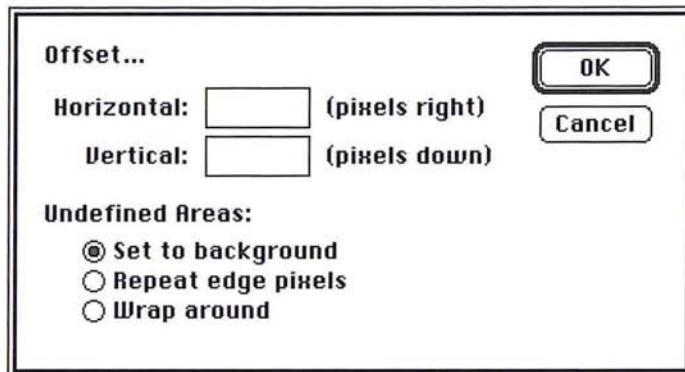
Original selection

Wrap around, horizontal value: 50;  
vertical value: 0

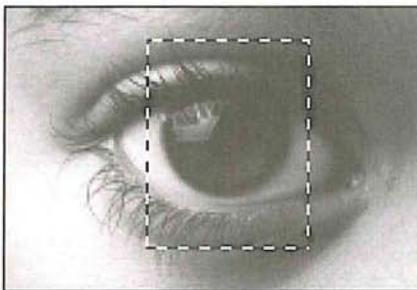
**To use the Offset filter:**

1. Select the part of the image you want to offset.
2. Choose Filter from the Image menu.
3. Choose Offset from the Filter submenu.

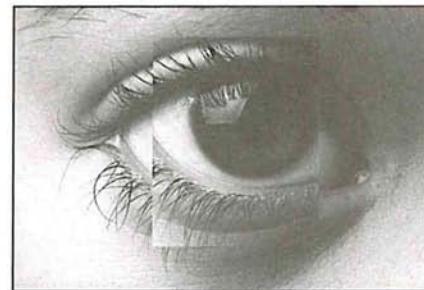
The Offset dialog box appears.



4. Enter the number of pixels you want the selection to be offset in the horizontal direction. Enter a positive value to move the selection to the right; enter a negative value to move the selection to the left.
5. Press the Tab key or click in the Vertical text box.
6. Enter the number of pixels you want the selection to be offset in the vertical direction. Enter a positive value to move the selection down; enter a negative value to move the selection up.



Original image with selection



Horizontal Offset value: 30  
Vertical Offset value: -20

7. If your selection appears near the edge of an image, specify how the undefined areas will be treated by clicking the Undefined areas option you want.
8. Click OK.

## The Add Noise filter

Noise in an image is represented by pixels with randomly distributed color levels. The Add Noise filter can be used along with the painting tools on a gray-scale image. The painting tools apply paint that is free of noise. Therefore, if you apply paint to an area in an image that contains some noise, you might select the area you painted, and use the Add Noise filter to make the area blend in better with its surroundings.

When you use the Add Noise filter, you can select the method that determines how the color values of the noise pixels are distributed in the image. The two distribution options available to you are Uniform and Gaussian; you can experiment with these two options to achieve the effect you want.

When Uniform distribution is active, the value you specify for the amount of noise is the maximum value. The color values of the noise are determined by calculating random numbers between 0 and plus or minus the specified value.

When Gaussian distribution is active, the distribution of color values are distributed along a Gaussian (bell-shaped) curve. In this case, the value you specify for the amount of noise is used as the standard deviation of the color values of the noise. The standard deviation is a statistical calculation that represents how widely the values vary.

### To add noise to a selection:

1. Select the part of the image to which you want to add noise.
2. Choose Filter from the Image menu.
3. Choose Add Noise from the Filter submenu.

The Add Noise dialog box appears.



4. Enter a value from 1 to 999 for the amount of noise you want to add.
5. Select either the Uniform or Gaussian option to distribute the noise in the selection.

6. To apply the Add Noise filter, click OK.

The Add Noise filter is applied to the selection.

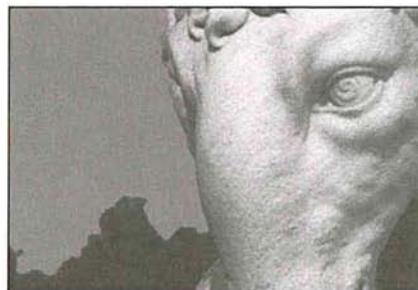


Image with uniform sky



Add Noise: 30

## Using the High Pass filter

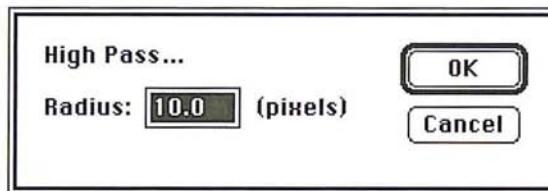
The High Pass filter retains the high frequency part of the image and suppresses the low frequency parts of the image. High frequency areas coincide with sharp transitions that generally occur around the edges of distinct parts of an image, for example, where the ram's head shown in the following illustration meets the darker background. The low frequency areas occur where there are smooth, gradual transitions between the brightness levels of pixels, for example, on the surface of the ram's head.

To determine how much of the high frequency information to retain and how much of the low frequency information to suppress, you enter a value in the High Pass filter dialog box. The value you enter in the dialog box determines the amount of low frequency information that is suppressed. Enter a low value to suppress a large amount of low frequency information; enter a high value to suppress a small amount of low frequency information.

### To use the High Pass filter:

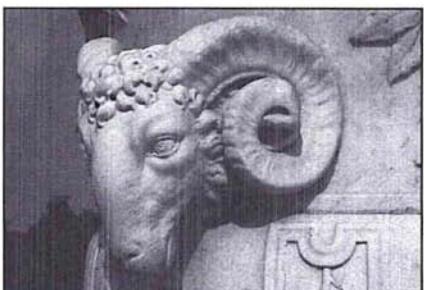
1. Select the part of the image to which you will apply the filter.
2. Choose Filter from the Image menu.
3. Choose High Pass from the Filter submenu.

The High Pass dialog box appears.

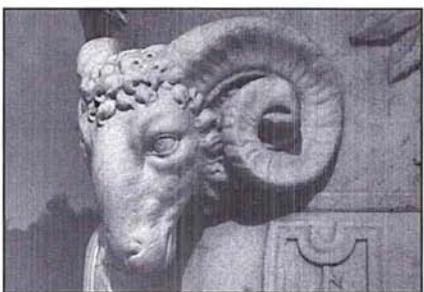


4. Enter a value from 0.1 to 100.0.
5. Click OK.

The High Pass filter is applied to the selection.



Original image



High Pass value: 80 pixels



High Pass value: 10 pixels

## Using the Custom filter

The Custom filter allows you to create a special filter to suit your needs that can be saved and loaded into another document for use. Using the Custom filter, you can create special effects by changing the brightness values of pixels according to a mathematical convolution kernel that you specify. As an example, you can define a filter that shows off a selection in high relief or a filter that creates a motion blur effect.

The filter uses a grid consisting of text boxes. The grid acts as a template that is applied to each pixel, one at a time, in the image. The center text box in the grid represents the current pixel, the pixel whose new brightness value is currently being calculated; the text boxes around it represent the pixels surrounding that pixel. The values you enter in the text boxes apply a designated weight to the pixel represented by that text box. If you enter a high value, that pixel is heavily weighted and is more influential in the brightness calculations than pixels that are assigned lower values.

The Custom filter works as follows. You enter values into the grid text boxes and the Scale and Offset boxes. The values entered for Scale and Offset are applied to the value that results from the mathematical operations involving the values in the grid text boxes. The Adobe Photoshop program multiplies the brightness values of the center pixel and the surrounding pixels by the respective values in the grid text boxes.

As an example, if you enter "1" into the center text box, the program multiplies the current pixel's brightness value by 1. The program then adds the resulting brightness values of all of the pixels involved, divides that value by the Scale value, and finally adds the Offset value. The current pixel's brightness is changed to this final value.

Below are some examples of custom filters and their effects on an image.

1				
				-1

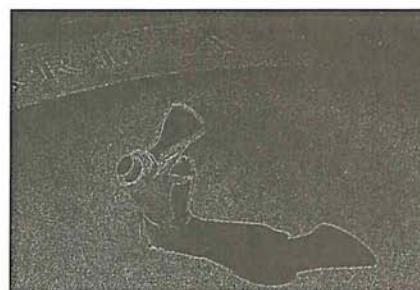
Scale value: 1; Offset value: 128



Custom filter applied

	-1	-1	-1	
	-1	-8	-1	
	-1	-1	-1	

Scale value:1; Offset value: 0

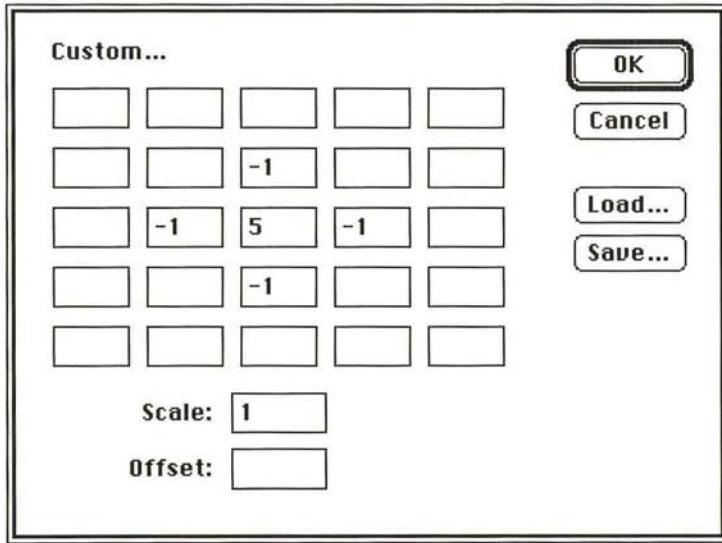


Custom filter applied

**To create a custom filter:**

1. Choose Filter from the Image menu.
2. Choose Custom from the Filter submenu.

The Custom dialog box appears.



3. Click a text box representing a pixel to which you want to assign a weighted value.
4. Enter the value by which you want the pixel in that position multiplied. The value can be an integer between -999 and 999. For example, if you want the brightness value of the pixel to the immediate right of the current pixel multiplied by 1, enter "1" into the text box to the immediate right of the center text box in the grid.
5. Repeat steps 3 and 4 for all of the pixels you want to be weighted.
6. Click the Scale text box.
7. Enter the value by which to divide the sum of the brightness values of the pixels in the calculation.
8. Click the Offset text box.
9. Enter the value to add to the result of the scale calculation.
10. Click OK.
11. The Custom filter you specified is applied to your selection.

**To save the current custom filter:**

1. Click Save in the Custom Filter dialog box.  
The Save As dialog box appears.
2. Type the file name in which you want to save the custom filter.  
If necessary, use the drive and directory buttons to access the folder in which you want to save the filter.
3. Click Save.

**To load a previously saved custom filter into the Custom dialog box:**

1. Click Load in the Custom dialog box.  
The Open dialog box appears.  
If necessary, use the drive and directory buttons to open the folder that contains the filter you want to load.
2. Click the filter you want.
3. Click Open.  
The values used for the selected filter are automatically entered in the Custom dialog box.

## Using plug-in filters

A plug-in filter is a filter that is developed by a third party for use in the Adobe Photoshop program. The effects vary according to the filter. Documentation for the plug-in filter is included with the third-party software disk in your Adobe Photoshop package.

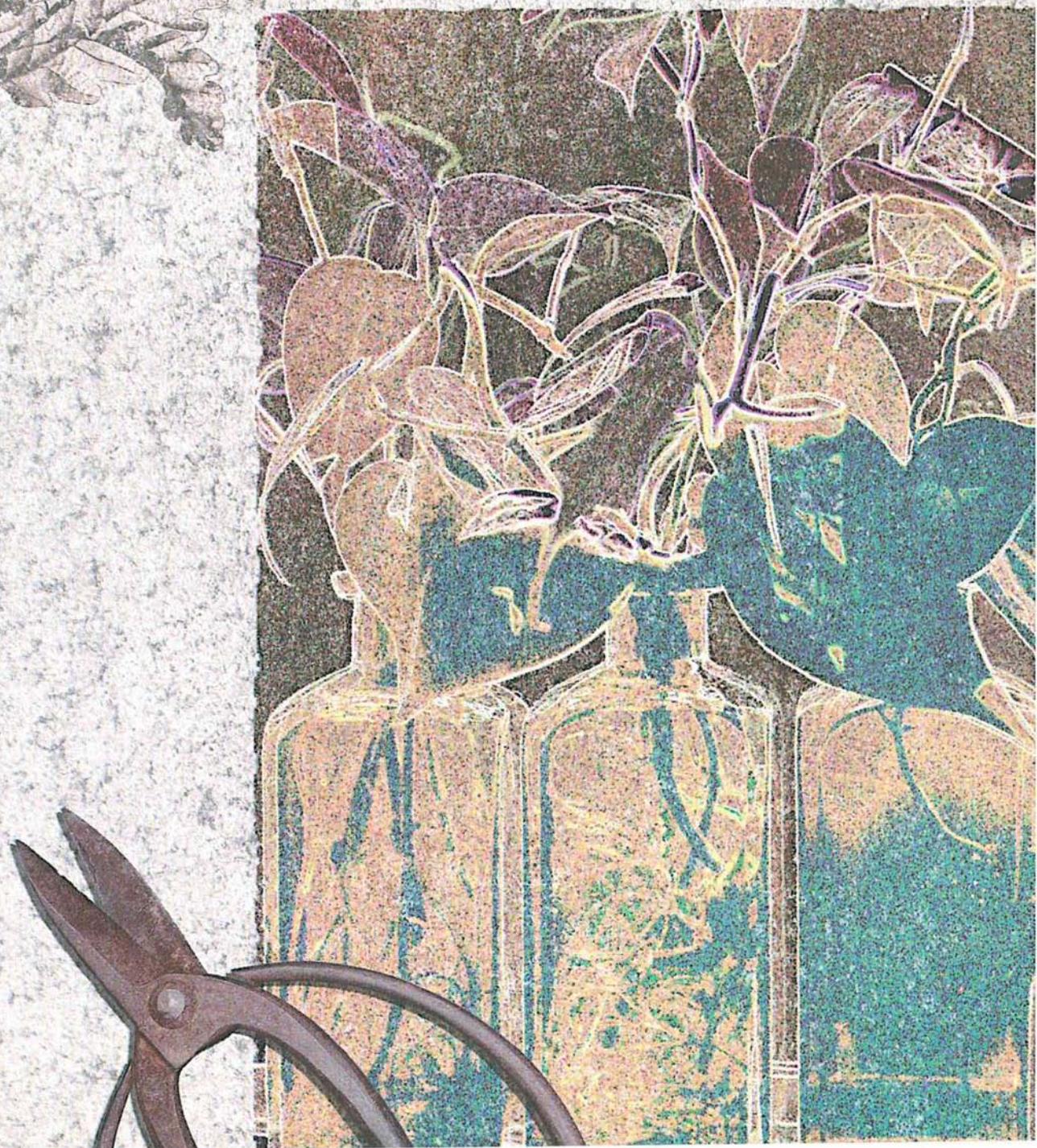
Plug-in filters are easy to install; once installed, they appear in the Filter submenu, which is accessed via the Image menu, in the same way as the standard Adobe Photoshop program filters.

**To install and use a plug-in filter:**

1. Drag a copy of the filter from the third-party software disk to the folder that contains your preferences file (named "PS Prefs" by default).
2. Restart the Adobe Photoshop program. You do not have to reboot the Macintosh. The plug-in filter will appear in the Filter submenu of the Image menu.
3. Select the plug-in filter by choosing Filter from the Image menu and dragging to highlight the desired filter.



## Section 5: *Printing Images*





Starting with an image of plants in bottles, the artist applied the Find Edges filter to produce a hand-drawn effect. The color balance was adjusted to modify and subdue the colors; and the Diffuse filter was applied to roughen the transitions between colors. The leaf image was scanned on a flatbed scanner from an ink drawing. The background was created by scanning a small piece of tracing paper in a slide scanner. Both images were pasted onto the background using paste controls, allowing some of the background texture to show through the images.

## Chapter 18: A *Printing Overview*

This chapter gives an overview of the basic concepts of printing, describes the general printing options, and explains how to print individual channels and print images on color printers.

The Adobe Photoshop program allows you to print images in a number of ways. You can create a halftone from a gray-scale image, as well as a color proof and color separations from color images using the four process colors. You can print halftones and color separations as negatives that an offset printer can use to print reproductions of your work.

The Adobe Photoshop program allows you to combine a variety of media—from photographs, scanned-in artwork like watercolors and old map fragments, pen-and-ink drawings, airbrushed illustrations—and produce them as camera-ready artwork. Producing high-quality results, whether a halftone or color separation, mandates good planning.

The key to producing a high-quality halftone or color separation is planning and testing the process first. Before producing camera-ready artwork, you should talk with everyone involved in the printing process, from the graphic designer and art director, to the print buyer, color separation house, and print shop, to take into account and compensate for any problems that may be encountered in printing the job. You should experiment with what will work by producing a proof or color key, compensating for factors such as paper surface and quality, then standardize your printing process.

This compensation or calibration is largely an iterative process in which you calibrate one aspect of the system, print out a test proof, compare the printed results to the display on-screen, then make an adjustment, and make another comparison. You may have to perform this process a number of times to achieve the results you want. When you have finished making calibrations to your system, it is a good idea to record the date of the calibration and the current settings in a printing log. This information helps you achieve predictable results.

Some of the problems that can be encountered in printing are poor registration and moirés; banding from dot gain; and the inability to produce or repeat predictable results due to imprecise calibrations of equipment.

Factors that can affect the quality of final printing include the quality of the film, ink, and paper that will be used in the printing; the concentration, amount, and use of the chemicals used in the film processor; and the experience and knowledge of the print shop. Other factors that affect printing include the calibration of the equipment, including the scanner, monitor, proofing system (such as a MatchPrint or Chromaline system), and the original image.

To achieve the best results, the output device you use, such as a PostScript imagesetter, should be set to the proper density limit and the processor should be properly calibrated. If these factors are inconsistent, you cannot achieve predictable results.

Because of the complexity of offset printing, a description of the process of color printing is beyond the scope of this section. If you are new to color printing or have never worked with a professional color-separation house before, it is suggested that you work closely with your local print shop.

## Printing basics

To print any type of image, you first select any printing options, then specify settings for the particular image type. For halftones and color separations, you may have to calibrate the various plates to correct the color. Finally, you print the image as one or several plates.

You can print the three channels of an RGB image as a single, composite image; the three channels are printed as one on a single plate and appear black and white if you print them on a monochrome PostScript printer. You can also print the individual channels, one channel at a time on separate plates. By converting an RGB or indexed color image to a CMYK image, you can print a color separation of the image consisting of cyan, magenta, yellow, and black plates.

By default, when you print a gray-scale image on a 1-bit PostScript printer, the image is printed as a halftone, consisting of a series of dots. The size and density of the dots vary to create the optical illusion of variations of gray in the image.

For both a halftone and a color separation, you can specify the screen frequency and angle for each plate, just as if you were using a stat (photostat) camera. You can also specify the shape of the dot used in the screen and print a calibration bar to help you correct dot gain and color inconsistencies between the screen display and the printed image.

For all of the image types, you can print identifying information to help you crop and register (align) the image. The printing options appear in the Page Setup and Print dialog boxes under the File menu. The following sections describe the various options.

## General printing options

For any type image you print, you can choose to print the document and channel name on each plate, along with crop marks, registration marks, and a caption. You can adjust the size of the printed image, print a negative of the image, and specify an emulsion side for your film processor. You can preview how these options will appear on the printed output by using the page preview box.

The page preview box is displayed in the lower left corner of the document window; it displays the size of the image in memory.

For more information about using the page preview feature, see the section, "Previewing the page size and layout" in Chapter 14, "Resizing Images."

The various printing options appear in the Page Setup dialog box under the File menu. To activate the option, you click the checkbox beside the option.

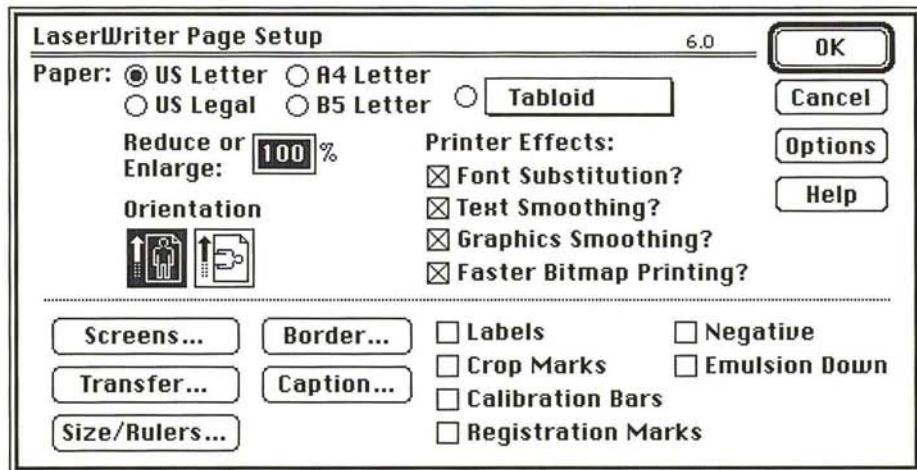
### To display a page preview:

1. Position the pointer on the box in the lower left corner of the document window.
2. Press down the mouse button.  
The page preview appears.
3. Release the mouse button when you have finished previewing the page.

To activate a printing option:

1. Choose Page Setup from the File menu.

The Page Setup dialog box appears.



2. Click the checkbox next to the appropriate option to select it.

#### Printing crop marks

When the Crop Marks option is checked, crop marks are printed near the edges of the image. The crop marks indicate where the image is to be trimmed.

#### Printing labels

When the Labels option is checked, the document name and the channel name are printed on the image.

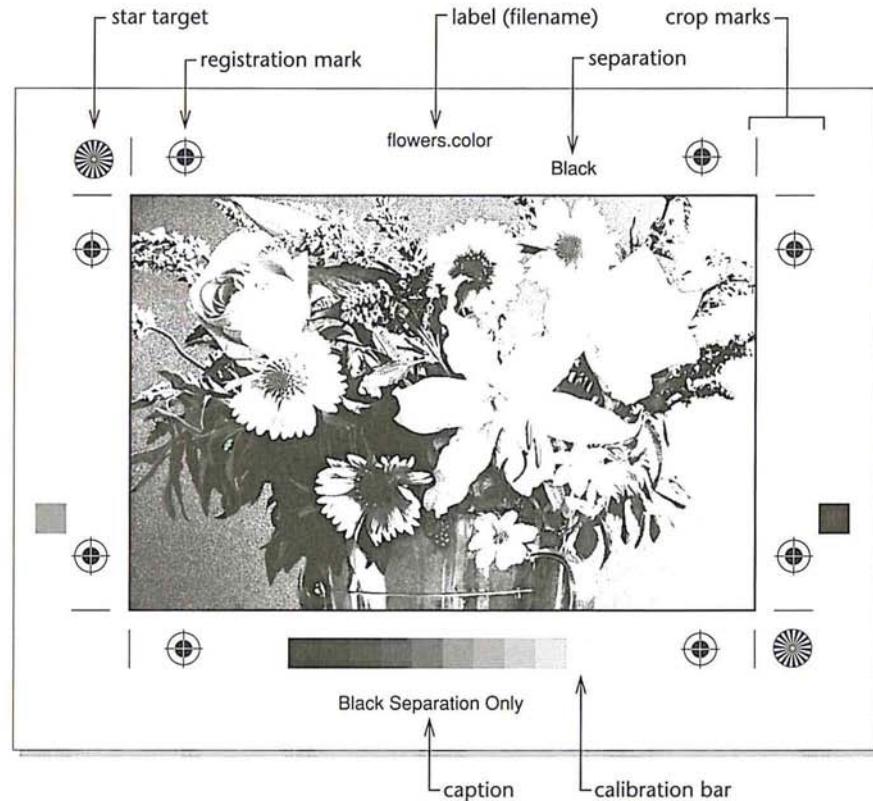
#### Printing registration marks

The Registration Marks option prints registration marks on the image, including bull's-eyes and star targets, to help you register the various plates that are printed. These marks are used primarily for aligning CMYK color separations.

## Printing calibration bars

The Calibration Bars option prints an 11-step gray-scale. The steps represent a transition in density from 0 percent to 100 percent in 10-percent increments.

When you print a CMYK color separation, this step wedge appears only on the black plate. However, the cyan, magenta, and yellow plates display screen tints of the channel you are printing. The illustration below shows a sample black plate. The illustration on the following page shows the full-color image with the screen tints, called progressive color bars, on both sides of the image.





### Printing a negative

The Negative option prints an inverted version of the image. Only the output (not the image on-screen) is converted to a negative when you use this option. If you are printing separations directly to film, you will probably want a negative, although in many countries it is common to print film positives. You should also check with your print shop about whether it prefers a film positive or negative of your image. If you are printing to paper, you will want a positive. It is recommended that you print on film to achieve the best results.

### Specifying an emulsion side

Emulsion refers to the photosensitive layer on a piece of film or paper. The Emulsion Up option (right-reading) means that any type in the image is readable when the photosensitive layer is facing you. The Emulsion Down option (right-reading) means that the type is readable when the photosensitive layer is facing away from you. Normally, images to be printed on paper should be printed emulsion up, whereas images to be printed on film should be printed emulsion down.

To tell whether you are looking at the emulsion up (emulsion side) or the emulsion down (base), examine the film after it has been developed under bright light. One side will appear shinier than the other. The dull side is the emulsion up side; the shiny side is the emulsion down side (base).

You should check with your print shop to see whether it prefers film as a positive emulsion up, negative emulsion up, or negative emulsion down.



Simulation of a printed page with Negative and Emulsion Down options active

### Printing a border

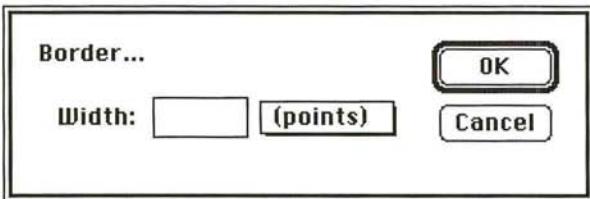
You can specify the width of a border you want to appear around an image using the Border dialog box. The dialog box appears when you click the Border option in the Page Setup dialog box. The border is printed in black. The unit of measure is points, inches, or millimeters.

You can select the units of measure you want from the pop-up menu beside the Width text box.

**To specify the width of a border:**

1. Choose Page Setup from the File menu.
2. Click the Border option.

The Border dialog box appears.



3. Choose the units of measure you want from the pop-up menu beside the Width text box.
4. Enter the width you want the border to be; you can specify decimal values.
5. Click OK.

**Printing a caption**

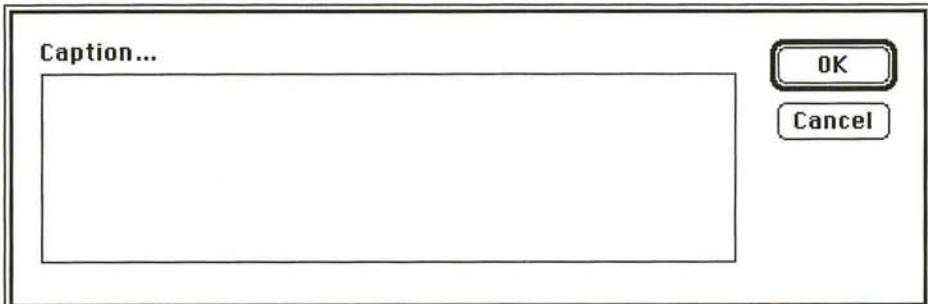
You can enter text that will appear below an image using the Caption dialog box. The dialog box appears when you click the Caption button in the Page Setup dialog box.

You use the standard Macintosh text editing techniques to edit the text in the dialog box. You can print up to six lines of text as a caption; additional text will not appear on the image. The text is printed as 9-point Helvetica type.

**To define a caption:**

1. Choose Page Setup from the File menu.
2. Click the Caption option.

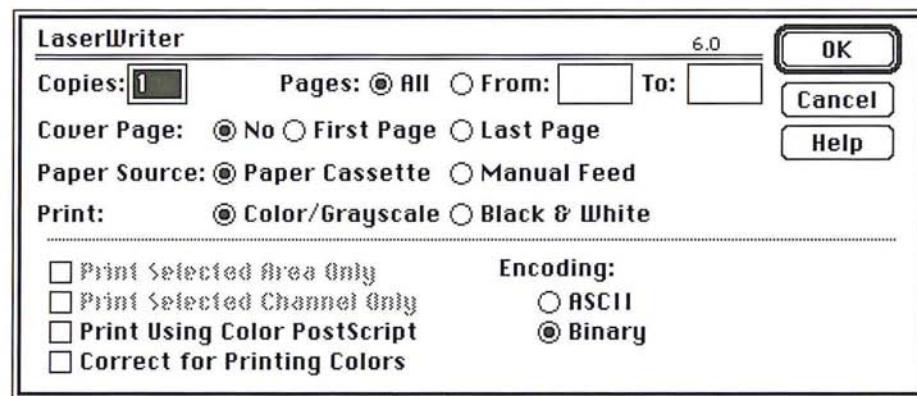
The Caption dialog box appears.



3. Type in the text box the text you want to appear as the caption.
4. Click OK.

## Miscellaneous printing options

Other printing options allow you to print only the selected area on an image, or to transfer the image data to the output device in ASCII format. The options that control how an image is printed appear in the lower left corner of the Print dialog box. The options that are not currently available are dimmed. The options and their effects on the printed image are described below.



### Printing a selected area only

You can print just part of an image that was previously selected with the rectangular marquee.

#### To print a selected part of an image:

1. Select the part of an image you want to print using the rectangular marquee tool.
2. Choose Print from the File menu. The Print Selected Area Only option is automatically checked.
3. Click OK.

Only the selected area is printed.

## **Printing with print spoolers and across networks**

By default, the Adobe Photoshop program transfers binary information to printers. However, some print spooler programs and computer networks don't support files that are binary-encoded. In these situations, you can choose to transfer the document in an ASCII format. Files that are encoded in the ASCII format require about twice as much time to transfer as binary files, because they contain about twice as many characters.

### **To select the ASCII encoding option:**

1. Choose Print from the File menu.
2. Click ASCII.
3. Click OK.

The image information is sent to the printer in ASCII format.

## **Composite and color image printing options**

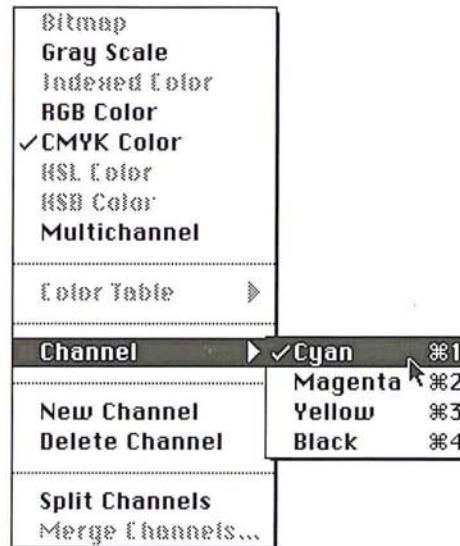
If you are printing a color image, you can choose to print only the active channel. You can also compensate for the differences between the RGB colors of the monitor and the CMYK printing ink colors, and send color PostScript language information to the printer if you are printing on a color PostScript printer.

### **Printing individual channels**

You can choose to print one channel at a time. The Print Selected Channel Only option is automatically selected when you print an RGB, HSL, HSB, or multi-channel image. This option is available when you print a CMYK image, but you must select it manually. To use this option with an RGB image, the red, green, or blue channel must be active. The Print Selected Channel Only option is not available when the RGB display option is active.

To print a single, specific channel of an image:

1. Choose Channel from the Mode menu.
2. Choose the channel you want to print from the Channel submenu.



3. Choose Print from the File menu.
4. Click the Print Selected Channel Only option, if it is not already checked.
5. Click OK.

The active channel is printed.

### Printing a color composite and a color corrected image

Normally, if you intend to print large quantities of an image on a conventional, four-color press, you convert an RGB or indexed color image to a CMYK image and then print a color separation that consists of four plates, one plate for each of the four process colors. However, if you have a color output device, you can print a composite image using the Use Color PostScript option. If you select the Use Color PostScript option and print an image on a color PostScript printer while the RGB display mode is active, an RGB composite image will be printed.

When you print a color composite, you should use the Correct for Printing Colors option in the Print dialog box to compensate for differences between the RGB colors and the CMYK printing ink colors. This option causes the Adobe Photoshop program instead of the printer to make the conversion to CMYK colors, which usually produces better results.

When you select the Use Color PostScript and Correct for Printing Colors options and print on a color PostScript printer, the Adobe Photoshop program prints the composite image on one page. The program performs an internal RGB to CMYK conversion before sending the data to the printer. The image type of the image displayed on-screen remains the same; the image is not converted to a CMYK image.

If the Correct for Printing Color option is selected before printing to a color QuickDraw printer, the Adobe Photoshop program performs an internal RGB to CMYK conversion before sending the data to the printer.

**To print a composite color image:**

1. Open the indexed color or RGB image you want to print; if you are printing an RGB image, choose Channel from the Mode menu and select the RGB Channel command.
2. Choose Print from the File menu.
3. If you are printing to a color PostScript printer, click the Use Color PostScript option.
4. To print a color corrected version of the image, click the Correct for Printing Colors option in the Print dialog box.
5. To print the image, click OK.

Your composite color image is printed.

## Chapter 19: *Printing Halftones*

This chapter describes how to print a halftone from a gray-scale image. It also covers how to adjust for the gamma of your monitor and compensate for dot gain on press.

A halftone is an image composed of a series of dots of varying sizes. When you produce a halftone of a gray-scale image, the variations in size and spacing between the dots simulate the changes in gray levels that occur in a continuous-tone image. (When you print a CMYK image, the dots determine the various tint densities that occur in each of the four process colors.)

Conventional graphics uses a stat camera to produce a halftone by placing a halftone screen between a piece of film and the image, and exposing the film. The image is converted to a series of dots. A computer and imagesetter follow a similar principle in producing a halftone.

Before printing a halftone, you can calibrate your monitor to correct any discrepancy in gray-levels, brightness, or contrast between your screen display and the printed image. The process of printing a halftone begins with a gray-scale image. Using the image, you set up your halftone screen including its frequency, angle, and dot shape. You select general printing options, including printing calibration bars and other identification such as crop or registration marks with the image. Then you print the halftone and check the results. If the halftone needs adjustment, you repeat the process.

Several factors affect the quality of the halftone, including attributes of the screen. The screen attributes include the screen frequency, screen angle, and dot shape. With gray-scale images, the Adobe Photoshop program uses only one screen to produce the halftone.

The screen frequency controls the density of dots on-screen. The dots are arranged in lines on-screen, and the frequency is commonly measured in lines per inch (lpi). The screen frequency used is largely dependent on the type of paper stock and the quality of the press to be used to print the image. The higher the screen frequency, the finer the image produced. Magazines, which normally are printed on coated paper stock on high-quality presses, tend to use fine screens of 133 lpi and up. Newspapers, which are normally printed on lower-quality paper stock, tend to use lower screen frequencies, such as 85 lpi screens.



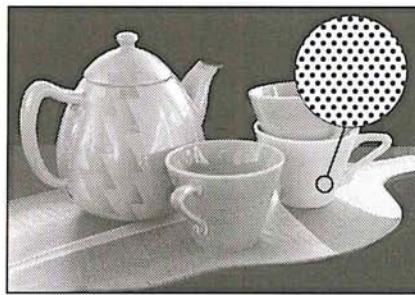
Screen frequency: 100 lines per inch



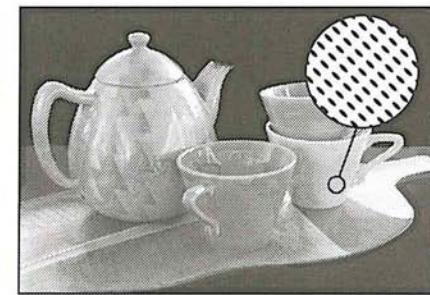
Screen frequency: 50 lines per inch

The screen angle used to create halftones of gray-scale images is usually 45-degrees.

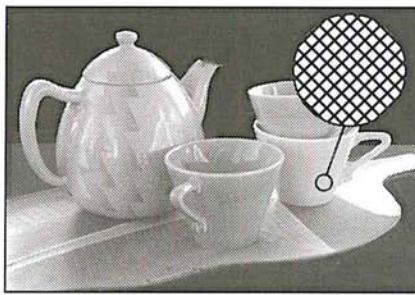
The dot shape also affects the printed image. The shape of the screen dot determines the shape of the dots that comprise the halftone. Elliptical-shaped dots are commonly used; however, the Adobe Photoshop program also supports round, line, square, and cross-shaped dots.



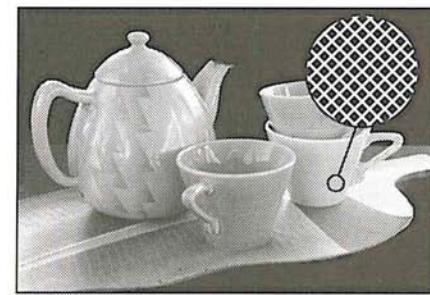
Round



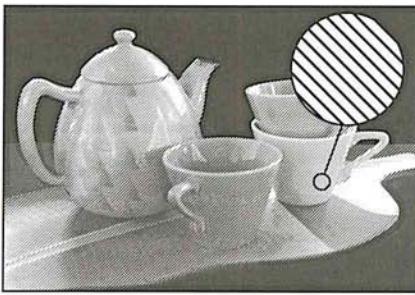
Ellipse



Cross



Square



Line

In general, you perform seven major steps to produce a halftone. The following sections describe the steps in detail. They are:

1. Convert the image to a gray-scale image.
2. Select the screen attributes, including the screen angle and frequency, and the dot shape.

3. Load the transfer function file appropriate for the paper stock on which you will print the image.
4. Calibrate the monitor gamma using the Levels dialog box under the Adjust command in the Image menu, and the Gamma Gray Ramp file included on the Calibration disk.
5. Select the printing options you want, including the Calibration Bar option, which is necessary to perform the density calibrations.
6. Print a proof of the image.
7. Calibrate the density of the output of the gray-scale image. This step includes a number of different operations, including:
  - Using a densitometer to measure density levels on the printed calibration bar.
  - Converting the densitometer readings to percentage values (if necessary).
  - Entering values in the Transfer Function dialog box, which is accessed through the Transfer option in the Page Setup dialog box, to adjust the density levels.

## Preparing to print a gray-scale image

Printing a halftone of a gray-scale image is a process that involves a series of steps. The first step in printing a halftone of a continuous-tone black and white image is to make sure that you are working on a gray-scale image. You can do this by opening the Mode menu and checking to make sure that the Gray Scale menu item is checked. Then you set your screen settings including the screen frequency, angle, and dot shape. Next, you select the general printing options you want to use, such as crop and registration marks.

For halftone images, you can also choose encoding options and whether to print a selected area only. You should check your monitor gamma and, if necessary, adjust the monitor correction setting. The monitor gamma affects the appearance of the image displayed on-screen and the density of the output.

Before you print an image, you should select the transfer function file appropriate for the type of paper stock you plan to use. The transfer function file compensates for dot gain on press. You can adjust the transfer function information to achieve density levels suitable for the press.

Finally, you are ready to print your image. If the results are not as you expected, you should adjust the density of the output using the Transfer option.

## Step 1: Converting to a gray-scale image

The first thing you should do in preparing to print a halftone image is convert the image to a gray-scale image if it is not already a gray-scale image.

To convert an image to a gray-scale image:

1. Select the image to be converted.
2. Choose Gray Scale from the Mode menu.

The image is converted to a gray-scale image.

## Step 2: Selecting screen attributes

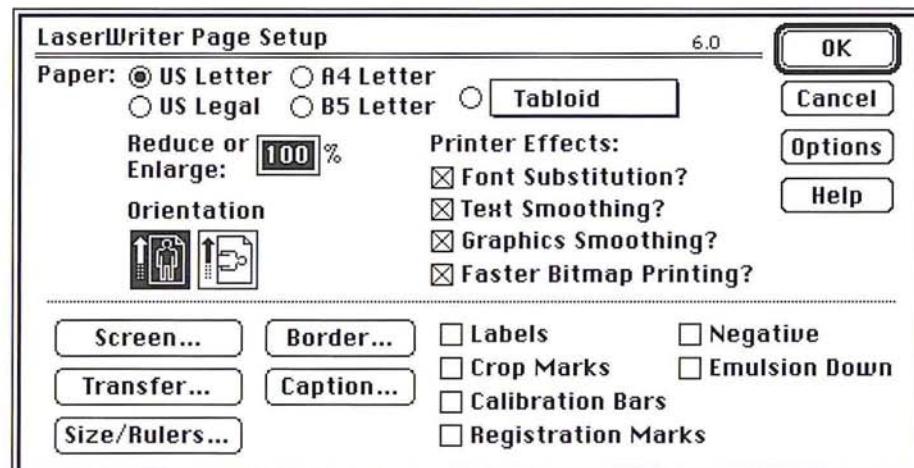
The screen attributes you can specify include the screen frequency, screen angle, and dot shape. Screen frequency can be measured either in lines per inch or lines per centimeter. For gray-scale images, the screen angle typically is at 45 degrees. In most cases, you should use the default setting for the screen angle. Dot shapes include round, elliptical, line, square, and cross. You set up the screen attributes in the Page Setup dialog box, which is under the Page Setup command in the File menu. You may want to save these screen settings as defaults to use with future halftones.

If you save the screen settings as the default settings, the screen settings will appear in all new Adobe Photoshop documents of the same image type you create. For example, if you specify 120 as the default screen frequency for a gray-scale image, the 120 screen-frequency value will be used for all new gray-scale images you create. If you specify 133 as the default screen frequency for a color image, the 133 screen frequency will be used in all new color images you create.

To define the screen attributes for a gray-scale halftone image:

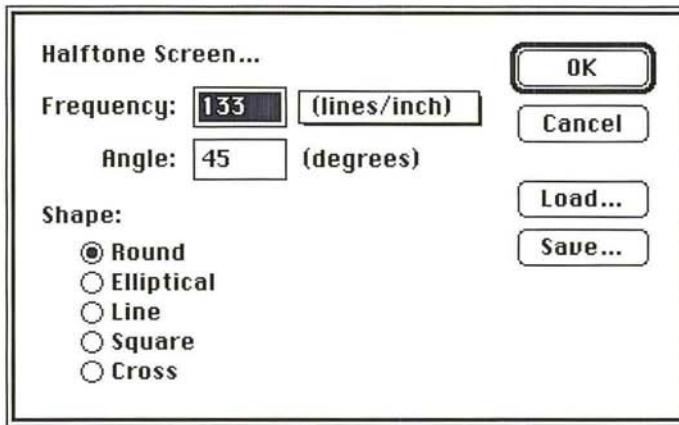
1. Choose Page Setup from the File menu.

The Page Setup dialog box appears.



2. Click Screen.

The Halftone Screen dialog box appears.



3. Use the pop-up menu next to the Frequency text box to specify lines per inch (line/inch) or lines per centimeter (lines/cm) as the units of measurement.
4. To specify the screen frequency, double-click in the Frequency text box, and enter a value from 1.0 to 999.0.
5. To specify the screen angle, press the Tab key or double-click in the Angle text box, and enter a value from -180.0 to 180.0.
6. To select the dot shape, click the dot shape you want.

**To save the current halftone screen settings:**

1. Click Save in the Halftone Screen dialog box.

The Save As dialog box appears.

2. Enter the file name in which you want to save the screen settings.

If necessary, use the drive and directory buttons to access the folder in which you want to save the settings.

3. Click Save.

The settings are saved in the file and location you specified.

**To load previously saved screen settings into the active document:**

1. Click Load in the Halftone Screen dialog box.

The Open dialog box appears.

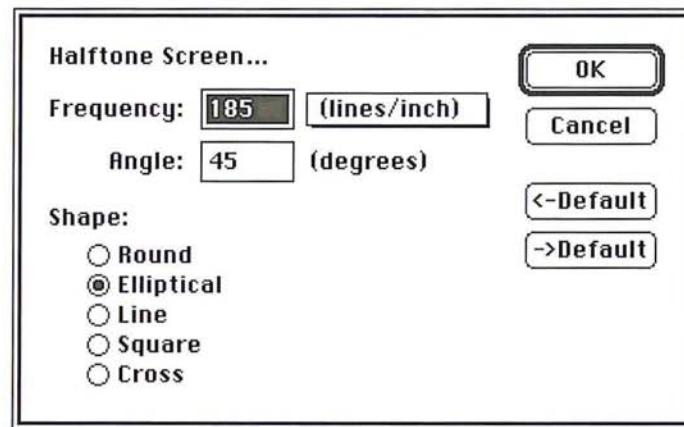
If necessary, use the drive and directory buttons to open the folder that contains the settings you want to load.

2. Select the document you want, and click Open.

The selected settings are loaded into the Halftone Screen dialog box.

To save the settings as the new defaults:

1. Press down the Option key.
2. Click → Default.



To revert to the original default settings before closing the dialog box:

1. Press down the Option key.
2. Click <- Default.

When you have finished defining the screen information, click OK.

### Step 3: Loading a transfer function file

The Transfer Function dialog box lets you specify the density settings for your halftone image, and save the settings as files. The files allow you to compensate for dot gain based upon the ink retention of the paper stock you are going to use. The density, or transfer function, settings allow you to compensate for dot gain in an image. Dot gain is an increase in density, and is measured as the density of light reflected off an image.

The transfer function files contain the different density settings for an image. The density settings are classified as highlights, 1/4 tones, midtones, 3/4 tones, and shadows.

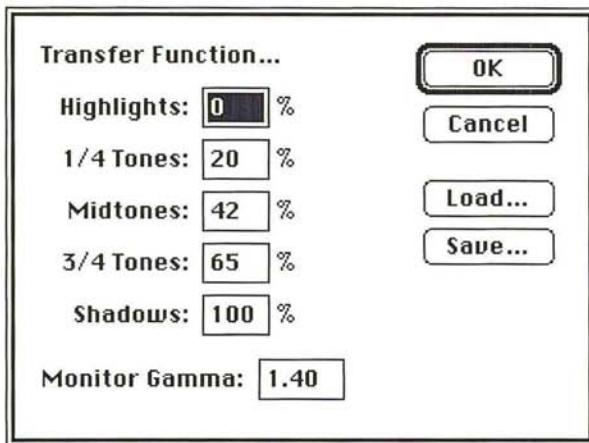
You should consult with your print shop or print buyer to determine the type of paper stock to be used, then choose the appropriate transfer function file for that paper stock.

There is a different transfer function file for newsprint, coated matte stock, (which has a fine layer of material that allows it to retain ink without smearing), coated glossy stock, and uncoated stock.

To select a transfer function file to use with your paper stock:

1. Insert the Calibration disk included in the Adobe Photoshop package.
2. Choose Page Setup from the File menu.
3. Click Transfer.

The Transfer Function dialog box appears.



4. Click Load in the Transfer Function dialog box.

The Open dialog box appears.

If necessary, use the drive and directory buttons to open the Transfer Function folder on the Calibration disk.

5. Select the transfer function file appropriate for the paper stock you will use, and click Open.

The selected settings are loaded into the Transfer Function dialog box.

6. Click OK.

7. Click OK again.

## Step 4: Calibrating the gamma of your monitor

If you are using a gray-scale or color monitor, you will want the appearance of documents on your monitor to match the printed output as closely as possible. Because of differences in monitors, factory settings, and other factors, no two monitors are exactly alike. A consistent display is especially important if you are correcting your gray-scale images on-screen.

A discrepancy may occur between the electrical input to your monitor and how the monitor displays color or gray tones. You can correct such a discrepancy using the monitor gamma value, as well as standardize your display and compensate for changes over time by calibrating your monitor using the monitor gamma value.

The monitor gamma value varies between manufacturers and even between monitors from the same manufacturer. The default monitor gamma value is 1.4, which is the normal gamma correction value for the Apple® Hi-Res, 13-inch RGB monitor. You can purchase self-calibrating monitors that maintain a consistent monitor gamma, or you can adjust the monitor gamma to a consistent level using monitor calibration hardware and software.

If you are using a self-calibrating monitor or monitor calibration device, simply adjust your monitor to a known gamma value, and use this same gamma value in the Transfer Function dialog box. Otherwise, you must estimate your monitor's gamma value.

The Adobe Photoshop program provides you with a way to estimate the correct gamma correction value for your monitor. This process involves using the Levels dialog box under the Adjust command in the Image menu, and the Gamma Gray Ramp file; the Gamma Gray Ramp file is located on the Calibration disk. The Gamma Gray Ramp file displays dithered gray ramps interleaved with true gray ramps. By using the gamma slider in the Levels dialog box to make the true gray ramps match the dithered gray ramps, you can estimate your monitor gamma.

Do not undertake the following procedure until your monitor has been on for at least 20 minutes. Before you do anything else, follow the instructions for adjusting the monitor display in the manual provided with the monitor.

### To estimate your monitor gamma:

1. Insert the Calibration disk included in the Adobe Photoshop package.
2. Open the Gamma Gray Ramp file.  
The Gamma Gray Ramp file appears.
3. Choose Adjust from the Image menu.
4. Choose Levels from the Adjust submenu.

The Levels dialog box appears.

5. Position the pointer on the gray (middle) Input Levels triangle beneath the histogram.
6. Holding down the mouse button, drag the slider to the left or right until the center portion of the true gray ramp matches the center portion of the dithered gray ramp as closely as possible.
7. Note the center value at the top of the Levels dialog box; this is the value you will enter for your monitor gamma.
8. Click Cancel.
9. Close the document without saving changes (so you can use this document again to estimate the gamma on other monitors).

**To enter the correct monitor gamma value:**

1. Choose Page Setup from the File menu.  
The Page Setup dialog box appears.
2. Click Transfer.  
The Transfer Function dialog box appears.
3. Double-click the Monitor Gamma text box in the Transfer Function dialog box.
4. Enter the value you recorded from the Levels dialog box above.
5. When you have finished entering the monitor gamma value, click OK.
6. Click OK again.

## **Step 5: Selecting printing options and printing the image**

The next step in printing a halftone is to choose the printing options you want from the Page Setup dialog box. In most cases, you should print film negatives to give to the printer. The image quality of negatives is better than positives. (For one thing, there is less dot gain on negatives.) You should consult with your print shop to determine the correct media to use.

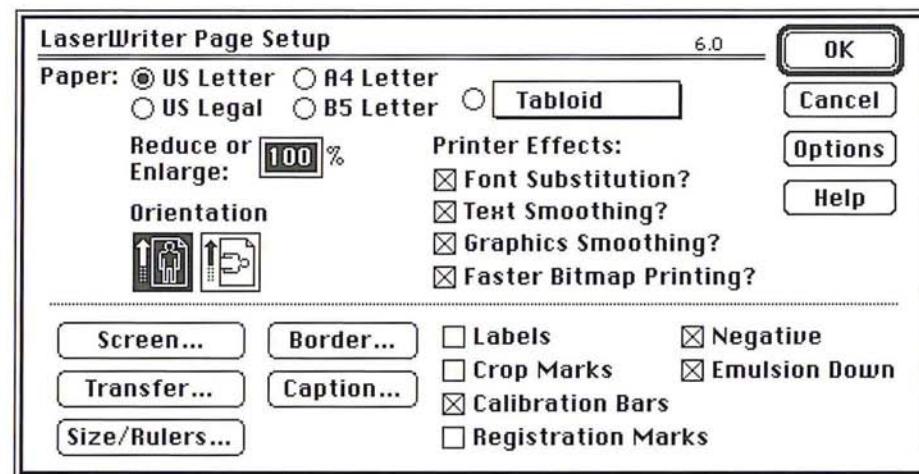
To print negatives of an image, you should select the Calibration Bars, Negative, and Emulsion Down options in the Page Setup dialog box before printing. To print positives, make sure that Emulsion Down and the Negative option are not checked.

When you open the Print dialog box to print a gray-scale image, you can also choose the Print Selected Area Only option and the Encoding options. These options are described in Chapter 18, "A Printing Overview."

To select printing options:

1. Choose Page Setup from the File menu.

The Page Setup dialog box appears.



2. Select the Calibration Bars, Negative and Emulsion Down options by clicking the appropriate boxes.

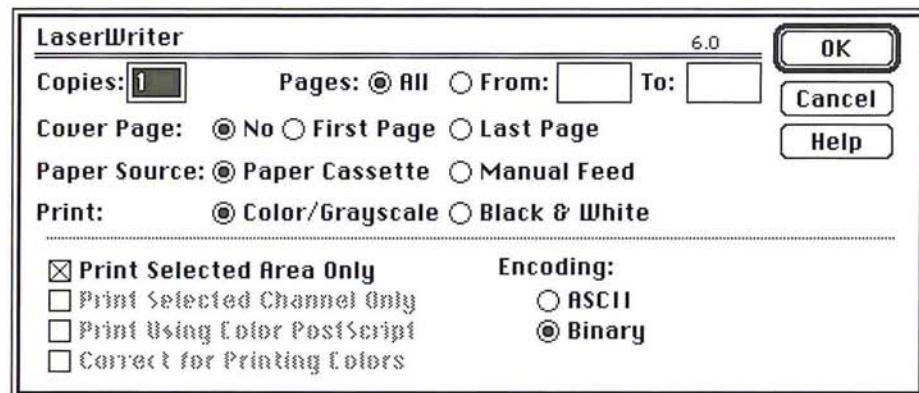
## Step 6: Printing the image

The next step in producing a halftone is to print a proof of your image.

To print your image:

1. Choose Print from the File menu.

The Print dialog box appears.



2. Click OK.

The gray-scale image is printed as a halftone. If the halftone produced is satisfactory, you are finished.

However, in some cases you may have to adjust the output to compensate for factors like dot gain and the density range supported by the printing press you intend to use. The following section covers how to calibrate the output.

## Step 7: Calibrating the output for gray-scale images

The quality of output can vary quite a bit, depending on your image-setting equipment, the strength and mixture of your chemicals, the batch of film you are using, and the press you use. The Transfer option allows you to calibrate and adjust the screen process, to ensure more consistent densities. The Transfer option is controlled through the Transfer Function dialog box, which is accessed from the Page Setup dialog box under the File menu.

The Transfer option operates as a lookup table. Here is a simplified example of how it works. When you print an image, the Adobe Photoshop program evaluates the density of each pixel in an image and classifies it according to five levels. The levels are highlights, 1/4 tones, midtones, 3/4 tones, and shadows. The classification is based on the color values (or gray-scale values, in the case of a gray-scale image) of the pixel, which are evaluated on a 256-step scale. The white pixels in an image have a value of 255 and are classified as highlights; the black pixels in an image have a color value of 0 and are classified as shadows. The pixels with intermediate color values are classified as 1/4 tones, midtones, or 3/4 tones, depending on their values.

When you print an image, the Adobe Photoshop program looks up the density specified for each level in the Transfer Function dialog box and outputs the pixels with that level at the specified density. For example, if you specify a value of 10 for the Highlights in the Transfer Function dialog box and print an image that contains highlight pixels, these pixels will print out at a density of 10 percent.

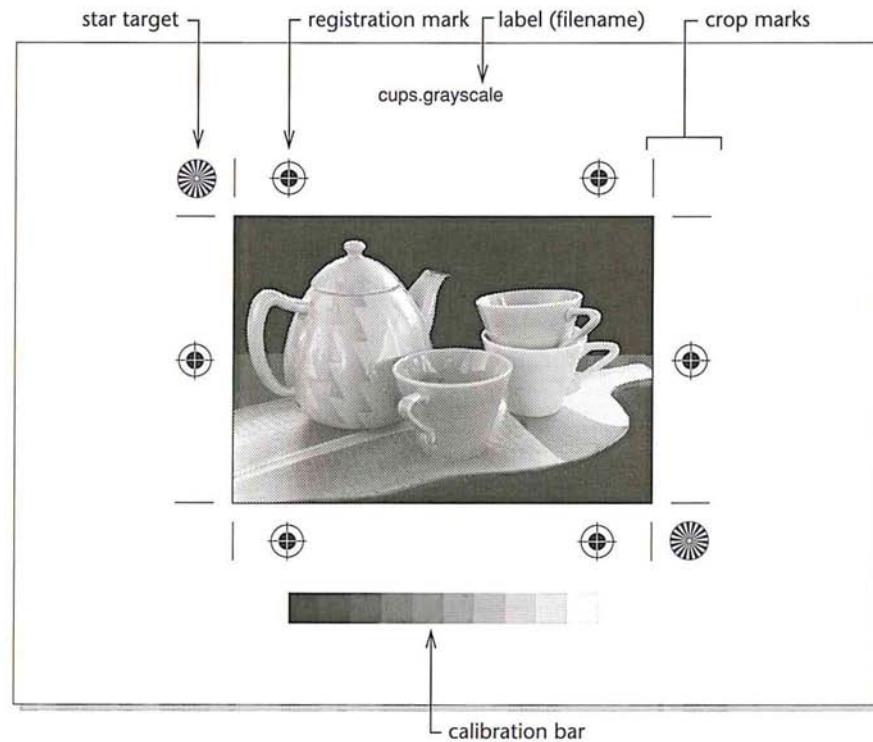
You may need to adjust the density settings that control the middle densities in an image. This adjustment is based on a visual examination of the printed image. You may also need to adjust the overall density range based on the density range the press supports. This adjustment involves the highlight and shadow areas on an image.

Based on visual examination, you can adjust the values for the 1/4 tones, midtones, and 3/4 tones. If the image is too dark, you should lower the values in these areas; if the image is too light you should increase the values.

To adjust the overall density range of the printed image, you should first consult with your printer to find out the density range of the press you will use. The density range is the range from the smallest highlight dot the press can print to the largest shadow dot it can print. On a given printing press, a very small highlight dot might be too small to hold ink, and beyond a certain density level, the shadow dots might fill into solid black, thereby removing all of the detail in the shadow areas. Therefore, you need to ask your printer about the effective density range of the printing press to be used for your job.

For example, if the smallest highlight dot the press can hold is a 10-percent dot, you should aim to produce a 10-percent highlight dot; if the largest shadow dot the press can hold is a 90-percent dot, you should aim to produce a 90-percent dot in the areas where you want shadow detail to appear.

When you select the Calibration Bars option in the Page Setup dialog box, the Adobe Photoshop program prints an 11-step gray-scale wedge below the image. You use the calibration bar to adjust the output to compensate for dot gain. The illustration below shows the calibration bar printed below the gray-scale image.



You can have the Adobe Photoshop program automatically adjust the printed output to compensate for any dot gain (increase in dot size) that results from printing. To do so, you use a densitometer to record the density values at the appropriate steps in the calibration bar, calculate the required adjustment, and enter the appropriate values in the Transfer Function dialog box under the Page Setup command in the File menu. You can measure either the density values of the calibration bar that is printed on a press proof or the values on a color proof, such as a MatchPrint or color key.

Because your objective is to obtain the best results on the final printed piece, you should ask your print shop to create a press proof of the image so you can measure the density levels that result.

However, printing press proofs requires time and money. If time is short and budget a consideration, you can take measurements on the proof you printed. To measure the density on a press proof, you use a photodensitometer, which measures reflective density on an opaque surface. Make sure that the densitometer is properly calibrated and in good working order before you use it.

You may need to convert the recorded density readings to percentage values to make the correct adjustments in the Transfer Function dialog box. Some densitometers make this conversion for you.

The Transfer Function dialog box contains default density settings that are already adjusted to compensate for dot gain. The settings vary, depending on the paper stock Transfer option you chose. As an example, a 42-percent value for the midtones has an 8-percent dot gain compensation built-in. In other words, the Adobe Photoshop program prints a midtone dot, which normally should have a density of 50 percent, at a 42-percent density, and assumes that the dot will grow 8 percent on the press.

If you record a density value of 48 percent on the middle step in the calibration bar, and you want the midtone dot to print at a 50-percent density, you would raise the value of the midtone dot by 2 percent to 44 percent. In other words, the 42-percent setting produced a 48-percent midtone dot, so to increase the density of the dot to 50 percent, you enter 44 percent in the Midtones text box in the Transfer Function dialog box.

**NOTE:** The 1/4 tone, midtone, and 3/4 tone values are optional. If you leave these blank, the Adobe Photoshop program will interpolate their values.

You can save the transfer function settings in a document, and load them into another Adobe Photoshop software document to use the same settings. You can also save these settings as the default settings for all Adobe Photoshop software documents.

To calibrate the output to compensate for dot gain:

1. Choose Print from the File menu.
2. Click OK.

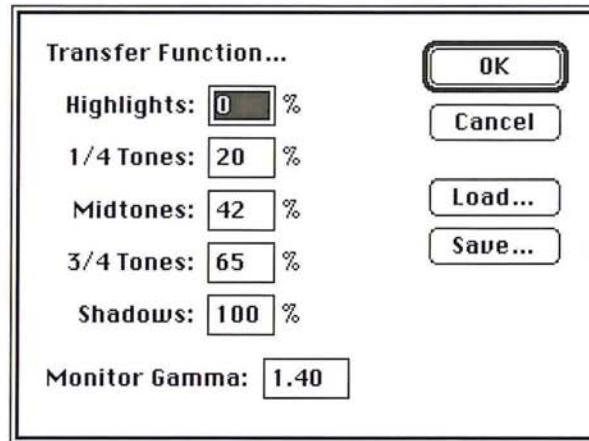
The image is printed as a halftone.

3. Use a densitometer to measure the density values on the printed calibration bar and to convert the readings to percentage values.

To adjust the density settings in the Transfer Function dialog box:

1. Choose Page Setup from the File menu.
2. Click Transfer.

The Transfer Function dialog box appears.



3. Click the text box for the tone you want to adjust, and enter a value to adjust the density to the desired level.

**To save the current transfer function settings in a document:**

1. Click Save in the Transfer Function dialog box.

The Save As dialog box appears.

2. Enter the file name in which you want to save the screen settings.

If necessary, use the drive and directory buttons to access the folder in which you want to save the settings.

3. Click Save.

**To save the current transfer function settings as the new defaults:**

1. Choose Page Setup from the File menu.

2. Click Transfer.

The Transfer Function dialog box appears.

3. While pressing down the Option key, click → Defaults in the Transfer Function dialog box.

4. Click OK.

To revert to the default settings before closing the Transfer Function dialog box, while pressing down the Option key, click <- Defaults.

When you have finished defining the transfer function information, click OK.

If you have successfully printed a halftone and are satisfied with the results, you are finished. If you are dissatisfied with your results, you may want to adjust your system, image, or print settings by repeating the seven steps in this chapter.

## Chapter 20: *Producing a Color Separation*

The Adobe Photoshop program creates a color separation by converting the red, green, and blue colors of an image into CMYK colors. This chapter describes the steps you follow to calibrate and produce color separations. A color separation is an image that has been separated into CMYK colors, then is printed on four separate plates, each plate representing one of the four process colors. The calibration instructions discussed in this chapter explain how to calibrate the density of the output, the colors on your monitor, and the color separation process itself.

This chapter also covers the steps for selecting the screen attributes of the halftone screens used in the color separation, how to control the amount of black generated on the black plate, and how to create traps. Traps prevent gaps from appearing along edges in an image due to slight misalignment or movement of the printing plates on press.

With the Adobe Photoshop program you produce the four pieces of camera-ready film ("plates") by printing each color plate of the CMYK image using a specified screen frequency and angle. Normally, you print each plate on film, and each of the four plates appears as a halftone image on the film. The halftone dots on the film contain the tint density information that your print shop uses to create the printing plate for that particular color.

The screen angle and frequency are different for each plate. The screen angles used are very important because if the screen angles are incorrect, moiré patterns will appear in the image when the four colors are printed on the press.

Another important part of the color separation process is the ability to achieve consistent and predictable results for all your work. A true color separation system requires a completely controlled environment to produce consistent results. Lighting must be constant. The monitor must be calibrated so that the monitor display and the printed output appear the same. Any calibrations made to the system must be fed back through the system in a single-loop system—from the scanner that input the image through the display monitor, to the color proofing system, and back to the original image—so that compensation can be made for any changes. (Note that the program does not perform scanner calibration, however.)

While such a controlled environment and single-loop feedback system are ideal, they are beyond the scope of this user guide. Also, in most instances, the default settings in the Adobe Photoshop program will produce excellent results. However, calibrations can be made that will help you produce the highest quality output possible on your equipment.

To produce the best possible results, you print a color proof, then perform a series of calibrations to correct color in your separations. You should perform some of these calibrations each time you print a color separation to achieve the best results. For example, you should calibrate the output to adjust for dot gain each time you print on a different imagesetter or on an imagesetter that hasn't been properly calibrated. You should adjust the color swatches in the Separation Setup dialog box, which is accessed through the Preferences dialog box, each time you change to a different printing press that uses different inks. The color swatches are CMYK tint samples that affect the color separation process.

Other calibrations need to be made rarely or only once. You might never need to adjust the black generation settings, and you should only have to specify the monitor gamma correction once, then change it only if the monitor gamma changes over time or if you install the Adobe Photoshop program on another machine.

In general, you should perform the necessary calibrations before you generate a color separation you want to be printed. To perform the calibration, you correct the monitor gamma, create a color separation of an image using the default separation settings, print the color separation, and then use the resulting four pieces of film for the density calibration process. The steps discussed below assume you are generating film negatives to be sent to the printer.

In most cases, you perform nine major steps, including two optional steps, to produce a color separation. The following sections describe the steps.

The steps to produce a color separation include:

1. Select the screen attributes, including the screen angle and frequency, and the dot shape.
2. Calibrate the monitor gamma using the Levels dialog box, under the Adjust command in the Image menu, and the Gamma Gray Ramp file included on the Calibration disk.
3. Load the transfer function file appropriate for the paper stock on which you will print the image.
4. Calibrate the density of the output. This step includes a number of different procedures; they include:
  - Converting an RGB image to a CMYK image.
  - Selecting the printing options you want, including the Calibration Bar option, which is necessary to perform the density calibrations.
  - Printing the image.
  - Creating a color proof.
  - Using a densitometer to measure density levels on the calibration bar printed on the black plate.
  - Entering values in the Transfer Function dialog box, which is accessed through the Transfer option in the Page Setup dialog box, to adjust the density levels.

5. Adjust the color swatches.

This step includes additional operations; they include:

- Examining the color swatches printed in the Appendix or printing the Photoshop Color Swatches file included on the Calibration disk. The file and the Appendix both contain the same color swatches displayed in the Separation Setup dialog box that you use to calibrate your monitor colors. You may want to create a color proof of the Color Swatches file to match against your monitor display.
- Adjusting the color swatches in the Separation Setup dialog box to match the printed color swatches.

6. An optional calibration step allows you to fine-tune the color swatches.

The procedures for implementing this step are:

- Converting an RGB image to a CMYK image.
- Printing the color separation.
- Creating a color proof from the four pieces of film.
- Converting the CMYK image back to an RGB image.
- Visually comparing the RGB display to the printed CMYK version, and noting ways to change the CMYK color swatches to make the RGB image more closely match the CMYK image.
- Returning to the CMYK mode.
- Adjusting the color swatches in the Separation Setup dialog box to make the RGB image appear closer to the CMYK printed image.
- Converting back to the RGB mode to view the effect of the changes on the RGB image; and if necessary, repeating the procedure until the RGB image closely matches the printed CMYK image.

7. An optional color separation step includes adjusting the black generation, which controls the amount of black generated on the black plate of a color separation. This step involves:

- Choosing the black generation option you want from the Separation Setup dialog box while in the RGB mode.
- Converting the image to the CMYK mode.

8. Create color traps.

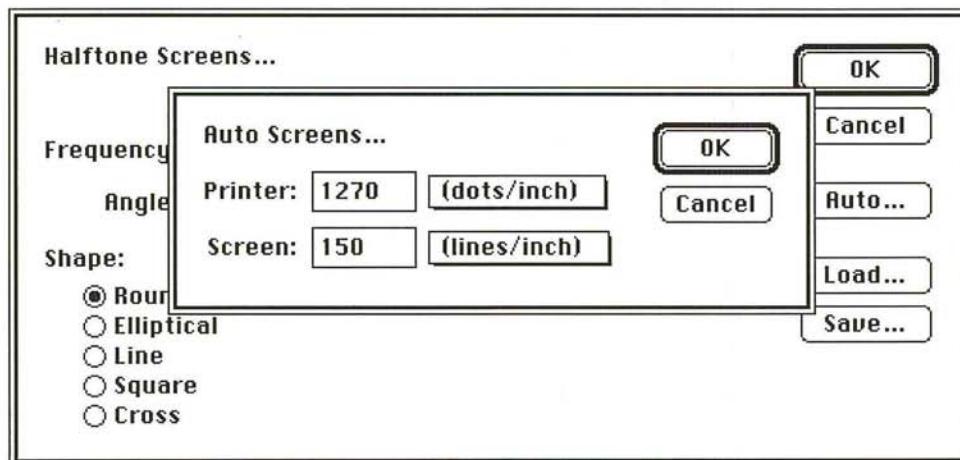
9. Print final, camera-ready film.

## Step 1: Selecting screen attributes

You can specify the screen frequency, screen angle, and dot shape to be used in your image. To make sure that you can correct color in your image and register the four plates correctly, you should print labels, calibration bars, and registration marks, and select the Negative and Emulsion Down options.

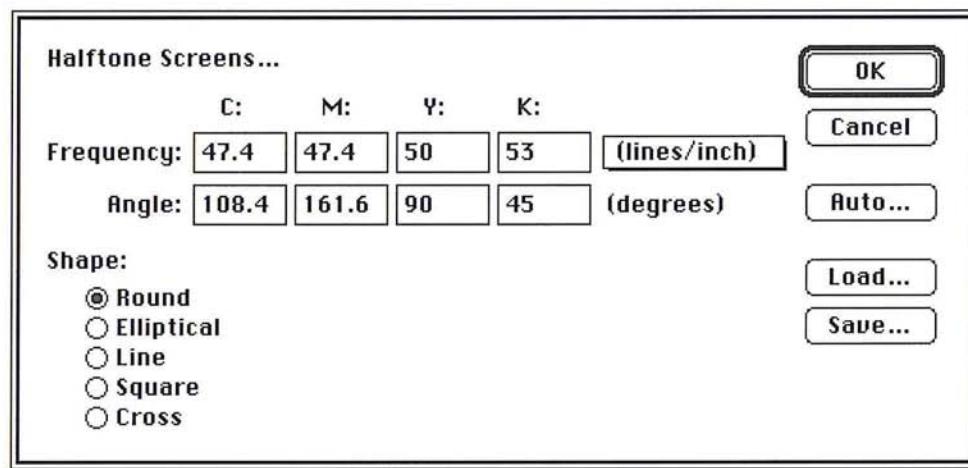
The version of the Halftone Screens dialog box that appears in a color document is different from the dialog box that appears when you set up the screen attributes for a gray-scale halftone. The instructions below concentrate on the areas that are unique to the setup for color separations. The section, "Step 7: Calibrating the output for gray-scale images" in Chapter 19, "Printing Halftones," contains detailed instructions on editing the screen attributes. See that section for details about defining the screen attributes.

You should use the Auto function to specify the resolution of the output device and the screen frequency you intend to use. Once you have entered that information, the Adobe Photoshop program automatically determines the appropriate frequencies and angles for the four halftone screens. The Adobe Photoshop program uses the Adobe Minimum Moiré calculations to determine the screen frequencies and angles that produce the best results. You should not adjust these frequencies and angles. If you do, moiré patterns may appear on the image.



**To specify the screen attributes:**

1. Choose Page Setup from the File menu.  
The Page Setup dialog box appears.
2. Click Screens.  
The Halftone Screens dialog box appears.



3. Click Auto to define the desired screen attributes using the Auto Screens dialog box.

When you have defined the screen attributes, click OK; click OK again.

## Step 2: Calibrating the gamma of your color monitor

Calibrations you may need to make to your image to produce the best quality output include calibrating your monitor to determine the monitor gamma, calibrating your output to adjust for dot gain, and adjusting the color swatches each time you print on a different printing press.

You can standardize your display and compensate for changes over time by calibrating your monitor. You can calibrate your monitor by adjusting the monitor gamma value.

The monitor gamma value varies between manufacturers and even between monitors from the same manufacturer. The default monitor gamma value is 1.4, which is the normal gamma correction value for the Apple Hi-Res, 13-inch RGB monitor. However, there is considerable variation in monitor gamma even among monitors made by the same manufacturer.

You can adjust the color display visually or using a calibration system such as that available from Radius for the Apple 8-bit monitor, which reads calibration information back to the display to adjust it automatically.

The Adobe Photoshop program provides you with a way to estimate the proper gamma correction value for your monitor.

Calibrate the monitor gamma using the Levels dialog box, under the Adjust command in the Image menu, and the Gamma Gray Ramp file included on the Calibration disk in the Adobe Photoshop package.

This process involves using the Levels dialog box under the Adjust command in the Image menu, and the Gamma Gray Ramp file included on the Calibration disk in the Adobe Photoshop package. The Gamma Gray Ramp file displays dithered gray ramps interleaved with true gray ramps. By using the gamma slider in the Levels dialog box to make the true gray ramps match the dithered gray ramps, you can estimate your monitor gamma.

Do not undertake the following procedure until your monitor has been on for at least 20 minutes. Before you do anything else, follow the instructions for adjusting the monitor display in the manual provided with the monitor.

**To estimate your monitor gamma:**

1. Insert the Calibration disk.
2. Open the Gamma Gray Ramp file.  
The Gamma Gray Ramp file appears.
3. Choose Adjust from the Image menu.
4. Choose Levels from the Adjust submenu.  
The Levels dialog box appears.
5. Position the pointer on the gray (middle) Input Levels triangle beneath the histogram.
6. Holding down the mouse button, drag the slider to the left or right until the center portion of the true gray ramp matches the center portion of the dithered gray ramp as closely as possible.
7. Note the center value at the top of the Levels dialog box; you will enter this value for your monitor gamma.
8. Click Cancel.
9. Close the document without saving changes (so you can use this document again to estimate the gamma on other monitors).

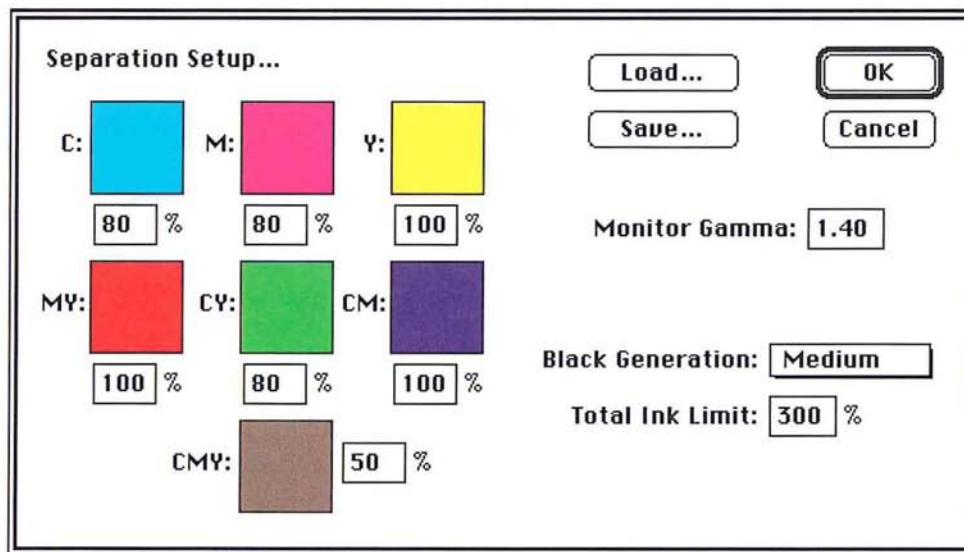
To specify the appropriate amount of gamma correction for your monitor:

1. Choose Preferences from the Edit menu.

The Preferences dialog box appears.

2. Click Separation Setup.

The Separation Setup dialog box appears.



3. Double-click the Monitor Gamma text box.
4. Enter the gamma value you recorded from the Levels dialog box.
5. Click OK, and click OK again.

### Step 3: Loading a transfer function file

The next step is to load the transfer function file appropriate for the paper stock you intend to use. For instructions on how to do this, see the section, "Step 3: Loading a transfer function file" in Chapter 19, "Printing Halftones."

## Step 4: Calibrating for dot gain on color separations

You should now convert an RGB or indexed color image to a CMYK image, print it out, then use the calibration bar printed on the black plate to calibrate for dot gain. Dot gain increases the density in parts of an image.

To convert an RGB or indexed color image to a CMYK image, choose CMYK color from the Mode menu. The image is separated into cyan, magenta, yellow, and black channels. Because each pixel in the image has to be converted separately, this might take a few minutes.

The next steps are to select the options in the Page Setup dialog box under the Page Setup command in the File menu to perform the calibration, and calibrate the output to compensate for dot gain.

Calibrating for dot gain is described in detail in the section, “Step 7: Calibrating the output for gray-scale images” in Chapter 19, “Printing Halftones.” The sections that follow primarily address the areas unique to the color separation process. For more information about the calibration process, see that section in chapter 19.

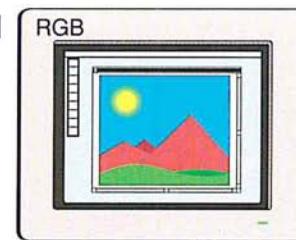
When you selected the Calibration Bars option, an 11-step gray-scale wedge (called a “calibration bar”) was printed below the image on the black plate. You use the four pieces of film to create a press proof or a color composite, such as a MatchPrint, then use a photodensitometer to measure and record the density levels of certain steps in the calibration bar.

You need to convert the recorded density readings to percentage values to make the correct adjustments in the Transfer Function dialog box.

Information about determining the proper adjustments to make to the density values in the Transfer Function dialog box is contained in the section, “Step 7: Calibrating the output for gray-scale images” in Chapter 19, “Printing Halftones.” In the case of a color separation, you need to adjust the density values for four colors. To do this, make the same density adjustments to all four colors based on the measurements of the calibration bar on the black plate. For example, if the measurements on the calibration bar indicate that you need to increase the Midtones value to 44 percent, enter 44 in the Midtones text boxes for the cyan, magenta, yellow, and black colors.

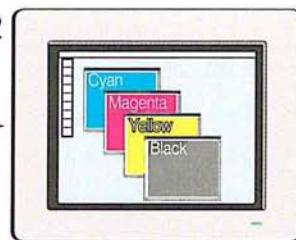
## Dot Gain Calibration

1



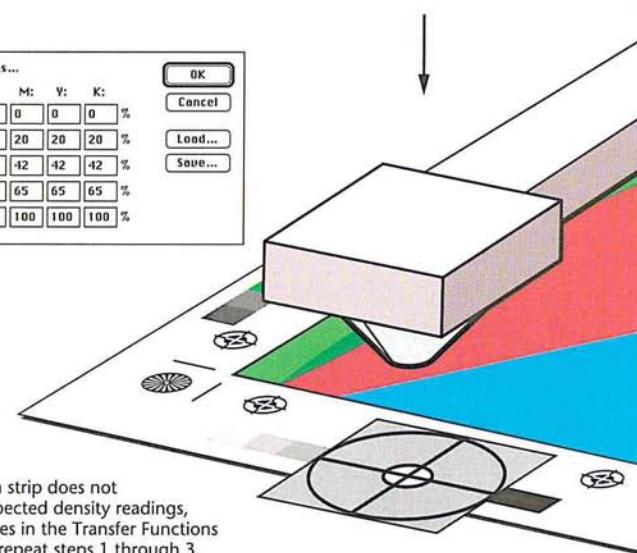
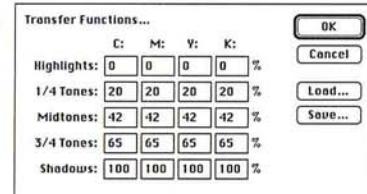
Convert the RGB image on your screen to the CMYK mode.

2



Print a press proof of your image on the same type of paper on which your final project will be printed.

3



If the calibration strip does not produce the expected density readings, change the values in the Transfer Functions dialog box and repeat steps 1 through 3.

**To select the Page Setup options to perform the calibration:**

1. Choose Page Setup from the File menu.

The Page Setup dialog box appears.

2. Make sure that the Labels, Calibration Bars, Registration Marks, Negative, and Emulsion Down options are checked. If they aren't checked already, click them.

3. Click OK to close the Page Setup dialog box.

4. Choose Print from the File menu.

The Print dialog box appears.

5. Click OK.

The four plates are printed.

**To calibrate the output to adjust for dot gain:**

1. Create a press proof using the four pieces of film you just printed.

2. Use a photodensitometer to measure the density of the lightest, darkest, and middle steps in the calibration bar, and record the values for use in step 7.

3. Convert the density values to percentage values (if necessary).

4. Choose Page Setup from the File menu.

5. Click Transfer.

The Transfer Function dialog box appears.

6. Double-click the text box for the level and the color you want to adjust.

7. Enter a value to adjust the density to the desired level.

8. Click OK.

## Step 5: Calibrating the monitor colors

After you have calibrated the output for dot gain, and adjusted the monitor gamma (if necessary), you can calibrate the printed colors to match the colors displayed on your monitor. You perform this calibration by adjusting the color swatches displayed on-screen to make them match the same color swatches when printed.

*NOTE: This color matching process is fundamentally different from that used by the Adobe Illustrator 88 program. Illustrator's native color space is CMYK; adjusting its color swatches is used to make its screen preview match the printed results. The native color space of the Adobe Photoshop program is RGB; adjusting its color swatches is used to make the printed results match the screen display.*

You can use either the sample color swatches provided in the Appendix, or you can print the Photoshop Color Swatches file included on the Calibration disk. You should only print the color swatches file after you have calibrated your system for dot gain.

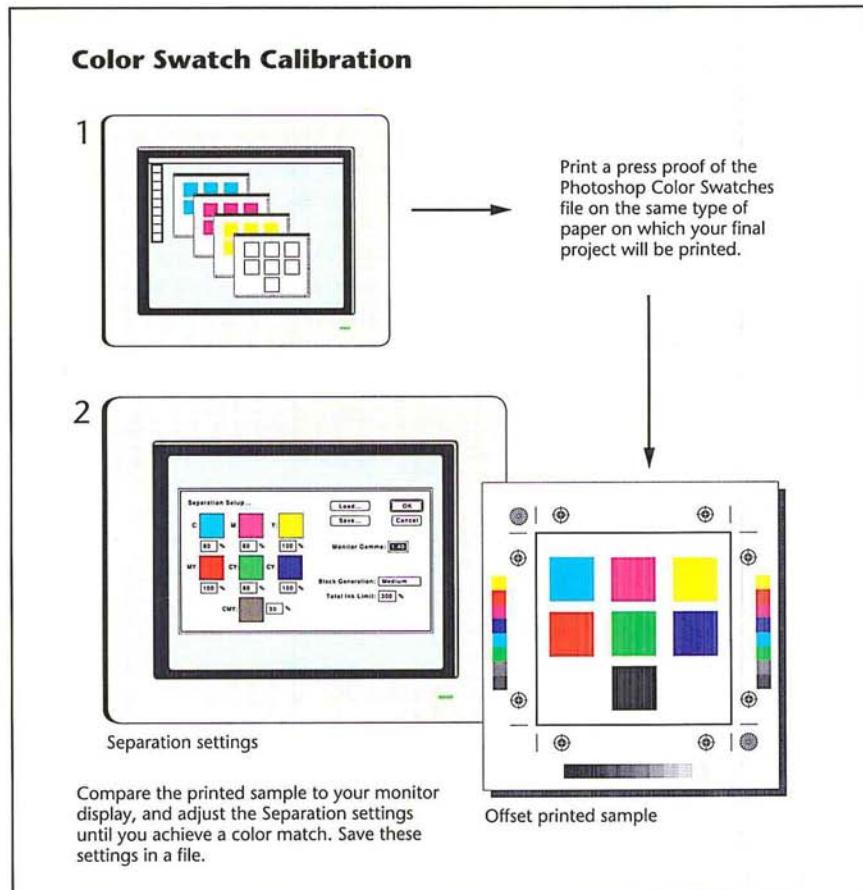
The color swatches are used to generate parameters that help convert an RGB image to CMYK. It is very important that they be calibrated accurately. The quality of your separation will be strongly influenced by the color swatch calibration.

*NOTE: When the Calibration Bars option is selected, and a color image is printed, small color swatches are printed at the sides of the image. On the left are the 80% screened colors and the 50% CMY swatch. On the right are the 100% screened colors. These swatches, called screen tints, can be used to adjust the monitor's color swatches if you prefer.*

Once you have generated a screen tint sheet, the next step is to match the color swatches in the Separation Setup dialog box, which you open by choosing the Preferences command from the Edit menu. The Separation Setup dialog box displays the same color swatches that appear in the Appendix and in the Photoshop Color Swatches file. The color swatches, from upper left to right, are as follows: 80 percent cyan, 80 percent magenta, 100 percent yellow, 100 percent magenta and yellow, 80 percent cyan and yellow, 100 percent cyan and magenta, and 50 percent cyan, magenta, and yellow.

The default percentage values that appear below the color swatches are CMYK color tint levels that can be displayed accurately on an RGB monitor. For example, pure, 100-percent cyan cannot be accurately displayed on-screen, so an 80-percent tint is used.

You can change the tint values to other percentage values. You can enter a value between 70 and 100 percent for all the swatches except the CMY swatch. You can enter a value between 30 and 70 for that swatch. The default settings correspond to the tint densities of the colors that appear in the printed color swatches. In general, you should use the default values for color calibration.



**To generate your own printed color swatches:**

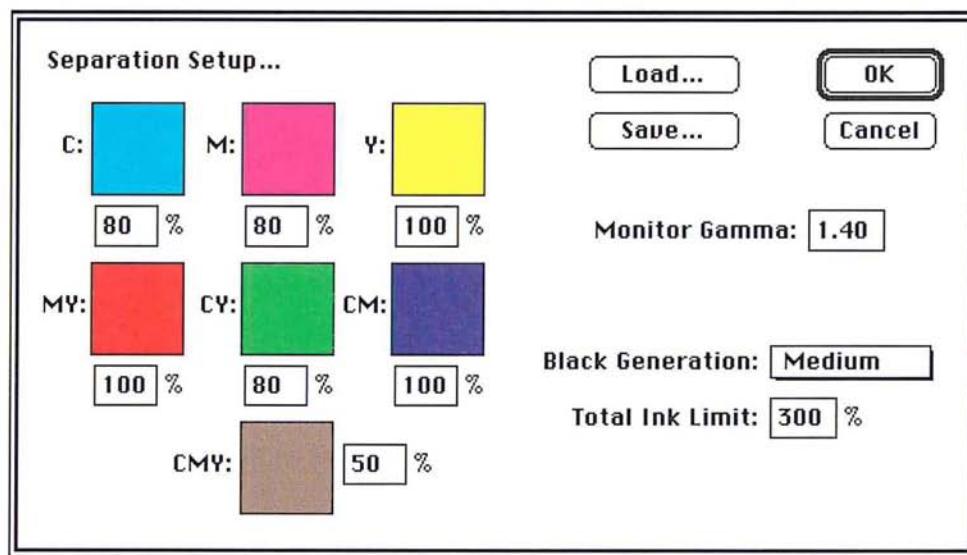
1. Insert the Calibration disk.
2. Open the Photoshop Color Swatches file.
3. Choose Print from the File menu.
4. Click OK.
5. Use a color proofing system to create a color proof of the color swatches, or ask your print shop to produce a press proof using the color swatches.

Follow the instructions below to use the printed color swatches to calibrate the colors displayed on your monitor.

**To adjust the color swatches:**

1. Choose Preferences from the Edit menu.
2. Click Separation Setup.

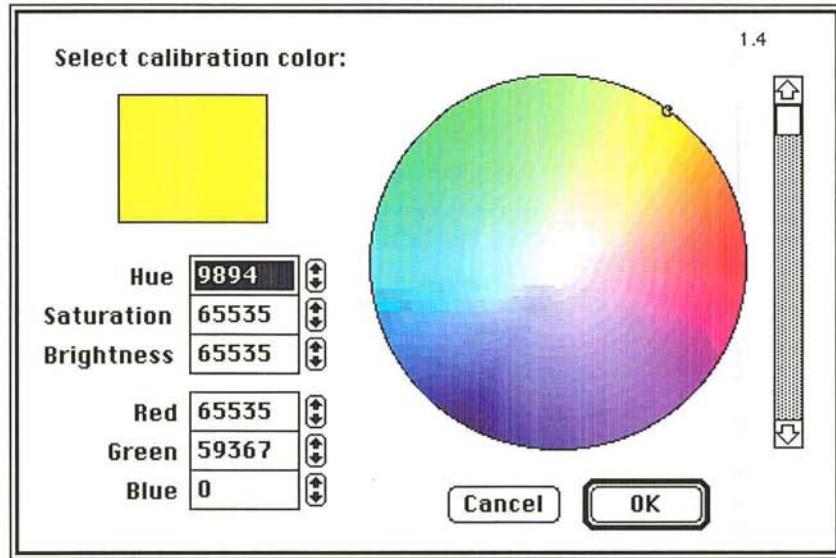
The Separation Setup dialog box appears.



3. As an option, to change the percentage values for the tint samples, double-click in the text box beneath the swatch you want; enter the tint value you want (as a percentage).

4. Click the color swatch you want to adjust.

The Color Wheel dialog box appears.



5. Use the controls in the Color Wheel dialog box to define a color that closely matches the appropriate color on the printed color swatches.

For instructions on using the color wheel to select colors, see the section, "Using the color wheel" in Chapter 11, "Selecting Colors."

6. Click OK.

7. Repeat steps 4 through 6 for all the color swatches that need adjusting.

8. Click OK, and click OK again.

The changes you make to the colors are saved in your preferences file.

## Steps 6 and 7: Color separation options

This section describes how you can fine-tune the color swatches, automatically create color traps, and control the amount of black generation.

### Step 6: Fine-tuning the color swatches

Because it is difficult to match color visually, sometimes the color swatch values selected in the previous section are not exactly right. This section describes how you can fine-tune the color swatch values by matching the colors in an entire image. This technique is possible because the Adobe Photoshop program, in addition to being able to perform a normal RGB to CMYK color separation, is also able to perform a CMYK to RGB color preview.

To perform this calibration, you should open an RGB or indexed color document, choose CMYK Color from the Image menu to produce a color separation, and print that separation. Be sure to save the CMYK file before quitting the program.

You then have two choices for producing the proof for the calibration. You can use a color proofing system, like the MatchPrint system, to create a composite, four-color proof of the image. The four-color proof process is similar to the actual printing press process that ultimately will be used to print the image. A color proof made from four pieces of film more closely matches the printed result than a color composite printed on paper. As an alternative, you can send the four pieces of film to a print shop to produce a press proof using the ink and paper you will use to print the final piece. This option can be expensive, but it produces the closest approximation to the final printed piece.

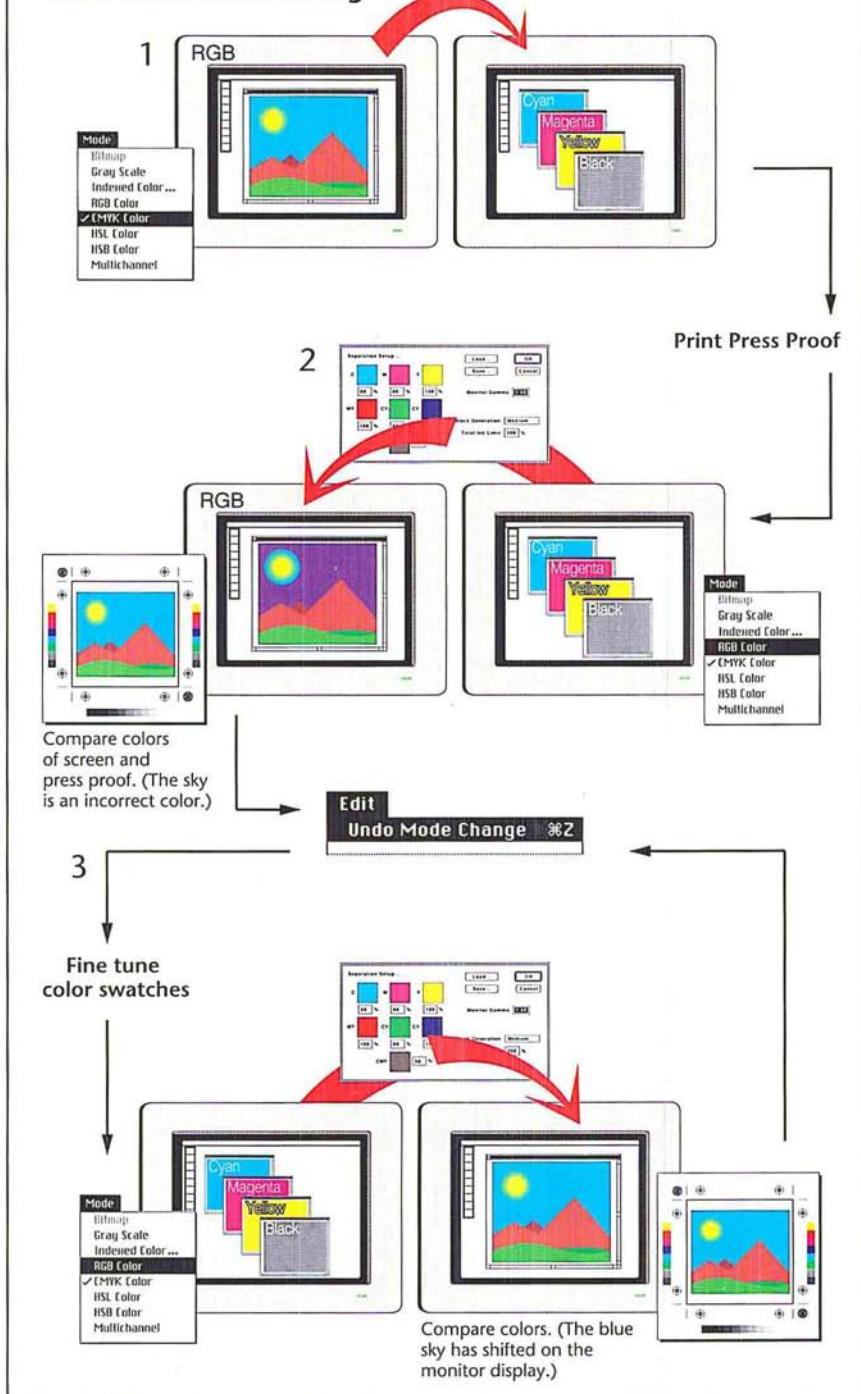
If the composite color or press proof matches the image displayed on the monitor, there is no need to perform any additional color calibration. However, if the color proof does not match the display, you need to adjust the color swatches to calibrate the color separation process.

After you produce a color proof, you convert the CMYK image back to an RGB image and compare the RGB image on-screen to the printed CMYK image. You should note the variations in color between the two images and consider ways to adjust the CMYK colors swatches to make the RGB image on-screen match the printed CMYK image.

You may have to repeat this process a few times to make the display match the printed output. However, once you have calibrated the CMYK colors on-screen, the color separation process will be more accurate with other images.

**WARNING:** After you convert back to the RGB mode, do not make any adjustment to the RGB image. You want only to view the effects of the changes to the CMYK color swatches on the RGB image. If you alter the RGB image, you may not be able to undo the conversion and return to the CMYK mode.

## Color Swatch Fine-Tuning



To create a press proof for a calibration:

1. Open a document that contains an RGB or indexed color image.
2. Choose CMYK Color from the Mode menu.  
The image is converted to a CMYK image.
3. Choose Print from the File menu.
4. Click OK.
5. Save the CMYK file.
6. Take the resulting four pieces of film, and create a press proof or use a color proofing system to create a four-color proof.

To compare the RGB image on-screen to the printed CMYK image:

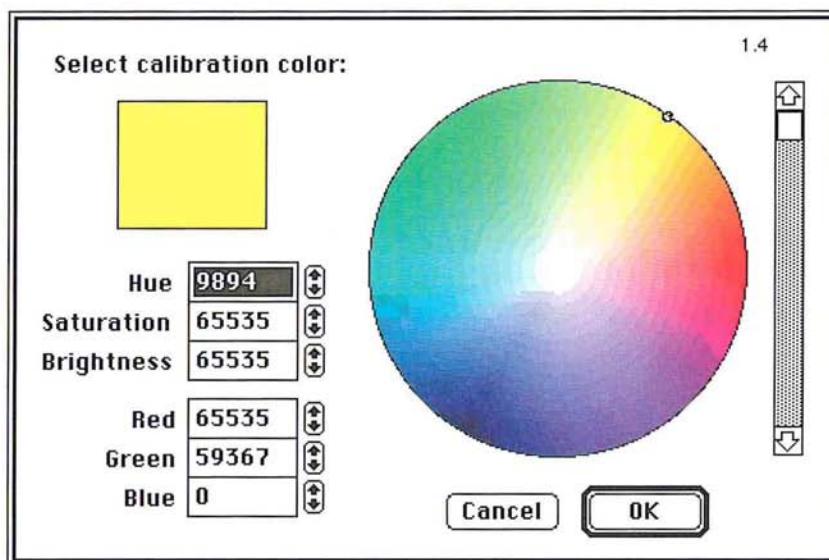
1. Open the CMYK image that you just printed.
2. Choose RGB Color from the Mode menu.
3. Compare the RGB image to the printed CMYK image. Note any variations in color between the two images, and consider how to adjust the CMYK color swatches if necessary. Do not adjust the RGB image.
4. Choose Undo Mode Change from the Edit menu.

The CMYK version of the image is restored without any alterations.

To adjust the color swatches:

1. Choose Preferences from the Edit menu.
2. Click Separation Setup.
3. Click the color swatch you want to adjust.

The Color Wheel dialog box appears.



4. Use the controls in the Color Wheel dialog box to adjust the color so that the RGB display of the image matches the printed CMYK image.

For instructions on using the color wheel to select colors, see the section, "Using the color wheel" in Chapter 11, "Selecting Colors."

5. Click OK.
6. Repeat steps 3 through 5 for any color swatches that need adjusting.
7. When you have finished adjusting the color swatches, click OK, and click OK again.

Repeat the preceding steps to view the effects of the changes on the RGB display of the image, return to the CMYK mode, and adjust the color swatches in the Separation Setup dialog box to make the RGB image match the color proof.

### Step 7: Adjusting the black generation

The black generation option for color separations allows you to replace the combination of cyan, magenta, and yellow colors of your image with black. Black generation involves a process called undercolor removal, which is an adjustment color separators use to make precise adjustments for the printed image.

The undercolor removal process removes a portion of cyan, magenta, and yellow in the areas where these three colors overlap, and replace some percentage of those colors with black. Often when cyan, magenta, and yellow appear in high densities in dark areas of an image, a muddy, brownish color results, and the shadow detail in the image is lost. Undercolor removal is designed to eliminate these problems.

You make your choices for black generation before you convert an image to the CMYK format.

Part of the black generation process involves specifying the maximum density of ink that the printing press you intend to use can support. If an area of the image exceeds that amount, the option automatically removes ink from that area.

The upper end of the density limit is 400 percent, which means that a 100-percent tint of each of the four process colors is applied to the image. However, most presses cannot support this much ink on the page without degrading the quality of the image. You should ask your printer what the density limit on the press is. The value specified for the total ink limit ensures that no more than the specified amount of ink will be printed on any area of the image; in fact, the amount of ink printed may be less than the specified amount. The default maximum density is 300 percent.

You can control how much black is substituted for the cyan, magenta, and yellow colors in an image using the black generation options. The amount of black that is substituted is reflected on the black plate of a color separation. If no black is substituted, no black appears on the black plate; if the maximum amount of black is substituted, the black plate will contain a large amount of black.

### Black generation options

The black generation options are None, Light, Medium, Heavy, Maximum, and Custom. The name of the option reflects the amount of black generated on the black plate—that is, the Light option generates a light amount of black. Medium is the default option and should produce satisfactory results in most cases. You can use the Maximum option with images that contain a large amount of solid black color against light backgrounds, such as images showing screen shots of dialog boxes and windows taken from a Macintosh computer.

The Custom option allows you to precisely control the amount of black generation during a color separation. The steps for using the Custom option differ from those for the other options, and are described in the section that follows this.



Black generation set to medium



Black plate



Black generation set to heavy



Black plate

To specify the total ink density supported by a press and the desired amount of black generation:

1. Ask your print shop what the maximum density of ink is that the press can support.
2. Choose Preferences from the Edit menu.  
The Preferences dialog box appears.
3. Click Separation Setup in the Preferences dialog box.  
The Separation Setup dialog box appears.
4. Click the Total Ink Limit text box.
5. Enter the total ink limit recommended by your printer as a percentage value from 200 to 400.

*NOTE: This limit is applied before the Transfer option, which, by default, lightens the printed result to compensate for dot gain. Thus, you may be able to enter a slightly higher limit than your print shop specified.*

6. Position the pointer on the box beside the title, "Black Generation."
7. Press down the mouse button.  
The Black Generation pop-up menu appears.
8. Holding down the mouse button, choose the black generation option you want.  
The option appears in the box.
9. Click OK, and click OK again.

When you create a color separation, the amount of black that appears on the black plate will be determined by the option you chose.

### **The Custom black generation option**

The Custom option allows you to accurately control the amount of black generated during a color separation. The Custom option allows you to use the Arbitrary Map dialog box, which is accessed from the Map submenu in the Image menu, to adjust the areas where black appears in the image. You may not want black to appear in certain areas in an image. As an example, in a photograph of a person, you might not want black to appear in the areas where there is a transition between dark areas, such as dark hair and the flesh tones of the face. If black appeared in these areas, the transition might be exaggerated, and the printed result might be unsatisfactory.

The Custom option allows you to use the controls in the Arbitrary Map dialog box to remap the black pixels that appear in these areas to white, thereby ensuring that cyan, magenta, and yellow will be used in these areas instead of black. The steps for using the Custom option are described as follows.

**To use the Custom option for black generation:**

1. Choose Save from the File menu to save any changes made to the document.
2. Choose Preferences from the Edit menu.  
The Preferences dialog box appears.
3. Click Separation Setup in the Preferences dialog box.
4. Position the pointer on the box beside the title, "Black Generation."
5. Press down the mouse button.  
The Black Generation pop-up menu appears.
6. Holding down the mouse button, choose Maximum.
7. Click OK, and click OK again.
8. Choose CMYK color from the Mode menu to create a color separation.

The black plate appears as the active channel.

**To adjust black in an image using an arbitrary map:**

1. Choose Map from the Image menu.
2. Choose Arbitrary from the Map submenu.  
The Arbitrary Map dialog box appears.
3. As an option, you can load one of the the black generation curves provided on the Calibration disk to see how an arbitrary map controls the black generation. The maps for light, medium, heavy, and maximum black generation are provided.

**To load an arbitrary map on the Calibration disk:**

1. Click Load in the Arbitrary Map dialog box.  
The Open dialog box appears.  
Use the directory and drive buttons to locate the folder on the Calibration disk that contains the maps.
2. Click the map you want.
3. Click Open.

The curve for the selected map is loaded into the Arbitrary Map dialog box.

4. Use the controls in the Arbitrary Map dialog box to adjust the areas where black appears in the image.
5. Save the arbitrary map in a file by clicking Save and specifying a file name and location.

For instructions on using the Arbitrary Map dialog box to remap the color values of pixels, and saving the map in a file, see the section, "Creating a color curve" in Chapter 16, "Making Color Corrections."

6. Choose Revert from the File menu to return to the RGB image.

7. Click OK in the alert dialog box to revert without saving changes.

**To use the custom arbitrary map to control the amount of black generation:**

1. Choose Preferences from the Edit menu.
2. Click Separation Setup in the Preferences dialog box.
3. Choose Custom from the Black Generation pop-up menu.

The Open dialog box appears.

Use the drive and directory buttons, if necessary, to select the arbitrary map file you created.

4. Click Open.
5. Click OK, and click OK again.
6. Choose CMYK color from the Mode menu to create a color separation.

The information in the arbitrary map file is used to control the amount of black generated in the color separation.

## Step 8: Creating traps

Trap is the overlap needed to ensure that a slight misalignment or movement of the separations will not affect the final appearance of the print job. If any distinctly different colors in your image touch, you may need to overprint them slightly to prevent tiny gaps from appearing when the document is printed. This technique is known as adding traps.

Even the best presses experience slight shifts in the position of the plates. To ensure proper trapping, print shops use techniques called choking and spreading, in which traps are created by overexposing the film to produce the necessary overlap. Because you are printing the Adobe Photoshop files directly to film, shrinking and spreading cannot be used, but traps can be produced using the program's Trap command. The Trap command in the Image menu is only active in CMYK images.

Consult with your print shop for the amount of misregistration you can expect to experience on press. The value can be in pixels, points, or millimeters. The Adobe Photoshop program uses this value to determine automatically where color transitions occur, and where the colors in those areas should be spread outward. So if the plates shift on press, ink still will be printed continuously throughout the image.

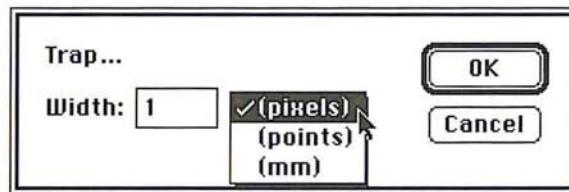
To spread the colors in areas (create trap) where color transitions take place:

1. Choose CMYK Color from the Mode menu to convert the image to the CMYK format.

The image is converted to an image consisting of four channels. The channels, cyan, magenta, yellow, and black, are used to print the four plates you send to the printer.

2. Choose Trap from the Image menu.

The Trap dialog box appears.



3. Use the pop-up menu beside the text box to choose the units of measure you want; you can choose pixels, points, or millimeters.
4. Enter the amount of anticipated misregistration you will experience on the press.
5. Click OK.

When you have finished calibrating and setting up your color separation, you can print the final film.

## **Step 9: Printing final, camera-ready film**

You are ready to print your separated image as four pieces of camera-ready film.

**To print the final, camera-ready film:**

1. Choose Page Setup from the File menu.
2. Check Labels, Registration Marks, Negative, and Emulsion Down.
3. Click OK.
4. Choose Print from the File menu.
5. Click OK.
6. The image is printed as final, camera-ready film.

If you are satisfied with your results, you have successfully printed the final, camera-ready film to be used to create plates for a press. If you are dissatisfied with your results, you may want to go back and adjust your system, monitor, image, or other print settings in this chapter's previous eight steps.

## Chapter 21: *Tips and Troubleshooting*

This chapter contains tips for using the Adobe Photoshop program most efficiently, and solutions to problems you may encounter when using the program. Many of the tips and solutions address situations you may encounter when making color corrections and printing images. In addition, the chapter includes techniques for using the Adobe Photoshop program with the Adobe Illustrator 88™ program.

### Working efficiently with color

Following are techniques for working most efficiently with color images. This section explains how to select CMYK colors precisely and achieve the desired results, save color documents for video applications, view color changes dynamically on 24- and 32-bit systems, and save color documents for video applications.

#### CMYK colors appear different than those specified

**Problem:** The CMYK values specified didn't yield the same values when the image was separated. As an example, you specified a color of 10% cyan, 55% magenta, 100% yellow, and 10% black, but the actual separated values of this color differed.

**Cause:** The CMYK values you choose must be consistent with the black generation curve that dictates how RGB colors are translated to CMYK colors. (The black generation curve is specified in the Separation Setup dialog box under the Preferences command in the Edit menu.) Otherwise, your CMYK values will appear differently than what you specified. The black generation curve defines a unique mapping for each RGB value. That is, for a given black generation curve, every RGB color has an equivalent CMYK color. If you change your black generation curve, then your RGB colors will translate to different CMYK colors.

**Solution:** To determine the actual CMYK values that will result from the separation, click the cursor once on the CMYK pop-up menu in the color palette. The sliders will adjust to display the CMYK values that the color will have when it is separated.

## **Color changes do not preview dynamically on 24- and 32-bit systems**

**Problem:** In 24-bit mode, the screen displays odd colors, or a system error results as you move the sliders in the color adjustment dialog boxes which are accessed via the commands in the Adjust submenu in the Image menu.

**Cause:** If you have a 24- or 32-bit monitor and are in 24-bit mode, you can view millions of colors at a time and preview color changes dynamically. A feature called color table animation causes the screen to change interactively as you adjust color by moving the sliders in the Levels, Color Balance and Brightness/Contrast dialog boxes. The Adobe Photoshop program implements color table animation in 24-bit mode using a 32-bit QuickDraw command called DirectSetEntries.

However, some early releases of 24- and 32-bit video cards by several video board manufacturers have bugs in their implementations of the DirectSetEntries command. These bugs may prevent previewing color changes or may result in a system error.

**Solution:** In the Preferences dialog box under the Edit menu, uncheck the box labeled "Use DirectSetEntries." Disabling the DirectSetEntries option will prevent a system error, but it will also disable the ability to preview changes interactively as you move the color adjustment sliders. However, you can preview the changes by clicking the Preview button in the Levels, Color Balance and Brightness/Contrast dialog boxes. To solve the problem, contact your video board manufacturer for a replacement to the ROMs in the video card.

## **Undesirable dithering patterns appear in 16-bit PICT images**

**Problem:** Noticeable and undesired patterns occur in a 16-bit PICT image that has been saved from a 24- or 32-bit image format.

**Cause:** Some applications, such as video, don't require the image resolution and information contained in 24- and 32-bit images; converting the image to a smaller format reduces the amount of color information and disk space required by the image. When saving a 24-bit image as a 16-bit PICT file for video or other applications, the Adobe Photoshop program normally dithers the image to simulate the colors in the 24-bit image that cannot be included in the 16-bit file. A 16-bit image can display only 32,768 different colors (compared to more than 16 million for a 24-bit image), but this display is usually adequate for video purposes. However, dithering can result in a noticeable and undesired pattern throughout the image.

**Solution:** Dithering can be disabled by ensuring that the 24-bit image contains 32,768 or fewer unique colors before it is saved. Decreasing the number of colors in an image to 32,768 or less effectively converts a 24-bit image to a 16-bit file before it is saved.

To change a 24-bit image to 16 bits for video applications, you use the Posterize command in the Map submenu in the Image menu to decrease the number of colors in each channel to 32 levels. This will result in an image that now has no more than 32,768 individual colors. When you save the image as a 16-bit PICT file, the image will be saved without dithering.

## Tips and techniques for printing efficiently

Following are techniques for printing images most efficiently, as well as solutions to some problems you may encounter when printing an image.

**Problem:** The printer is taking an unusually long time to print.

**Cause:** The resolution of your image may be too high for the resolution of your printer.

**Solution:** Make sure that you have properly sampled down your image to comply with the resolution at which you are printing. Before printing your image, you should save your file. Then use the automatic resampling feature in the Resample dialog box under the Resample command in the Image menu to adjust the resolution of your image.

To do so, choose Resample from the Image menu, and in the Resample dialog box, click Auto. Enter the resolution for the printer, and click OK to have the Adobe Photoshop program automatically resample the file. When you have finished printing, revert the illustration to the version you saved before the resampling, using the Revert command in the File menu. It is important to revert your image, to retain all of the information in the image. You should not resample down below the resolution at which you will print the final image because when you resample down, you delete image information that cannot be recovered.

## High-resolution images print enlarged and at a low resolution

**Problem:** Images that were scanned at high resolution print much larger than the original size and at much lower resolution than scanned.

**Cause:** The Adobe Photoshop program opens documents in some formats at 72-dpi resolution, regardless of the resolution of the original document. This may cause a document to appear enlarged when it prints, if the resolution of the original image is greater than 72 dpi. Because the image still contains all of its information, the image will be sized many times larger than the original and will thus print too large and at low resolution.

**Solution:** To correct this, change the size of the document using the Size/Rulers option in the Page Setup dialog box under the File menu. Notice as you make the size smaller, the resolution will increase and become closer to the original scanning resolution. The option will cause the image to print at its accurate size, but will not affect how the image appears on-screen.

## Using computer and system memory efficiently

Following are techniques for using computer and system memory most efficiently.

### Space on hard disk appears lost

**Problem:** Help! A system error occurred, and now it appears that a large segment of the hard disk is missing. All of the space occupied by the files doesn't add up to the storage capacity of the disk.

**Cause:** When a system error occurs, the directory entries used to locate files on your hard disk can be damaged. If a system error occurs while you are running the Adobe Photoshop program, it is possible that the space occupied by the PS.temp file could become lost to the Macintosh system. It may appear as though a large segment of your hard disk is actually missing.

The PS.temp file is a special file created by the Adobe Photoshop program to implement the program's virtual memory scheme. Virtual memory allows you to work on images of nearly any size, by using a hard disk instead of RAM (random-access memory) to hold information. The PS.temp file contains the program's virtual memory information. The file is normally deleted when you quit the program.

**Solution:** To restore the lost space on your hard disk easily and quickly, run the Disk First Aid program, a utility supplied with Apple's system software. For more information, see your Macintosh documentation.

### Third-party virtual memory program doesn't speed processing

**Problem:** The Connectix Virtual program is installed to speed up processing, but it doesn't seem to have an effect on the Adobe Photoshop program. If anything, it seems to slow down the program.

**Cause:** The Adobe Photoshop program's implementation of virtual memory is highly optimized for its particular architecture. No additional virtual memory program is required for optimal system performance when using the Adobe Photoshop program.

Virtual memory uses the hard disk to hold information when there is not enough RAM in your computer. Because the access speed of a hard disk is much less than that of memory chips, large images that must be swapped to and from disk will slow processing noticeably.

For both color and black-and-white images, the Adobe Photoshop program requires between three and five times the file size in combined RAM and hard disk space. Thus, to work on a 10-megabyte color image, you will need nearly 30 megabytes of free disk space.

**Solution:** If a virtual memory program is used, the Adobe Photoshop program's Multifinder memory allocation should be set to some value smaller than the amount of actual RAM installed in the Macintosh.

You will get the best performance if you use an empty hard drive (or drive partition) as the Adobe Photoshop program's virtual memory disk. An empty drive contains contiguous disk space, allowing the PS.temp file to be stored in one large piece, rather than in fragments throughout the hard drive. The PS.temp file contains the program's virtual memory information, and is automatically located in the same folder as the preferences file.

### **Message states disk is full**

**Problem:** The message continually displays that operations can't be performed because the disk is full.

**Cause:** Your preferences file may be on a disk that doesn't have enough free disk space for your image.

**Solution:** Make sure that your Adobe Photoshop preferences file is on a volume or hard disk that has enough free disk space to equal about three times the size of the file. The file size is displayed in the lower left corner of the document window.

### **Installed plug-in modules don't appear in the program**

**Problem:** After additional plug-in modules have been installed in the same folder as the Adobe Photoshop program, the additional features still are not accessible in the program.

**Cause:** Plug-in modules must be placed in the same folder as the Adobe Photoshop preferences file to be accessible.

**Solution:** Move the plug-in modules to the same folder as the preferences file, and restart the Adobe Photoshop program. Some of the plug-in modules may appear as filters in the Filter menu. Other plug-in modules may appear as import and export modules in the Acquire and Export submenus in the File menu.

### **Painting tools don't work**

**Problem:** Painting tools don't apply any paint on the image.

**Cause:** Painting tools only work inside areas that are part of the current selection or when no part of the image is selected.

**Solution:** Check to make sure that you are not painting outside a selected area. If you are painting outside a selected area, choose either None or Inverse from the Select menu.

## Using the Adobe Photoshop program with Adobe Illustrator 88

This section includes tips and techniques for using Adobe Illustrator 88 in tandem with the Adobe Photoshop program, and solutions to problems you may encounter when doing so. The section assumes you are using version 1.9.3 or later of Adobe Illustrator 88 software.

### Imported Adobe Illustrator 88 files have jagged edges

**Problem:** Files imported to the Adobe Photoshop program from the Adobe Illustrator 88 program have jagged edges.

**Cause:** Like other image types, Adobe Illustrator 88 files are imported into the Adobe Photoshop program in a low-resolution, 72-dpi format. The low resolution can result in images with fairly jagged edges.

The Adobe Photoshop program can import files in a variety of formats, including the EPS file format created by Adobe Illustrator 88, but sometimes the files to be imported require special consideration.

Only part of the information in an EPS file is useable by the Adobe Photoshop program. An EPS format can contain both vector (mathematically described line art) and pixel-based (scanned) graphics. An EPS file may also include a low-resolution PICT file (either color or black-and-white) that can be used to preview the images on screen when imported into other applications.

Although the Adobe Photoshop program can import EPS files, the program works only with pixel-based images, and so can only read and write the pixel-based portion and the PICT images of an EPS file. In contrast, Adobe Illustrator 88 is primarily a vector-based program, and therefore its files are saved in a vector format.

Adobe Illustrator 88 files intended to be exported to the Adobe Photoshop program should be saved with the Macintosh preview option selected. This option saves the file as a 72-dpi PICT image, suitable for importing into the Adobe Photoshop program. However, once imported into the Adobe Photoshop program, the 72-dpi images have fairly jagged edges.

**Solution:** To smooth out the edges, you can use the same trick that Adobe Photoshop software uses to create anti-aliased (or smoothed) text.

While still in the Adobe Illustrator 88 program, simply resize the image by about 2-1/2 times. To do so, select your image to be scaled. Click the scale tool to select it, and hold the Option key and click; a transformation dialog box appears. Enter a value of 250% and click OK.

Save the file using the Save As command; be sure to check the Color Macintosh preview option. Then import the image again into the Adobe Photoshop program. In the Adobe Photoshop program, convert the image from indexed color to RGB using the Mode menu. Choose Resize from the Image menu, and shrink the image to 40 percent of the original size.

If your file is too large, the Adobe Illustrator 88 program may not save it. In that case, you should copy portions of the image onto the Clipboard and paste them into the Adobe Photoshop program. To save portions of an image, select a part of the image; hold the Option key and choose the Copy command from the Edit menu. This will place a color PICT image on the Clipboard.

### **File cannot be imported into the Adobe Photoshop program**

**Problem:** Adobe Illustrator 88 files containing Adobe Photoshop images can't be opened or used on the Macintosh you are using.

**Cause:** Often, the most efficient way to print documents containing both separated color images and Adobe Illustrator 88 artwork is by exporting the files to the Adobe Illustrator 88 program. Once placed in the Adobe Illustrator 88 program, the file must be saved in a specific way, depending on how you plan to use it later.

As long as you plan to use the file on the same Macintosh, you will have no difficulty using the EPS file. However, if you plan to use the file on another Macintosh, or take the file to a service bureau for processing, you must take care in how you save the EPS file. The Adobe Illustrator 88 program, by default, does not save placed Encapsulated PostScript (EPS) files within its images because the files can be large and require a large amount of disk space. Instead, the Adobe Illustrator 88 program uses a pointer to point to an EPS file's location on the hard disk.

**Solution:** You have two options for saving and exporting the EPS file with the Adobe Photoshop and Adobe Illustrator 88 programs. You can save the file as an ASCII file or as an EPS file.

To save the artwork as an ASCII file, use the Save As dialog box to check the EPS option to Include copy of Placed Encapsulated PostScript files for other applications. The file now can be used on another Macintosh.

If you want to save the artwork as a binary file, you will have to first copy the file to a floppy disk for use on another Macintosh or by a service bureau. To save the artwork as a binary file, use the Save As dialog box to check the binary option. Do not check the EPS option; using this option will generate an error message when you try to reopen the file in the Adobe Illustrator 88 program. Once you have copied the file to a floppy disk and saved it without checking the EPS option, you can then take copies of the placed Adobe Photoshop files, as well as the Adobe Illustrator 88 files, to another Macintosh or to a service bureau.

## **Adobe Photoshop files can't be exported**

**Problem:** Adobe Photoshop images can't be imported into the Adobe Illustrator 88 program.

**Cause:** To be imported into the Adobe Illustrator 88 program, Adobe Photoshop images must be saved in the EPS file format. The Adobe Illustrator 88 program only accepts the EPS file format.

**Solution:** To import an Adobe Photoshop image into the Adobe Illustrator 88 program, you open an Adobe Illustrator 88 document and use the Place command in the File menu of the Adobe Illustrator 88 program.

If you want to import a color Adobe Photoshop image, and you plan to separate the final result using Adobe Separator, you will want to separate it first. To do so, first convert the Adobe Photoshop document to CMYK before saving it, using the CMYK Color command in the Mode menu. This creates separate images for each color plate that will be saved as one EPS file. Then choose the Save As command from the File menu, and choose the EPS option from the File Format pop-up menu; the EPS Options dialog box displays options for preview resolutions and encoding. For placement into the Adobe Illustrator 88 program, the files must be saved using the 1 bit/pixel Preview PICT option, in either binary or ASCII encoding format.

It's important to note that if you choose the binary option in the Adobe Photoshop program, and plan to use the EPS option in the Adobe Illustrator 88 program's Save As dialog box, you will not be able to reopen the files in Adobe Illustrator 88, and an error message will be generated. Either choose the ASCII encoding option if you want to also use the EPS option; or use the binary encoding option, but do not select the EPS option in the Adobe Illustrator 88 program.

## **Imported EPS files don't appear in the artwork**

**Problem:** The placed EPS file imported from the Adobe Photoshop program doesn't appear in my artwork.

**Cause:** By default, placed EPS files do not display in the Adobe Illustrator 88 artwork mode, but they will display in the preview mode.

**Solution:** Change the default in the Preferences dialog box in the Edit menu. To display placed EPS images, check the Show placed images option. Once the option is checked, placed EPS images will display in both the artwork and preview mode.

## Imported PICT files can't be opened

**Problem:** An error message results when you try to open PICT files imported from the Adobe Illustrator 88 program in the Adobe Photoshop program. The Adobe Photoshop program can't open the PICT file.

**Cause:** If a file is too large, the Adobe Illustrator 88 program may not save a PICT preview, and you will be unable to open the file.

**Solution:** You may be able to select portions of your illustration, and then copy and paste them into the Adobe Photoshop program. To copy a color PICT image to the Clipboard, select a portion of the image to be copied; hold down the Option key and choose Copy from the File menu to transfer the image to the Clipboard.



## Section 6: *Reference Material*





The designer combined two separate slides of houses and clouds to create this image. Using two copies of the clouds image at two different magnifications, she filled the entire background area with the first selection, and reduced the second selection in size and pasted it behind the houses in the foreground area.



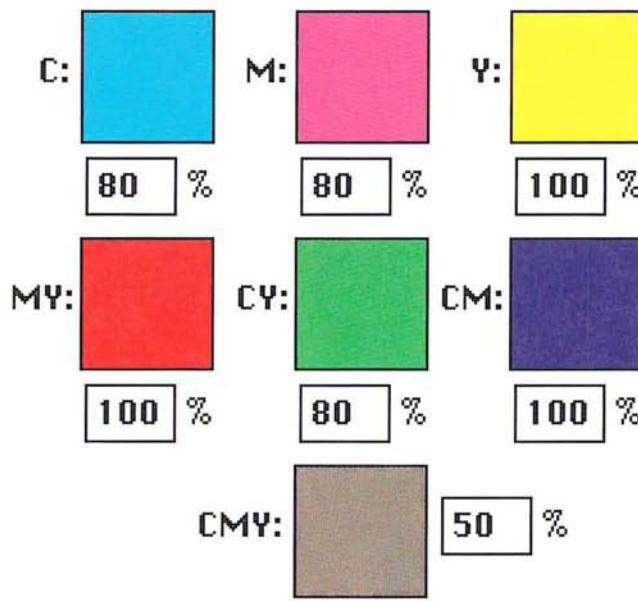
The designer selected a section of the houses and road from the original scan, and, omitting the original sky in the background, placed them on top of the new clouds. Using a filter, she sharpened both areas to create a crystalized effect. She then selected the upper and left sides of the image and copied them to a separate file where she converted them to gray scale to remove the original color information. The designer then converted the image back to RGB mode where she colorized it using the hue/saturation controls. She then copied the selection and positioned it in the composite image.

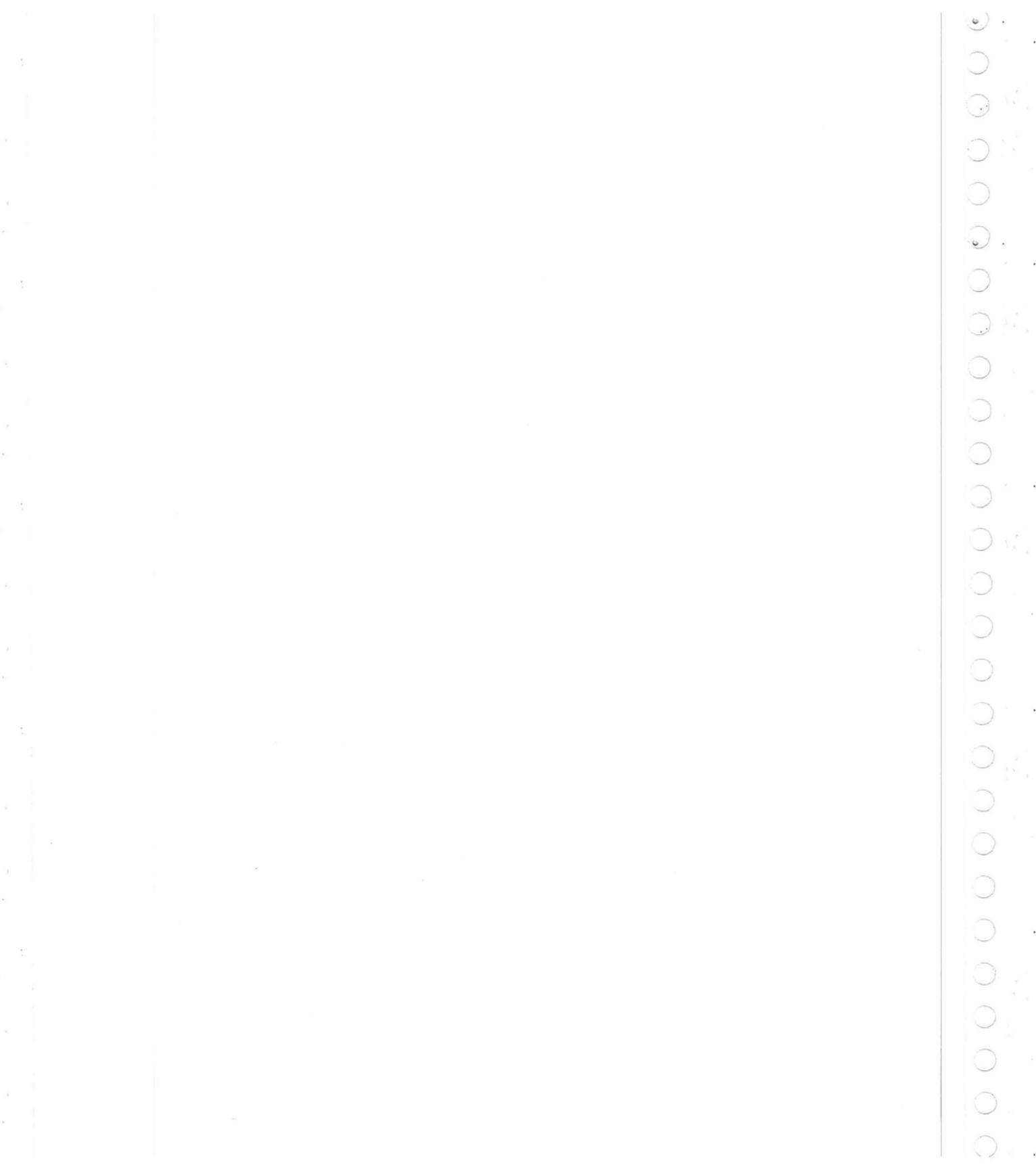
## Appendix: *Photoshop Color Swatches*

The Photoshop Color Swatches printed on this page, as well as the electronic file on the Calibration disk, should be used with the instructions on calibrating your monitor colors, in Chapter 20, "Producing a Color Separation." The Photoshop Color Swatches allow you to match the colors displayed on your monitor to the actual printed output. As a result, you can adjust what you see on-screen to what you get on your printed output.

To calibrate your monitor using the printed swatches, hold the page next to your monitor and compare each swatch to the corresponding swatch in the Separation Setup dialog box under the Edit menu, adjusting the monitor colors as necessary. To calibrate your monitor using a press proof of the electronic file on the Calibration disk, follow the same procedure.

For more information, see Chapter 20, "Producing a Color Separation."





## Glossary

**additive primary colors** Red, green, and blue, which are the three colors used to create all other colors when direct, or transmitted, light is used (for example, on a computer monitor). They are called additive primaries because when pure red, green, and blue are superimposed on one another, they create white.

**alpha channel** An 8-bit, gray-scale representation of an image, often used for creating masks that isolate part of an image.

**anti-aliasing** Smoothing edges created with painting, selection, or type tools.

**arbitrary map** An option that helps control the amount of black in a color separation by remapping black pixels in certain areas of an image to white, thereby ensuring that cyan, magenta, and yellow will be used in those areas instead of black.

**ASCII** Acronym for American Standard Code for Information Interchange. A standard that assigns a unique binary number to each text character and control character.

**aspect ratio** The height-to-width ratio of a marquee selection.

**bitmap-type image** A single-channel image with 1 bit of color information per pixel, also known as a bitmapped image. The only colors displayed in a bitmap-type image are black and white.

**black generation** The amount of black generated on the black plate of a color separation.

**brightness** One of the three dimensions of color; the other two are hue and saturation. The term is used to describe differences in the intensity of light reflected from or transmitted through an image independent of its hue and saturation.

**bull's-eyes (registration marks)** Marks that appear on a printed image, generally for CMYK color separations, to help you align the various printed plates.

**calibration bars** The printed 11-step gray-scale wedge that appears on printed output. When you print a CMYK color separation, this step wedge appears only on the black plate. On a color image, this refers to the color swatches printed at the sides of the image.

**caption** Text that appears below a printed image.

**channel** Analogous to a plate in the printing process, a channel is the foundation of an image. Some image types have only one channel, while other types have several channels. An image can have up to 16 channels.

**CMYK** Cyan, magenta, yellow, and black, the four process colors.

**CMYK image** A four-channel image containing a cyan, magenta, yellow, and black channel. A CMYK image is generally used to print a color separation.

**color correction** The changing of the colors of pixels in an image, including adjusting brightness, contrast, mid-level grays, hue, and saturation to achieve optimum printed results.

**color separation** An image that has been separated into the four process colors of cyan, magenta, yellow, and black (CMYK), and is then printed on four separate plates, each plate representing one of the four process colors.

**constrain** To restrict the movement of a selection.

**continuous-tone image** An image containing gradient tones from black to white.

**contrast** The tonal gradation between the highlights, midtones, and shadows in an image.

**crop** To select part of an image and discard the unselected areas.

**crop marks** The marks that are printed near the edges of an image to indicate where the image is to be trimmed.

**densitometer** An instrument used to measure the density of printed halftones. A densitometer is used to measure the density levels on the printed calibration bars.

**density** The ability of an object to stop or absorb light. The less the light is reflected or transmitted by an object, the higher its density.

**density range** The range from the smallest highlight dot the press can print to the largest shadow dot it can print.

**dithering** The technique of making adjacent pixels different colors to give the illusion of a third color. Dithering can give the effect of shades of gray on a black-and-white display, or more colors on an 8-bit color display.

**dot gain** A defect in printing that causes dots to print larger than they should, causing darker tones or colors. Dot gain is reflected in an increase in the density of light reflected by an image.

**dpi** Dots per inch; a measure of resolution.

**emulsion** The photosensitive layer on a piece of film or paper.

**fade-out rate** The rate at which the paint brush and airbrush tools fade out as you paint with them to simulate an actual brush stroke.

**feather edge** The area along the border of a selection that is partially affected by changes you make to the selection.

**fill** To paint a selected area with a gray shade, a color, or a pattern.

**floating selection** A selection that has been moved or pasted on an image. It floats above the pixels in the underlying image until it is deselected.

**fringe** The pixels along the edge of a selection. The fringe pixels contain a mixture of the colors in the selection and the background color(s) around the selection.

**fuzziness** A parameter that controls how much anti-aliasing is applied to the edges of a selection.

**gamma** A measure of contrast that affects the mid-level grays (midtones) of an image.

**gradient fill** A fill that displays a gradual transition from the foreground to the background color. Gradient fills are made with the blend tool.

**gray-scale image** A single-channel image consisting of up to 256 levels of gray, with 8 bits of color information per pixel.

**gray-component replacement (GCR)** The removal of a mixture of cyan, magenta, and yellow, and replacement of them with black.

**halftone** The reproduction of a continuous-tone image, made by using a screen that breaks the image into various size dots.

**highlight** The lightest part of an image, represented in a halftone by the smallest dots, or the absence of dots.

**histogram** A graphic representation of the number of pixels with given color values. A histogram shows the breakdown of colors in an image.

**HSB image** An RGB image that is displayed in three channels: hue, saturation, and brightness. Only one channel is displayed at a time.

**HSL image** An RGB image that is displayed in three channels: hue, saturation, and luminance. Only one channel is displayed at a time.

**hue** Color; the main attribute of a color that distinguishes it from other colors.

**indexed color image** A single-channel image, with 8 bits of color information per pixel. The index is a color lookup table containing up to 256 colors.

**kern** To adjust the character spacing in type.

**labels** A printing option that prints the document and channel name on the image.

**leading** The line spacing for type, measured from baseline to baseline of the lines of text.

**linear fill** A fill that is projected from one point to another, in a straight line.

**lpi** Lines per inch; a measure of resolution.

**luminance** Lightness; the highest of the individual RGB values plus the lowest of the individual RGB values, divided by two; a component of an HSL image.

**luminosity** A color parameter that measures the brightness of color. Luminosity is expressed as a value computed as the weighted average of the pixel's individual RGB values, expressed as a percentage (.30 x red + .59 x green + .11 x blue).

**midtone** Tonal value of dot, located approximately halfway between the highlight value and the shadow value.

**moiré pattern** An undesirable pattern in color printing, resulting from incorrect screen angles of overprinting halftones. Moiré patterns can be minimized with the use of proper screen angles.

**multichannel image** Any image that has more than one channel.

**noise** In an image, pixels with randomly distributed color values.

**pattern** A selection that repeats in tiles to form a regular design.

**pixel** A single dot on a computer display or in a digital image.

**plug-in module** Software developed by a third-party vendor in conjunction with Adobe Systems that lets you use a function that is not available in the standard Adobe Photoshop application.

**process color** The four color pigments, cyan, magenta, yellow, and black, used in color printing.

**1/4 tone** Tonal value of dot, located approximately halfway between highlight and midtone.

**radial fill** A fill that is projected from a center point outward in all directions.

**random access memory (RAM)** The part of the computer's memory that stores information temporarily while you're working on it.

**registration marks (bull's-eyes)** Marks that appear on a printed image, generally for CMYK color separations, to help you align the various printed plates.

**repeat rate** The rate at which paint is deposited on an image by the painting and editing tools when the mouse is stationary.

**resample** To change the resolution of an image. Resampling down discards pixel information in an image; resampling up adds pixel information through interpolation.

**resize** To change an image's size while maintaining its resolution.

**resolution** The number of pixels per inch in an image, or the number of dots per inch used by an output device. Resolution can also refer to the number of bits per pixel.

**RGB image** A three-channel image containing a red, green, and blue channel.

**saturation** The amount of gray in a color. More gray in a color means lower saturation; less gray in a color means higher saturation.

**scanned image** The image that results when a photograph, slide, paper image, or other two- or three-dimensional image is converted into a digital image.

**scanner** An electronic device that digitizes and converts photographs, slides, paper images, or other two-dimensional images into bitmapped images. A video camera is a scanner that converts three-dimensional objects into digital, bit-mapped images.

**screen angles** The angles at which the halftone screens are placed in relation to one another.

**screen frequency** The density of dots on the halftone screen, commonly measured in lines per inch.

**shadow** The darkest part of an image, represented in a halftone by the largest dots.

**spacing** The distance between the pixels that are affected by each painting and editing tool.

**star targets** The printed pinwheels, used primarily in printing color separations, to align the different plates, and measure dot doubling, grain, and slurring during printing.

**3/4 tone** Tonal value of dot, located approximately halfway between midtone and shadow.

**tolerance** A parameter of the magic wand and paint bucket tools that specifies the color range of the pixels to be selected.

**toolbox** The set of tools, normally displayed to the left of an image. The toolbox is a floating palette that you can move or hide.

**trap** An overlap that prevents gaps from appearing along the edges of an object in a separated image, due to slight misalignment or movement of the separations on-press.

**undercolor removal (UCR)** The technique of reducing the cyan, magenta, and yellow inks from the darkest neutral shadow areas in an image, and replacing them with black.

**virtual memory** The memory space that is separate from the main memory (physical random access memory), such as hard disk space. Virtual memory allows you to work on large documents without requiring you to have large amounts of RAM.

**zoom** To magnify or reduce your view of the current document.

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