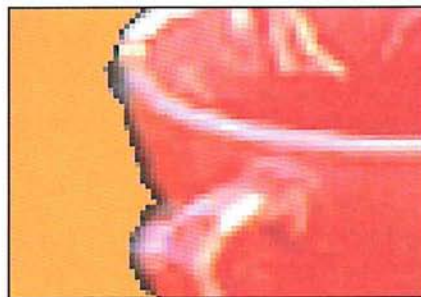
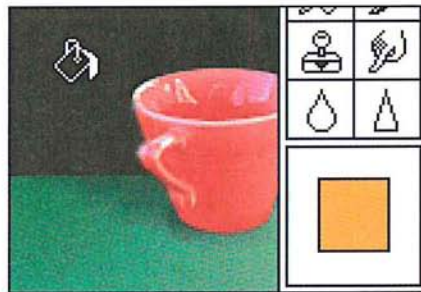


When used with the paint bucket tool, the Fuzziness parameter softens the transition from the filled areas to the unfilled areas by applying some of the color in the fill to a one-pixel boundary around the selection. This, in turn, allows you to make changes to portions of an image without making the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

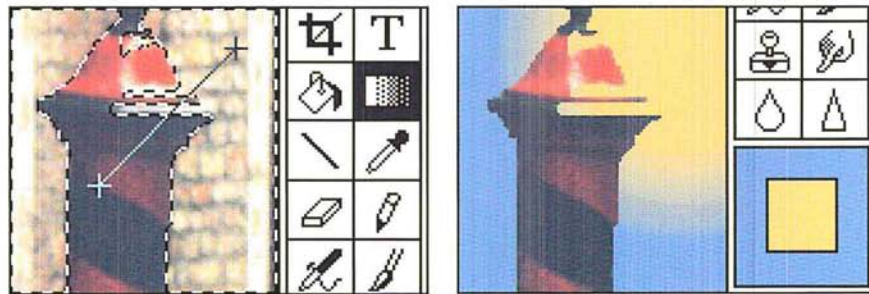
The Adobe Photoshop program fills the pixels that fall within the Tolerance and Fuzziness parameters you specified.

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.)

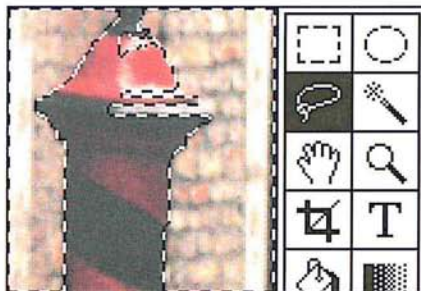
For a radial fill, you can also specify an offset value. The offset value defines the distance from the starting point where the radial fill displays the foreground color without any gradations of color. The radial offset value is the percentage of the total distance from the starting point to the end 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.

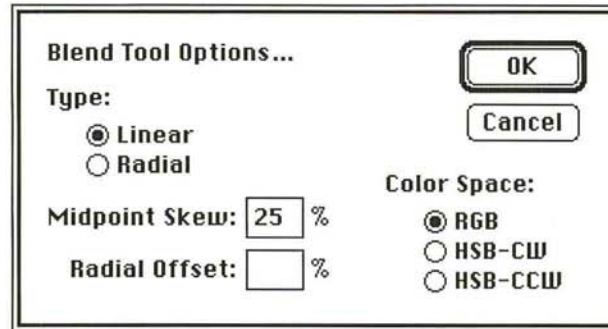
To create a linear fill with the blend tool:

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

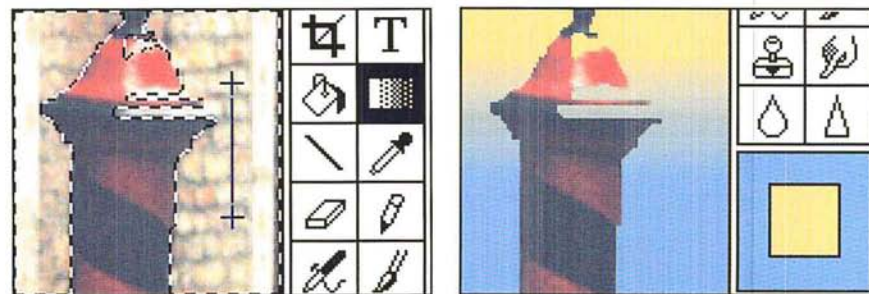




2. Double-click or Option-click the blend tool in the toolbox.
The Blend Tool Options dialog box appears.



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.

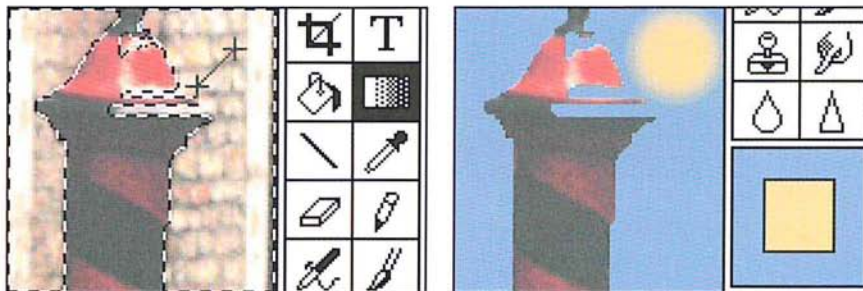
The Blend Tool Options dialog box appears.

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.

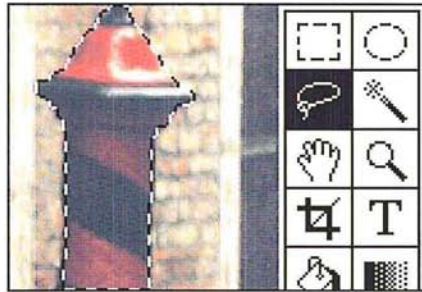
NOTE: In the Indexed Color Mode, feathering around a selection is ignored when you fill it.

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.

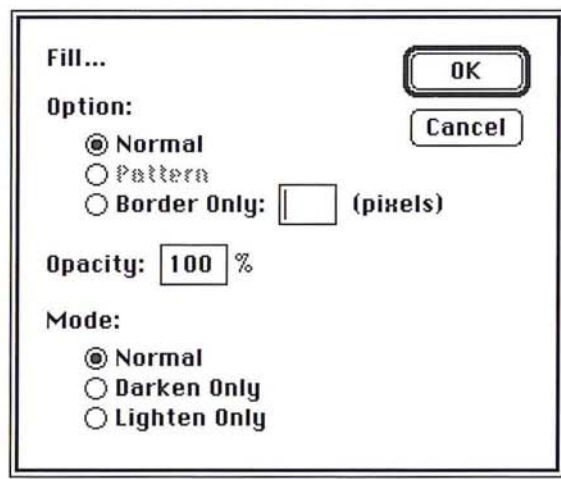
To fill a selection with the current foreground color:

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



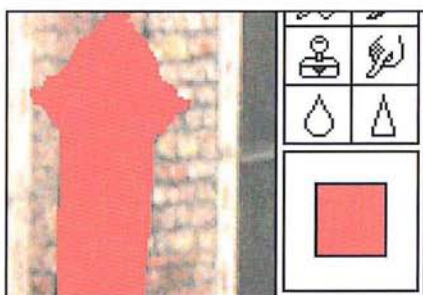
2. Choose Fill from the Edit menu.

The Fill dialog box appears.



- 3. Click Normal. Click OK.

The selection is filled with the current foreground color.



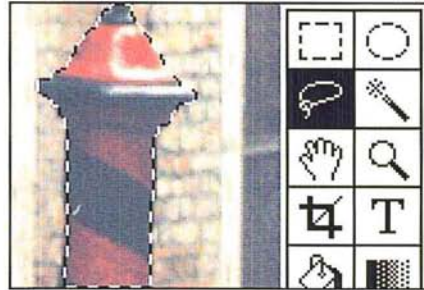
NOTE: You can also fill a selection with the current foreground color by typing Option-Delete at any time, except when a dialog box is active. You can fill a non-floating selection with the current background color by pressing Delete or by choosing Clear from the Edit menu. Floating selections are deleted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

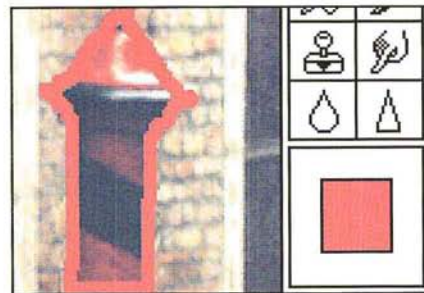


2. Choose Fill from the Edit menu.

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.

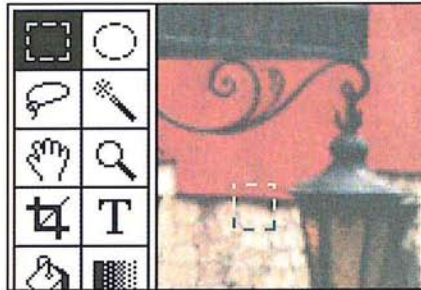


Filling a selection with a pattern

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:

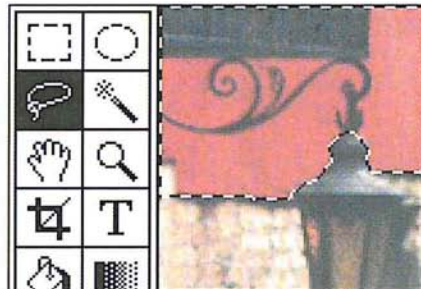
1. Click the rectangular marquee tool on the toolbox.
2. Holding down the mouse button, drag to select the part of the image you want to use as the pattern.
3. When you have selected a pattern, release the mouse button.



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.

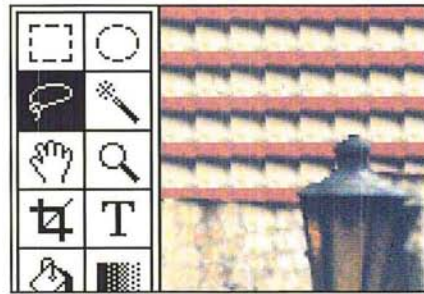


2. Choose Fill from the Edit menu.

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.

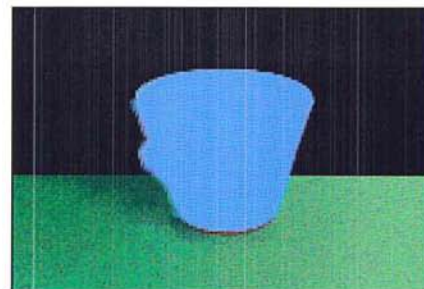


Specifying the opacity of the fill

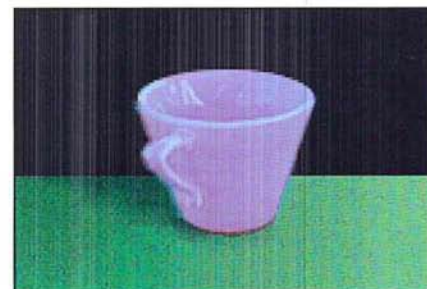
Using the Fill command, you can specify the opacity of the fill or how transparent the pixels in the fill are. Specify a value near 100 to make the fill pixels nearly opaque; specify a value near 1 to make them nearly transparent.

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

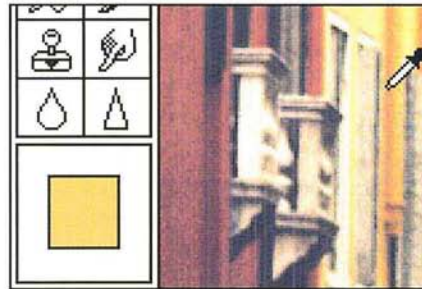
The eyedropper tool is a color selection tool. It lets you select the current foreground and background colors for an image. You can select colors from any open document without making it the active document (bringing it to the front). This allows you to use other documents as color tables that store 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:

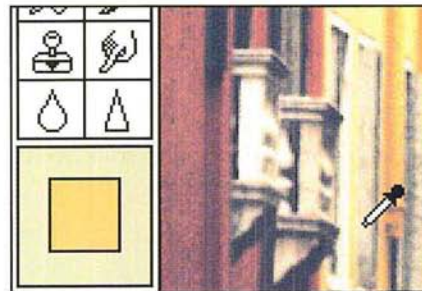


1. Click the eyedropper tool in the toolbox.
2. Position the pointer on the color in the image you want to use as the foreground color.
3. Click the mouse button.



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:

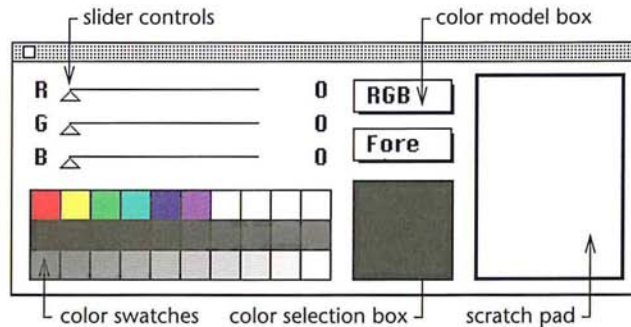
1. Hold down the Option key.
The pointer turns into the eyedropper.
2. Click the color you want to use as the foreground color.
3. Release the Option key.

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

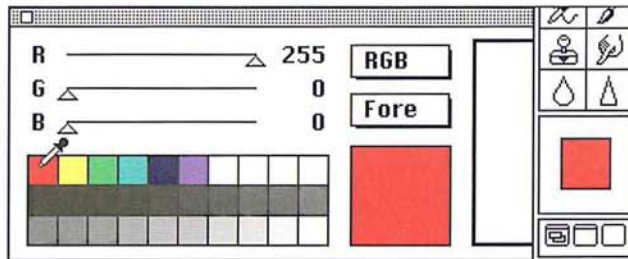
You can use the color palette to select the current foreground and background colors. The color palette is a floating window that you can display on-screen. You can move the color palette to a more convenient place on-screen, and you can hide it when you have finished using it.

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.



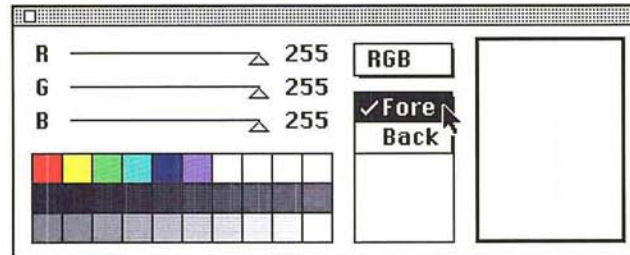
You can also use the color palette to access the Color Picker and the Color Wheel dialog boxes to select a foreground or background color, as described in the sections, "Using the color picker" and "Using the color wheel" that appear later in this chapter.

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

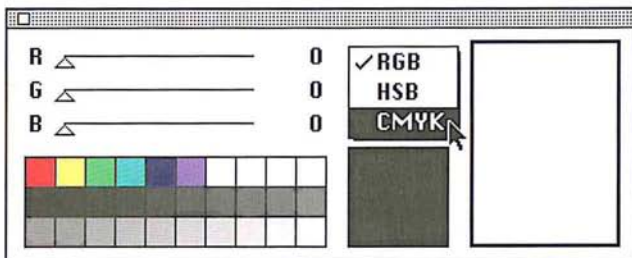
You can also select the foreground and background colors by choosing a color model on the color palette, and dragging the slider controls to define the desired color values.

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.

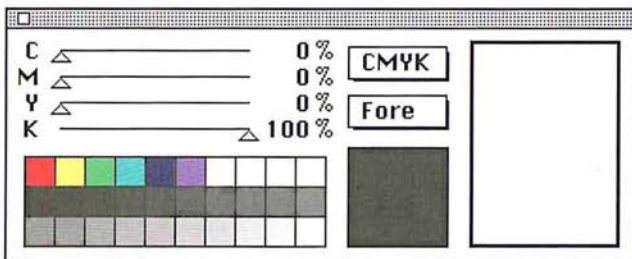
Some RGB colors cannot be printed as CMYK colors (the bright green color swatch on the color palette, for example) because there is not an equivalent color in the CMYK color model. If you select an RGB color that can't be printed, the Adobe Photoshop program displays the closest color that can be printed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

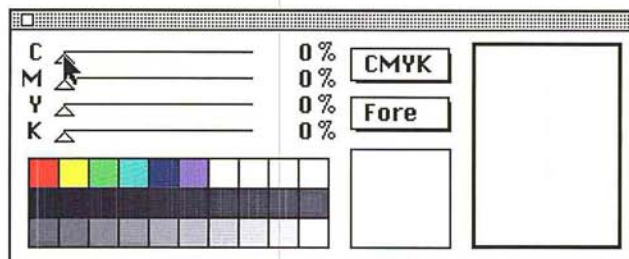


Specifying RGB or CMYK colors using the color palette

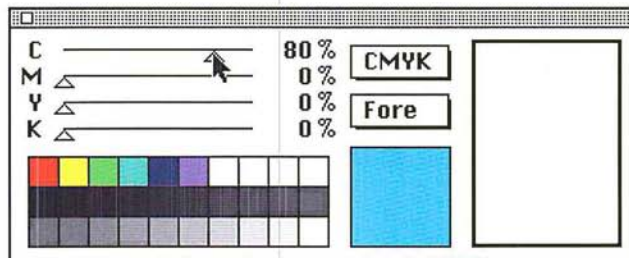
When RGB or CMYK is the active color model in the color palette, you select a color by using the slider controls to specify the percentages of red, green, and blue or cyan, magenta, yellow, or black in the color.

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.

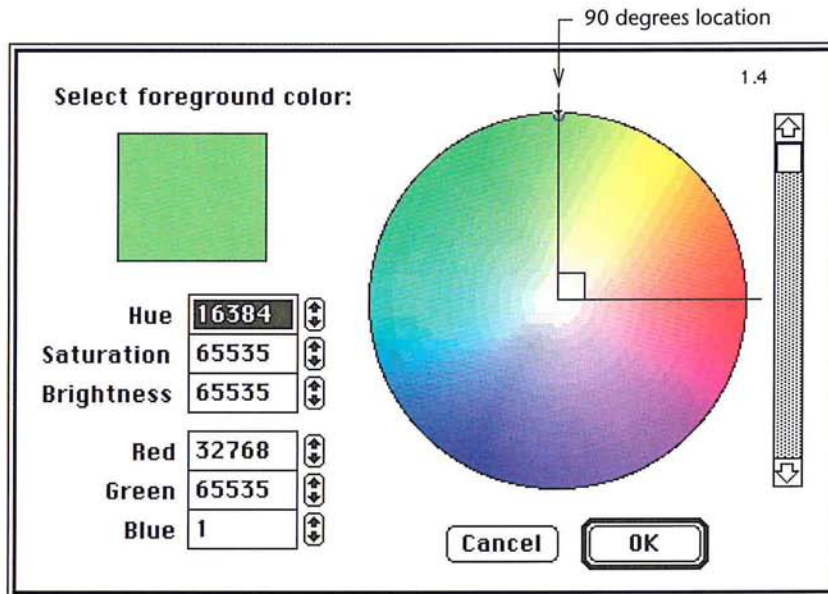
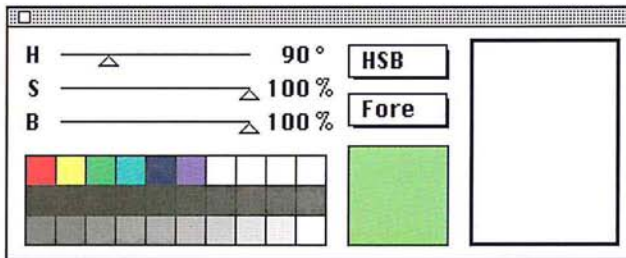
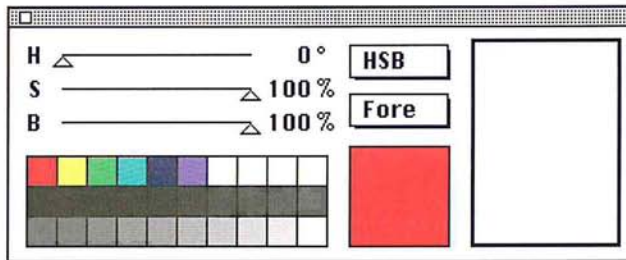


Specifying an HSB color using the color palette

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."



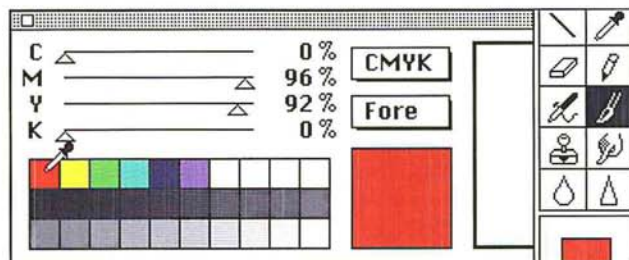
Using the scratch pad to mix colors

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.

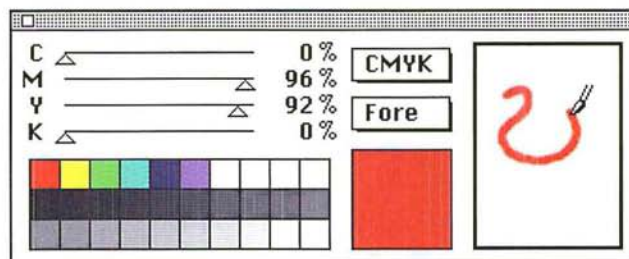
For information on selecting a custom brush shape, see the section, "Selecting a custom brush shape" in Chapter 7, "Painting and Editing Tool Options." For information on selecting the current pattern, see the section, "Filling selections with patterns" in Chapter 10, "Using the Fill Tools."

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.

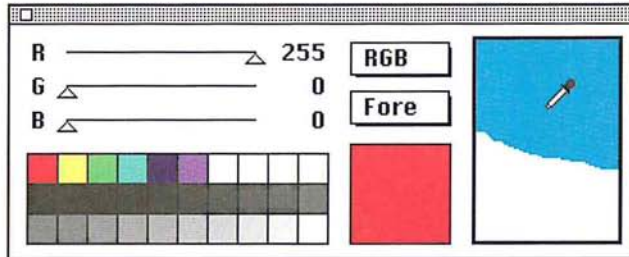


5. Release the mouse button when you are finished.

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.

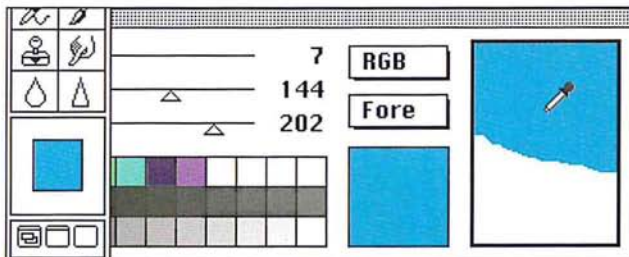
The pointer turns into the eyedropper.



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.



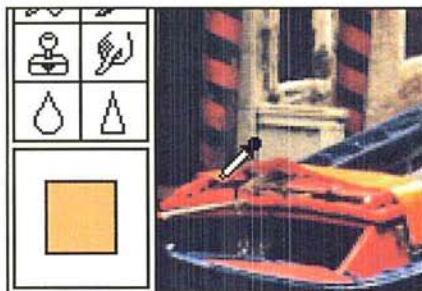
Adding colors to the color palette

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.

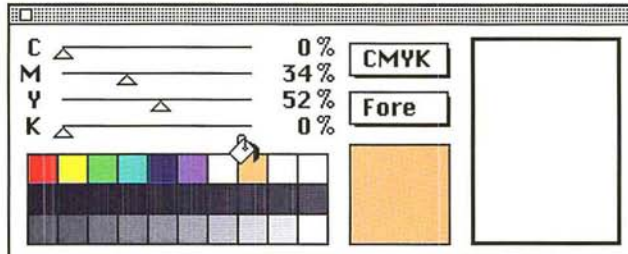


2. Position the pointer on the color swatch where you will place the color.
3. Hold down the Option key.

The arrow pointer turns into the paint bucket pointer.

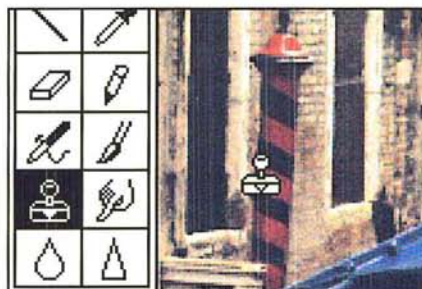
4. Click the mouse button.

The selected color appears in the color swatch.

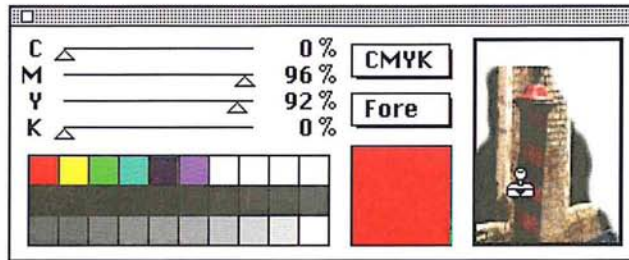


If you want to paint using the rubber stamp tool:

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.

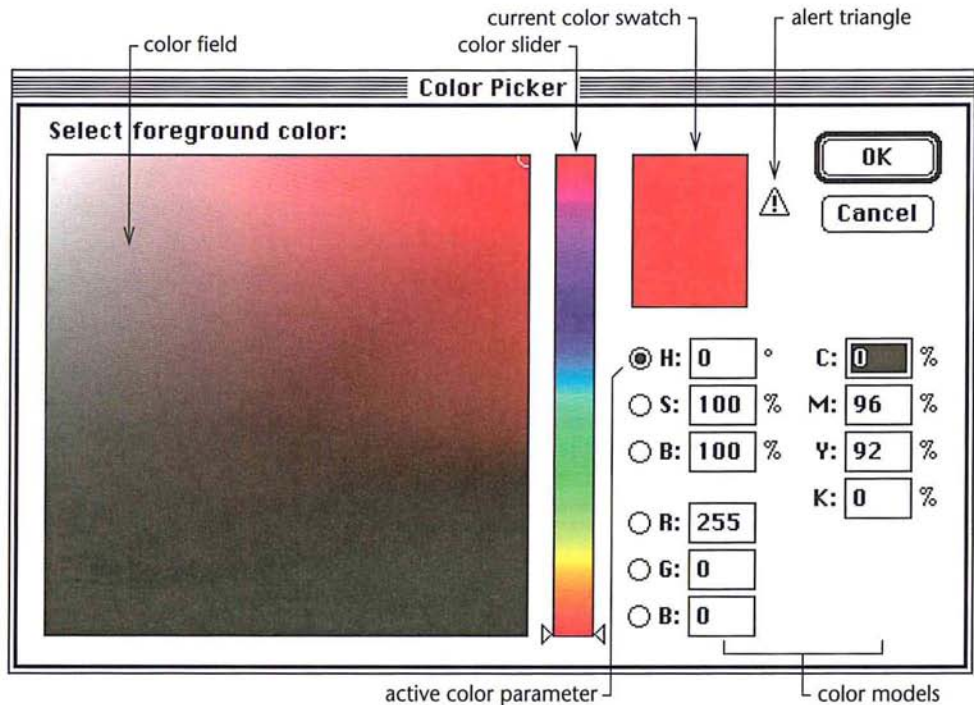
The Color Picker dialog box contains several controls you can use to select a color: the color field, a large box that you drag a pointer through to change the color selection; a rectangle in the upper right of the dialog box, which displays two color swatches; and three color model options, HSB, RGB, 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 picker.

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.

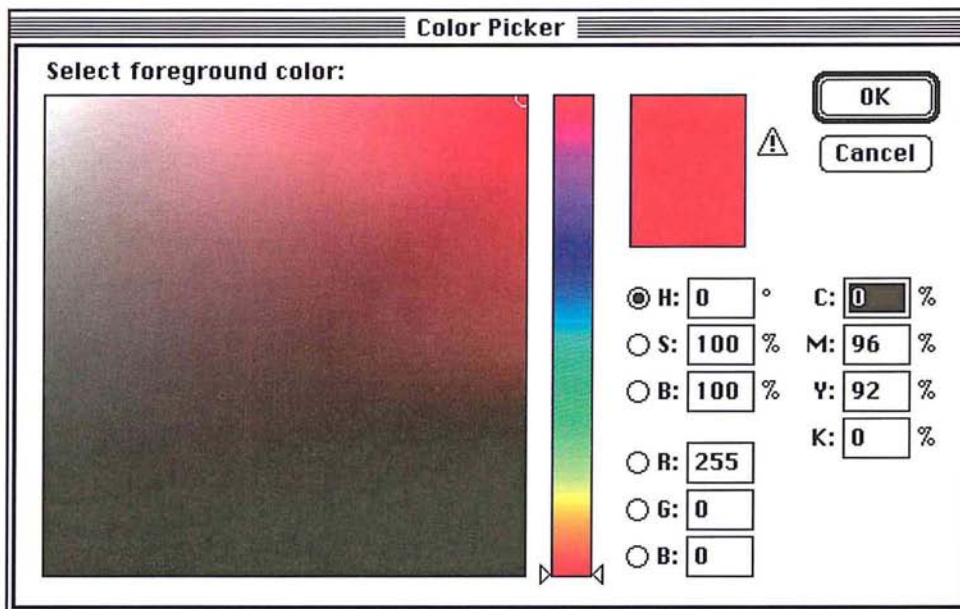
Using hue as the active parameter

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 slider 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

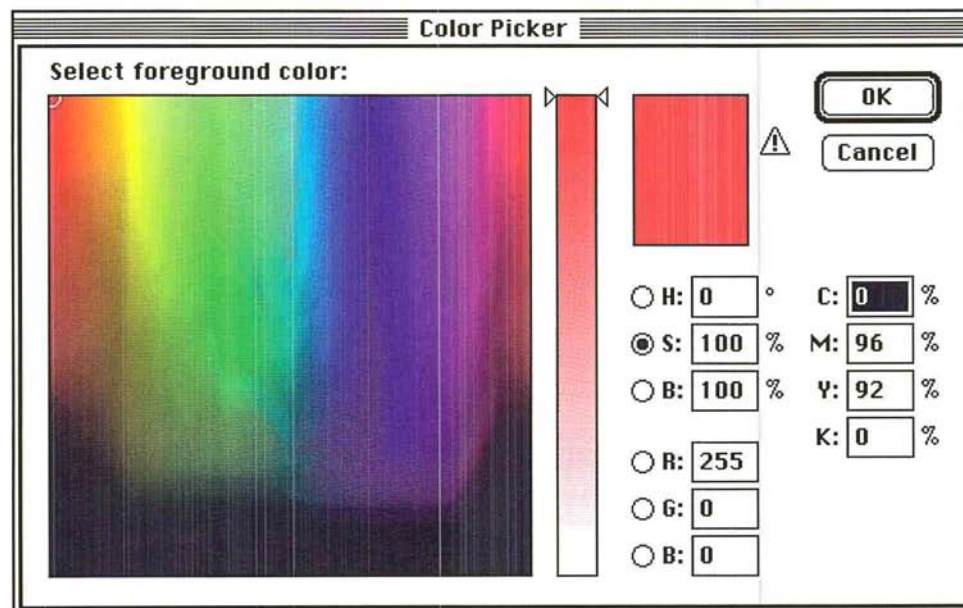
When saturation is the active color parameter in the Color Picker dialog box, the color slider controls the saturation, and the color field controls the hue and brightness.

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

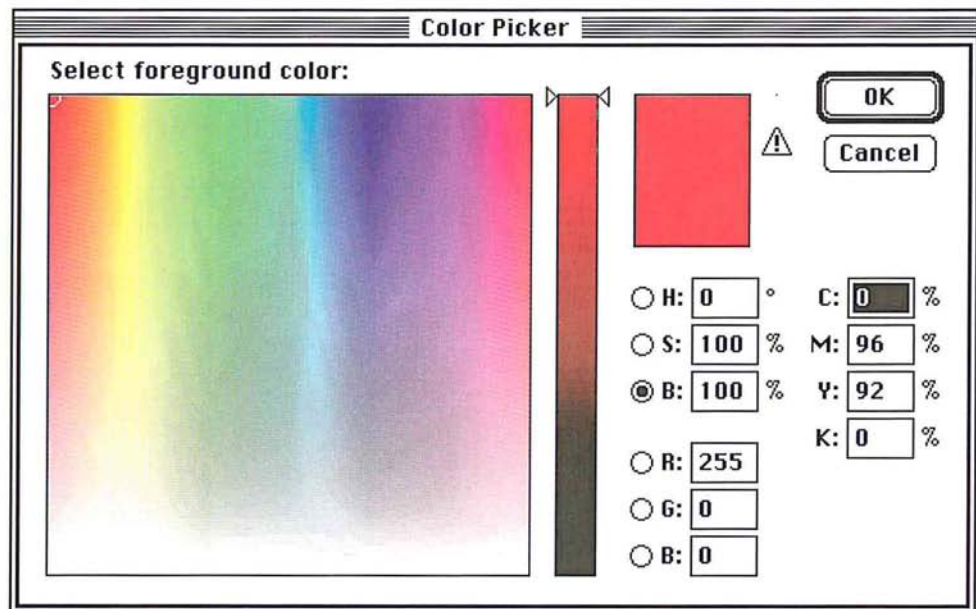
When brightness is the active color parameter in the Color Picker dialog box, the color slider controls the brightness, and the color field controls the hue and saturation.

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

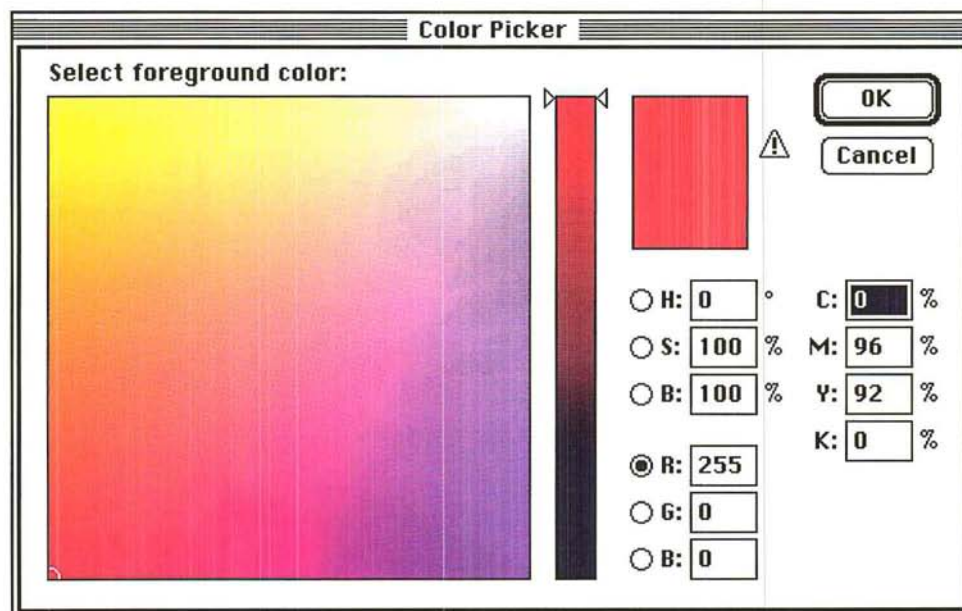
When red is the active color parameter in the Color Picker dialog box, the color slider controls the red value, and the color field controls the blue and green values.

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

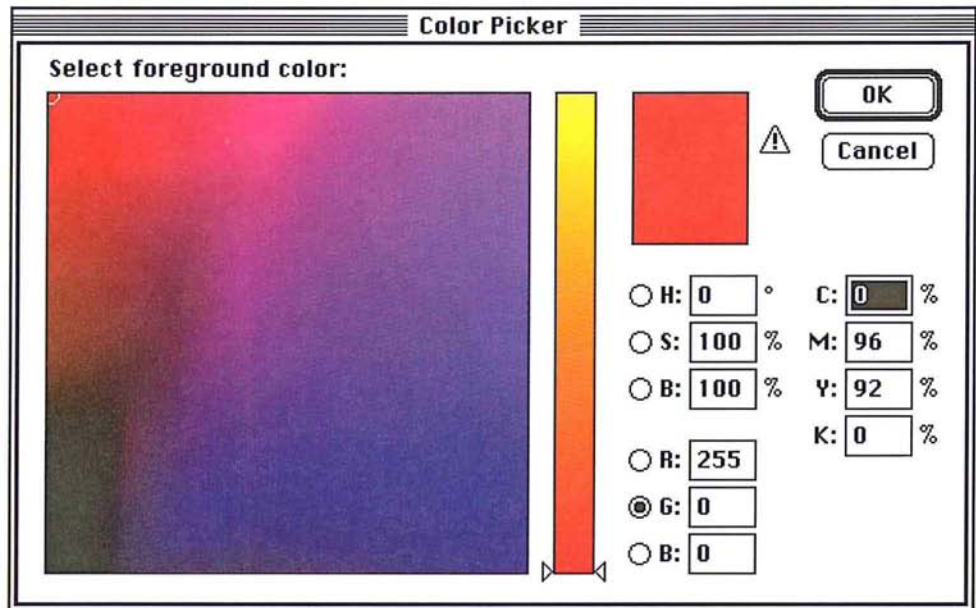
When green is the active color parameter in the Color Picker dialog box, the color slider controls the green value, and the color field controls the blue and red values.

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

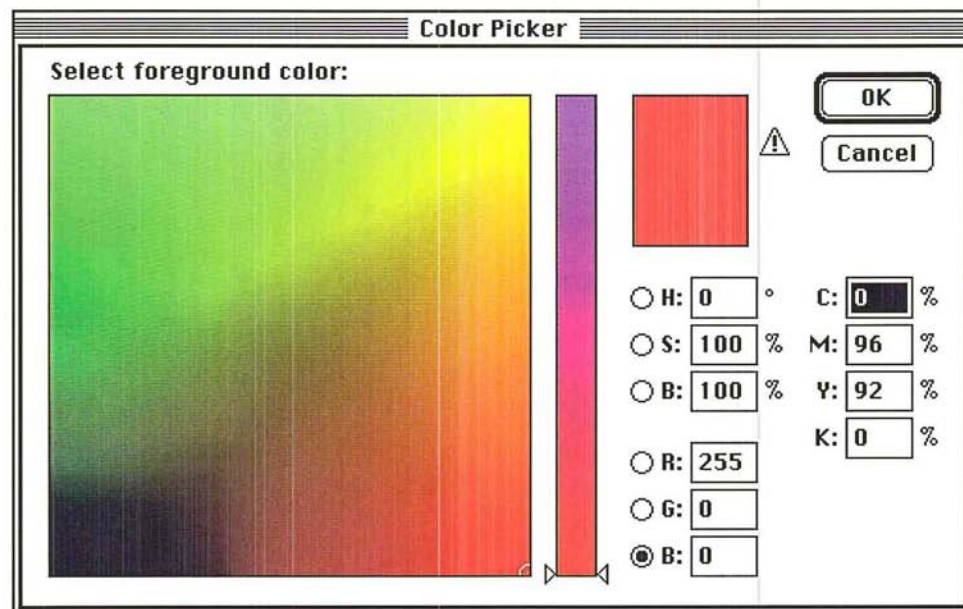
When blue is the active color parameter in the Color Picker dialog box, the color slider controls the blue value, and the color field controls the green and red values.

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.

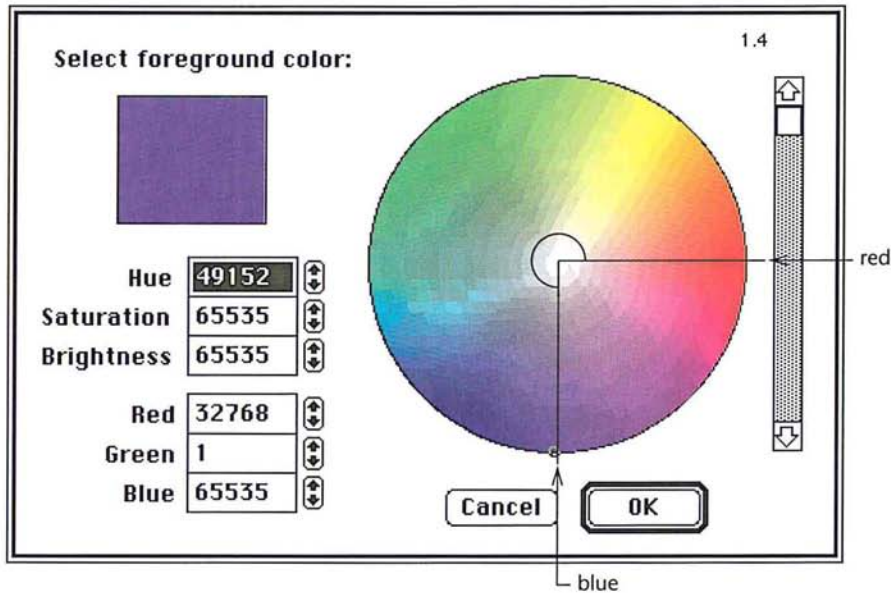
2. Click the B (blue parameter) radio button in the Color Picker dialog box, if it is not already selected.



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.

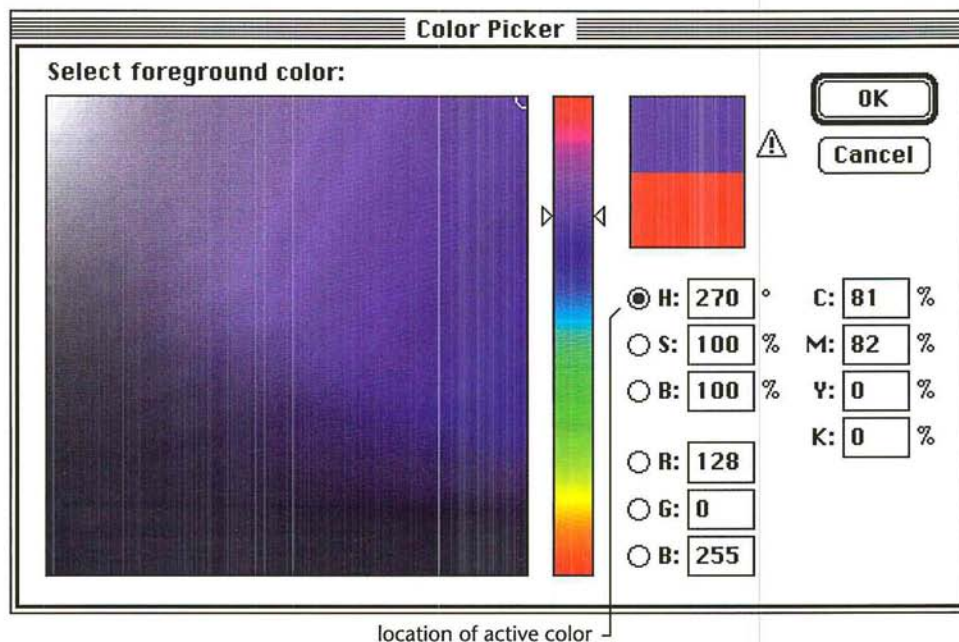
Specifying a color value

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.



location of active color

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

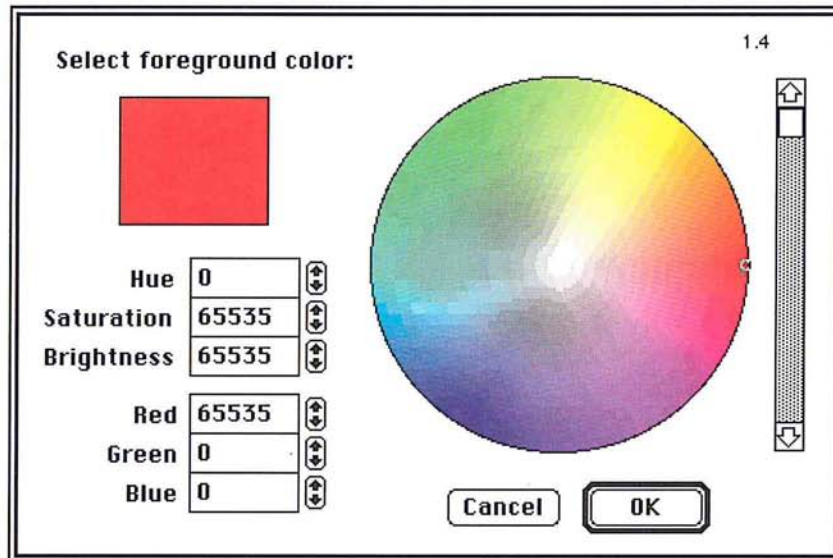
Like the color picker, you can enter numerical values into the color wheel's text boxes to specify the mixture of colors that combine to form the color you want, and you can click the color on the color wheel to select the desired color. The color wheel lets you select colors based on the HSB or RGB 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:

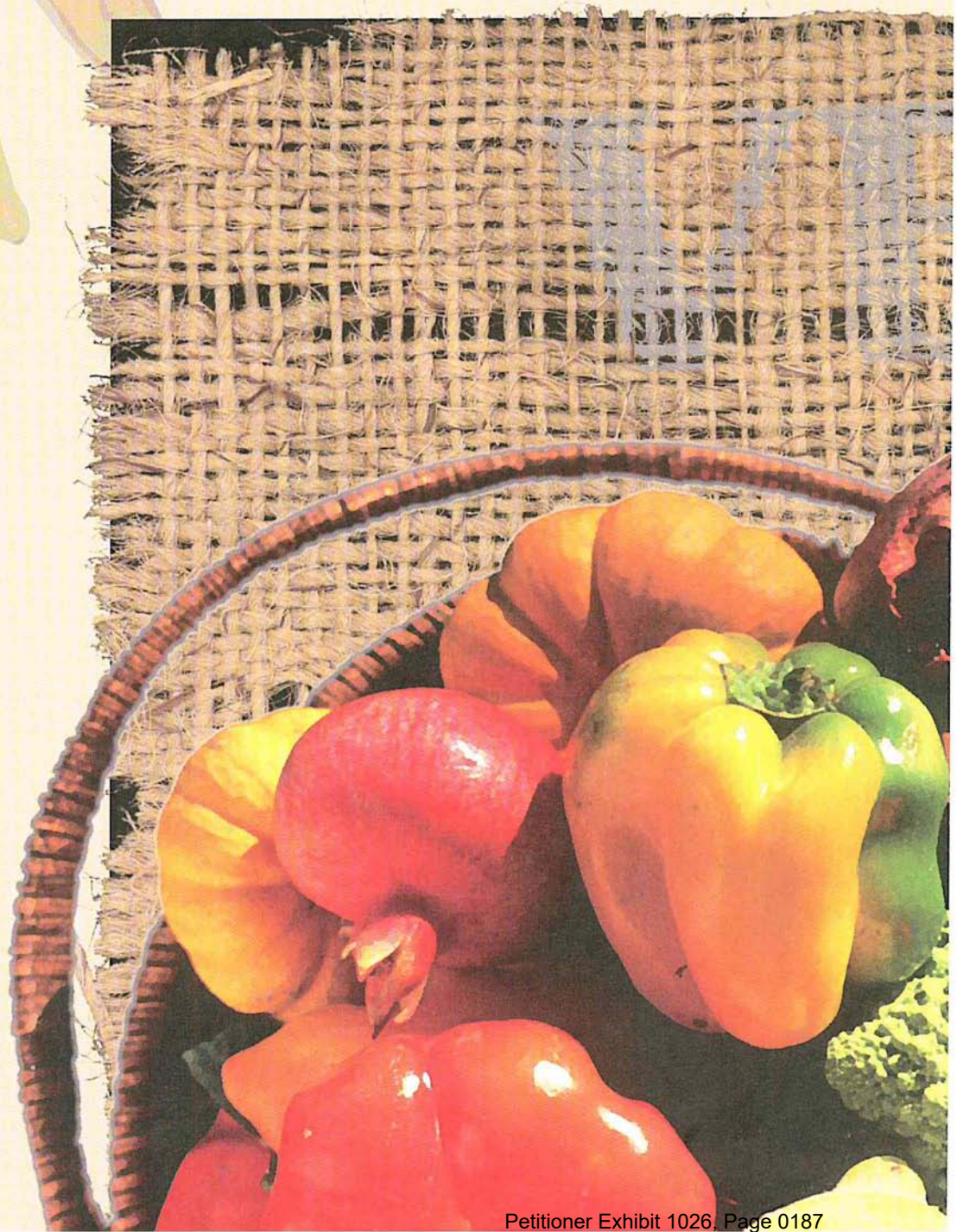
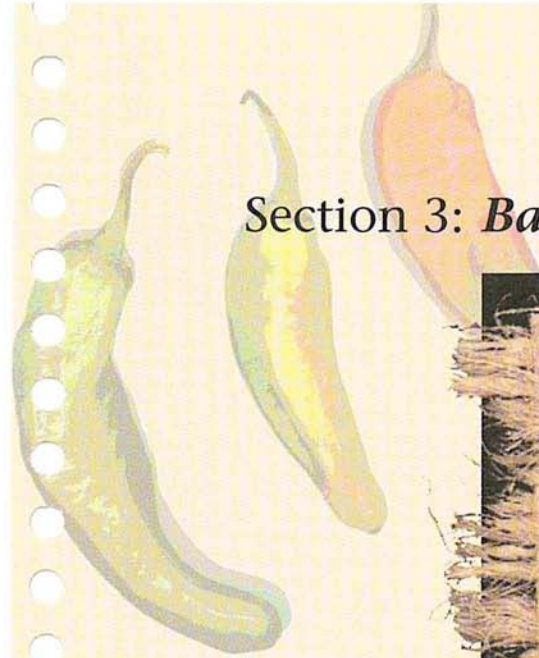
1. Hold down the Option key.
2. Click either the color sample box in the color palette, or the foreground or background color rectangle in the toolbox.

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*

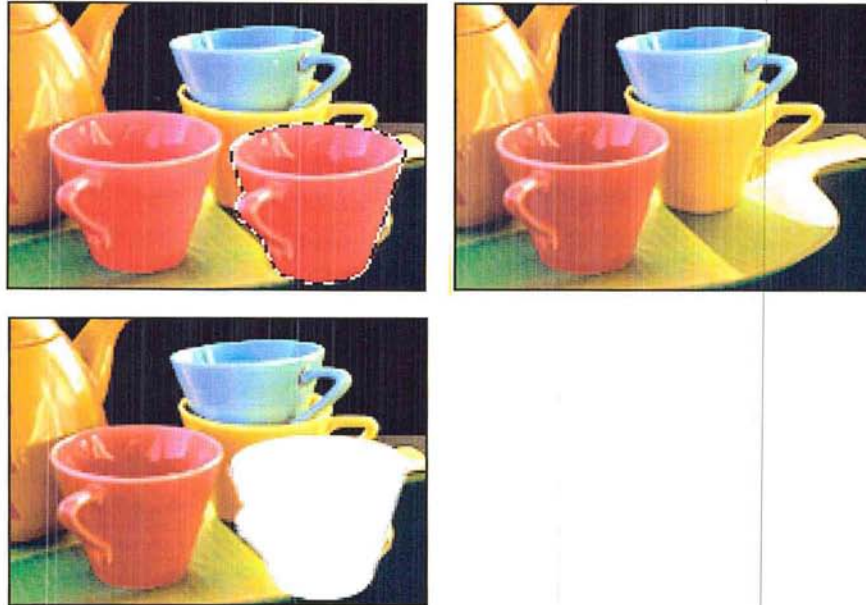
The Adobe Photoshop program contains many tools and features that allow you to edit an image in different ways. A selection on an image can be cut, copied, pasted, or deleted, as well as transformed by skewing, distorting, stretching, rotating, and flipping. You can change the perspective of an image 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.

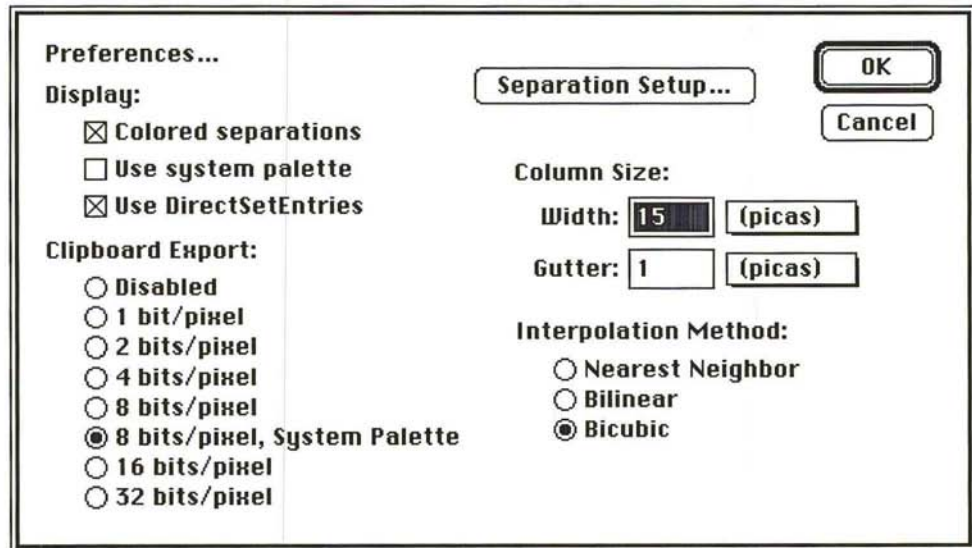
You can disable the automatic conversion feature to save time if you do not intend to paste the contents of the Clipboard into another application's document. If you disable this feature, the contents of the Clipboard are deleted when you exit from the Adobe Photoshop program. The automatic conversion 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

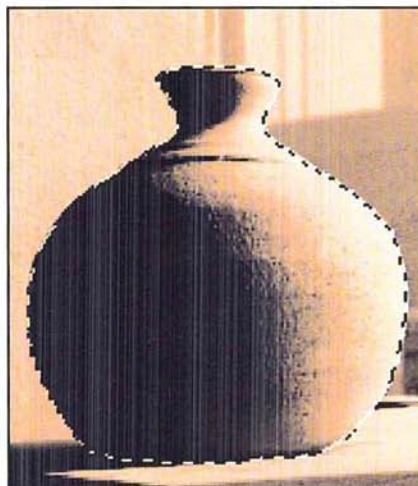
Instead of pasting part of an image inside the current selection, you might want to paste it behind the current selection so that the target selection covers part of the source selection. You use the Paste Behind command in the Edit menu to accomplish this.

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.



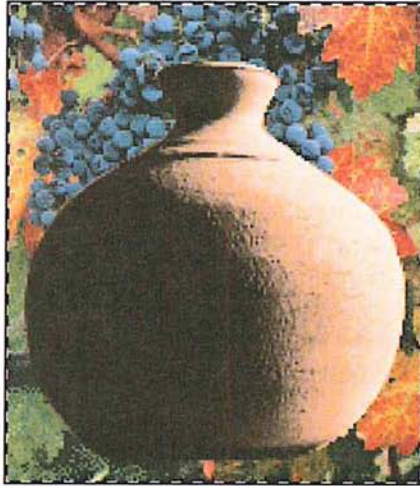
Source selection



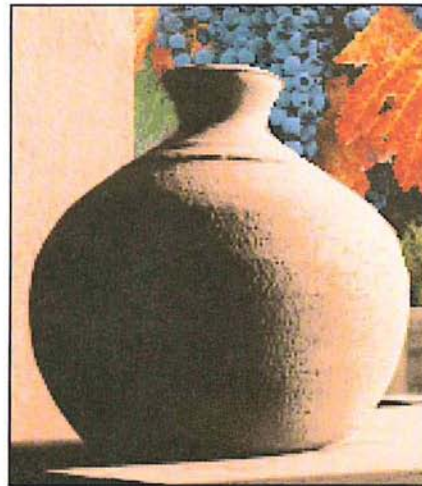
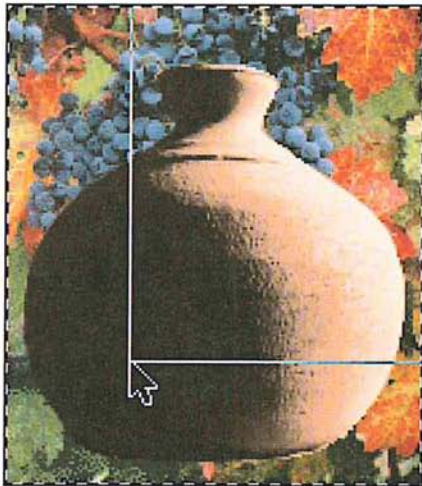
Second selection

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.

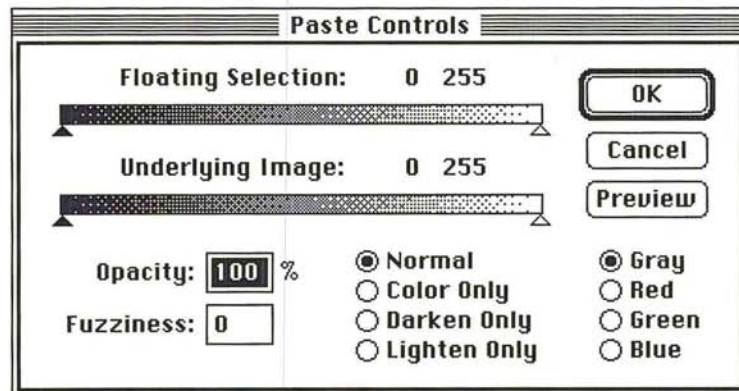
To see how the pixels in the image are affected by your choices before you apply the changes, click the Preview button in the Paste Controls dialog box.

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:

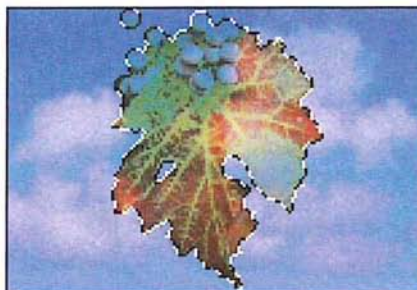
1. Choose Paste Controls from the Edit menu.

The Paste Controls dialog box appears.

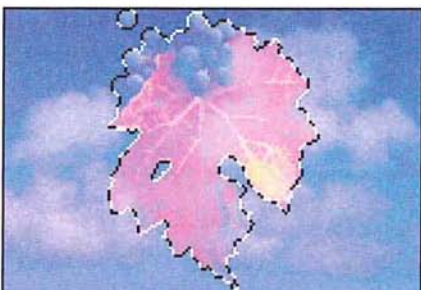
2. Click the option you want.



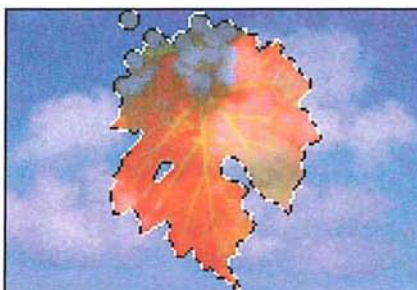
Normal



Darken Only



Lighten Only



Color Only

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 the 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.

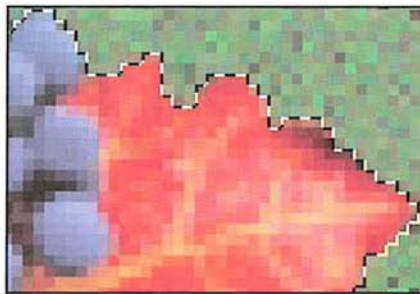
If you used the Underlying Image slider, only the pixels with color values outside of the specified color range will show through. All of the pixels within the range will be pasted over by the floating selection.

Controlling color transitions when pasting

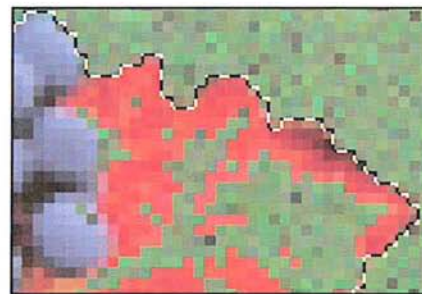
You can control the transitions between colors in the floating selection and the underlying image using the Fuzziness parameter. The Fuzziness parameter works differently than the paint bucket tool's Fuzziness parameter; the Paste Controls' Fuzziness parameter allows you to avoid sharp transitions in 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:

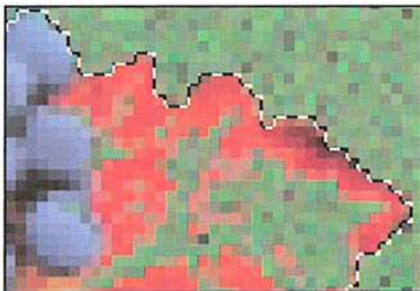
1. Press the Tab key or double-click in the Fuzziness text box.
2. Enter a value from 0 to 100.



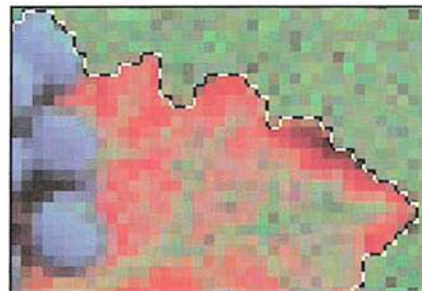
Without Paste Controls adjustments



Fuzziness value: 0;
Floating Selection parameter: 140



Fuzziness value: 25;
Floating Selection parameter: 140

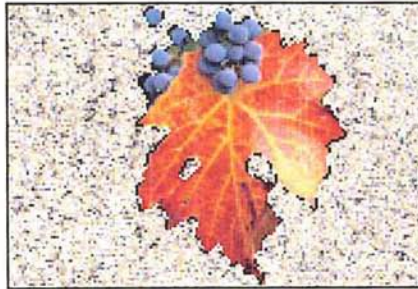


Fuzziness value: 100;
Floating Selection parameter: 140

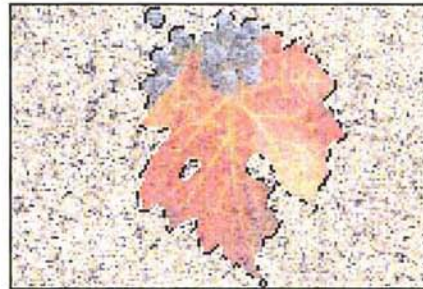
Controlling the opacity of a floating selection

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."

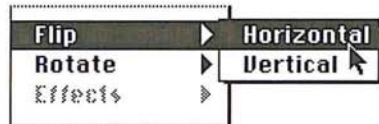
Flipping a selection

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



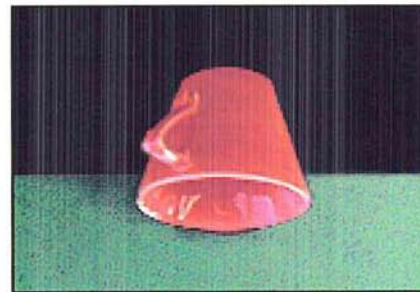
Flipped horizontally

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.



Original selection



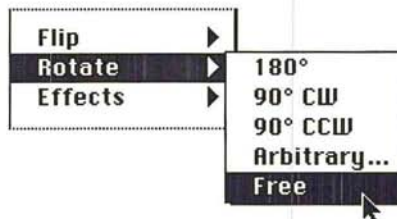
Selection rotated 40° CW

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.

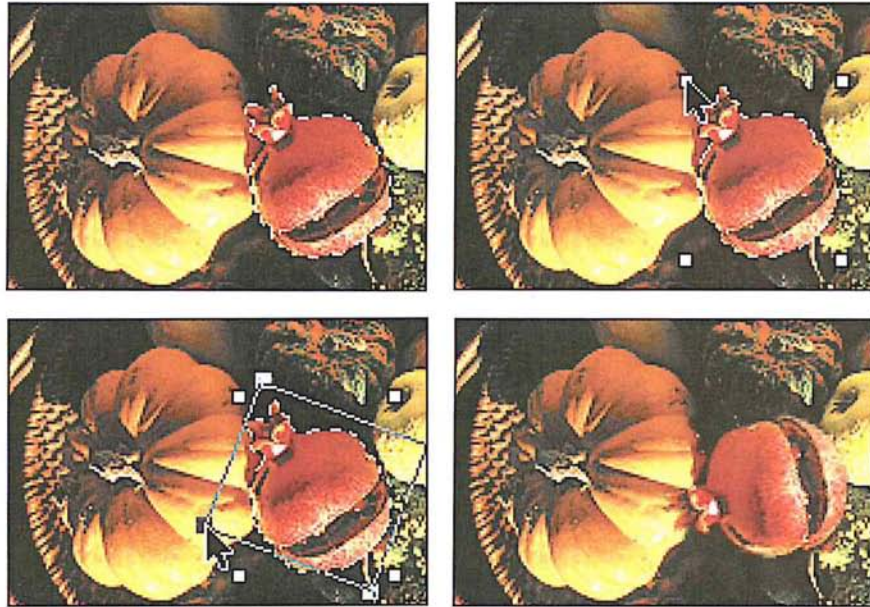
To freely rotate a selection to any angle:

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.

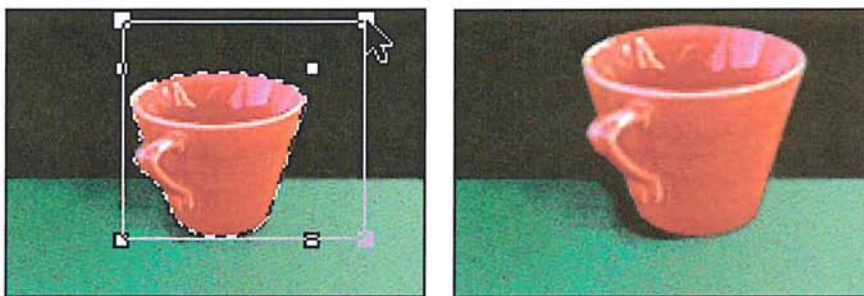
To stretch a selection:

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.

7. 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:

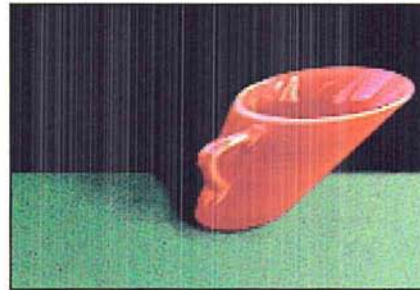
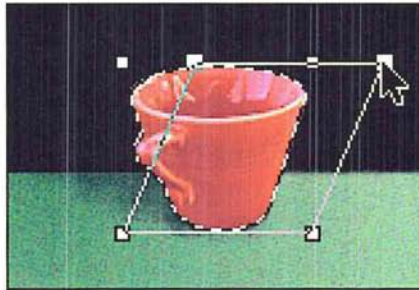
1. Select the part of the image you want to skew.



2. Choose Effects from the Image menu.
3. 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.

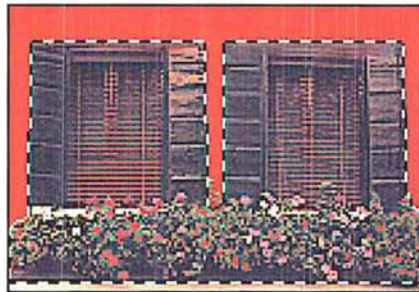


Creating perspective

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.

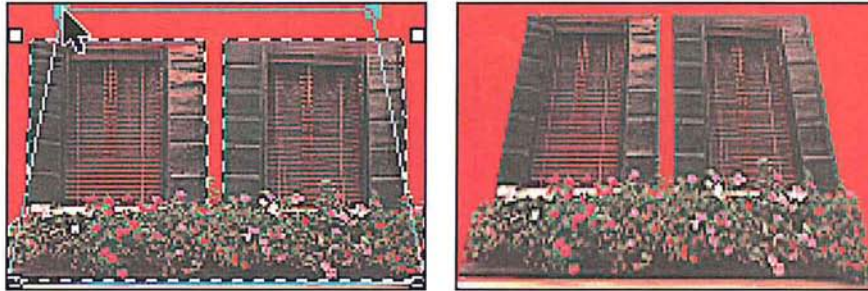
Four handles appear around the selection. You drag the handles to produce the desired effect.

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.

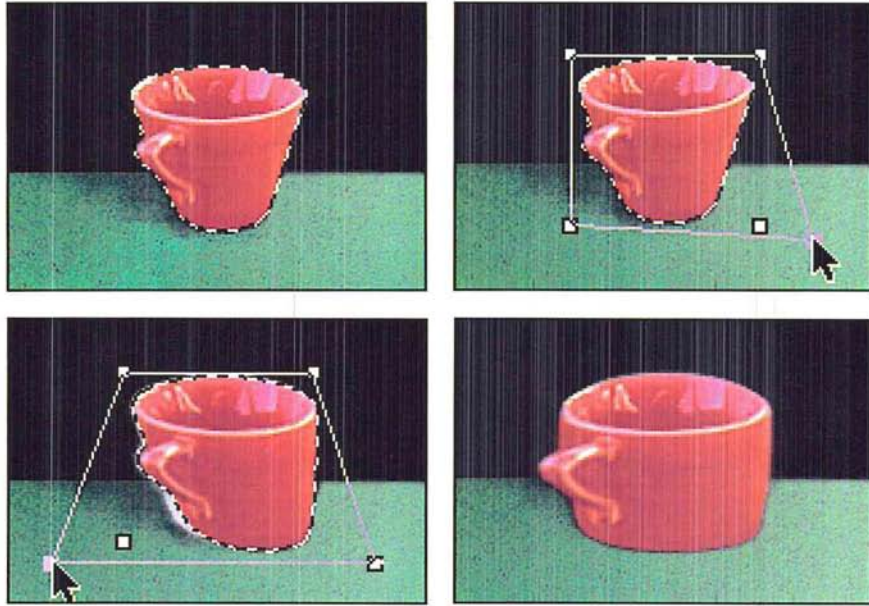
Distorting a selection

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.

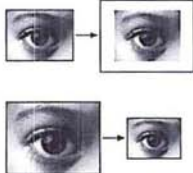
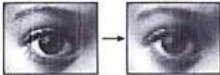
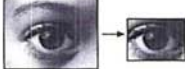
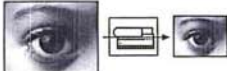
This chapter covers changing the size of an image by cropping it, resizing it, or resampling it. It explains when you might want to resample an image at the same time you resize it, and when you would not want to resample an image. Resampling changes the resolution of an image to correspond with a scanner 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"> • Add working space around existing image without changing dimensions of image • Reduce or enlarge overall size of image (Note: this will also cause resampling) <ul style="list-style-type: none"> -by percentage -by specific dimensions <ul style="list-style-type: none"> • uniformly • non-uniformly
Resample command 	Image menu	<ul style="list-style-type: none"> • Change the resolution of an image <ul style="list-style-type: none"> -adjust (increase or decrease) resolution of image to reflect output device -reduce the dimensions of the image and at the same time increase the resolution for higher quality output
Cropping tool 	Toolbox	<ul style="list-style-type: none"> • Delete unwanted areas from an image • Crop an image to specific dimensions <ul style="list-style-type: none"> -change or retain the resolution of an image while cropping
Size/Rulers 	Page Setup File menu	<ul style="list-style-type: none"> • Change either the dimensions or the resolution of the image only when it is printed

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.

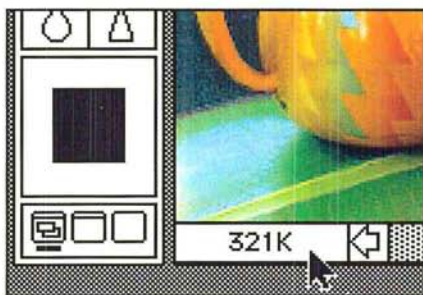
The page preview shows the optional information you have selected in the Page Setup dialog box that will appear on the image when it is printed, including registration marks, calibration bars, labels, and captions. Calibration bars, labels, and captions are represented by gray boxes on the previewed 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.

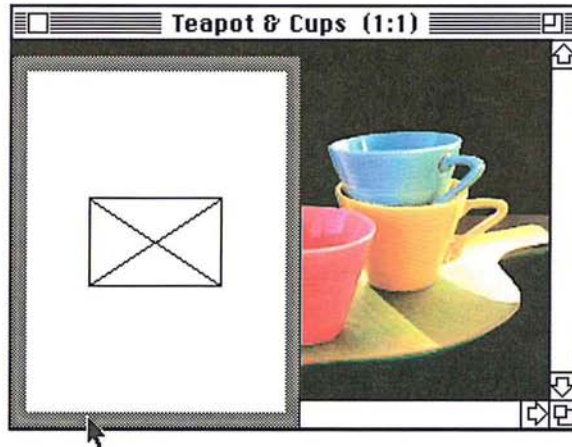
For example, if you preview the size of a 5-inch-by-5-inch, 72-pixel per inch image, and the units of measure for rulers are inches, the height is displayed as 360 pixels, which represents the number of pixels in the vertical direction when the image is printed, times 5 inches, which is the image's physical 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.

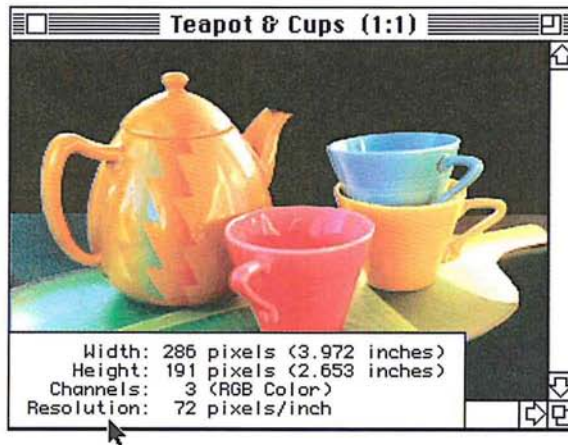


3. Release the mouse button when you have finished previewing the page.

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.")

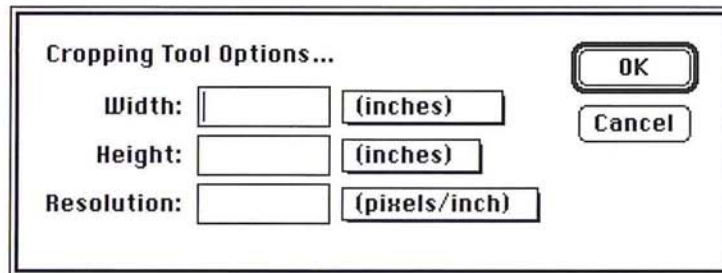
To deactivate the cropping tool, click any tool in the toolbox or click outside the selected area.

To cancel the cropping operation once it has started, type Command-period (.).

To choose options for the cropping tool:

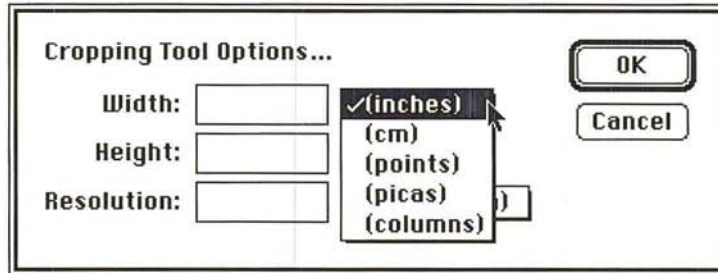
1. Double-click or Option-click the cropping tool in the toolbox.

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.



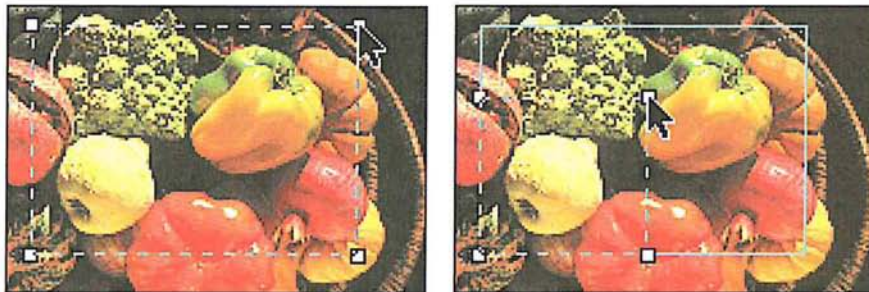
4. When you have selected the cropped image, release the mouse button.
5. To crop the image, click inside the selected area.
If you specified a size and resolution, the image is resampled when you crop it.

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:

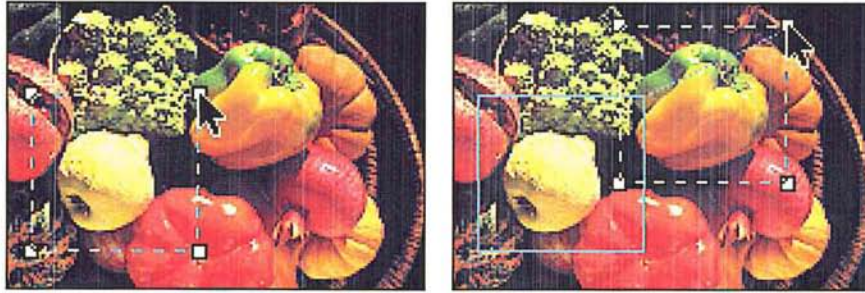
1. Click the cropping tool in the toolbox, and define the area to be cropped.
2. Position the cropping tool on one of the handles on the marquee.
The tool changes into the arrow pointer.
3. Holding down the mouse button, drag until the rectangular marquee is the size you want.
4. Release the mouse button.



To move the rectangular marquee:

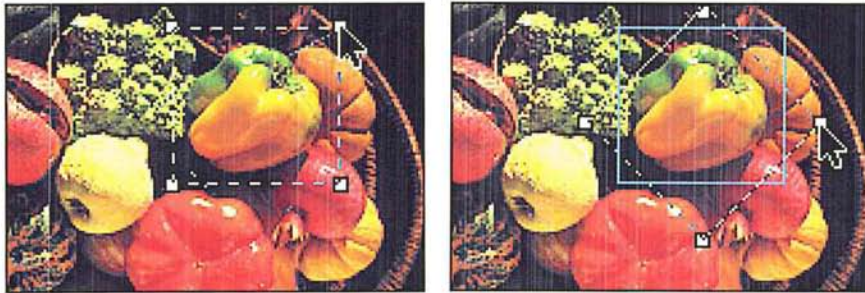
1. Position the cropping tool pointer on one of the edit handles on the rectangular marquee.
2. Holding down the Command key and the mouse button, drag the edit handle to enclose the area you want to crop, then release the mouse button.

3. When you have moved the rectangular marquee to the desired position, release the Command key and the mouse button.

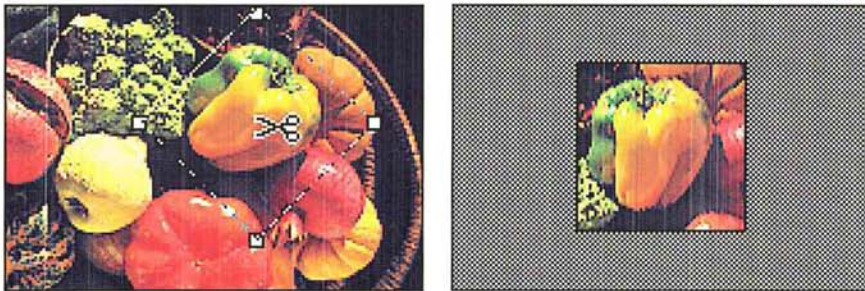


To rotate the selection:

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.



Before cropping

After cropping

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.

The image shows a 'Preferences...' dialog box with a 'Separation Setup...' button. The 'Display' section has three checked options: 'Colored separations', 'Use system palette', and 'Use DirectSetEntries'. The 'Clipboard Export' section has seven radio button options, with '8 bits/pixel, System Palette' selected. The 'Column Size' section has two input fields: 'Width' with the value '15' and '(picas)', and 'Gutter' with the value '1' and '(picas)'. The 'Interpolation Method' section has three radio button options: 'Nearest Neighbor', 'Bilinear', and 'Bicubic', with 'Bicubic' selected. 'OK' and 'Cancel' buttons are in the top right corner.

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.

Resize...

Resize image by:

Percent:

Resize image to:

Width: (512 pixels)

Height: (512 pixels)

Constrain aspect ratio

Existing Image:

Stretch/shrink **Place at center**

Place at upper-left **Place at upper-right**

Place at lower-left **Place at lower-right**

OK

Cancel

Screen

Window

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

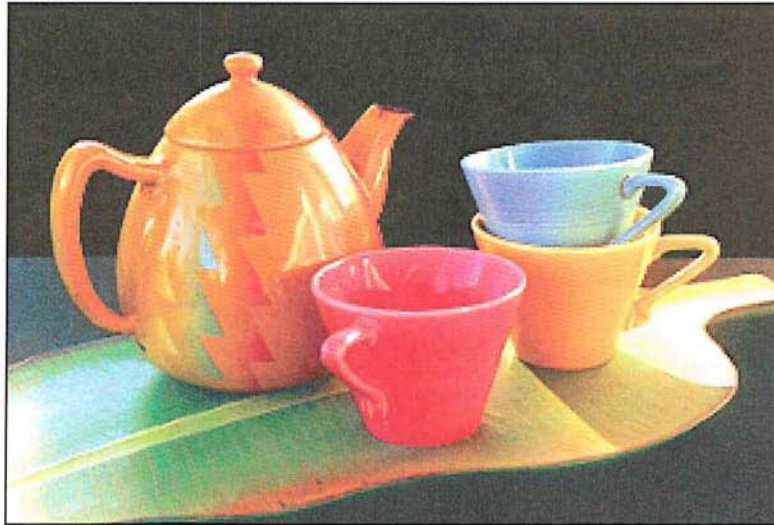
You can resize an image by a certain percentage. The maximum size of enlargement depends on the original size of the image. When you specify a percentage by which to enlarge an image, values appear in the Width and Height text boxes. These values show you what the size of the image will be after resizing. 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.

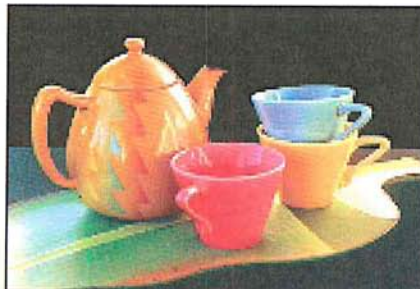


Original image

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.

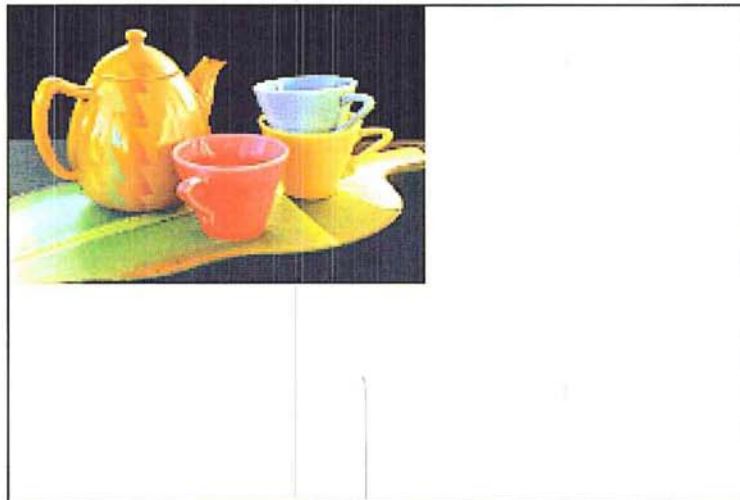


Image resized by 175% using Place at upper-left option

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).

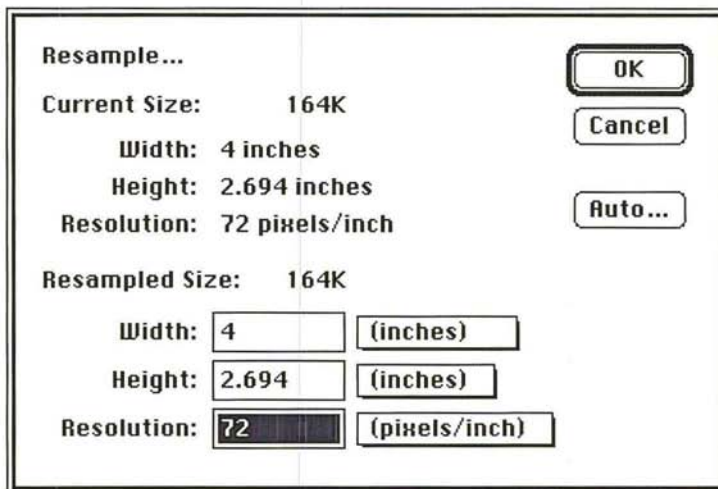
The Resample dialog box also shows you the projected size of the document based upon the changes you propose to make to its height, width, and resolution (Resampled Size). The Resampled Size information changes when you change any of the parameters in the Resample dialog box. The size of the document 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.

Auto Resolution...

Printer: (dots/inch)

Screen: (lines/inch)

Quality Required:

Draft

Medium

High

OK

Cancel

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.

LaserWriter 6.0

Copies: Pages: All From: To:

Cover Page: No First Page Last Page

Paper Source: Paper Cassette Manual Feed

Print: Color/Grayscale Black & White

Print Selected Area Only Print Selected Channel Only Print Using Color PostScript Correct for Printing Colors

Encoding: ASCII Binary

OK Cancel Help

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.)

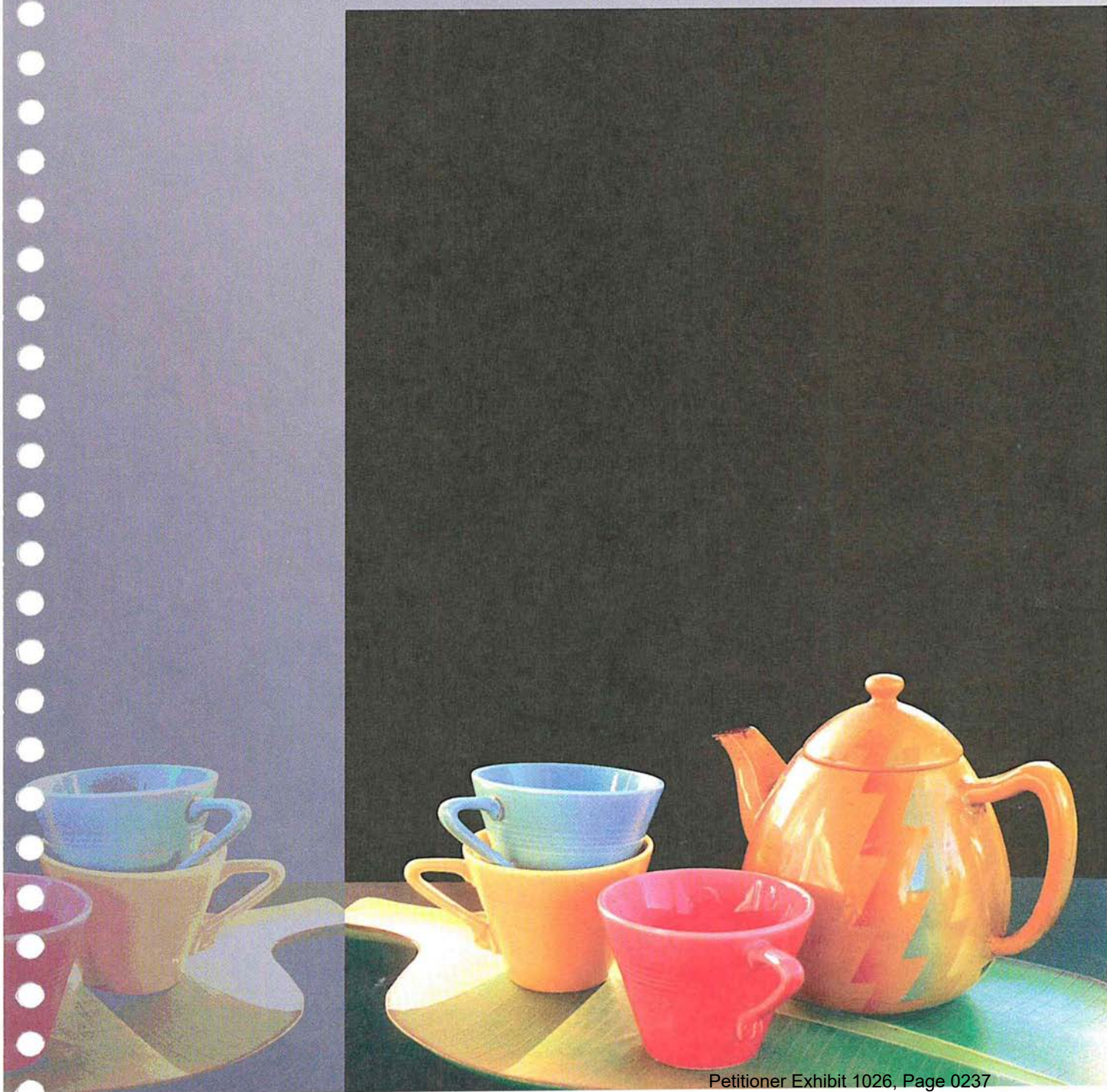
The Adobe Photoshop program automatically enters a value for the other dimension and the appropriate resolution for the specified size.

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



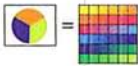
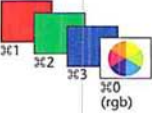
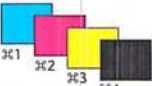
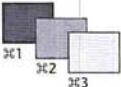
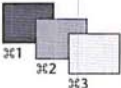
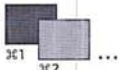
The Adobe Photoshop program supports a variety of image types, including bitmapped, gray-scale, RGB, indexed color, CMYK, HSL, and HSB images.

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.

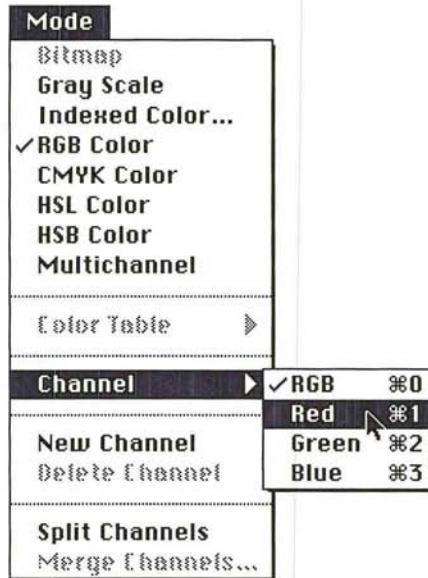
To select the active channel:

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).

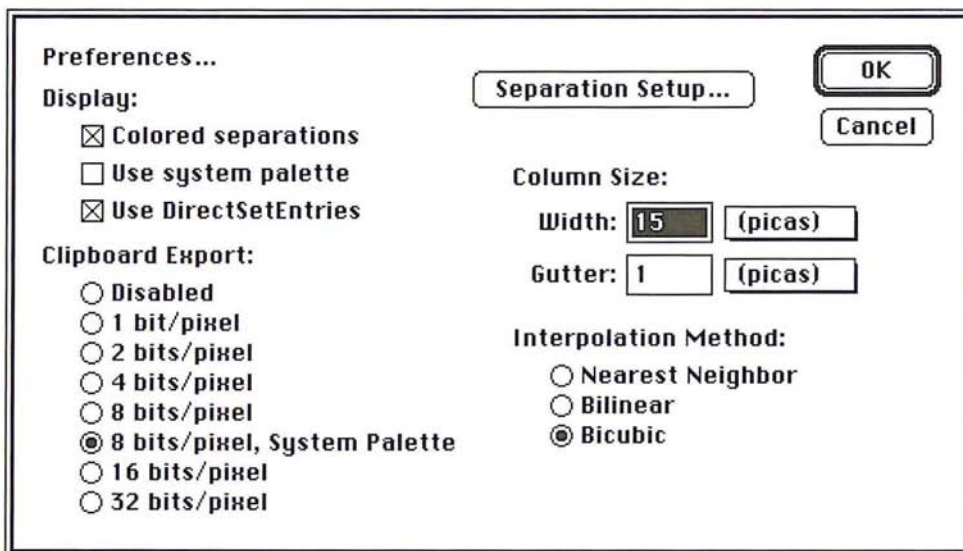
To make the colors in the inactive documents appear closer to their actual colors, you can use the Use system palette option in the Preferences dialog box, which is accessed via the Preferences command in the Edit menu. When you select this option, the colors in the system's color table, rather than 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).

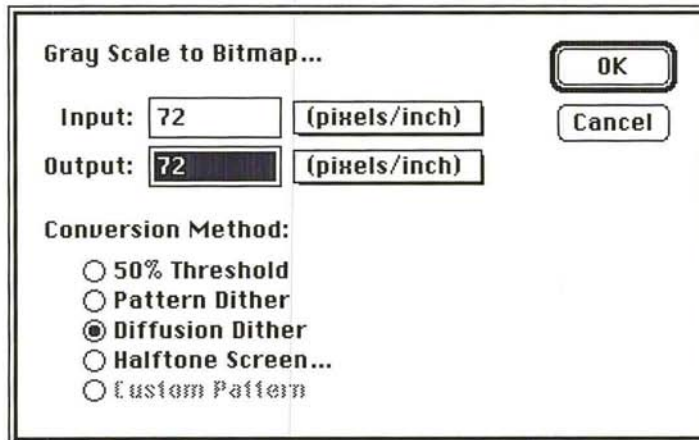
When you convert a gray-scale image to a bitmap-type image, you specify the resolution of the gray-scale image in the Input text box of the Gray Scale to Bitmap Options dialog box. You also specify the resolution you want the bitmap-type image to be in the Output text box. By default, the current image 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 half-tone 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

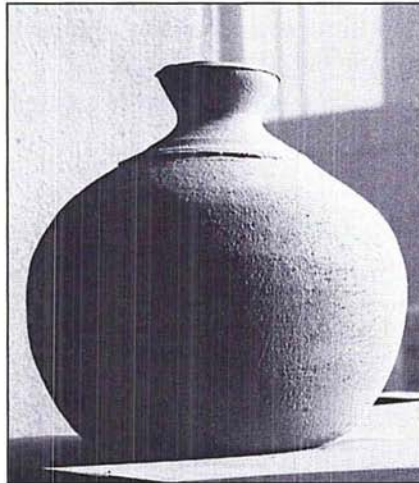
The 50% Threshold option converts pixels with a gray value above the middle gray level (128) to white, and pixels below the middle gray level to black. The result is a high-contrast black-and-white representation of the image.

The Pattern Dither option

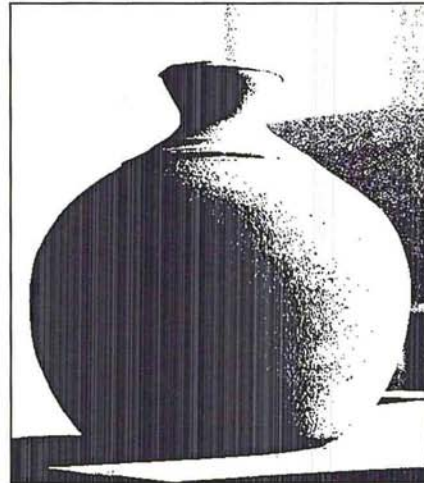
The Pattern Dither option converts an image by organizing the gray levels into patterns made up of black-and-white dots. The resulting image is made up of geometric configurations of black and white dots.

The Diffusion Dither option

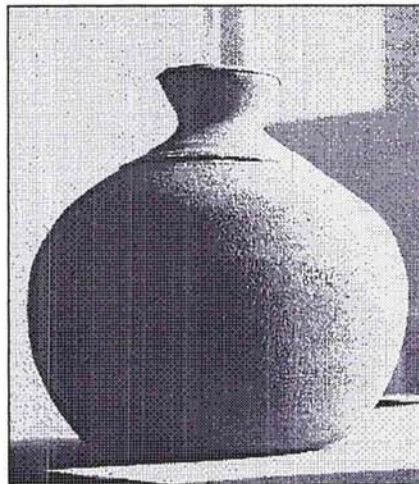
The Diffusion Dither option uses an error-diffusion process to convert the image. The diffusion option starts at the pixel in the upper-left corner of the image and evaluates its gray level value. If the value is above a certain value, it is changed to white; if it is below the value, it is changed to 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.



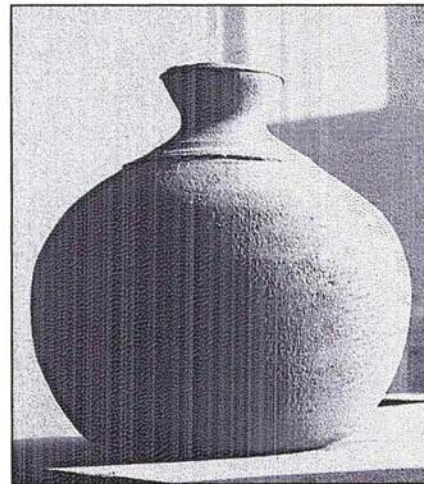
Original gray-scale image



50% threshold conversion method



Pattern dither conversion method

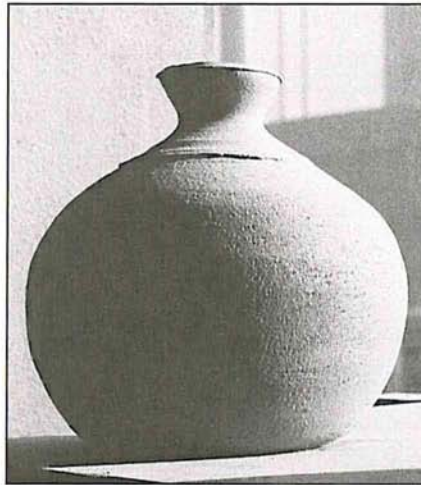


Diffusion dither conversion method

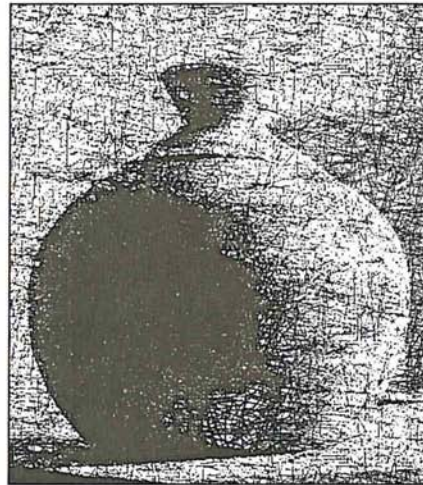
The Custom Pattern option

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

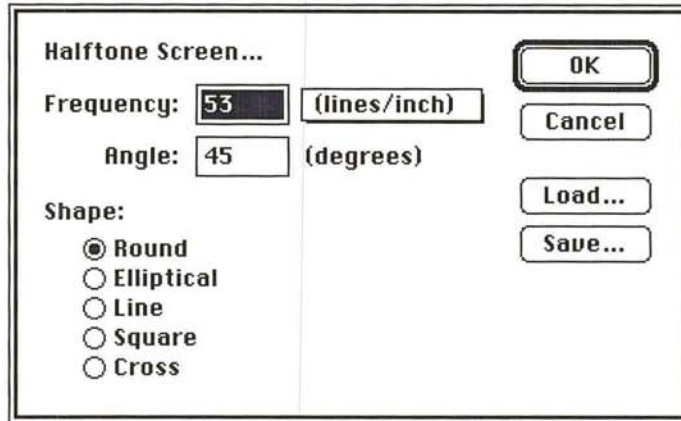


Custom pattern conversion method

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.



Halftone Screen...

Frequency: (lines/inch)

Angle: (degrees)

Shape:

- Round
- Elliptical
- Line
- Square
- Cross

OK

Cancel

Load...

Save...

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.

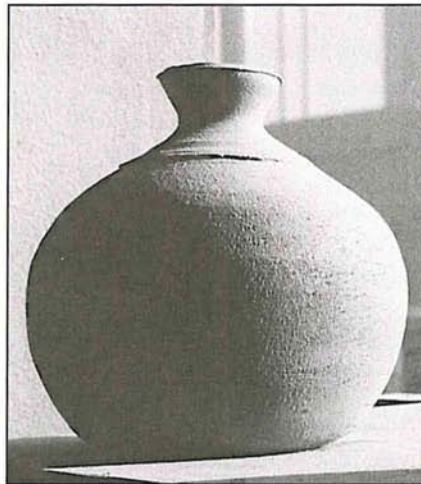
The screen angle refers to the orientation or angle of the screen. Continuous tone and black-and-white halftone screens commonly use 45-degree angles.

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.

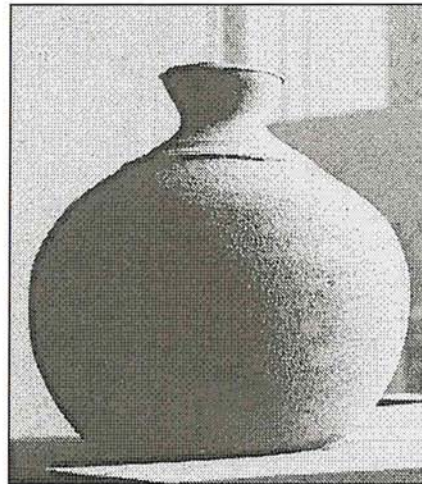
Chapter 19, "Printing Halftones," discusses how to produce a halftone in greater detail.

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.

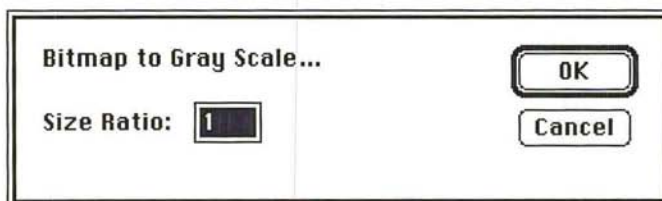
Converting a bitmap-type image to a gray-scale image

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.

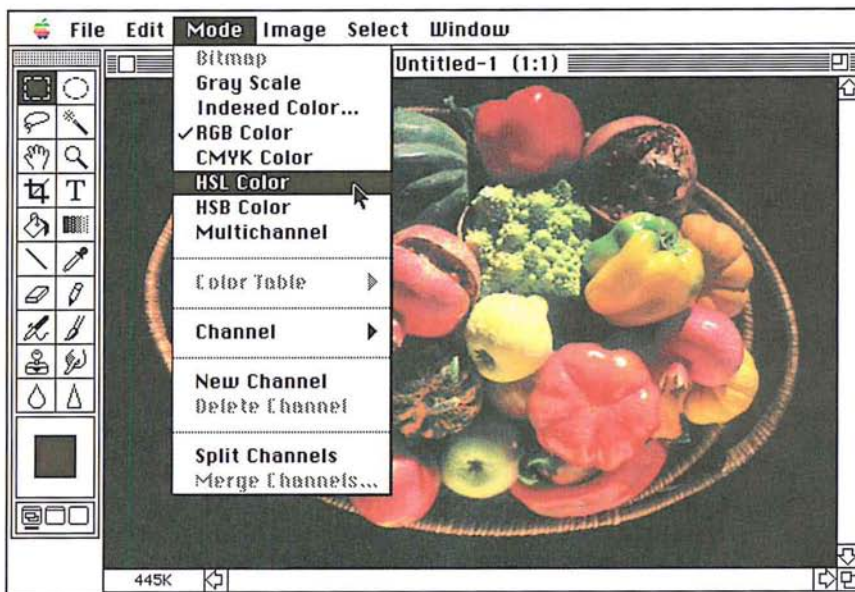
Converting a gray-scale image to an indexed color or RGB image

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.

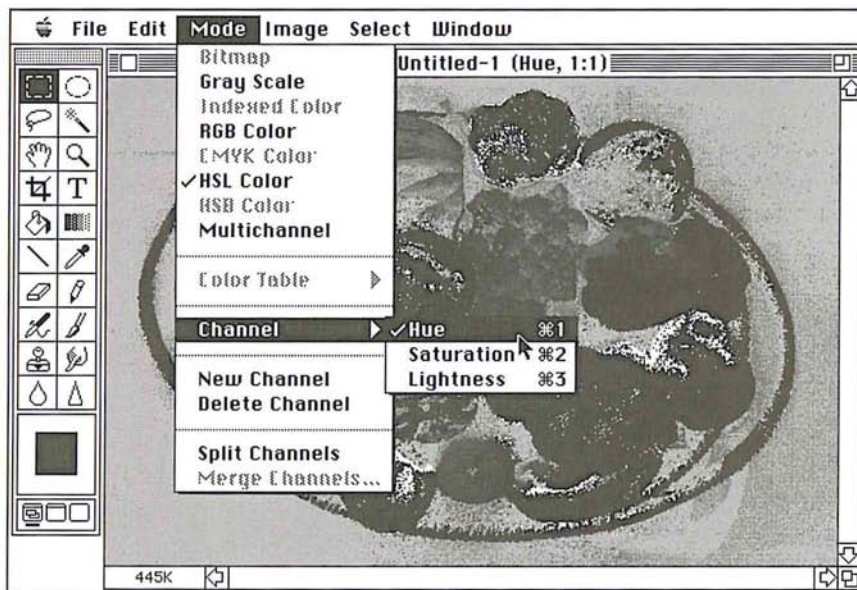
Converting an indexed color or RGB image to an HSL or HSB image

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.

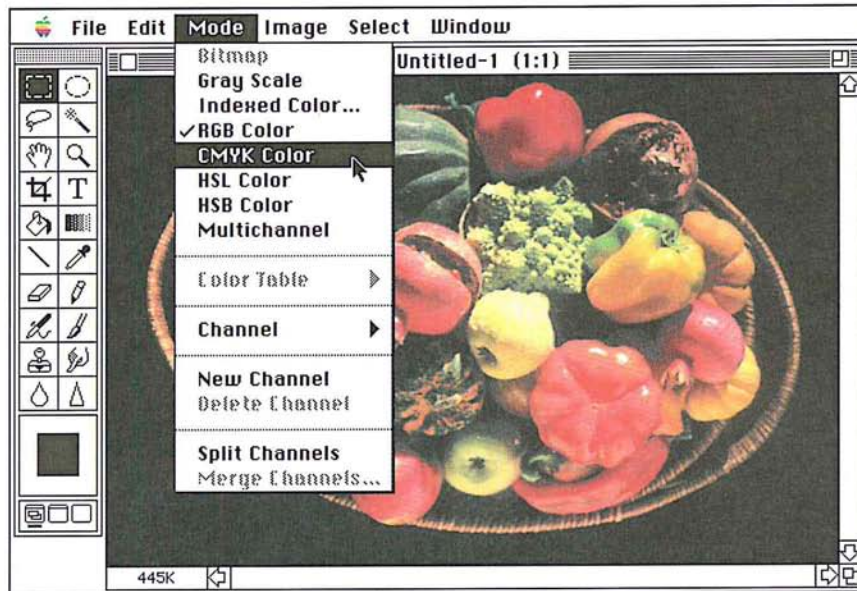
Converting color images to multichannel-type images

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.

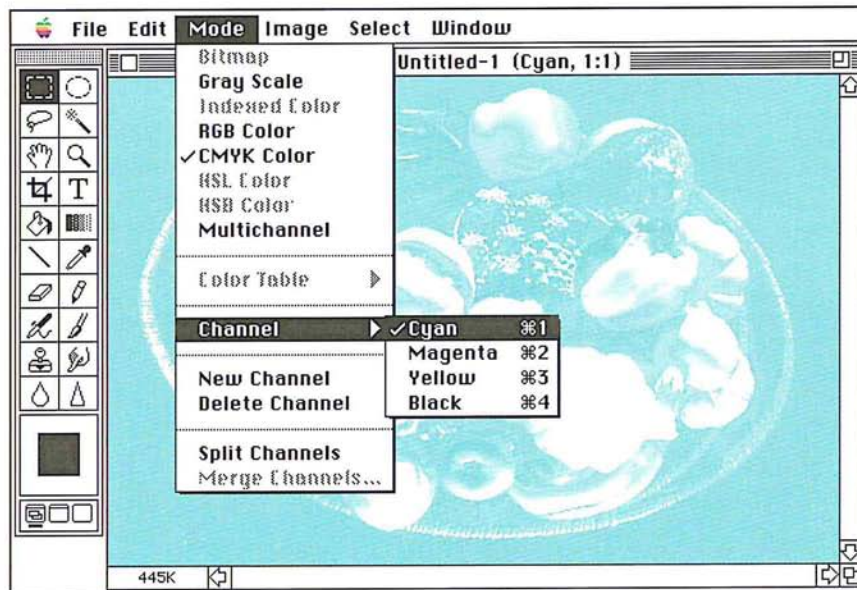
In the case of an RGB image, the red, green, and blue channels are converted to gray levels that reflect the color values of the pixels in each channel. Likewise, each of the CMYK channels is converted to a gray-scale channel. If you add a new channel to a gray scale image or delete a channel from an 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.

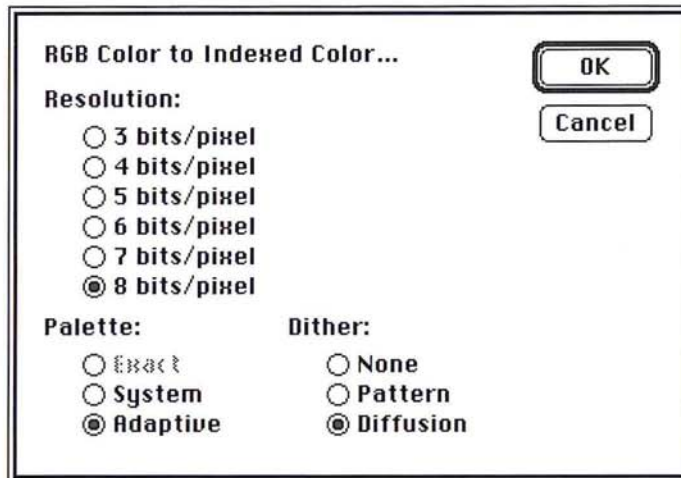
"Dithering" juxtaposes colors to simulate another color. This is important to keep in mind when you want to convert an RGB image to an indexed color image. An RGB image can contain millions of colors, whereas an indexed color image can directly reference only 256 colors. As a result, the transitions 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."

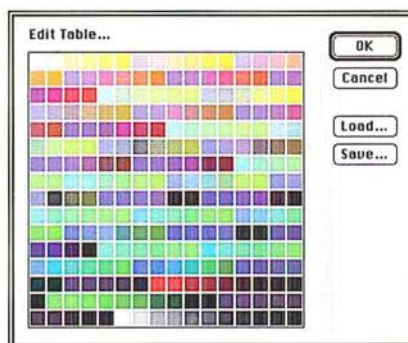
In addition, when you choose the System or Adaptive color table options, you can specify how the colors should be dithered. Descriptions for the options follow.

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



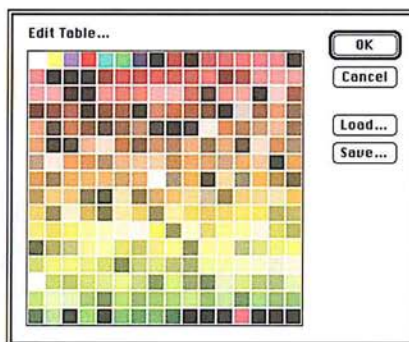
Resulting system color table

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.

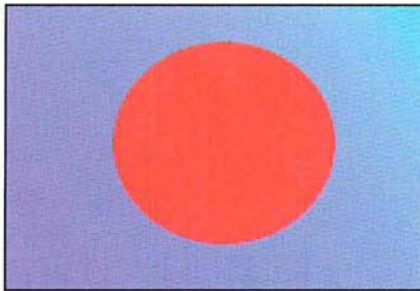
There are two types of indexed color images: color images that have a limited number of colors (less than 256) and pseudocolor images, which are gray-scale images that display variations in gray levels with color, rather than shades of gray. This type of image is often used in scientific and medical 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.

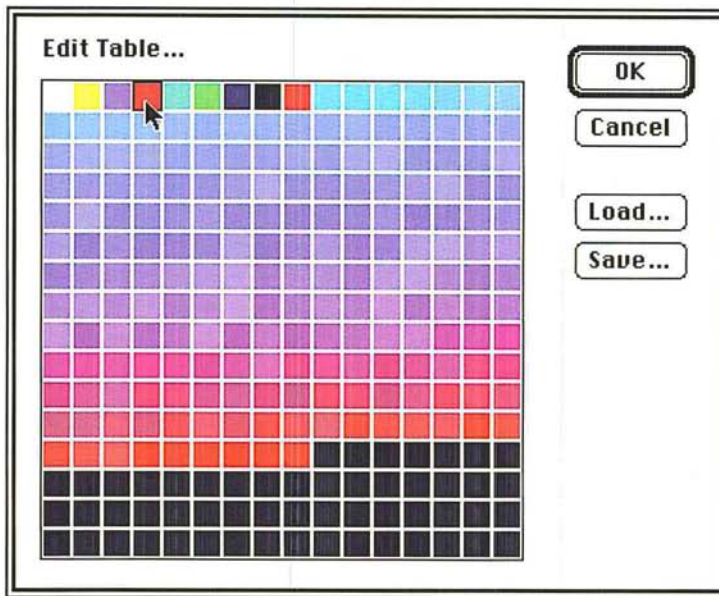
What follows is an example of how changing a color in a color table affects a color in the image that references that color in the color table. Note that to change colors in an image, you should use the color correction commands in the Map and Adjust submenus, which are accessed via the Image menu. Chapter 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.



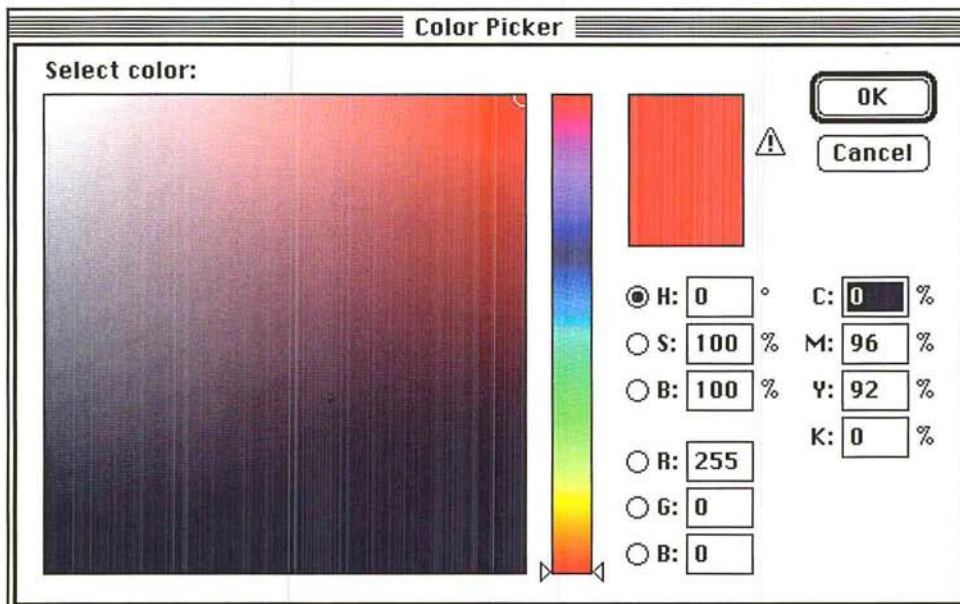
Before editing table

The red color in the color table occupies the fourth position from the left in the top row of the table.

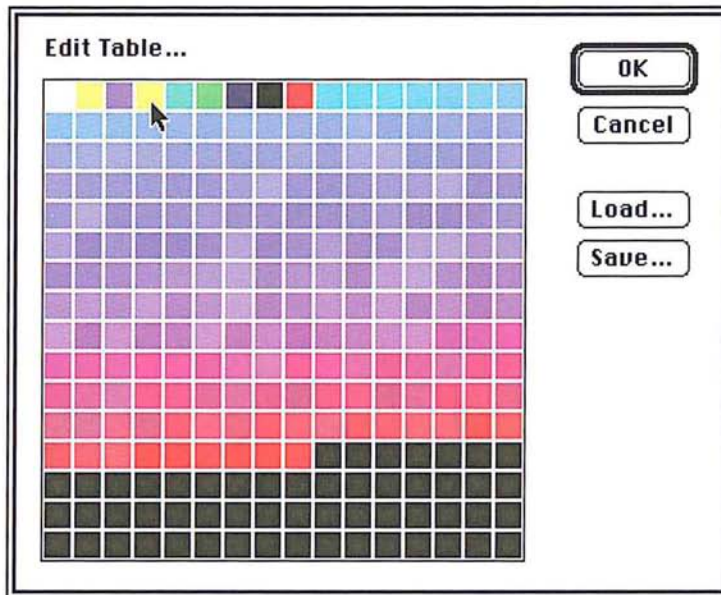


Red reference in color table

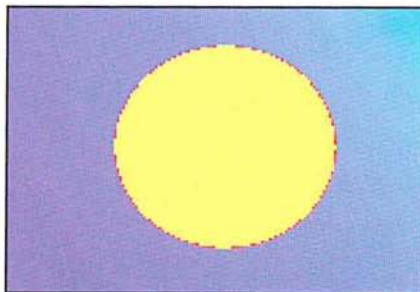
Suppose you change the red color in that position to yellow using the Color Picker or Color Wheel dialog box.



Red color referenced in Color Picker before being changed to yellow



New color in table



After editing table

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.

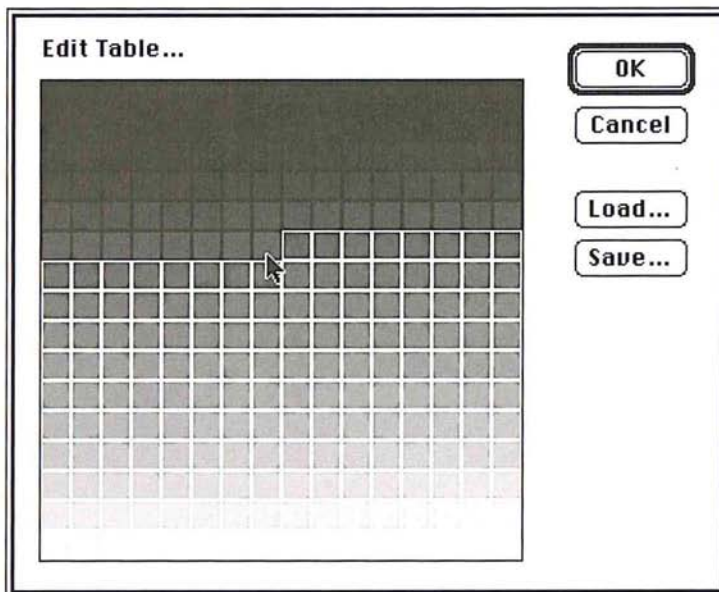
The colors in the image that reference the selected position in the color table are changed to the new color.

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.

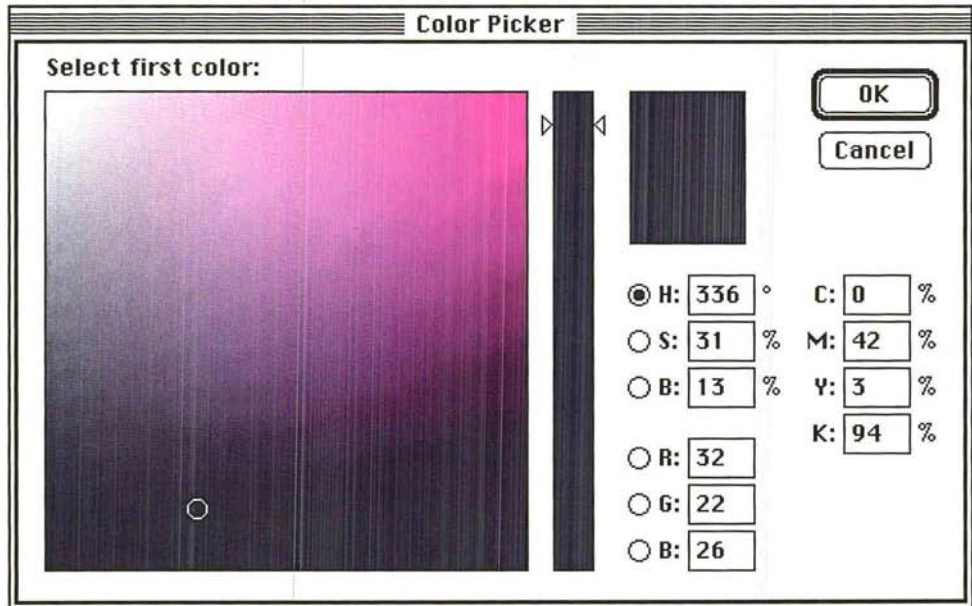
To select the range of colors in the color table:

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.

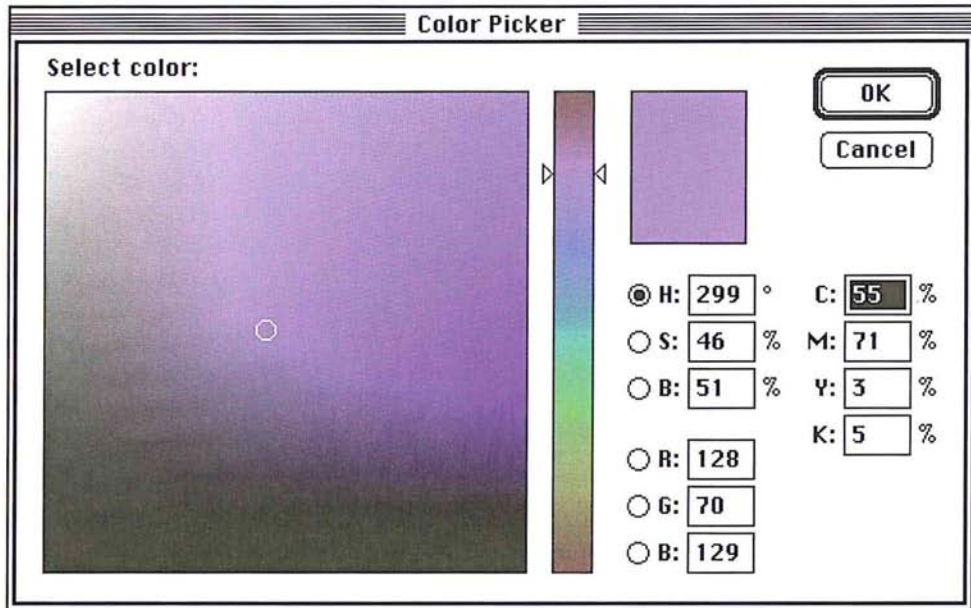
6. Use the controls in the Color Picker dialog box to pick the starting color for the blend.



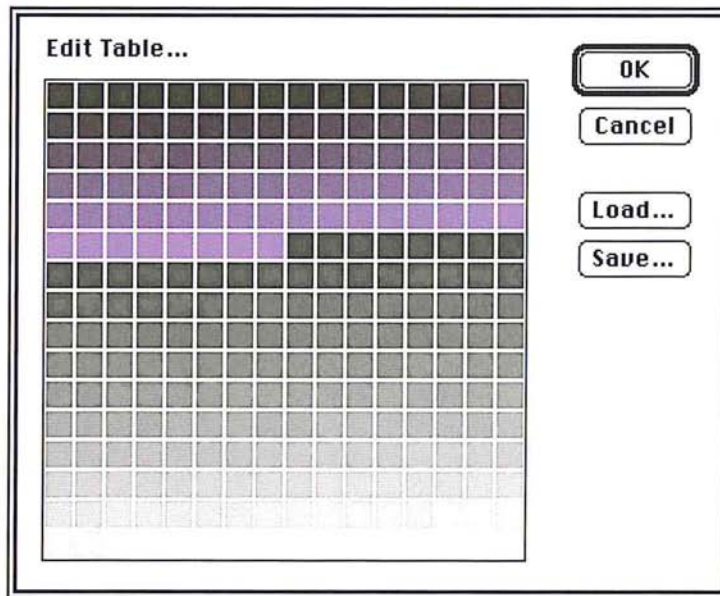
7. Click OK.

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.

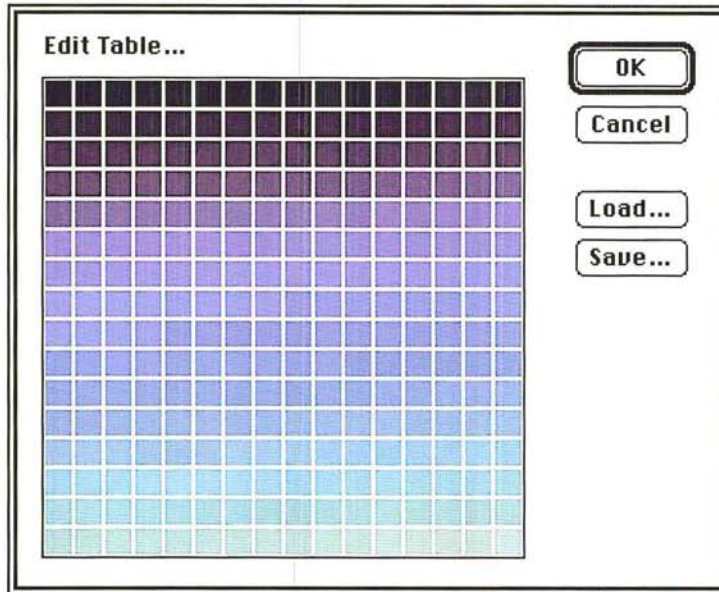


9. Click OK.



Edited color table

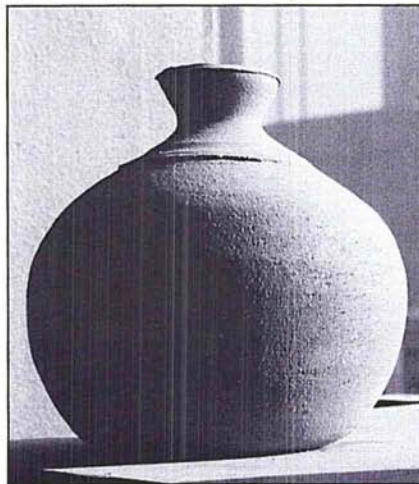
You can continue to modify the colors in the color table.



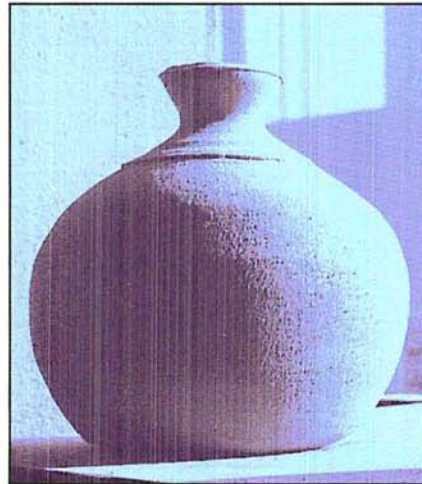
Final edited color table (multiple blends)

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

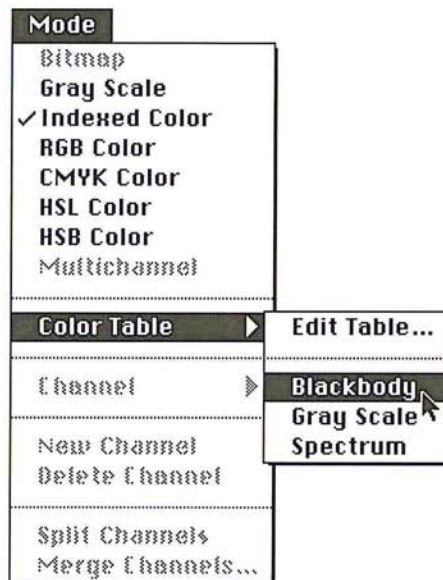
Structuring the color table

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

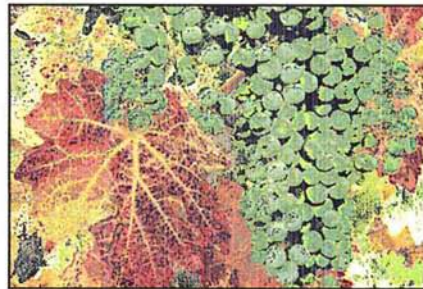
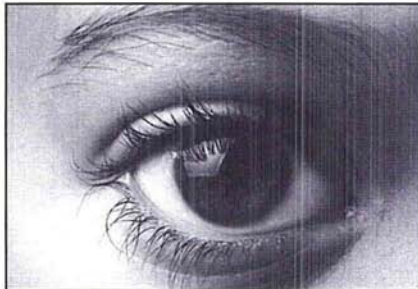


Image with new color table



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.

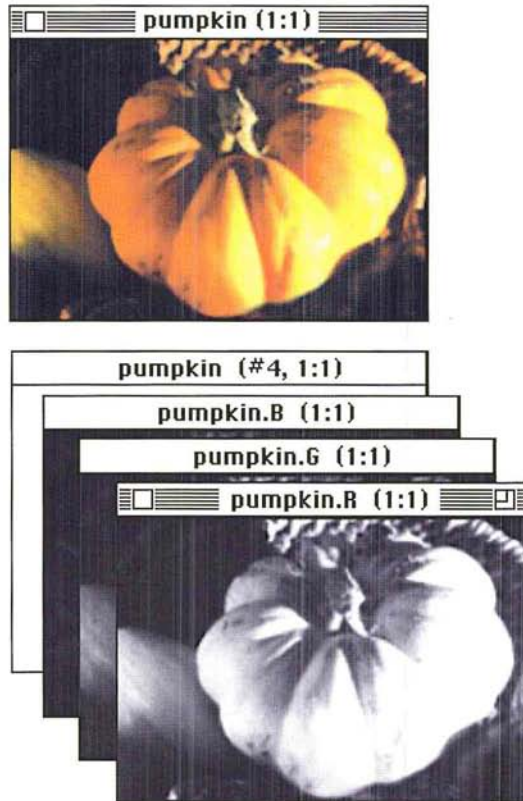
Adding a new channel

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.

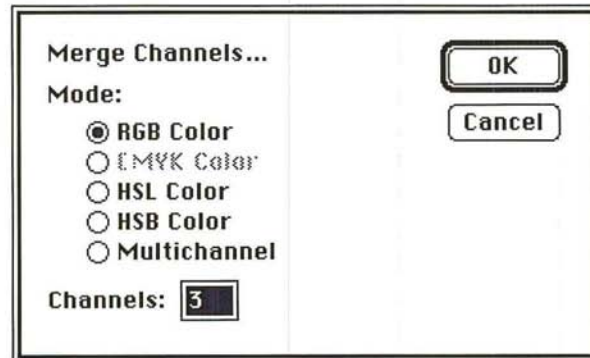
If Multichannel is the selected image type, a separate, Specify Channels dialog box appears for each of the specified number of channels. Use the pop-up menu beside the channel name to select the channel document for each of the channels to be included in the Multichannel image.

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:

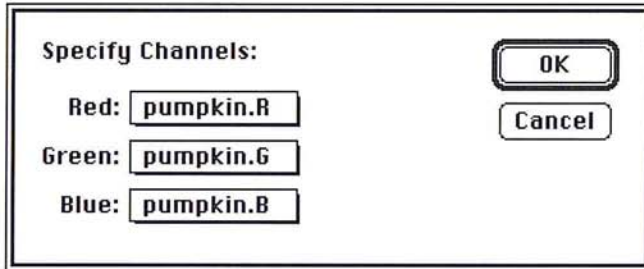
1. Click one of the channel documents you want to merge to make it the active document.
2. Choose Merge Channels from the Mode menu.

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.

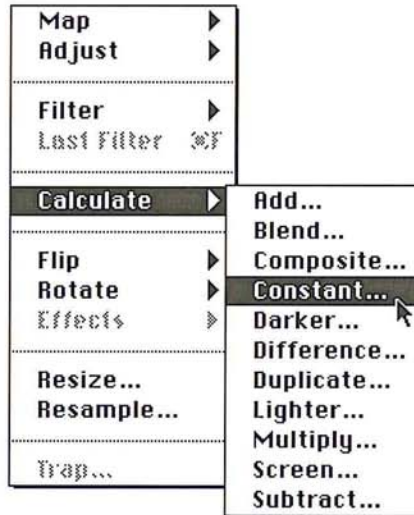
WARNING: *If you assign the results of a channel calculation to an existing channel (the destination channel), the channel calculation results will overwrite the pixels in the existing channel.*

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.

A pop-up menu appears.

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.

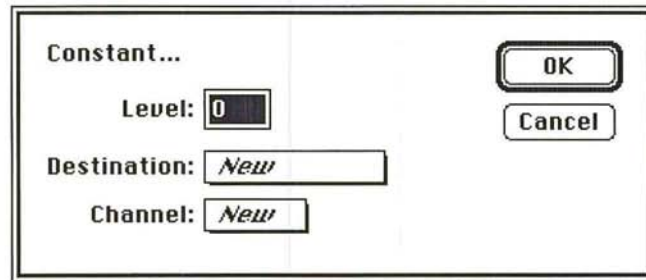
Assigning a gray level to a channel

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.

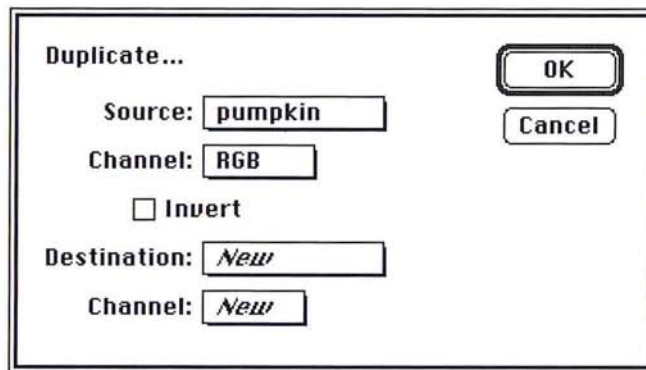
You can place a copy of a channel into the selection of the destination image. This procedure is analogous to copying the contents of an alpha channel into an image's selection using the Alpha -> Selection command. To do this, simply choose Selection as the destination channel in the Duplicate dialog 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

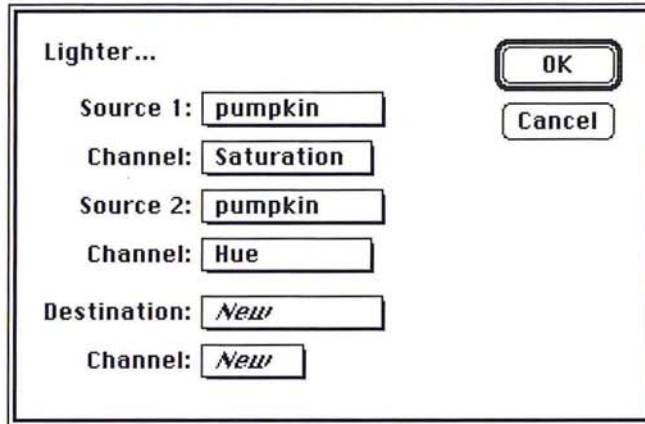
You can compare the brightness values of the corresponding pixels in two channels and automatically place a copy of the lighter or darker of the two pixels into a destination channel. The Lighter command selects the lighter of the two pixels; the Darker command selects the darker of the two. When you 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.

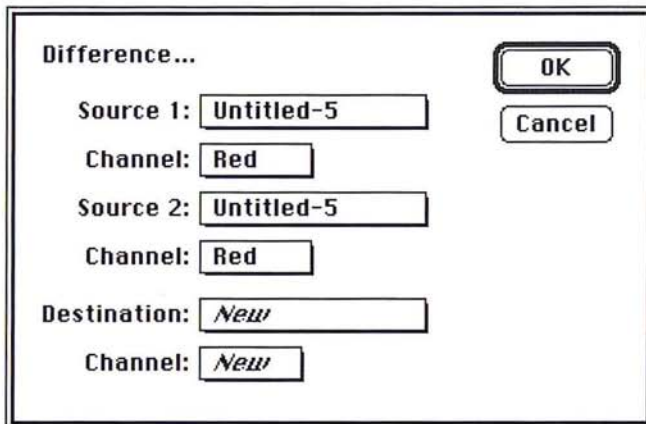
The steps for implementing the Multiply, Difference, and Screen commands are the same; you choose the two source channels you want to include in the calculations and the destination channel. The Adobe Photoshop program uses the brightness values of the corresponding pixels in the two selected source 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:

$$|Source 1 - Source 2| = destination$$

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:

$$\frac{(Source 1) (Source 2)}{255} = destination$$

Multiply...

Source 1:

Channel:

Source 2:

Channel:

Destination:

Channel:

OK

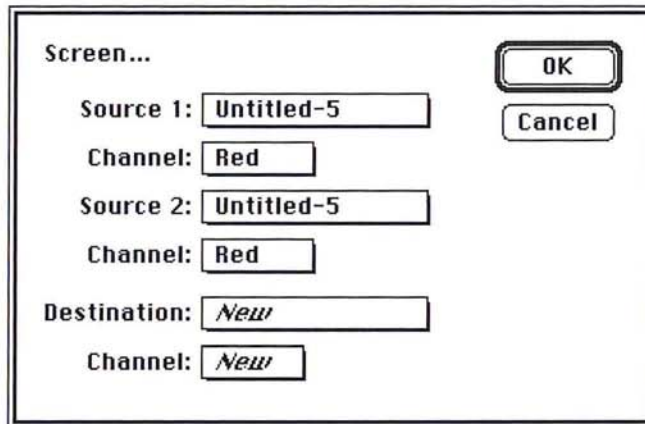
Cancel

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:

$$255 - \frac{(255 - \text{Source 1}) (255 - \text{Source 2})}{255} = \text{destination}$$



Screen...

Source 1:

Channel:

Source 2:

Channel:

Destination:

Channel:

OK

Cancel

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:

$$\frac{(\text{Source 1} - \text{Source 2}) + \text{Offset}}{\text{Scale}} = \text{destination}$$

The screenshot shows a dialog box titled "Add...". It contains the following fields and controls:

- Source 1:** Text box containing "Untitled-5"
- Channel:** Text box containing "Red"
- Source 2:** Text box containing "Untitled-5"
- Channel:** Text box containing "Red"
- Scale:** Text box containing "1"
- Offset:** Text box containing "0"
- Destination:** Text box containing "New"
- Channel:** Text box containing "New"
- Buttons:** "OK" and "Cancel" buttons are located in the top right corner.

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:

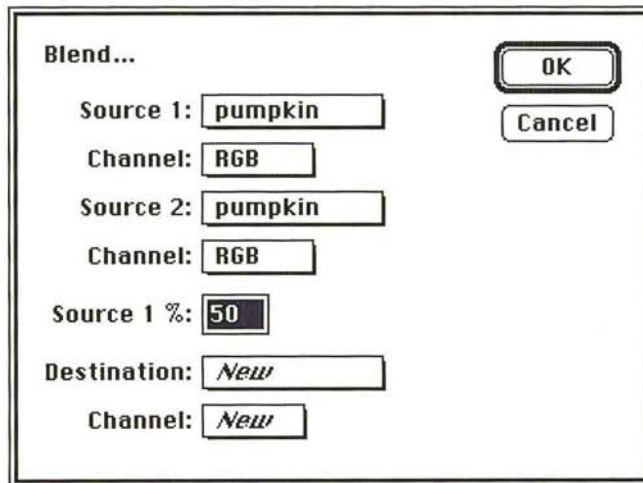
$$\frac{[(\text{Source 1}) (\text{Source}\%)] + [(\text{Source 2}) (100 - \text{Source}\%)]}{100} = \text{destination}$$

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:

$$\frac{[\text{Foreground (Mask)}]}{255} + \frac{[(\text{Background (255 - Mask)})]}{255} = \text{destination}$$

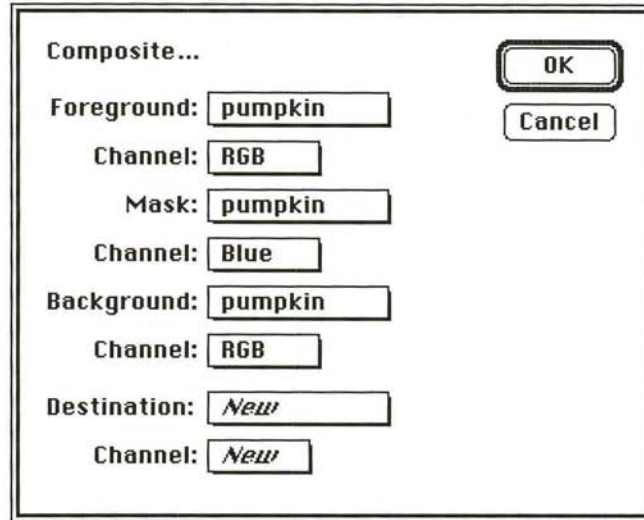
The brightness values of the pixels in the mask channel will tend to vary; the varying brightness values determine whether the pixels in the foreground or the pixels in the background channel are more influential in the calculation. The lighter areas in the mask channel tend to make the foreground pixels 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 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.

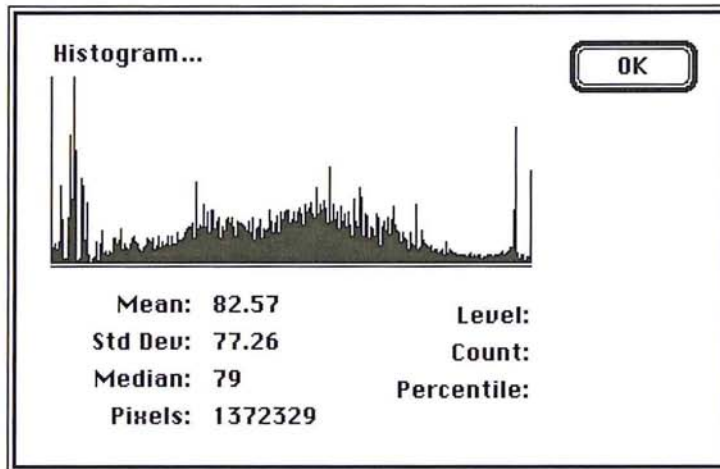
In the Histogram dialog box, the middle section of the graph shows the pixels with medium color values (near 128), the left side of the graph shows the pixels with dark color values (near 0), and the right side of the graph shows pixels with light color values (near 255). The X-axis represents the color 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.

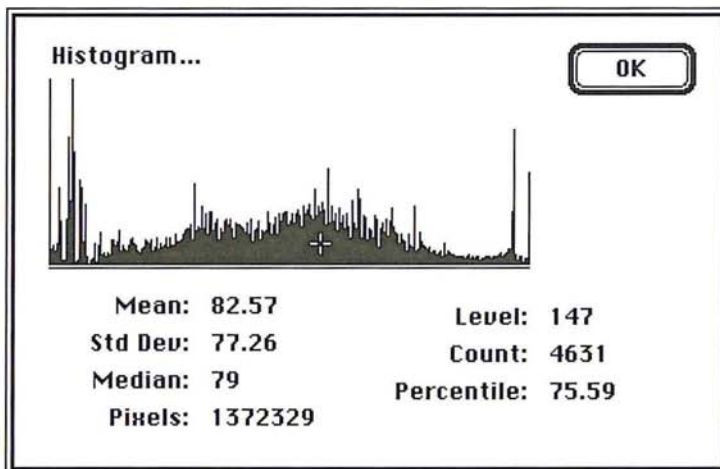
When you create a histogram of an RGB or indexed color image, an extra set of controls is available in the Histogram dialog box. These controls allow you to plot either the luminosity of the pixels (the Gray option), or the color values of the pixels in the red, green, or blue channels. Depending on 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.



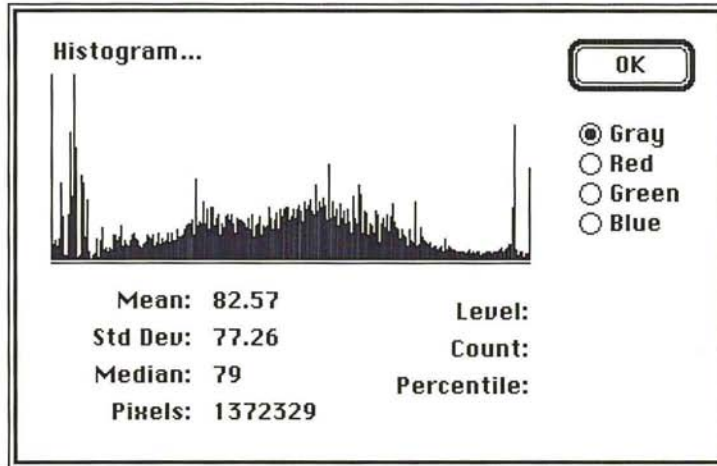
2. To obtain specific information about a point on the graph, position the pointer on the point of interest. The values at the lower right of the dialog box change to display information about the point on the graph.



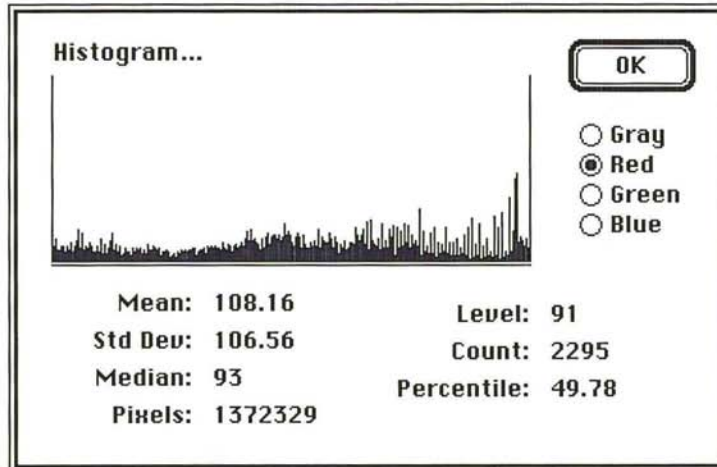
Pointer on histogram displays current values

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.



Original image



Inverted image

Specifying the number of gray levels in an image

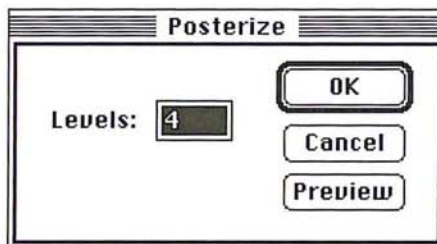
You can specify the number of gray levels in an image using the Posterize command. This is useful for creating special effects, such as large, flat areas in a photograph. The effects of this command are most evident when you reduce the number of gray levels in a gray-scale image; this command also works 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.

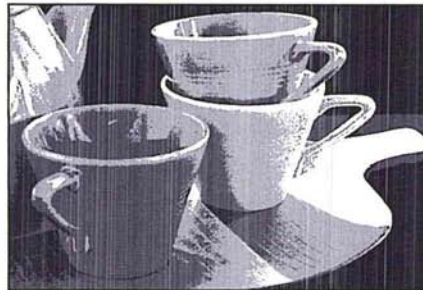
The Posterize dialog box appears.



3. Enter the number of gray levels you want.
4. Click OK.



Before Posterize: 256 gray levels

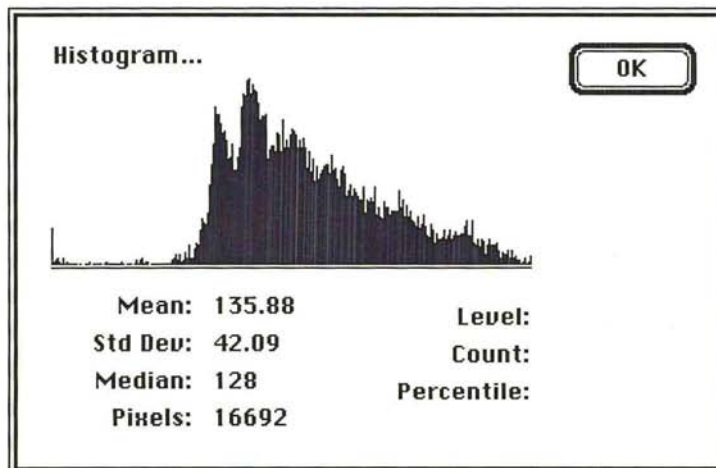


After Posterize: 4 gray levels

Equalizing brightness values

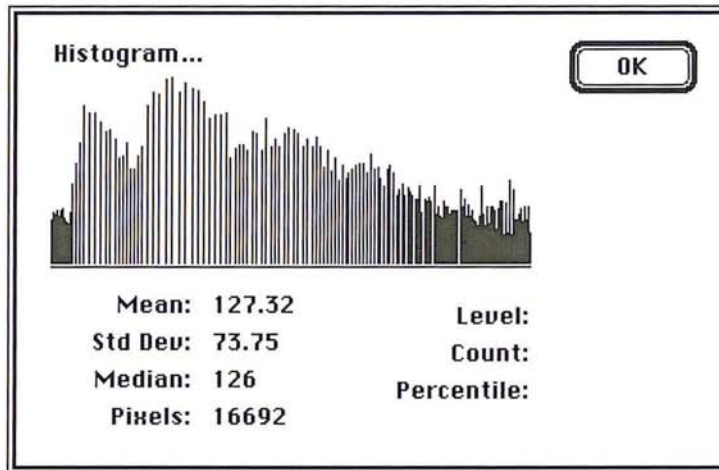
The Equalize command enhances the contrast in an image. When you use the Equalize command, the Adobe Photoshop program attempts to distribute more evenly the brightness values of the pixels throughout the range of brightness levels. The effect of this command is best understood by using a histogram.

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).



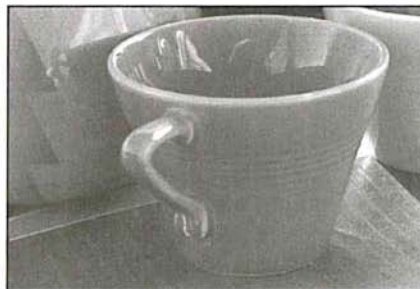
Gray-scale image before Equalize command

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

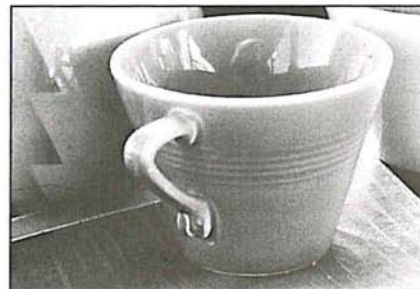


Image after using Equalize command

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.