

# Photoshop



## Part 1: Photoshop's Color Modes

**P**hotoshop offers an abundance of color picking tools—there's Color Picker, Color Palette, Swatches Palette, Custom Color Picker . . . and the list goes on. Without a general knowledge of your options, it's awfully hard to know where to turn when the color-picking moment arrives. In this two-part "Instant Expert," we'll take a trip through the color picking maze and find out why Photoshop gives you so many choices. In Part I, we'll get acquainted with all those strangely named color systems (CMYK, RGB, HSB, etc.), and then cozy up to the Color Picker Dialog box and find out why it's so important to use it properly.

In Part II, in an upcoming issue, we'll discuss the Color Picker palette, the Eyedropper tool, the Swatches palette, the Info palette (a plain looking interface, but more useful than you'd think!), and finally, making the most of the Photoshop measurement tools.

### Different Color Systems

Every image you open is in a specific color mode (RGB, CMYK, etc.), but that doesn't mean you have to use the same color system to work with your images. Photoshop can translate any image from one color mode to the other, so that you can work within one color system, and then convert it to another when you're ready to process the final image file (HSB to RGB, for example).

There are many ways to build colors. Because your image might be in RGB or CMYK mode, Photoshop offers these choices. They aren't always the most user friendly choices, but many people are accustomed to using the three primary colors—red, green, and blue—because they correspond to the colors of light used to display images on a computer monitor. Photoshop can handle up to 256 shades of each, so the numbering system it uses runs from 0 to 255, where 0 means no light and 255 means the maximum amount of light you can display on your monitor.

Others are more comfortable defining colors in terms of cyan, magenta, yellow, and black inks, the process colors, which are designated as CMYK ("K" stands for "key" or black). Each color can range from 0% to 100%; even though Photoshop can deal with as many as 256 shades of each of those inks, those who work in the printing industry find it easier to describe them as percentages.

CMY is the opposite of RGB. Cyan ink absorbs red light, magenta ink absorbs green light, and yellow ink absorbs blue light. To confuse the issue, cyan ink does not absorb red light alone. The impurities in the ink cause it to also absorb some blue and green light. Because of this, you cannot reproduce all the colors you see on your RGB monitor, especially the bright, saturated

ones. Fortunately, Photoshop has a warning system built in so you can't accidentally choose a color that can't be reproduced with CMYK ink, but more on that when we discuss the Color Picker.

### HSB Color Mode

Not everyone is comfortable thinking in RGB or CMYK color. The HSB model is very helpful for general color work because it is based on how most people think about color. The "H" in HSB stands for hue, which describes the basic color you are using (red, yellow, orange, blue, green, etc.). Hue is measured in degrees of angle, from 0 to 359 (a total of 360). This can be best explained using a visual approach. If you're on a Mac, you can follow along; if you're using Windows, just keep reading—you'll see why in a few minutes.

Choose File>Preferences>General and change the Color Picker pop-up menu from Photoshop to Apple and click OK. Now click on your foreground color and see what shows up.

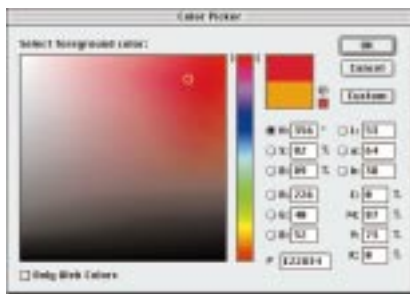


Change the Color Picker setting to Apple in order to see the Hues organized by angle.



Using Apple Color Picker, you can see why the Hues range from 0 to 359 degrees.

Do you see how the basic colors (also known as hues) are arranged in a circle? If all you see is a black circle, then move the slider below the circle to the middle. Now do you get a sense of why hue is measured in degrees? Adobe simply straightened out the circle into a vertical bar. Look at the normal color picker again and notice that red is at both the bottom and top of the vertical bar. It could just as easily have been wrapped around a seamless circle like the one in the Apple Color Picker.



The Photoshop Color Picker places the hues you found in the Apple Picker into a vertical bar, yet measures them as if they were still in a circular arrangement.

Before we leave the Apple Color Picker, let me show you a cool little trick. Go back to the Apple Picker and move your cursor outside the Picker and onto something that is not part of Photoshop (like your desktop pattern), then option-click. That should pick the color you clicked on even though it wasn't in Photoshop. I wish I could do that with the normal Photoshop Color Picker!

There is a special Windows Color

Picker, but unlike the Apple's, there is no real advantage in using this version over the normal Photoshop Picker.



The Windows Color Picker does not place the hues around a circular shape.

Back to picking colors using HSB: Hue alone is not enough to describe a color. You must also know how vibrant the color is—is it fire engine red, or is it more a shade of pink? This quality of the color is controlled by the Saturation setting. Colors with low saturation will look rather gray, with just a hint of color, and colors with high saturation will be vibrant and intense.

There is one more ingredient you need to flesh out a color: Brightness. Let's look at some examples from real life: When you tell someone you bought a green dress, will that person know the exact color of the dress? No. The only information you have supplied is the hue. Is the dress fluorescent green, or is it dark green?

Let's say you ask Kinko's to copy a brochure "on one of those fluorescent papers." Do you want fluorescent green or fluorescent blue? How likely is it that you'll end up with what you want, when you've described only the saturation you want? Or how about when you say "I like dark colors." Do you mind dark yellow, or would you prefer blue?

Occasionally you want to darken a color in your image. In HSB, all you have to do is lower the Bright-

ness setting and let Photoshop figure out how to make the change using RGB or CMYK values. If you want five different colors to have the same brightness and saturation, you would move only the Hue setting. You might think a particular object in your image should be gray, but you see a color cast in it. Simply note the saturation number. If it's 0, then you really are looking at gray, but if it's much higher than that, then indeed there is a color cast. You can see what the color cast is by looking at Hue.

### Lab Color Mode

The Lab color mode is based on human vision. It can describe all the colors you can see, far more than your monitor (RGB) can display or your printer (CMYK) can reproduce. Different computer monitors will display the same RGB values differently; similarly, different printers use slightly different colors of ink. Imagine trying to reproduce the exact same shade of red with a crayon, a magic marker, and a colored pencil. Since Lab mode is based on human vision, there is only one set of values for each color; in theory, those Lab values (the numbers you assign them) will give you the same color on any output device, as long as the device is capable of printing it.

This might seem like an understandable way to describe color, but it's not. The "L" in Lab stands for Lightness—that's the easy part. It's similar to brightness in HSB. But then the concept gets murky. The "a" component is for colors that range from greenish to reddish, and the "b" component is for colors that fall between light blue and yellowish orange. And if that isn't confusing enough, the numbering system is truly odd: The lightness is numbered 0-100 and the

“a” and “b” components are numbered -50 to +50!

When would you use the Lab mode? It’s great for balancing the brightness levels of two colors. Here’s an experiment: Choose a nice red color using any color system, then move the Hue setting until you change that nice red to green. Doesn’t that green color look brighter than the red you had a minute ago? If you’re not sure, squint your eyes.

Try the experiment again, but this time when you have the red color displayed, glance at the Lab numbers and remember the Lightness setting. Now swing Hue to green again. The Lightness setting changed, because that green looks brighter than the red you began with. Now change the Lightness setting to the setting you noted when the red was displayed. The result should be a green that appears to have the same brightness as the red (squint your eyes again if you need to).

### Hexadecimal Color Picker

Now don’t run screaming for the door. There’s another, slightly bizarre way to describe color, mainly used for the Web, called Hexadecimal. It allows you to specify a range of 0-255 colors using only two digits! This computer-friendly numbering system couldn’t care less whether it makes sense to our little human minds, but you will be forced to use it to create Web pages. Understanding the Hexadecimal system requires some weird math. It’s a simple concept really, but it takes getting used to.

Here’s how it works: We are accustomed to using the numbers 0-9 for a single digit. In Hexadecimal mode, you start with zero and can go up to 9, but then you start using the letters “a” through “f.” It’s something like the numbering on a deck

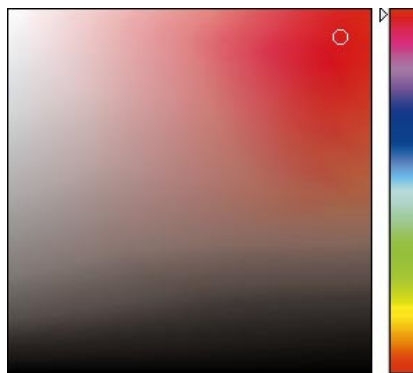
of cards (jack=11, queen=12, king=13). In Hexadecimal mode, A=10, B=11, C=12, D=13, E=14, and F=15. But somehow we need to number the colors all the way through 255. The solution is to use two digits, where the first is multiplied by 16; so “E” really means  $14 \times 16=224$ . The second digit is simply added to the product of that multiplication. If “A” were the first character, then  $244+10=254$ . Kooky! But that’s what you must use in creating the HTML code that makes up a Web page.

When you see an area in HTML code that reads, “BGCOLOR=A0B6FF,” it means a0 of red, b6 of green, and ff of blue. If your Photoshop application is earlier than Version 5.5, you can either grab your calculator and start multiplying, or update to Version 5.5 and let Photoshop do it for you.

Now that we’ve looked at all the different ways to build color, let’s see how Photoshop lets us use all this stuff.

### Color Picker Dialog Box

The most common way to choose a color is to click on the foreground color near the bottom of the Tool palette to bring up the Color Picker dialog box. With default settings, you just click on the basic color (Hue) you are looking for on the vertical bar and then pick a shade



Choose colors in Photoshop’s Color Picker by clicking on the vertical bar and then choosing a shade of that color from the square area.

of that color from the big square area on the left. You can see the color you’ve chosen just to the left of the Cancel button. Right below it, for comparison, will be the foreground color you first selected.

If you are used to using this dialog box to pick white or black, be very careful. All too often I find people clicking in the square area and dragging toward the upper left corner to choose white. That’s fine, but be sure to drag all the way past the corner, otherwise you might be surprised to find that you have actually chosen a light shade of gray instead of white. Do the same thing when choosing black at the bottom of the dialog box, but here you don’t have to be as careful; just drag beyond the bottom. It doesn’t matter if you get the corner or not because all the colors at the bottom are black.

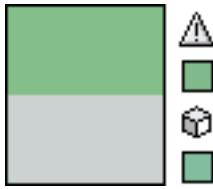
If you really want black, you can get it much faster by typing “D” to reset the foreground and background colors (or click on the tiny icon above and to the left of the foreground color). If you want to paint with white, then just click on the curved arrows near the foreground color, or type “X” to exchange the foreground and background colors.



Lower left: reset to default colors icon.  
Upper right: exchange foreground/background colors icon.

While working in the Color Picker, you might see two symbols showing up to the right of your selected color. If a triangle appears, then the color you have chosen cannot be reproduced in CMYK mode. You can click on it to change to the closest reproducible color. If a cube appears (only in Version 5.5),

it means the color you have chosen is not a Web-safe color.



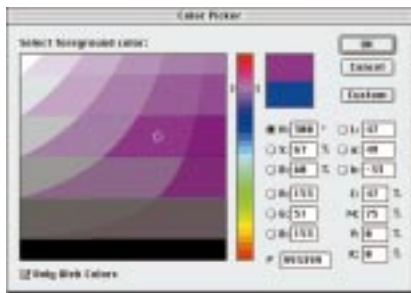
Top right: non-printable color warning  
Bottom right: non-Web-safe color.

Web-safe colors should be used for all solid areas of color in Web graphics. If you don't use Web-safe colors when you are using a low-end machine, you could see dithering. If you are using an older version of Photoshop, make sure your color is Web-safe by changing the RGB settings to 0, 51, 102, 153, 204, or 255. That's exactly what the color cube icon does in Photoshop 5.5.

## Web Safe Dithered

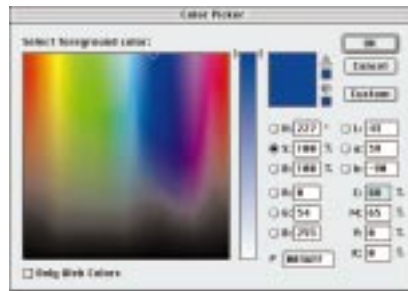
Web browsers that are low on memory or being run on low-end computers display only 256 colors.  
Top: Web-safe colors.  
Bottom: non-Web-safe colors dithered

In Version 5.5, you can turn on the Only Web Colors checkbox to ensure that only Web-safe colors appear in the picker.



The only Web Colors checkbox limits Photoshop's Color Picker to displaying Web-safe colors (you can still create a non-safe color using the numbers).

Default settings are not always the best ones to use, so let's see what else we have available. You might notice that a radio button is turned on next to the "H" in the HSB numbers. That means that the vertical bar will contain the Hue, and your other two choices (Saturation and Brightness) will be defined by where you click in the big square area. In the square area, bright colors are at the top and dark colors are at the bottom, so brightness runs vertically. Saturated colors are on the right and unsaturated colors are on the left, so saturation runs horizontally. You can change that—just click on one of the Radio buttons next to the HSB numbers; whichever button is turned on will appear in the vertical bar with the others appearing in the square.



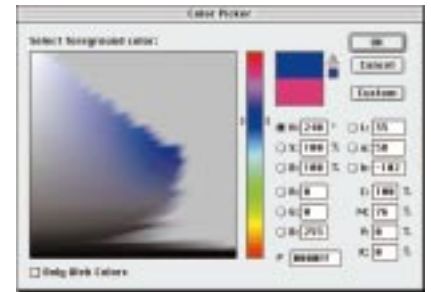
The Radio button to the left of the letters determines what will appear in the vertical bar.

You can use the same technique with RGB or Lab colors, but not with CMYK, because there is room for only three components to be displayed.

### Picking CMYK Colors

How can you pick CMYK colors visually using the big square and the vertical bar? Easy. First, choose a bright, saturated blue and notice that the warning triangle shows up. Click on the triangle and watch how far the color moves within the square area. To avoid this discrepancy, you can choose View>Preview>CMYK to see only the colors that are reproducible in

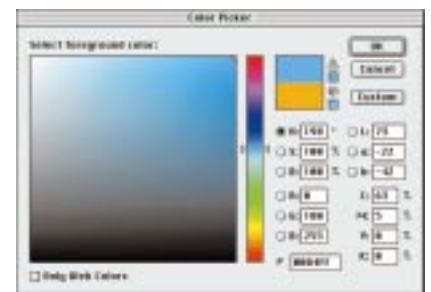
CMYK mode, and you won't be surprised with a warning. But you're not completely off the hook—you still have to click on that warning to get a printable color, so keep your eye out for it. You could also choose View>Gamut Warning, and then all the unprintable colors will be covered with gray in the Color Picker, but not in your document.



By turning on the Gamut Warning, Photoshop will cover all non-printable colors with gray.

If you want someone else to reproduce the color you have chosen, you might want to give him the numbers from the Picker. You need to pick only one numbering system (HSB, RGB, CMYK, Lab). Stay away from the CMYK numbers if you're designing for multimedia, Web, slides, or video; there are many colors you can display on screen but cannot print, so do not use RGB. You can choose a color mode that suits you, but be forewarned that most people are not used to dealing with HSB and Lab.

If you will be using the color in a Web page and you own Photoshop



Hexadecimal numbers appear below the RGB numbers and can be used within HTML code.

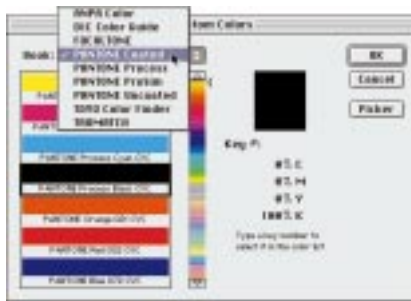
5.5, then use the Hexadecimal numbers in the lower left.

Let's not forget that colors existed long before the first color monitor was a gleam in an engineer's eye. Take a drive to a graphic arts supply store and pick up one of the many different color swatch books. Pantone is one of the most popular, but be sure to use the right Pantone books. If you will be printing the job on an offset press in process colors (CMYK), then be sure to use either the Pantone Process book or the Pantone ProSim book. You might want to stay away from the Pantone Coated and Uncoated books because they are used when purchasing ink colors other than cyan, magenta, yellow, and black.

One of my favorite swatch books is Trumatch. The colors are all created from CMYK inks, and because they have a wide variety and a great

numbering system (unlike Pantone), it's easy to find Trumatch colors that are similar in brightness, hue, and other characteristics.

If you work in the newspaper industry, then you might be familiar with NAA colors, developed by the Newspaper Association of America. You can visit their Web site at [www.naa.org](http://www.naa.org). The Focoltone Colour System is not a common swatch book (<http://apmedia.com/pubnet.htm#fcs>)



Click the Custom button within the Normal Color Picker to access Photoshop's custom colors.

but the colors in it are made from CMYK inks and they can be useful to avoid trapping problems. Focoltone swatch books show you how to create the same color on different papers—so your logo printed in a brochure on coated paper will be the same color as one printed on your uncoated company stationery.

To access these swatchbook colors in Photoshop, click on your foreground color, then click the Custom button and select from the Book pop-up menu. The only ones I'd use are Focoltone, Pantone ProSim, Pantone Process, or Trumatch—all based on CMYK inks. The others should be used in conjunction with Spot Channels.

When you are working in this dialog box, you can type in numbers to quickly bring up the color you desire. Unlike most dialog boxes, there's not a spot to click on, so just start typing, and quickly (otherwise Photoshop might think you typed in "9" when you wanted to type "789"). When you are finished with Custom Colors, you can click on the Picker button to switch back to the normal Color Picker dialog box, or just click the OK button.

### Take a Breather

I imagine your brain is swelled up like a wet sponge right now, so give yourself a break until "Navigating the Photoshop Color Mode Options: Part II" appears in an upcoming issue of *PEI*. In the meantime, check out all the free tips I provide on my Web site, at [www.digitalmastery.com](http://www.digitalmastery.com). ◀

Ben Willmore is the author of the best-selling book *Official Adobe Photoshop 5 Studio Techniques* (Adobe Press) and the founder of Digital Mastery, a training and consulting group based in Boulder, Colorado. Find out if Ben is coming to your area with his "Master Photoshop In 3 Days" seminar by visiting [www.digitalmastery.com](http://www.digitalmastery.com).

**In The Dark About Color Viewing?**

**Get Into The Light...**

**Graphiclite**

For our full line of innovative transparency viewers & color viewing products, call toll free or visit us on the web!

888-562-7066 [www.gtilite.com](http://www.gtilite.com)

gli graphic technology, inc. 211 Dupont Avenue E. Newburgh, NY 12550

See Us At PMA—Booth E-46/E-48

More info? PEInfo No. 51

# Subscribe to PEI Magazine!

Fill this in on our web site: [www.peimag.com](http://www.peimag.com)

-Or fax-mail today 404.614.6406!

-Or call us 1.800.786.6277x257

PEI (ISSN: 1060-4936) is published monthly for \$20.00 U.S.; \$33 Canada; \$50 International per year

(Single copies including postage and handling \$4, U.S. and Canada; \$5, International). Back issues are \$4 U.S., \$6 Canadian, and \$10 International.

**\*Prices Subject to Change.**

**Please allow 6 to 8 weeks for delivery of first issue.**

**Last name:**

**First name:**

**Company:**

**Street:**

**City: State/Province:**

**ZIP/Postal Code: Country:**

**Phone:**

**Email:**

## **Yes! Sign me up for a one year subscription to PEI for:**

US \$20.00•Canada \$33.00•International \$50.00

### **Charge my subscription to:**

Payment: Visa•America Express•MasterCard or

Check (Checks must be mailed to PPA in U.S. Funds with a copy of this form)

**Credit card number:**

**Exp. Date**

**Name on card if different from subscriber name:**

**Zip/Postal Code if different from subscriber:**

**--It is important that you provide the following information:--**

## **Please check ONE that describes the primary activity of your organization:**

- \_60 Corporate Photography/Imaging Studio 66 Advertising Agency
- \_61 Independent Photography Imaging Studio 67 Multimedia Services
- \_62 Publishing 68 Commercial Printing
- \_63 Computer Graphics Studio 69 Education/Training
- \_64 Prepress Services 70 Government
- \_65 Service Bureau/Lab 71 Dealer/Distributor/VAR
- \_Other 72 :

## **Please check ONE category that best describes your title:**

- \_A Owner/Partner/President
- \_Vice President/General Manager F Prepress Manager
- \_B Graphic Designer/Illustrator G Multimedia Producer
- \_C Photographer H Communications, Marketing Director
- \_D Digital Imager I Consultant/Systems Integrator
- \_E Creative Services Manger/Art Director
- \_Other J :