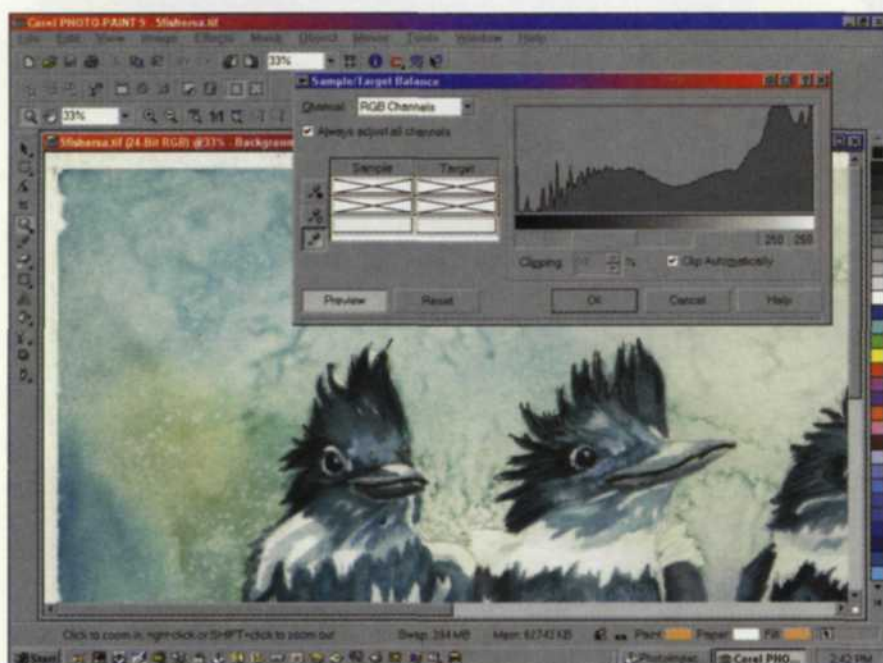# DIGITAL DIRECTIONS

SHADES OF GRAY—

Original scan show in the above image with an arrow showing where the target white balance is selected. Opposite page, Final image with white balance correction to original paper color.

Screen shot of watercolor scan. Because the software in the scanner tries to get a good balance, sometimes the color of the paper is removed. Using the target color balance tools in Corel 9 Paint, the edge of the paper can be restored to the original paper color.
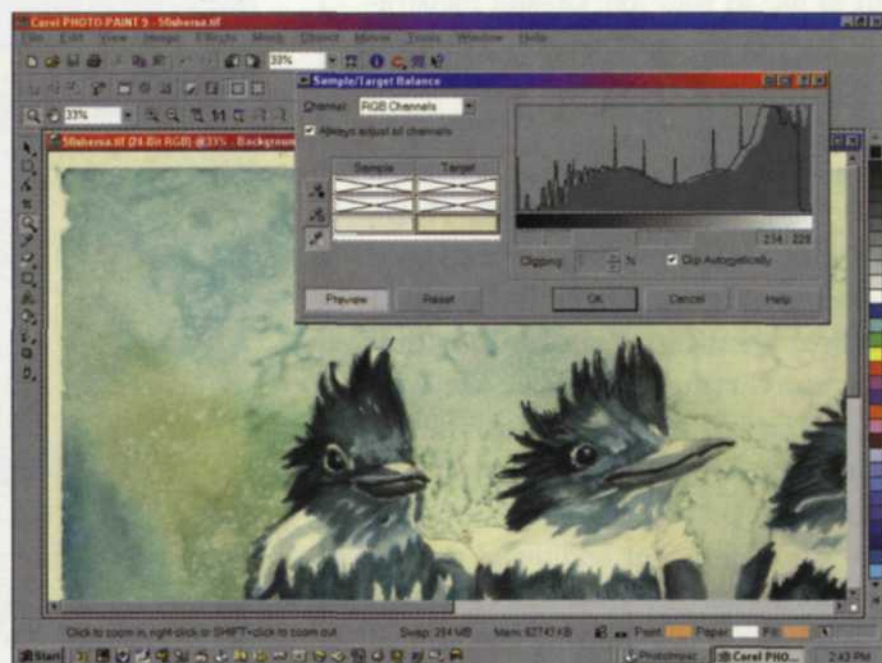
Screen shot of watercolor scan with white balance corrected to original paper color.

One of the most difficult parts of working with digital images is achieving correct color balance. The problem is that the human eye is very subjective, so the interpretation of correct color varies from person to person. If you have 10 different people visually color balance an image, your probable results will be 10 different color balances. The solution is to use gray scales to help keep images in balance.

BALANCING COLORS

Final image with white balance correction to original paper color.

Jack and Sue Drafahl

THE DIGITAL PHOTO lab uses several computer tools to allow the digital editor to make color corrections faster and with more accuracy. In an RGB image, a pure white area is represented as 255 pixels of red, green, and blue. A pure black area is represented as 0 pixels of red, green, and blue. The full colors of a digital image have varying ranges of data from 0–255 pixels of each color.

When an image is digitized into a system, several factors force the range of pixels to be less than perfect. A dark image may have a white of 200 red, 200 green, and 200 blue or a red color shift may show as 255 red, 200 green, and 200 blue.

Since the color range of a digital image is an absolute number, the off-color image can be adjusted. With the dark image, the 200 red, 200 green, and 200 blue can each be increased to 255 to achieve the correct brightness. With the red color shift image, the green and blue values can be increased to 255 and the color shift will disappear.

When you first start to color balance an image in Adobe Photoshop 5, you should try the auto balance to see if the computer can fit the input pixels of the image into the ideal digital image format. When you select this function, the program will look for the highest pixel value and assign it a white value. It then looks for the lowest pixel value and as-signs it a black value.

All other pixels in between are proportionally adjusted to fit the range. This function is very fast and only takes seconds to preview. If you don't like it, simply press the undo and go to Plan B.

If this were a perfect world, all color images would have a perfect white, middle gray, and pure black to eliminate all color balance problems. Since not all images have these qualities, this is where we employ our Plan B. There are special tools, usually located in the levels editor, that come disguised as black, gray, and white eyedroppers. You use these to select specific areas in your image to bring the color balance into quick control.

Before you select any of the three eyedroppers, examine the image to see if there is a dominate white, black, or mid-tone gray area. If you're not sure what these areas look like, just turn on your info display so as you move your mouse across the image, the RGB values are displayed.

When your mouse comes over an area with values close to 255, you have located a white area. You can then select the white balance eyedropper, and touch that area of the image. The image will then be re-adjusted to reflect the changes in the white values.
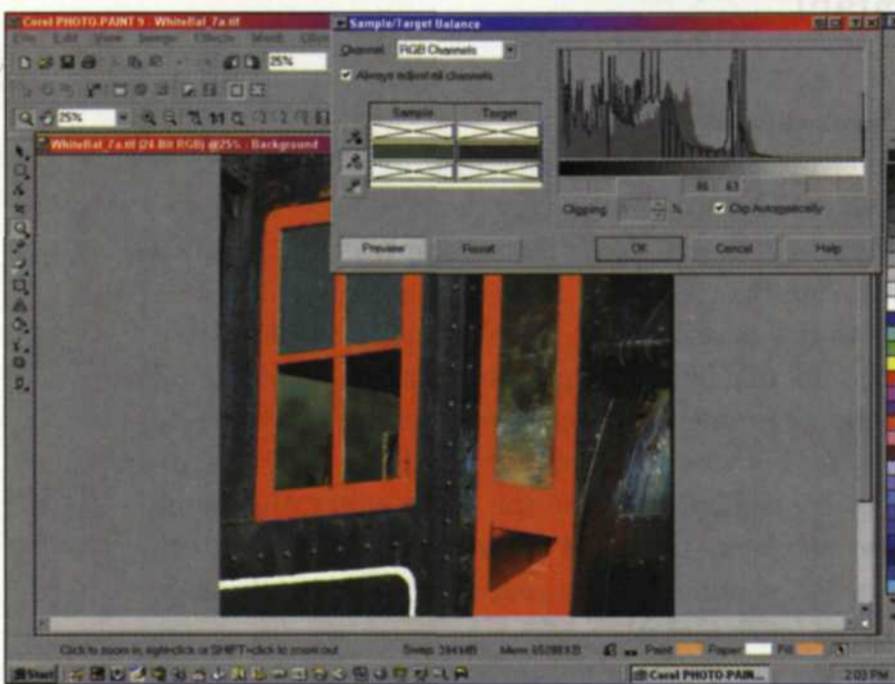
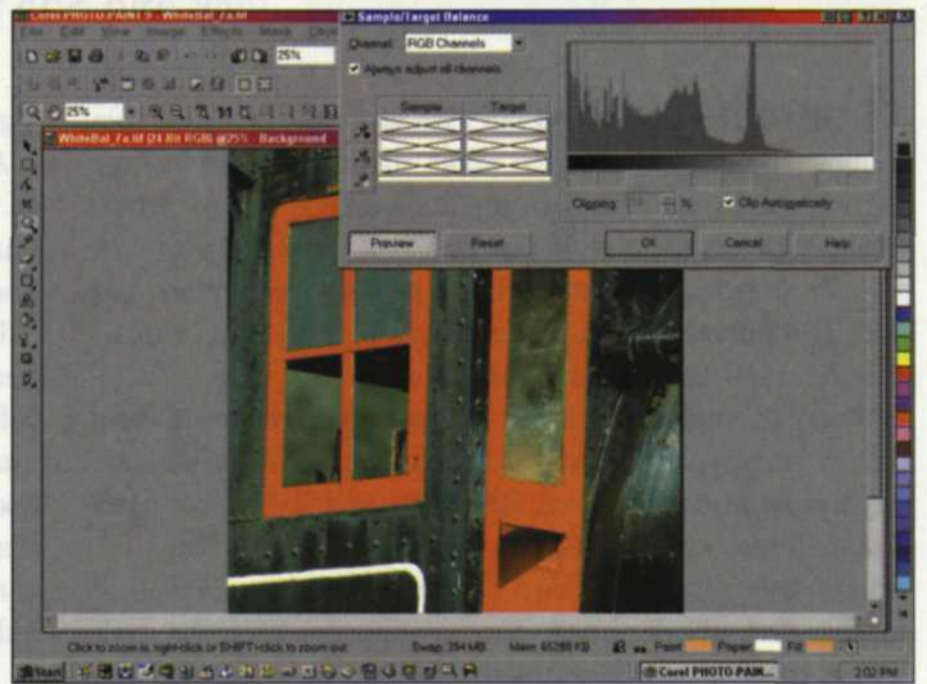*Stepwedge created in Photoshop 5 with gradient fill.*

Stepwedge created in Photoshop 5 with Posterization effect set at 11

Original scan (right) of train cab showing points for white balance (lower left), gray balance (center arrow), and black balance (lower right arrow)

Final image (far right) after corrections.

Screenshot of flat scan of train cab.

Screenshot with white, gray, and black corrections.

At this point, this may be all you have to do to obtain a good color balance, but it is always a good idea to check the black levels of the image. If they are much higher than 0, you may want to select the black balance eyedropper and touch the area. This should bring the color balance to even tighter tolerances.

As we mentioned earlier, some images do not have a clear black or white area, so you may need to look for an area that has a mid-tone gray level. Of the three balance tools, the mid-tone gray balance is the most difficult to use. Once you have found a gray area, touch the gray eyedropper to that area in order to bring the image into balance. Occasionally, you may touch a gray area and a color shift will result. Simply double click on the eyedropper function in the tool-

Studio set-up shot (glass figures with wood bases) under mixed lighting.

Screen shot of studio set-up with grayscale stepwedge added to help color balance. Arrow in upper left shows point of black balance, and arrow on glass is point of gray balance.
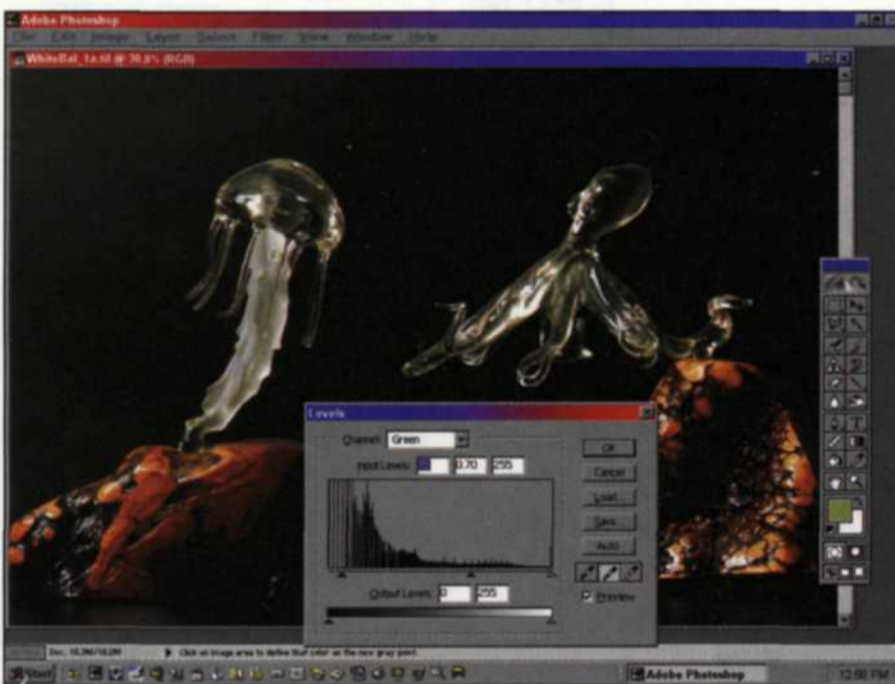
Screen shot of corrected image using black and gray balance.

Final image after corrections.

box, enlarge the sample area and then try it again.

A visual representation of the white to black values are also shown in the image histogram. A dark image will have data only in the left part of the histogram, so to increase the highest value, move the slider under the histogram over to the first point of indicated data. The program will then stretch the data to fit the new range of assigned pixels.

You can also analyze color shifts in an image by looking at the histograms of each of the red, green, and blue values. An image with red shadows will have no data recorded on the red histogram in the black area. To remove the red shadow, merely move the shadow slider in the red histogram over to the right until it touches the first red data. When you say OK, the program will stretch this data to fit the deepest black of the red histogram. The red shift will magically be gone.

If you want to set a custom white, gray, or black levels, you can double click on a specific eyedropper and then select a specific value for that eyedropper. You can even use custom color selection to match the eyedropper to a specific Pantone color. Since this function is hidden in the double click function, most people don't even know it exists and it is one of the most valuable functions in color image balancing.

You can also adjust the maximum white and black values for the eyedropper using a slider at the bottom of the levels editor. If you want the maximum white to be 250, move the slider over to 250. When you use the white eyedropper, it will make that area 250, and fit the rest of the image accordingly.

The best part of this digital color balancing system is that the values of white, gray, and black will not change. The adjusted color balance remains constant, no matter if you move locations or view the image using different monitors. This consistency is vital because all editing and printing systems use the same 0-255 system for image editing.

We have only talked about RGB editing and unfortunately, CMYK editing is quite different. It depends on special settings on the CMYK output device, so the problems of editing and creating CMYK images will be covered in a future article. Until then, we hope that we have answered some of your questions regarding digital color balancing. If you want to explore this area even more, we suggest that you try the Tutorial supplied with Photoshop 5.

Jack and Sue Drafahl are freelance writers and digital imagers living near Portland, Oregon. They are also professional photographers, specializing in underwater photography.