90% Method
of color correction basics
by Eddie Tapp

The Event

Processing images on the computer has brought us the responsibility to learn a new way to control color and tone from previous methods of cc filters, densitometer readings, and so on. The ever progressive evolution of Digital Imaging and the methods we use to control color management will continue to grow and change as time goes by... and by the way, become easier.

The event of controlled color management has taken on a whole new directive with the abilities of ICC profiling. But the event of Digital Image Processing remains quite the same. Resolution, color correction, creative input and digital output.

For the untrained eye and even the experienced, when an image is acquired in Photoshop and appears on the screen, our eyes adjust, adapt and usually start to accept the tone and color to a given point. Most will go to >File >Adjust - "Brightness & Contrast" and/or "Color Balance" to improve the color and tone. As this can be a very effective way to make corrections, it is perhaps the least desired method we could use because what we are seeing on the monitor may not be the best effective color/tone the image has to offer. The best method is by the numbers and the 90% Method is just that. The truth is in the pixel.

Acquiring an image with a 24 bit device (8 bits per color) does not mean that we'll get a true 8 bits of information per channel. As a matter of fact, once acquired with a 24 bit scanner, the actual bit depth will be closer to 5 or 6 bits of information to disseminate. It is important to use a scanner or digital camera that will permit 36 or 48 bits of pixel information as we will convert the image (automatically or eventually) to the 24 bit mode.   Perhaps then, we'll have more of a full range of tone in the 8 bit per (color) channel, 24 bit image.

The event of processing an image on the computer is where pixel information is thrown away! Okay, so just what does that mean? Let's take a look...
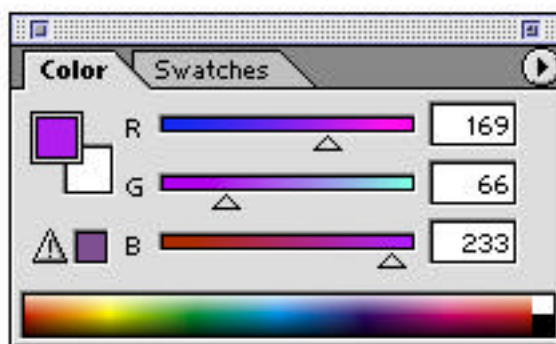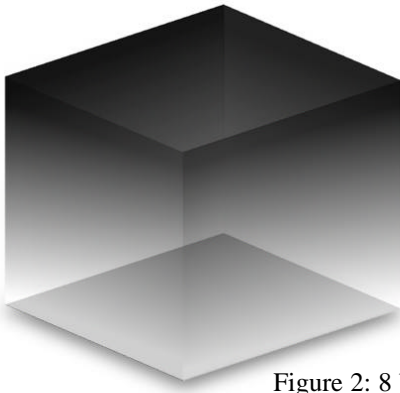

Figure 1: Color Window

Figure 2: 8 bit pixel

Pixel Depth

Look at an RGB image on your monitor. A 24 bit color image is made up from 8 bit Red, 8 bit Green and 8 bit Blue information. Each 8 bit channel holds 256 values of tone from black to white and grays in-between. 256 values of red x 256 values of green x 256 values of blue = 16.7 million colors.

BIT DEPTH CHART
1 bit = 2 tones (white & black)
2 bit = 4 tones
4 bit = 16 tones
8 bit = 256 tones (Fig 2)
12 bit = 4,096 tones
16 bit = 65,536 tones

Color Information

The event of color and tonal correction is a two step event. First we neutralize the color and then create subjective enhancements.

Neutralizing the color is a simple procedure of matching the numbers in the INFO window on a given white and black point or as I like to refer to it, white or black zone. Subjective enhancements allow us add our individual taste to the color and tone.

In Photoshop, you should become familiar with the "INFO" window and Photoshop's Eyedropper Color
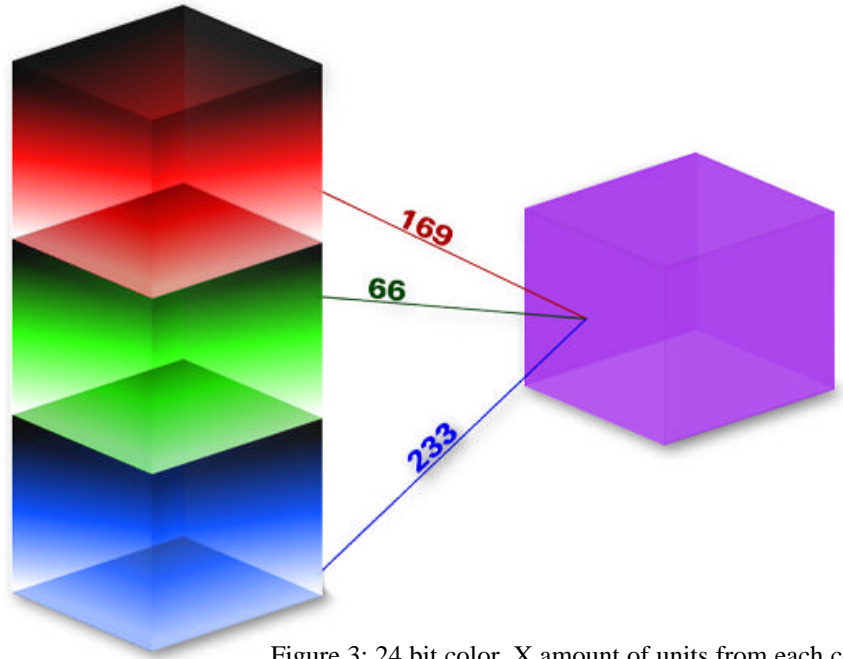

Figure 3: 24 bit color. X amount of units from each color to obtain a specific color.

Sampler tool. The INFO window is like a densitometer and shows us vital information regarding the color and tone of the image. Whenever your cursor is over a pixel in an active image, the info window shows the value of each color in RGB (along with the CMYK conversion value percentage or other selectable modes). Remember that we read 256 values of tone in each color channel of an RGB image (from 0 to 255).

When we click the mouse with the eyedropper color sampler tool, the RGB values are then "locked" into the info window. (see figure 8) You can set up to 4 sample points, each time the color values will "lock" into place expanding the info window to reveling the selected values.

Note: In the Option bar establish the eyedropper to a 3x3 or 5x5 pixel reading rather than point sample which only gives information on a singular pixel.
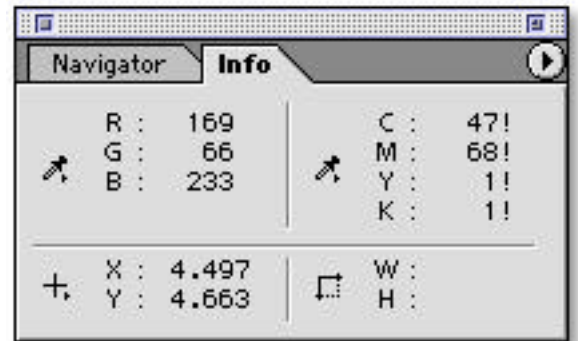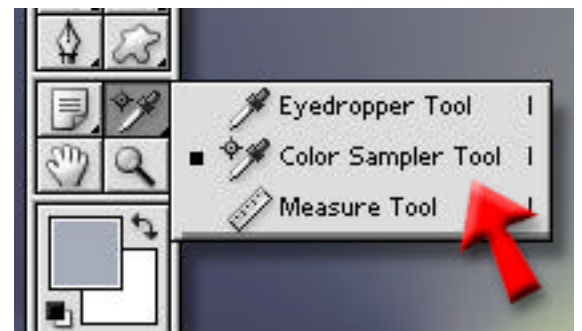

Figure 4: Info Window

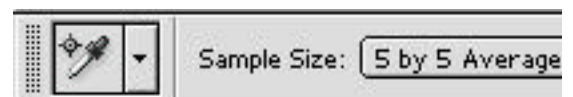Figure 5: Selecting Photoshop's Color Sampler Tool

Figure 6: Option bar

Levels in RGB

In Photoshop, under >Image >Adjust, you'll find Levels and Curves. Using Levels or Curves give us the opportunity to control the color and tone along with controlling what information gets thrown away, rather then clipping with no control (such as the Brightness & Contrast control). We'll use Levels for the 90% method.

Note: Before you open the Levels command window, make sure your INFO window is showing to the side of the monitor as you cannot move windows around while your in the Levels command window.

You should also become familiar with the Levels window. The first thing we see is a histogram. The histogram shows us where tone is resident in the image. I think of the Histogram as a sonar reading of the exposure of the image. At a glance, we can see if the image is a high key, low key, under or over exposed, the peaks tell us which tone is mostly represented. Along

the bottom of the Input Level are three sliders, the one on the left is the shadow slider representing the value "0", the highlight slider on the right represents the value of "255" and the Gamma or mid-tone slider in the middle starts at a value of 127. The three windows above the histogram (0, 1.00, 255) indicate the amount of change when we move one of these sliders. i.e. Moving the middle slider to the right, the window indicates how many clicks you have moved from center.

The Output sliders at the bottom allow us to minimize or maximize values but we will NOT use the Output level in this exercise. Also off limits for now are the three eyedroppers and Auto button. Above the Input Level we can access individual RGB channels by clicking on CHAN-NEL RGB and then onto the R, G or B channel. You'll also notice the key board short cut to access the individual channels, command 1, command 2, command 3 and command ~ (control on the PC).

The 90% Procedure

Our objective is to neutralize a white zone (where there is detail) and a black zone (where there is detail). To do this, we must select a white zone and black zone by clicking on the pixel(s) with the eye-dropper color sampler tool, this will lock the color information in the INFO window.
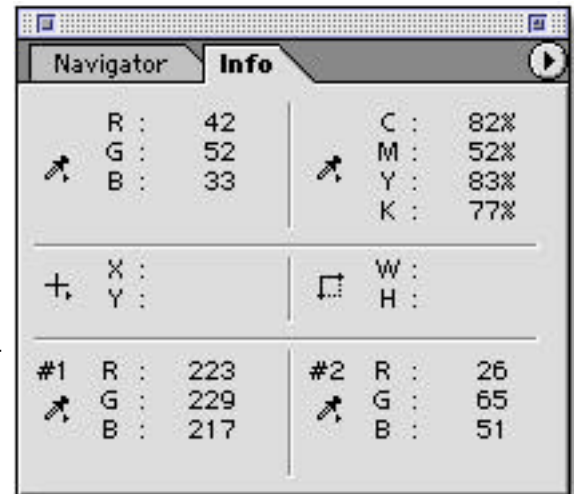

Figure 8: Info Window w/numbers LOCKED.

While reading the white zone our attention is focused on the top of the INFO window as we're looking at the RGB values change when the cursor is moved... our objective is
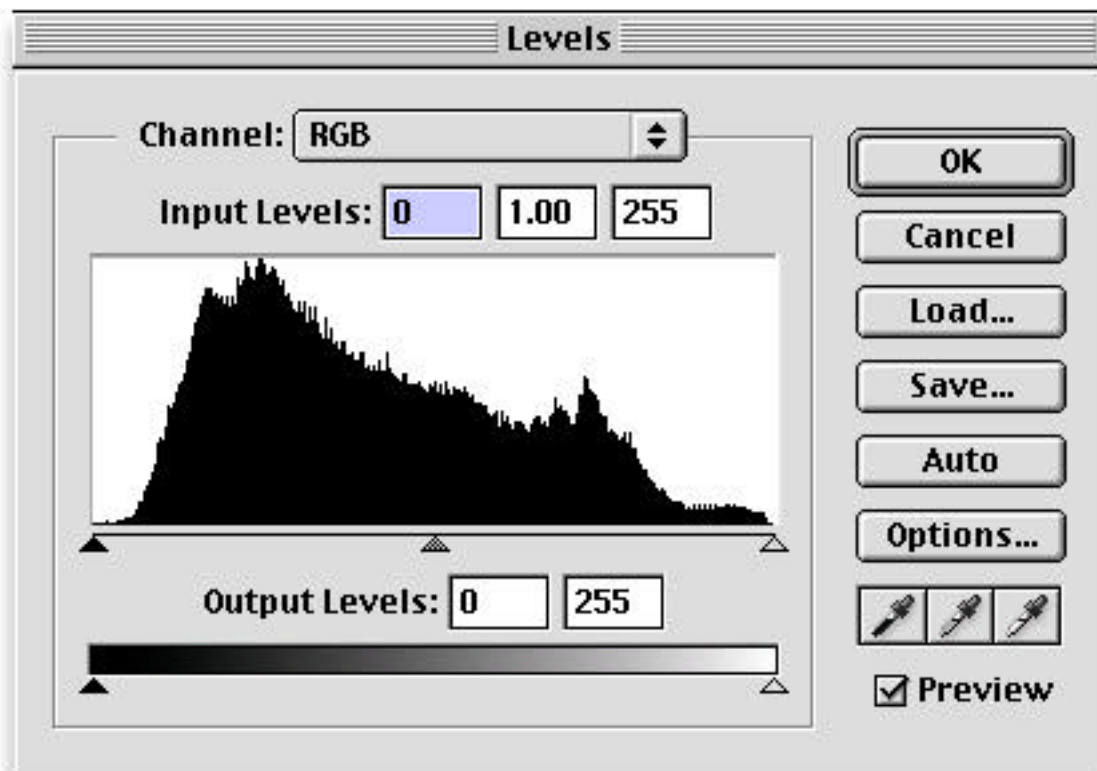

Figure 7: Levels window

to find the lightest value in a white zone without going over a value of say *250, and then click the mouse to lock the numbers in the INFO window. Lets say we found a white zone and the reading was 226 Red, 233 Green and 221 Blue. We now see these numbers (once we click the mouse) as #1 in the INFO window, our highest value is 233 Green.

Now find your black zone, and while your cursor is over this area, again look at the top of the INFO window. When you find the lowest value in the black zone (no lower than say *5), click the mouse to lock the numbers as #2 in the INFO window.

Note: It doesn't matter which color has the lowest (or highest) value.

Next goto Levels >Image >Adjust >Levels. We simply need to bring the Red and Blue values to match 233 for the highlight and black zone values to 35. To do this go to the CHANNEL Blue, move the Blue channel highlight slider over until the number in the #1 INFO window reads 233, and then go to the CHANNEL Red and move the Red channel highlight slider over until the number in the #1 INFO window reads 233. In the black zone match the lowest number using the shadow slider (left side) while matching the numbers in the #2 INFO window.

At this point it is important to go back to CHANNEL RGB and out of the individual channels. Now that you have neutralize the white and black zones, you can make tone adjustments using the RGB gamma slider or end point sliders if needed.

Now you have a neutral image!

* with 256 values of tone each 2.5 values represent 1%, hence a 5% dot would require 242 values of tone. A shadow with 95% info would represent a value of 13.
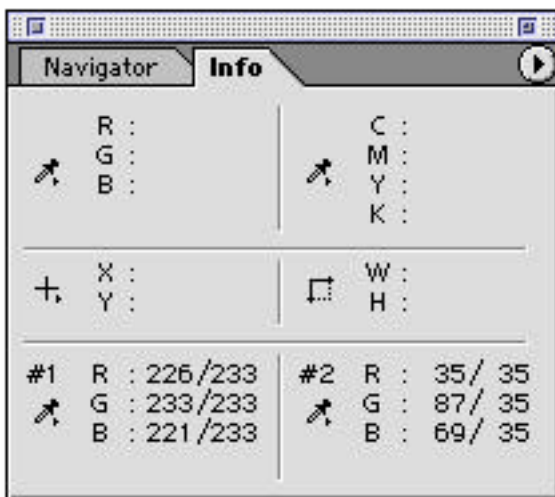
Figure 9: While in LEVELS two columns of numbers are shown. The left column shows starting values, the right column shows current values once you have moved the adjustment sliders.

90% check list:

1) Select true black and white zones with the eyedropper color sampler tool (this locks the numbers into the INFO window)

2) Goto Levels, and in the individual channels, use the highlight slider to match the highest white values, use the shadow sliders to match the lowest black values.

3) While still in Levels, go back to Channel RGB and adjust the gamma, or end point sliders if needed for tone and contrast.

4) Add subjective enhancements if needed as mentioned in Notes & Tips.

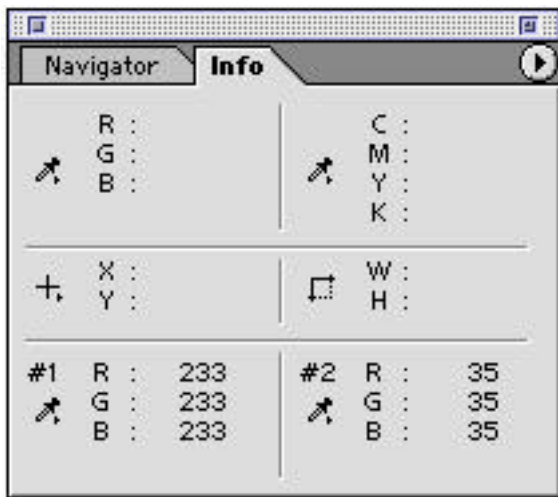Figure 11: MacBeth ColorChecker Chart with white and black zones selected using the Color Sampler Tool.

Figure 10: Info window showing white and black zones are neutral after Levels.