

# Why Calibrate a Monitor?

In today's color-critical workflows, even brand-new monitors need calibration.

In this article we will address the question "Why calibrate a monitor?". Further, we will address why you need to calibrate even your brand-new, high priced, professional-level monitor that you just purchased.

## **The short answer is relatively simple.**

All monitors display color differently and none of them display color that will match the color from your output device. Monitor calibration controls the display's color so that it is accurate, repeatable and relevant to your workflow.

## **The long answer is more complex but nevertheless relevant.**

Monitors out of the box have a natural blue-ish tint. This tint (or cast) may, however, look neutral because your eyes will automatically adapt to make the brightest area in your field of vision appear white. Nonetheless, the color of white on your monitor and the color of white displayed on your video output or reflected from your printed output probably do not match. Therefore, an image displayed on your computer monitor probably does not match the final output of that image. By calibrating your monitor and utilizing a profile of the monitor in conjunction with a profile of your output device (which we will get into later), you can change the color displayed on the monitor to match the color of your final output.

## **First, a little background.**

To intelligently discuss the characteristics of

color, in particular the color of white, color scientists have defined a color measurement scale to quantify the color characteristics of light. This scale uses degrees Kelvin (K) as its unit of measure. It is often referred to as color

temperature. If we were to measure the white of a new monitor, we'd probably find a Kelvin color temperature measurement of around 9300K (a 9300K white is considered very blue). Now, the color temperature of a printed output is defined by the light that is used to illuminate it. Daylight, which is considered to be a neutral illuminant, has a color temperature of approximately 6500K. Compared to 9300K, 6500K is a much less blue color temperature. The standard color temperature for viewing booths in the printing industry is 5000K. This is downright yellow when compared to 9300K! This is just one of the reasons why an image displayed on a monitor does not look the same as when it is printed.

Another characteristic relevant to monitor calibration is Gamma. Gamma is used to describe the transition of brightness from black to white for a device. Gamma values range from about 1.0 to 3.0 but in practice tend to be between 1.8 and 2.2.

The lower the Gamma value for a device, the brighter the midpoint of images will look on, or coming from, that device. Conversely, the higher the Gamma value the darker the midpoint will look.

The Gamma of a CRT (cathode-ray tube) monitor is naturally about 2.5 but this will change from monitor to monitor and even on the same monitor over a period of time.

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It will also change depending on what type of computer system (Macintosh, PC, SGI) to which the monitor is connected and what video graphics card is being used to drive it. Consequently, the only way to determine the actual Gamma of your monitor is to measure it.

The Gamma of a printer is a little different. It is related to the amount of dot gain inherent in its paper/ink combination. The term "dot gain" actually covers two printing phenomena; the spreading of the ink dots as they are mechanically laid onto paper and the optical effects of the paper itself which cause a more than expected amount of light to be absorbed by the ink. The net effect of both phenomena is that the midtones of the printed image become darker.

### **Enough background!! Tell me why I need to calibrate my new monitor.**

With all of the variances between monitors and their degradation of display quality over time, the only way to ensure consistency of images displayed is by calibration.

Even the best, most expensive monitors will drift over time. By recalibrating the monitor you will be bringing the monitor back to a known standard. Further, by calibrating all monitors in a workflow to this same standard, every monitor, new, old, model-X or manufacturer-Y, will display the same images the same way. Otherwise, every time you look at an image, or move it from one machine to another, there will be a risk that some unknown hardware change may be causing the image to be displayed differently.

### **What about matching what you see on your screen to the printed output?**

Monitor calibration is the cornerstone for achieving this. Just as you may linearize your imagesetter so that you get consistent output, monitor calibration linearizes your display so that the color judgements you make today will be the same color judgements you make a month from now. And, with the advent of color management systems such as ColorSync and

ICM, profiles of the calibrated display can be used to transform images from the display's RGB to the printer's CMYK color space. The result, color consistency from device to device, across platforms and across technologies. What-You-See-Is- What-You-Print.

### **What if my final output isn't a printer?**

Many industries will never see a printer in their workflow. These would include animators, film/video houses, medical imaging, and web designers. Each of these particular industries demand specific display characteristics that match their workflow needs. Animators may use a specific tonal response curve to match the output of film recorders; web designers will usually design in a sRGB standard; film and video professionals will use PAL, SECAM or NTSC standards. The point is, everyone who uses a monitor will have a particular standard that his/her monitor will have to match. Monitor calibration is the only way to get these monitors to match a workflow specific standard.

### **Now I know why. But HOW do I calibrate?**

The solution: SpyderPRO™ with OptiCAL™, the definitive standard for monitor calibration and profiling software. SpyderPRO with OptiCAL can make color temperature and gamma curve adjustments, allowing your monitor to match the industry standard that applies to your own workflow. SpyderPRO with OptiCAL can also generate ICC profiles of your monitor to work in conjunction with Apple's ColorSync protocols. And SpyderPRO with OptiCAL can even get all monitors in your workflow to agree and display color in a similar fashion.

Are you happy with what you see on screen? Usually, the answer is "no". For most, using the monitor to judge color is unthinkable. Have you asked (or been asked), "Why doesn't my output match what I see on my screen?"

If so, then OptiCal is something you should consider. With proper calibration, you can turn the unthinkable into an everyday reality.

