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REVIEWS

Monitor Color Calibrators

Hardware-Software Combos Give You Consistent Color

BY JEFF DORGAY

Calibrating your monitor is the first step in achieving accurate color on your Mac, so the colors you see on your screen are as close as possible to those captured by your scanner or digital camera. A monitor-calibration system—composed of a hardware colorimeter and its accompanying software—takes you beyond the accuracy readings of the built-in Apple ColorSync Utility, which provides strictly eyeball measurements. While there are some software-only calibration packages, this review includes only hardware-software combinations.

Such a calibration package precisely measures the way a monitor's color behaves, optimizes that behavior by tweaking the lookup tables (LUTs) in the video card to produce smooth gradations and neutral grays, and then writes a profile that describes the optimized behavior. Color-management systems then use that profile to display color accurately on your screen.

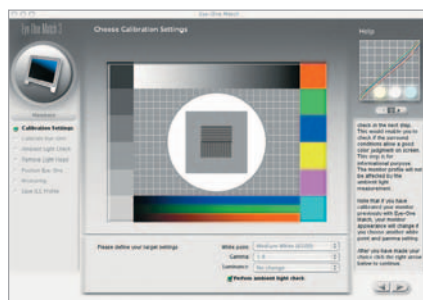
Using several different computers, I tested three popular color-calibration systems: ColorVision's \$299 Spyder2Pro Studio hardware-software package; Gretag-Macbeth's \$249 Eye-One Display 2 with Eye-One Match software; and X-Rite's \$379 Monaco OptixXR Pro hardware-software package.

These measuring devices plug into your Mac's USB port and either rest on your LCD screen or attach to your CRT with little suction cups. Do not press the calibrator tightly against an LCD panel, because this will change its color and may damage the monitor.

The test machines included a 667MHz PowerBook G4, a 1.8GHz 20-inch iMac G5, and a 1.6GHz Power Mac G5 with an 18-inch Sony XDM-82 LCD and a 19-inch LaCie Electron Blue CRT; all were

running OS X 10.3.7. I even tried them on the no-name LCD panel connected to my Windows workstation for a worst-case scenario. A few adjustments made even *that* monitor palatable.

I created a reference print with an Epson Stylus 4000 printer on matte paper. I used the monitor calibrators with their respective software in both basic and advanced modes to see which one produced the closest on-screen match to the reference print.



Advanced Calibration The Eye-One Display 2 system's left column walks you through the calibration operation, while a box on the upper right shows how you are manipulating the monitor's gamma curves.

Basic and Advanced

The basic mode requires no technical knowledge, and you don't need to adjust your monitor—just click on the Calibrate button, and you get a profile in five minutes. The basic method doesn't take into account room lighting or other monitor adjustments. I ran all the calibrators in basic mode first, and while all the results were somewhat off, the GretagMacbeth Eye-One Display 2 unit came closest to the reference print. I tested again in advanced mode and got very different results.

When you run the calibration software in basic mode, the profile you achieve won't

offer the ultimate in color accuracy, but it will be what the industry refers to as *pleasing* color. Typically, this color will be on the warm side, with a bit more contrast and saturation than you'll see in a perfectly color-corrected image. This is fine for most advanced hobbyists.

The advanced mode lets you choose the gamma (contrast ratio), white point, and brightness settings you want your monitor to display, so you can adjust your monitor for flesh tones and gray-scale images. If you have the manual settings on your monitor, for example, the software tells you how to set them so that you have an accurate white point from which to start. It also lets you adjust the fine details in shadows and highlights to be as neutral as possible, but this requires advanced color-adjustment skills. I performed my tests at a 6,500-Kelvin white point. I looked for neutral flesh tones (neither overly red and warm nor blue and cold), clean highlights, shadows free of color tint, and gray-scale images that were neutral gray, without colors.

How much you can fine-tune your monitor's color will determine the ultimate accuracy of your ICC profiles, but even if you have a PowerBook with only a brightness adjustment, proper use of a calibrator will give you more-accurate screen colors than you have now. From start to finish, it will take anywhere from 5 to 30 minutes to calibrate your monitor with any of the tools I tested. If you have more than one Mac, using the calibrator will help you keep color consistent across machines.

Spyder2Pro Studio

I was able to get the closest match to my test print using the Spyder2Pro in advanced mode. Setup is very easy; a wizard interface walks you through all the choices. The Spyder2Pro is also the slowest of the three, taking almost 20 minutes to create a profile.

As a bonus (in addition to its reasonable price), the Spyder2Pro comes with a copy of nik multimedia's Color Efex Pro LE, ColorVision's DoctorPro, and Pantone's Colorist. DoctorPro helps you profile your printer to match your newly profiled moni-



tor, and Colorist adds all the Pantone color checkers to Photoshop's checker.

The Spyder2Pro is the easiest to use and the best choice for advanced hobbyists.

Monaco OptixXR Pro

X-Rite's Monaco OptixXR Pro system was a close second for out-of-the-box color accuracy, and it offered a wide range of adjustments to the finished profiles. Spending a bit of time with the adjustment curves yielded some great profiles, but the test image was a bit warm on screen compared with the reference print.

My favorite feature of the Monaco OptixXR Pro is its ability to match profiles from different monitors. After you import color profiles from your other systems, you click on the Match Profiles button and resave the new profiles to their respective monitors. The results were very good, and this saved me a lot of time across four systems.

Eye-One Display 2

The \$249 Eye-One Display 2 had the most user-friendly software and setup. With the help of great PDF and wizard tutorials, it produced the most accurate profile of the four in basic mode, but in advanced mode its profile was somewhat cold and washed out.

The Eye-One site offers a free utility, Eye-One Share, that lets you share profiles

among multiple monitors and download the Pantone charts to your Mac.

If you get bitten by the color-management bug, GretagMacbeth will give you a \$200 trade-in allowance on its \$1,395 Eye-One Photo spectrophotometer, which will help you profile your scanner, printer, and projector (with the optional \$995 Eye-One Beamer attachment). I use this system in my studio with excellent results.

Which Is Best?

My favorite device was ColorVision's Spyder2Pro; of the three systems I tested, it allowed me to achieve the most accurate, neutral color. The Monaco OptixXR Pro was

also quite accurate and offered the ability to tweak profiles, but that requires a high degree of color-management skill. The Eye-One Display 2 had the least-accurate profiles in advanced mode, but it was a snap to use and produced great profiles in basic mode.

If you're just getting started in color management, you should be aware that calibrating your monitor, while essential, is just one part of your color-management system. You may find that you also need to profile other devices, such as printers and scanners. Most pros use separate dedicated packages for monitor and output profiling, rather than relying on one system that tries to do it all. And all of these companies sell add-on software and hardware, or bundled suites of both, that take into account your printers and scanners.

Macworld's Buying Advice

While the Eye-One Display 2 package is a great beginning calibrator, I recommend the ColorVision Spyder2Pro Studio for its excellent out-of-the-box color. Color pros can wrestle more performance out of X-Rite's Monaco OptixXR Pro, but the Spyder2Pro offers the best performance and value. □

COLOR CALIBRATORS COMPARED

COMPANY	PRODUCT	RATING	PRICE	CONTACT	PROS	CONS
ColorVision	Spyder2Pro Studio ★	★★★★	\$299	www.colorvision.com	Easy to use; best out-of-the-box profiles in advanced mode; reasonably priced; great extra software bundled.	Slow.
Gretag-Macbeth	Eye-One Display 2	★★★½	\$249	www.i1color.com	Easy to use; best basic profiles; reasonably priced; pro upgrade with trade-in; great tutorials.	Not as accurate as the others in advanced mode.
X-Rite	Monaco OptixXR Pro	★★★★	\$379	www.xritephoto.com	Fairly good color accuracy out of the box; easy to profile multiple monitors.	Needs expert tweaking to get best profiles; expensive.

★ = Editors' Choice.