Affordable Monitor Calibration

Accurate, Consistent Color Without Breaking the Bank

By Andrew Rodney

Anyone who has read my ramblings for any length of time knows I'm a strong advocate of calibrating (and profiling) monitors for imaging work. Of all the various input and output devices we regularly use, the display has to be one of the most inconsistent and unstable in the imaging chain. Even if we were to examine two supposedly identical displays of the same brand right out of the box, we would find that their conditions vary. Furthermore, monitor output changes with age. So calibrating your display has many benefits, as we will see.

The computer display is the first output device on which you will view your images when using a digital camera. In the case of high-end cameras, you may be making critical decisions about the capture based on what you see on the monitor (along with the numbers provided in the software). Having a calibrated display is essential. For those working in the field, I'm happy to report that one of the products discussed here will work on the LCD displays commonly found on laptop computers.

If you use scanners on your workstation, you should also seriously consider calibrating your display to aid in producing high-quality input. One could argue that a display could never show you a completely accurate preview of the final output, but a calibrated display can get awfully close. Certainly, having this added degree of accuracy is worth striving for. In addition, for users working on multiple workstations (and multiple operating systems), calibrating every display ensures that everyone in the workflow can rely on his or her display to closely match the displays of the other users. Without calibration, multiple displays can appear significantly different from one another.

Most calibration products provide feedback if the display cannot be calibrated to the aim point, which tells you that the display is ready for retirement. Many imaging experts recommend replacing displays used for critical imaging every three years or so, because the guns

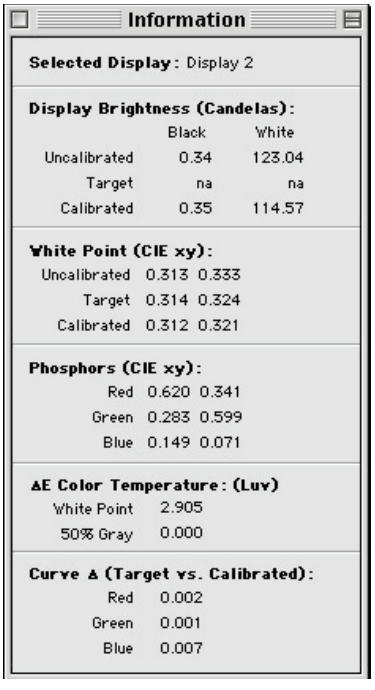

Figure 1. The Color Vision Optical Info window provides a great deal of information about the state of the display before and after calibration.

in the display age and the phosphors change over time. Optical software from Color Vision (See "Monitors: The Big Picture," July *PEI* 1999) has a sophisticated feedback window that provides information about the raw, precalibrated state of the display, the final condition of the display, and how far it is from the aim point (see Figure 1).

There are at least two ways we can calibrate (and then profile) a display: using software and our own eyes, or using software and a hardware device called a colorimeter. There are a few software-only products on the market, such as Adobe Gamma, which ships with Photoshop. Macintosh systems have a similar built-in calibration and profiling utility in the Monitors and Sound control panel. These software-only products work reasonably well, but the quality and accuracy depends solely on the user who moves the various controls until he can see the desired effect. If the user is fooled by environmental conditions, such as ambient light or color temperature, or has less than excellent color perception, the quality of the resulting calibration and profile could be faulty.

Hardware devices circumvent these problems, but not all colorimeters are created equal. In the past, when a colorimeter and software could easily cost $600 and more, the technology was limited to users with deep pockets or those who were certain they needed the most accurate calibrations for their demanding workflow. However, a few products released at Seybold San Francisco have reduced the price of calibration technology to make it more accessible to the masses. After examining several new products that are meant to produce easier, faster, and more accurate display calibration and profiling, I have some recommendations for users who cannot justify buying a more expensive colorimeter package.

WiziWYG Deluxe

Last month, I mentioned a new product called WiziWYG, from Praxisoft, that allows users to calibrate and profile scanners, monitors, and many output devices. That product is now shipping for $79. For monitor calibration and profiling, WiziWYG has a visual method much like the Adobe Gamma control panel.

WiziWYG Deluxe, the big brother of WiziWYG, has provisions for using hardware devices like the Sequel Colorimeter, which is included in the package. It has optional support for other Colorimeters, such as the X-Rite Monitor Optimizer (or DTP-92). The original WiziWYG package used a flatbed scanner to create output profiles, but the Deluxe version supports actual spectrophotometers, such as the Color Savvy Color MouseII spectrophotometer and X-Rite DTP-22 (Digital Swatchbook).

I tested WiziWYG Deluxe with the X-Rite Monitor Optimizer, and it produced excellent results on the iMac and my desktop PowerMac with ViewSonic display.

The interface for WiziWYG Deluxe—like the original product—is Wizard-based, and thus very easy to use. The WiziWYG IT8 reflective Target is included with the Deluxe package, though WiziWYG Deluxe works with any standard IT8 target.

Also in the package is the easy-to-use profile editor TweakIT! Anybody with any technical capability can use the application to make simple and quick edits. If you know how to edit an image in Photoshop, you'll be able to use TweakIT!. The useful utility called ICC AutoFlow Lite is also part of the Deluxe package. Based on the full version (reviewed in *PEI* November 1999),

Figure 2. The Wizard style interface from WiziWYG showing the monitor calibration window.

the Lite version will batch-process files, accomplishing such tasks as embedding, converting, and removing ICC profiles from any JPEG or TIFF image. In addition, the Lite version will extract any embedded profile and save it out to disk, allowing users to take advantage of profiles embedded by others in the workflow, even if those profiles are not installed on their computers.

AutoFlow Lite also allows you to proof images using two transform functions automatically—input to final output space and final output space to proofer space. AutoFlow and AutoFlow Lite are great time savers in an ICC workflow. As an introductory offer for a limited time, purchasers of WiziWYG Deluxe will receive a coupon for a free 36-bit color scanner. At this time, the exact model has yet to be determined, but I'm told it will likely be a MicroTek or UMAX scanner.

WiziWYG Deluxe retails for $599; upgrade price from WiziWYG, $499. WiziWYG Deluxe is the first full-featured, affordable color management product that takes into account the various devices most users will need to profile with hardware support and profile editing. WiziWYG is free to download, and the IT8 target is $79. At press time, the Macintosh version is out,

and the Windows version should be shipping by the time you read this. You can downloaded at *www.praxisoft.com*.

Radius Color Match for iMac

Radius high-end calibrated monitors have been a favorite of graphic professionals for years. Radius products are now distributed by Miro Displays Inc. of Mountain View, California. The company recently released iBug, a Radius ColorMatch software and hardware calibration package for iMac users. Why, you ask, would anyone want to calibrate an iMac? Well, much of what we've discussed about the need for monitor calibration is true for iMac users. Even on my original 233MHz iMac, I can use Photoshop on files of less than 25MB easily and quickly. The iMac screen is a sharp display, but it still requires calibration before you can consider using it for imaging.

The iMac is also a very popular machine for surfing the Web—did you know that Internet Explorer 4.5 on the Mac can provide ICC color management matching? (See Figure 5) With a calibrated monitor, Web page images with embedded ICC source profiles can be viewed as the creator intended. It's also ideal for users of consumer digital cameras who are downloading files to an iMac. The Radius ColorMatch for iMac is just what the doctor ordered for all you iMac users.

Naturally, the iBug comes in five matching colors and attaches to the iMac via USB. Using the software is as easy as double-clicking on the iMac graphic and attaching the iBug to the screen—a one-step procedure. I found using iBug on my iMac very easy, and the final calibration and profile appeared to produce excellent gray balance. The hardware itself, like the iMac, is translucent; as it calibrates the device, internal LCDs light up to let you know the hardware is doing it's job—appealing "icandy," and just what iMac users would expect in an accessory for their stylish machines.

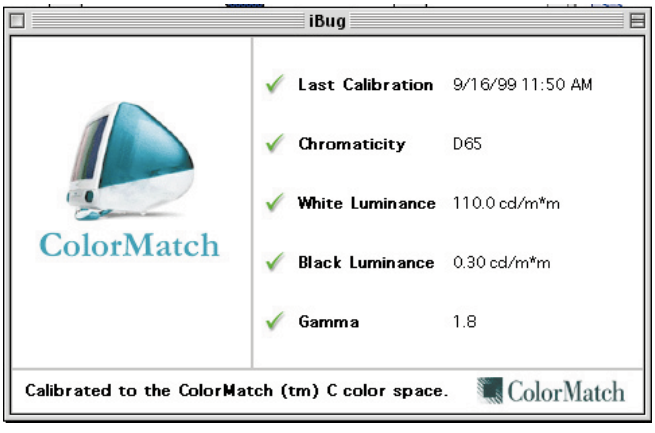

Figure 3. The single screen provided by ColorMatch for iMac provides information about the state of the calibrated dispaly. Double clicking on the iMac icon begins the calibration process; it's that simple.

The iBug worked like a charm. It produced a very neutral looking gray desktop for me, as well as excellent previews in Adobe Photoshop. The software automatically created an ICC profile called "ColorMatch C" and automatically placed it as the correct system profile for my machine. Interestingly enough, the iBug calibrates the iMac display for D65, with an optional setting for sRGB: With the white point set at D65, the display will more closely approximate a wider range of uses, such as Web surfing. The optional sRGB setting is intended for users whose devices may be set for this color space. Radius iBug is available for a mere $119.

Prove It!

Prove It!, a new monitor calibration and profiling package from Imaging Technologies Corporation (formerly Color Solutions), can be used with a hardware colorimeter or in a sophisticated visual process that many users are raving about, because of its powerful tools and capabilities. This inexpensive yet powerful package has some unique capabilities, such as working in a network to calibrate a vast number of displays to a specified aim point.

The base package of Prove It! contains the software-only version and is intended to be used for visual calibration of both LCD and CRT displays. The Wizard-based software walks users through the process of adjusting the display to the desired aim points. For novices who have no instrument support, the easy, five-step Wizard is a guide through the visual process of calibration and profiling. For intermediate users, there is a 13-step visual calibration process consisting of five visual targets and more expert tools. For those who wish to use a hardware device, the process is completely automatic. The user has the option of reading no less than 10 essays on calibration that are located throughout the application. They cover such related topics as the viewing conditions in a room, an overview of color management, and a glossary of terms. At just $49, Prove It! is available on the ColorBlind Web site (*www.color.com*).

ColorBlind also sells a version with a hardware colorimeter for $299. For those who already have a hardware colorimeter, Prove It! supports a number of devices, including the X-Rite Monitor Optimizer (also known as the DTP-92), the ColorTron II, the Spectrolino, and the Sequel Calibrator. The network version of Prove It! communicates over a network using TCP/IP and a special administrator copy of the software. Each station on the network launches a copy and attaches a Colorimeter to the screen. The user with the administrator copy can then control the process for all of the seeds. While

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Calibration vs. Profiling.

Just so we're clear on the differences between calibration and profiling, I submit the following explanations. In the calibration process, we alter the behavior of a device (if necessary) so it will produce the effect and/or output we desire. With displays, the usual goal of calibration is to make the device produce a certain output condition, such as a Gamma 1.8, D50 (5,000°K) or D65 (6,500°K) for the Mac, or Gamma 2.2 D65 for Windows systems. The calibration process ensures that the display truly produces the desired effect. Software and hardware work in similar ways by sending known data to the screen and having the hardware read the output. If necessary, the condition of the display is altered to achieve this desired output. With most monitor calibration devices, the goal is achieved by sending a color look-up table (CLUT) to the video card to alter the behavior of the display.

Profiling is the process by which a device is essentially fingerprinted. ICC and ICM profiles, the industry-standard means of communicating color among ICC-savvy applications, are used throughout the color management workflow. With the products discussed here, once the device is calibrated to the aim point, a profile that reflects that condition is created. The profile describes the various idiosyncrasies in the fingerprint of a particular device, which is necessary to know in the color management system (CMS). The beauty of a calibrated display is that even if you deal with an application that isn't ICC/ICM savvy, at least your display will be calibrated to a known standard and, usually, others who have calibrated their monitors to the same conditions will be that much closer to seeing what you see on your display.

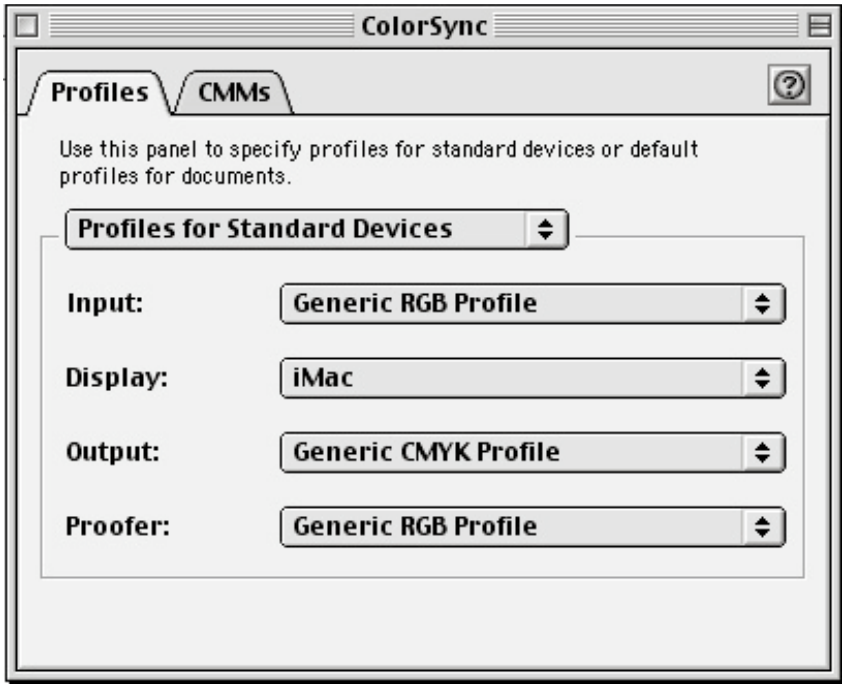

Figure 6. The new interface for ColorSync 3.0, where the profile created for the display is now selected in the pop-up menu named appropriately "Display" unlike earlier versions, which were known as "System Profile."

Once you have calibrated and profiled your display, the profile is used by ICC-savvy software in several ways. First, the profile must be set so the OS knows how to access this critical information. On the Macintosh OS, this is accomplished with the ColorSync Control Panel, where the user sets the profile he created to describe the monitor in the System Profile pop-up menu (in ColorSync 3.0, the pop-up is more appropriately called "Display"). In Windows 98 and 2000, users go to the display control panel/settings/advanced/color management tab. From here, you can add the profile of choice in the list box. When you select the profile and click Set as Default, the profile becomes available to any application that uses the Windows Monitor profile (including monitor calibration start-up files that will load gamma ramps to the video card). In Windows2000, multiple profiles can be added to the display control panel, where the default profile can be selected at any time. The profile that is added can stored in the Windows color folder or any other folder or location.

Applications that use the profile information in their displays will access the set profile and will potentially use it to affect what you see on screen. For example, when you open the RGB Set-Up in Photoshop 5.0 or later, you should see the profile you created show up by name, just next to the Display Using Monitor Compensation checkbox. The profile is used by Photoshop with this compensation option to ensure that the previews are accurate. To test this, simply load a different display profile, re-enter Photoshop, and observe that the preview has changed. You can see that it's critical that the profile describing the display is accurate and correctly loaded! ◀

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each client machine has the colorimeter running, the administrator receives information about the various displays and can calibrate them all to the lowest brightness level or even exclude the displays that are too low to calibrate from the process. The ProveIt! network version is a boon for workflows with many displays that must conform to the same standards. Prove It! creates industry-standard ICC/ICM profiles and runs on Macintosh and Windows.◀

More info? PEInfo Nos.:

Imaging Technologies Corporation	**(115)**
Praxisoft LLC	**(116)**
Radius/Miro Displays Inc.	**(117)**

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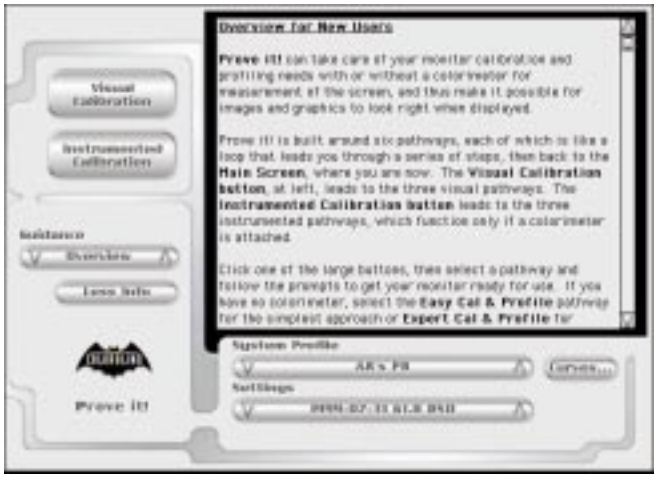

Figure 4. The main screen of the Wizard-based Prove It! where users can specify if they wish to use a visual calibration method or instrument-based calibration method. The large center window provides instructions and information about the process and can be toggled on or off using the More/Less info button.

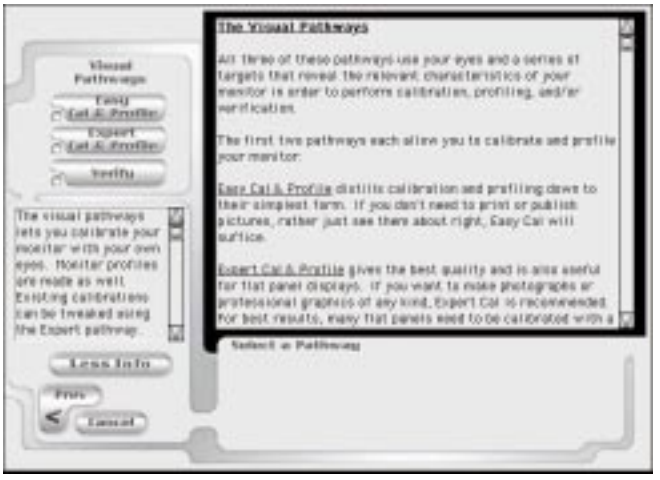

Figure 5. Once the user has pricked the visual calibration method, here they can pick either the easy or expert calibration routine or verify the calibration. The center windows provides step-by-step instructions.