

Living and working with LCD

Can't live without the thin screen? These calibration products work with both CRT and LCD displays

For years, imagers have had several hardware devices available to calibrate and profile CRT displays, but they didn't work with the newer LCDs. This year brings several hardware products designed to calibrate LCDs, and as a bonus, the price for display calibration hardware and software has come down considerably.

If you are working in an ICC-aware application like Adobe Photoshop, display calibration and profiling are critical. Without a display profile, these applications simply will not produce accurate previews of your color documents. Imagers should calibrate/profile their displays at least once a month.

Let's look at several affordable hardware devices and their companion software that will calibrate and profile both LCDs and CRT displays. All these products connect via USB and support OS 9, OS X and various flavors of Windows. We'll also give you a few tips on evaluating the quality of the calibration and profiling process.

GretagMacbeth Eye-One Display

The new Eye-One Display Colorimeter (list price \$249) and the accompanying EyeOne Match software are among the newer, most affordable products on the market. The Eye-One Match 2.0.3 Wizard-based software produced excellent results in our tests. The easy-to-use hard-/software combo has some nice built-in intelligence for the novice user. For example, if the software is installed on a Macintosh and the user picks the Easy mode, the software will automatically set the Tone Response Curve to Gamma 1.8 (with Windows, it will set the software to a TRC of 2.2). You can override any auto settings you wish in the Advanced mode.

The software will allow you to set the hardware of a CRT display to adjust for the individual RGB guns (if possible) to produce a more accurate calibration aim-point (see sidebar). Our only complaint—when setting the software to provide this function, the arrow keys bounce around during the measuring.

We're told this is perfectly normal behavior, but it might be confusing for a first-time user. In addition to yielding high-quality results, this package has the advantage of Gretag-Macbeth's generous licensing agreement. That means you can install the software on every machine in your work environment and use the Eye-One Display as an unlimited site license. For users with many displays to calibrate, the savings can



be considerable. Another perk is the \$200 upgrade coupon for the more advanced Eye-One Pro package for building other device profiles (printers, scanners, etc.) and the Eye-One Pro Spectrophotometer. (www.i1color.com)

MonacoOptix

The MonacoOptix colorimeter and software (list price \$299) is also new to the market. Like Eye-One Display, the MonacoOptix software is an easy-to-use Wizard-based product. The MonacoOptix comes with two quick-swapping interchangeable feet used for either a CRT or LCD display. The LCD base is felt-lined to protect the delicate LCD display surface. Like Eye-One Match, MonacoOptix conducts such important calibration settings as brightness and contrast through the hardware rather than relying on the user's visual adjustments. This produces far greater consistency—the key to and reason behind calibrating and profiling in the first place.



One area of concern in our tests was the size of the window in the interface where you place the Optix to measure the colors being passed to the screen. In Eye-One Match, the entire screen is filled with the colors for measurement, but with Optix, the space is not much larger than the instrument. You have to carefully place the colorimeter directly on the screen and make sure it doesn't move to get good results.

There also is no provision in Monaco-Optix for adjusting the RGB guns for calibration. This isn't an issue for LCD users, but it should be available for those wishing to better calibrate their CRTs. Another issue was the onboard instruction to set the display to 100% brightness and contrast, which blows out the highlights and most of the screen image to a point where you can't even see the interface. These are the correct settings, we're told. Even though it was difficult to view the interface, we got very good results with the product. MonacoOptix has an equally generous unlimited site license. (www.monacosystems.com)

Pantone ColorVision Spyder

This product may have been the first entry-level product designed for use with an LCD display. The Spyder colorimeter comes with your choice of



Testing a display

The debate of which is more color accurate, LCD or CRT, rages on. For this user, CRTs still have an advantage in color-critical work and the tests below can be used to see the proof. LCDs can't really be calibrated, so all the work has to be done with a color lookup table on the video card. Because the video card is providing only 8-bits per color, the usual result of forcing the correction is banding in smooth areas and some color crossover.

CRT displays that precisely calibrate using internal electronics (such as the Barco, Sony Artisan and LaCie Blue) can produce much finer corrections physically in the unit with results that, at least with my Sony Artisan, are spot on. LCDs do have some advantages, such as very high luminance, a small footprint and sexy looks. Nevertheless, like CRT users, LCD owners should consider placing some kind of hood over the unit to shield the screen from ambient light. LCDs or a similar technology will no doubt be predominant in the future. Today, LCDs still can't produce the critical color and repeatability of the state-of-the-art CRTs.

There are several easy tests for assessing your display calibration and profile. The following test is a good indicator of how well the calibration for the critical black setting is working.

Launch Photoshop.

In Photoshop, set your working space to Monitor RGB so that RGB values are sent directly to the monitor (Photoshop>Color Settings...).

Make a new document; size isn't important (cmd/ctrl-N).

Fill the document with black (Edit>Fill...).

Zoom-in so the document fills the screen. Using the Rectangle Marquee tool (no feather), make a selection in the center. Size isn't important but don't make it tiny.

Hide the marching ants (cmd/ctrl-H).

Click on tab key then the "F" key so that *all* you see is black; this is the Full Screen Mode. You should see *only* a black screen—no palettes or menus.

Call up the Curves dialog (cmd/ctrl-M). If possible, move it to the side or, better yet, to a second display.

Click, as carefully as you can, on the *bottom* Curves point that represents 0/0/0 (black). Using your arrow keys, move the up arrow one increment at a time until you can see separation between pure black outside the marquee and the new values in the marquee.

Do you see a difference?

Keep pressing the up arrow one click at a time. Do you see a difference between each move of the Curves point? Is the difference between each increment constant? Also look at the neutrality as you move the bottom Curves point up and make the inside square lighter. Does it remain neutral or do you see a color shift (usually magenta/green). On my Sony Artisan, the lighter square remains dead nuts neutral throughout all steps and I can see a difference between 0/0/0 and 1/1/1. On most other displays, I have to move the levels up to 5 or more.

two software bundles: for those on a budget, PhotoCAL (list price \$229); for advanced users, OptiCAL (list price \$339). PhotoCAL is attractively priced, but it's missing some important features, such as the ability to set a black level using the Spyder, making OptiCAL the better option. Setting black is a critical factor in calibrating a display to be repeatable. PhotoCAL asks the user to set black visually, where OptiCAL (and the other products discussed) use the actual colorimeter.

PhotoCAL is a much easier, Wizard-

based product for the novice. OptiCAL is advanced, full-featured software, but with a much steeper learning curve (advanced features include curves control and a colorimeter feedback window). One option we like that's missing in both the GretagMachbeth and Monaco products is an alert feature to remind the user to recalibrate after a specified number of days. OptiCAL comes with the application PreCAL (built into PhotoCAL), which does use the Spyder to set the RGB guns of a CRT display. Though it's very easy to



Above: The GretagMacbeth Eye-One Display colorimeter in use.

Gradient Test

In Photoshop, make a new RGB document (1,024x768 pixels should be fine).

Ensure the foreground and background color are set to default black and white (D key).

Assign the display profile to the file (Image>Mode>Assign Profile).

Click on the Gradient tool (“G” key) and be sure the Gradient Picker in the Options bar is set to Foreground to Background.

With the shift key down, make a gradient from left to right.

Examine the gradient. In a perfect world, it will be very smooth (no banding) and show no color shifts at all. Banding or colors, which will very likely show up on all LCDs, are due to the color lookup table doing the corrections rather than true hardware calibration. It is here that you’ll find that CRTs running very sophisticated calibration have an edge. One issue with banding on a display is it’s not always apparent whether the banding is a display problem or is actually in the file.

use, this feature is long overdue to be incorporated into both PhotoCAL and OptiCAL, much as GretagMacbeth has done (we were told this would be addressed in a future update). Like the Monaco product, the Spyder comes with a separate base unit that must be installed for use with an LCD display. OptiCAL comes with a three-site license agreement allowing three machines to use the same software; additional site licenses are available for purchase. (www.colorvision.com)

How the products performed

We used a LaCie Photon 18 Blue II LCD display for our tests, and set each product to calibrate to an aim-point of D65 white point, and a TRC gamma of 1.8 running OSX 10.2.6. The display was warmed up for at least 30 minutes. For Eye-One Match, we set the software to both Easy and Advanced modes, although with an LCD, there aren’t

many options to deal with. (To test the calibration and profile, we used the tests discussed in “Testing a display,” p. 31)

We also examined the color gamut of each profile in Chromix ColorThink (see www.chromix.com). Unfortunately, it’s impossible to make a file or screen shot showing the resulting black or gradient test, as what we’re looking at isn’t in the file—it’s being sent to the display. Nonetheless, with the levels test discussed below, we got these results:

GretagMacbeth Eye-One Display:

level value of separation of 2

MonacoOptix:

level value of separation of 3

ColorVision Spyder/OptiCAL:

level value of separation of 2

Both the Optix and Eye-One Display ask for relatively the same settings for brightness and contrast using the onboard controls. OptiCAL requested a much higher setting. The resulting profiles all produced quite acceptable previews and, as seen above, very similar black level results. The color gamuts of the Optix and Eye-One Display were shockingly similar. The size of the Spyder profile was a bit larger, although actual size isn’t necessarily an indication of quality.

With Optix and Eye-One asking for nearly identical contrast and brightness settings, it’s likely the reason the two profiles looked so similar. All the profiles showed banding in the gradient, and again, Optix and Eye-One Display were very close. The banding in the Spyder profile was a bit more coarse but not alarmingly so. In the final analysis, all the products produced significantly better results than using eyeball calibration (Adobe Gamma) or no calibration at all. ◀

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