



Display Calibration & Profiling

# Display Calibration & Profiling

In this lesson, we're going to cover what's needed in order to get your screen to accurately display your image. This will include making sure that your screen is calibrated, or profiled.

## Why not adjust the monitor to match the printer?

- What if you change printers?
- What if you have multiple printers?
- We don't want our Instagram/Facebook images to reflect the appearance related to the printer.
- Instead, we want to make the screen accurately display the image.
- We want to inform the operating system and Photoshop/Lightroom on what's unique about your specific display.
- Independently, we'll make the printer accurately output the image.
- Ideally, the screen will match the printer when everything is done correctly.

## Calibrate vs. Profile

- Calibration physically changes the display itself (independently of the computer it's attached to).
- Profiling changes the signal that the computer/video card sends to the display.
- A profile informs the operating system, Photoshop and Lightroom how the display responds to color.
- Low-end (average) displays = Adjust brightness + profile
- High-end displays = Calibrate + Profile

- LUT = Look Up Table (changes the signal before it's displayed)
- High-end displays use an adjustable 10-bit (1024 shade) minimum LUT.
- Low-end displays don't have an adjustable LUT, so you might use your video card's 8-bit (256 shades) LUT.

## High-displays:

- The hardware is adjustable.
- Settings are lockable.
- 10-bit LUT (minimum)
- They have a viewing hood.
- **Brands:**
  - Eizo ColorEdge
  - NEC SpectraView
  - BenQ

## Profiling on a budget (Not suggested)

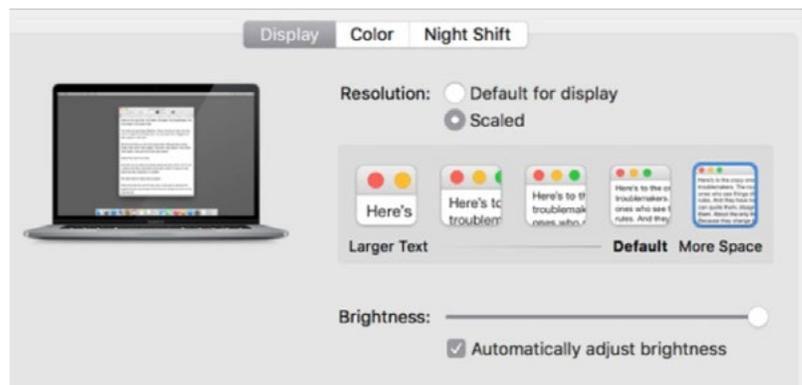
- This is for when hardware purchase is out of the budget.
- Use your eyes as a “better than nothing” attempt to profile the display
- Mac: Apple menu > System Preferences > Displays > Color > Calibrate
- PC: PC > Settings > System > Display > Color Management > Advanced > Calibrate Display

## Creating an Accurate Display Profile

- A hardware device is the only option for achieving accurate results.
- Colorimeter: A device that measures your screen to create a display profile
- Spectrophotometer: A device that can make both display and printer profiles
- The two most prominent brands are X-rite and Datacolor. (I prefer X-rite)
  - X-rite ColorMunki Smile \$108 (Not suggested)
  - X-rite ColorMunki Display \$189 (great for most people)
  - X-Rite i1Display Pro \$279 (This is the professional standard for color geeks, but overkill for some)
- Devices made after mid-2011 are more accurate and reliable than older models.
- If prompted for settings, start with: White point 6500K (Also known as D65), Gamma: 2.2, Brightness: 120 cd/m<sup>2</sup> (also known as candelas)

## Before Calibration or Profiling

- Clean the display glass.
- Let the computer warm up for 30 minutes (after turning it on).
- Turn off the Display Auto Brightness setting.
- Turn off Night Shift (This is for Mac only).



**Make sure the Auto Brightness setting is turned off so that the brightness is consistent throughout the day.**

## Let's make a profile!

After buying the hardware required to profile your screen, you will also need to install the software that came with it. In the video lesson, we are using a Spectrophotometer by ColorMunki. After opening the software, we can see that there are options for both display and printer. (The software for a Colorimeter will only have options for display.) We will choose the Display option.



You will need to download and install the software that came with your device. Here, we have the start screen for the ColorMunki device we are using in the video.

We'll next be prompted to choose the display type and we'll select the Laptop option. Then, there is a menu for choosing the display setting and we have a choice of Easy and Advanced. The Easy option will not ask us for settings. The Advanced option will present settings for White Point and White Luminance. We'll choose the easy option here and will then be prompted to plug in the device.

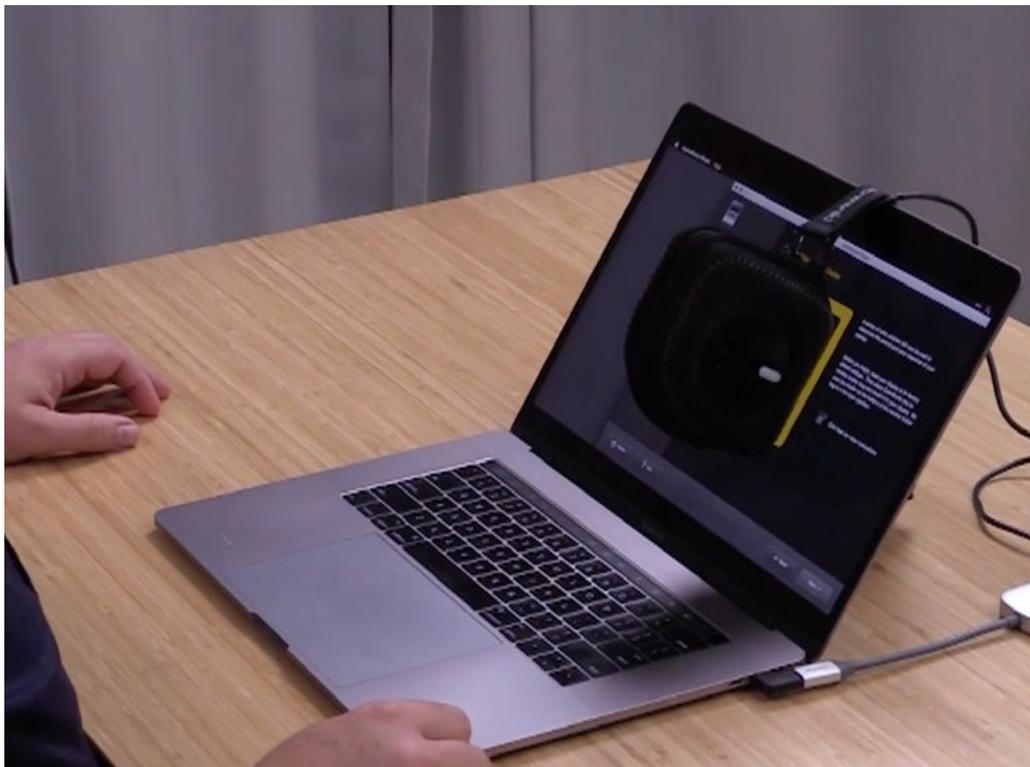
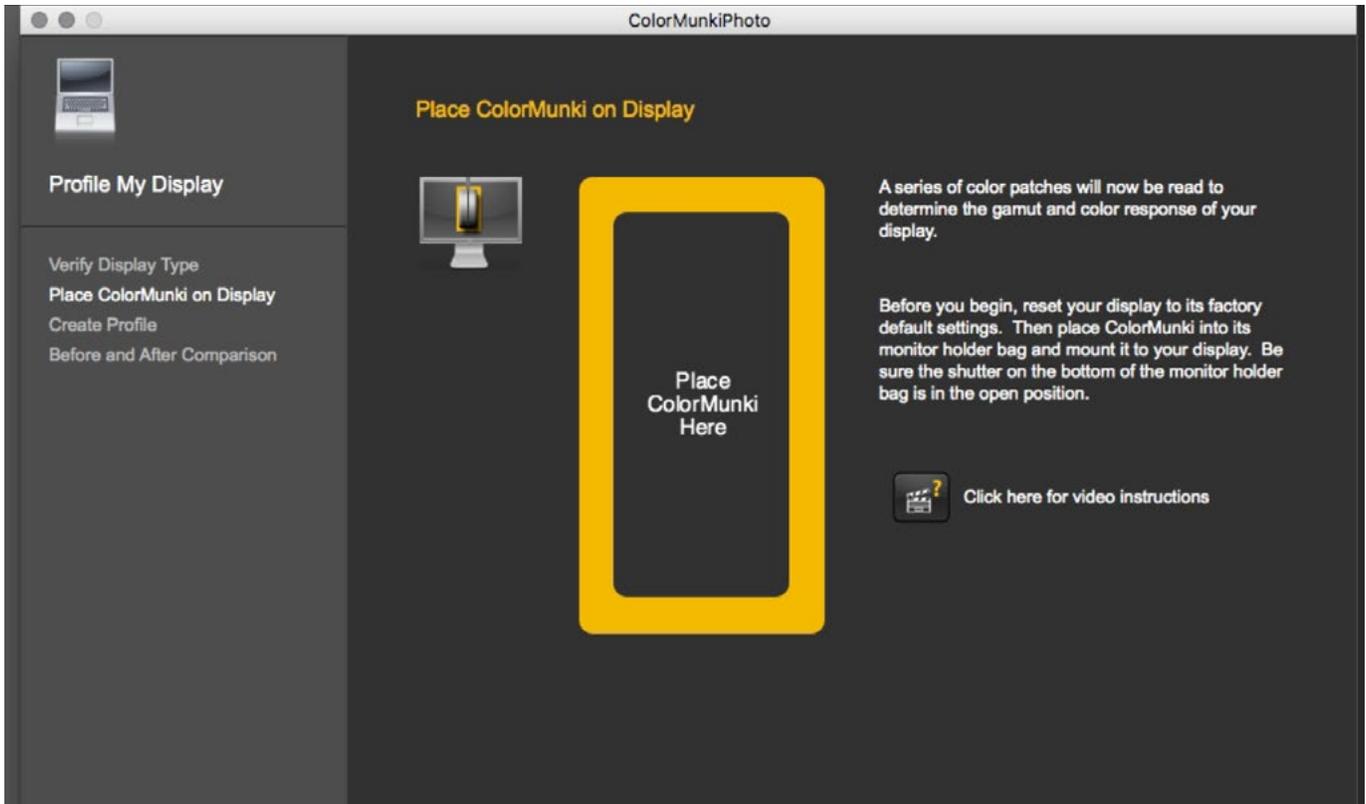


The software is asking us to choose the display type and decide whether we'd like to use the Easy or Advanced settings.



We're following the calibration instructions.

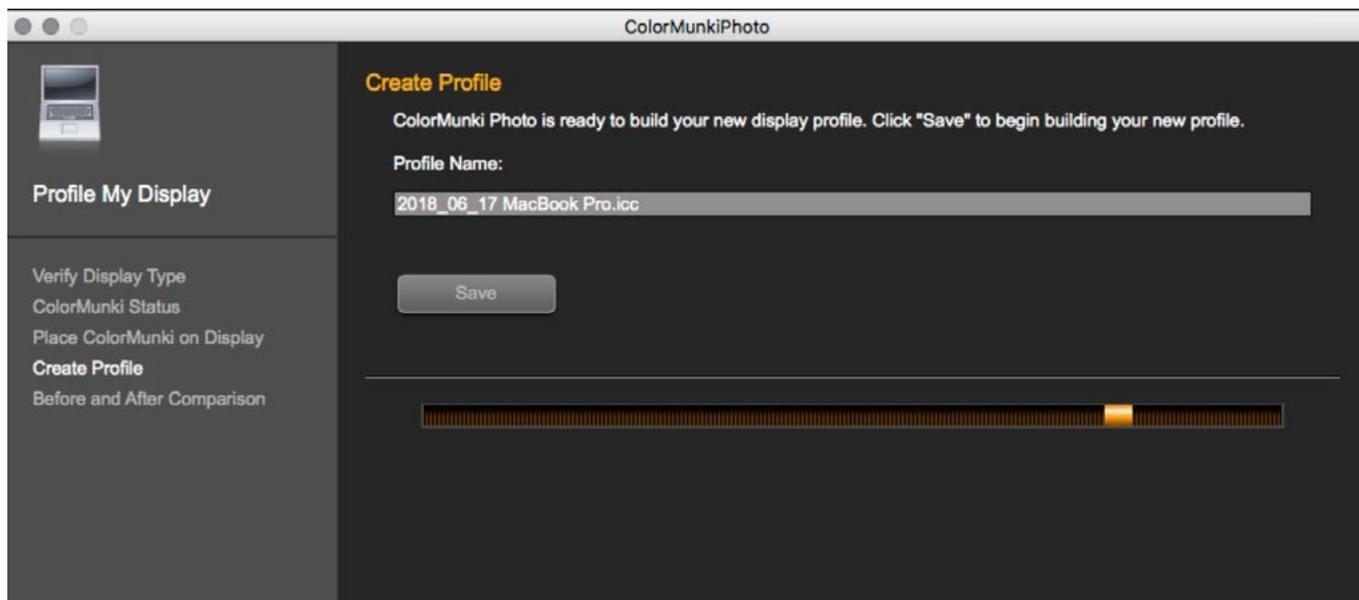
Now, the software will ask us to calibrate so we will follow the on-screen directions to do that and click Next. The next screen shows us where to position the ColorMunki device and we'll click the Next button. The software will spend about five to twenty minutes, flashing different colors for the device to measure. It will then make a profile based on what we



Above: The software is showing us where to position the device.

Left: You can see the ColorMunki device hanging on the display.

ended up with versus what we told it to display. In the process of doing this, it's going to create a color lookup table. When it's finished, the software gives us the option to name the profile. I like to use the date and the name of the display within the name.

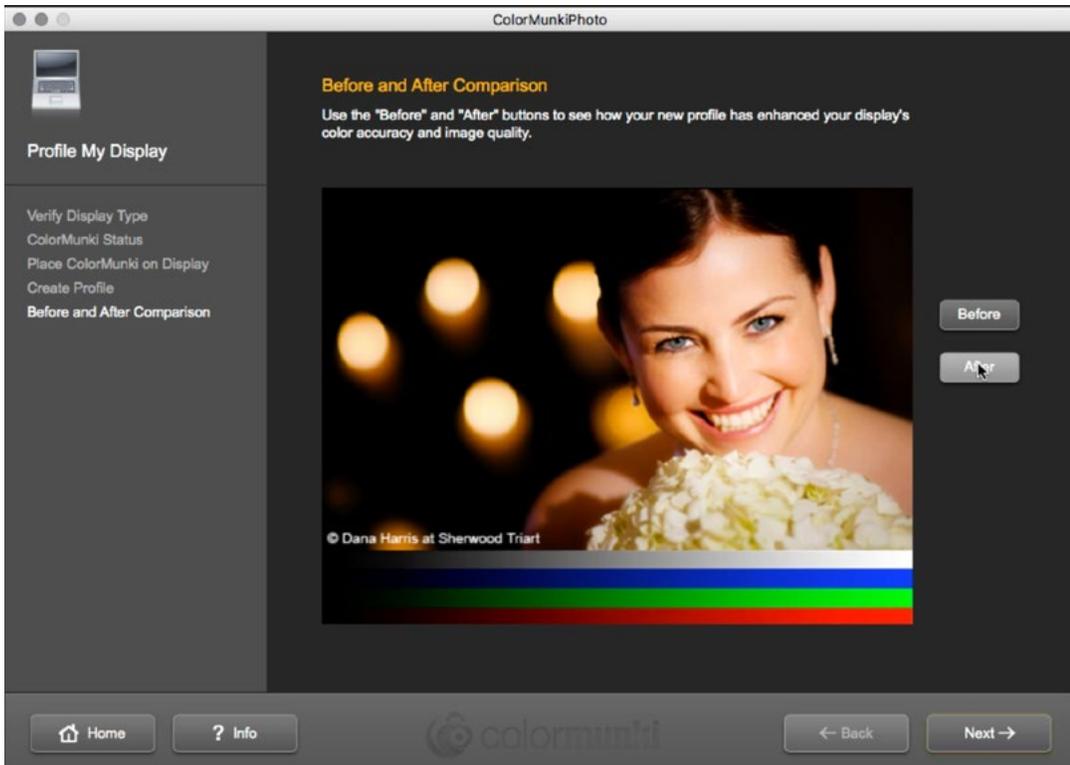


**The software is prompting us to give the new profile a name. I like to include the date and the name of the display within the name.**

When we click the Save button, the software will create the profile and install it within the computer's operating system. Any professional imaging software will be able to use this profile to be able to more accurately display colors.

The ColorMunki software can also remind us to re-profile the display every few weeks (we can specify the frequency) because the display's color capabilities can change over time.

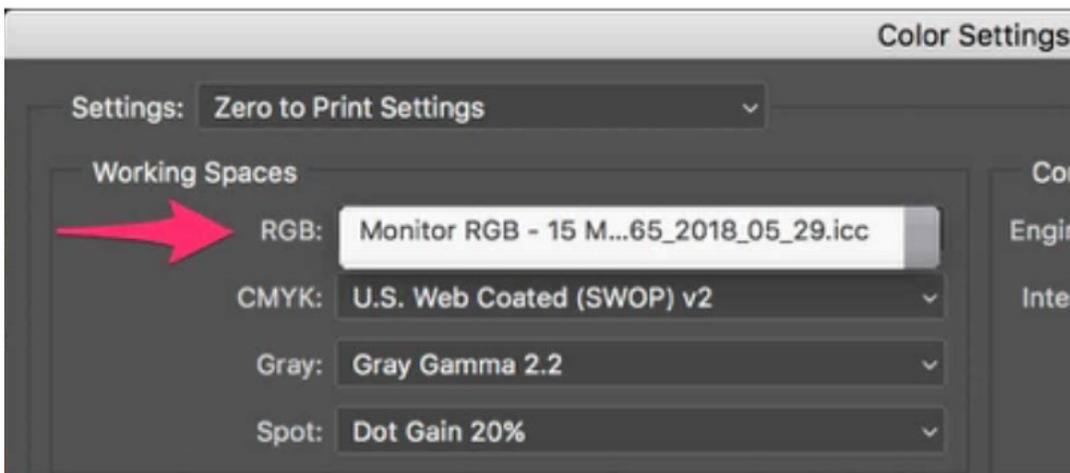
When we click the Next button, the software will allow us to compare how the display looks before and after creating the profile. Finally, we'll click the Next button again in order to finish the process and return to the home screen for the software.



In the last stage, we can click on the Before and After buttons to see what the display looks like before and after the profile was created and applied.

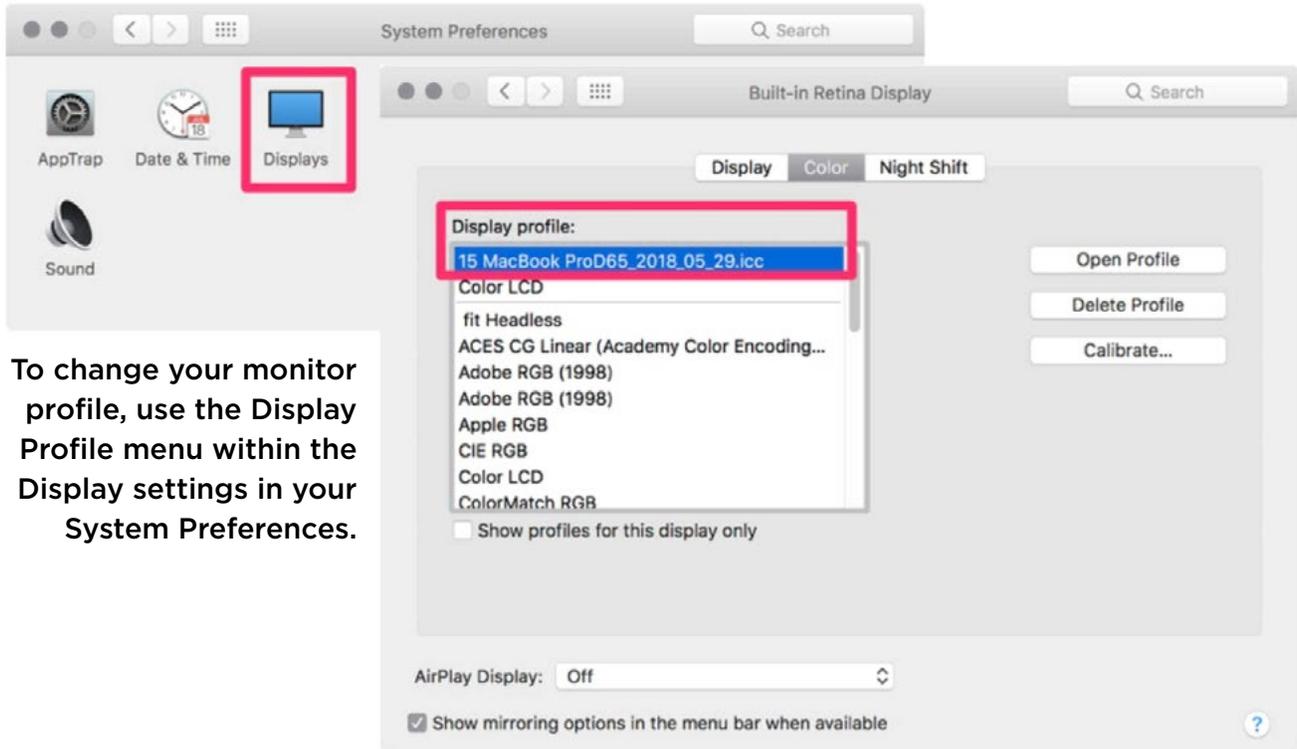
## Where can I find my display profile?

With Photoshop open, go to the Edit menu and choose Color Settings. The Color Settings dialog will appear and there you will find a menu for the RGB working space. If you click to expand this menu, one of the options will start with “Monitor RGB” and whatever comes after this text is your current monitor profile.



You can find your current display profile by clicking on the RGB working space menu within Photoshop's Color Settings.

If you would like to change the monitor profile, open your System Preferences and click on the Displays option. Make sure the Color option is chosen (it's one of the tabs at the top of the dialog) and then click on the Display Profile menu. Here, the current profile will be highlighted and you can click on a different one to change it.



## What if my prints still don't match my screen?

- Use soft proofing to preview what the print should look like. (There is a separate Masters Academy lesson on soft proofing.)
- Still dark? View the image surrounded by white and zoom out to evaluate the brightness.

- Re-profile the monitor and deviate from the settings we used, since the printer profiles are rarely the cause. (We used gamma 2.2, white point 6500K, brightness 120cd/m<sup>2</sup>)
- Crazy color cast? Re-profile the display and use the native white point (instead of D65).
- Still dark? Re-profile the display and lower the brightness setting toward 80 cd/m<sup>2</sup>
- Still dark? Lower the gamma setting toward 1.8.
- Still dark? Adjust Lightroom's Print Adjustment Settings (This is not the ideal solution, and you shouldn't need to do this.)
- Is the print warmer than what you see on screen? If that's the case, lower the color temp toward 5000K.
- Is the print cooler than what you see on screen? Then raise the color temp toward 8000K (if the software allows it).
- Still not right? Assume you have a faulty colorimeter or inaccurate printer profile.