Making a B&W ICC with a Scanner

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Using Roy Harrington's "Create ICC" program (see http://www.quadtonerip.com/html/QTRiccprofile.html) and a reasonably good flatbed scanner, very good ICCs can be made for printing B&W images with a number of B&W inksets. These ICCs work only with Photoshop or Photoshop Elements (sometimes referred to collectively as "PS") and the Print Previews of those image editors.

There are different approaches to using Create ICC to profile an inkset and paper. Here the one that involves the least expense (no spectrophotometer) and no curves is covered.

For this exercise I'll use an Epson Expression 1600 flatbed scanner. It is probably similar to a number of others. I'm also using the Carbon-6 inkset on a 2200.

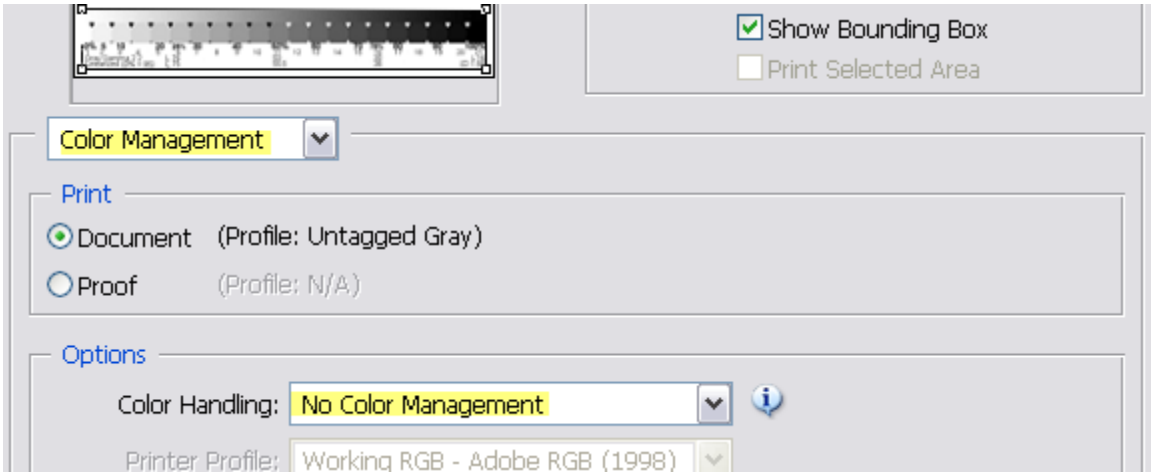
Why use an ICC? It takes advantage of our systems' color management tools and does a good job of matching the monitor's relative densities to the print. Prints can be made more consistent among different printers and papers if they all use a "color managed" workflow with appropriate ICCs.

Making the ICC Input Data File

1. Print a 21-step test strip.

The first step in making an ICC profile is to print a 21-Step test strip with the printer, inkset and paper you want to profile. A 21-step test file is posted at http://www.paulroark.com/BW-Info/21-Step.jpg

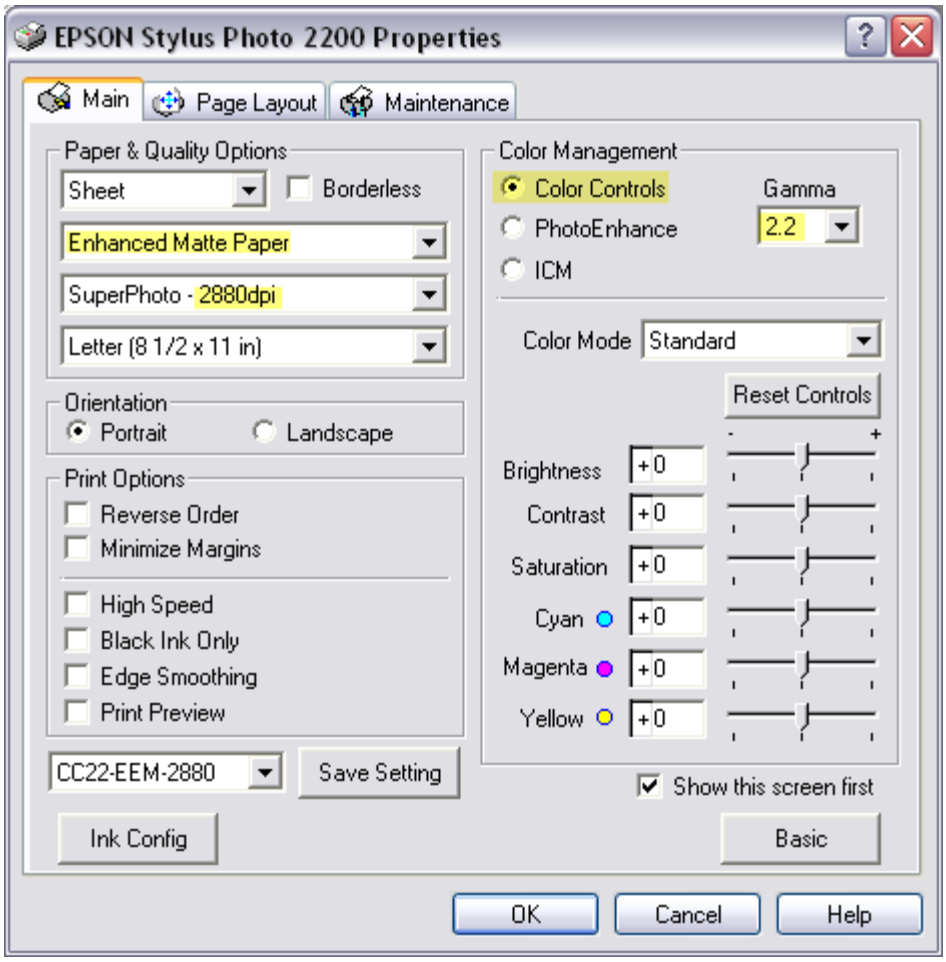
The Printer Preview should have the "Color Handling" box set to "No Color Management." See below.



The printer driver settings need to be the same when the ICC is used as when this initial 21-step test strip was made. As such, note these settings, which might also be abbreviated in the ICC name to remind you of what they should be.

I generally use the highest resolution or quality level, including having “High Speed” un-checked. The paper type is usually “Matte Paper – Heavyweight” or “Enhanced Matte Paper.”

With the Carbon-6 inkset, Color Controls checked and gamma set to 2.2 usually works. See the Driver Properties screen grab, below.

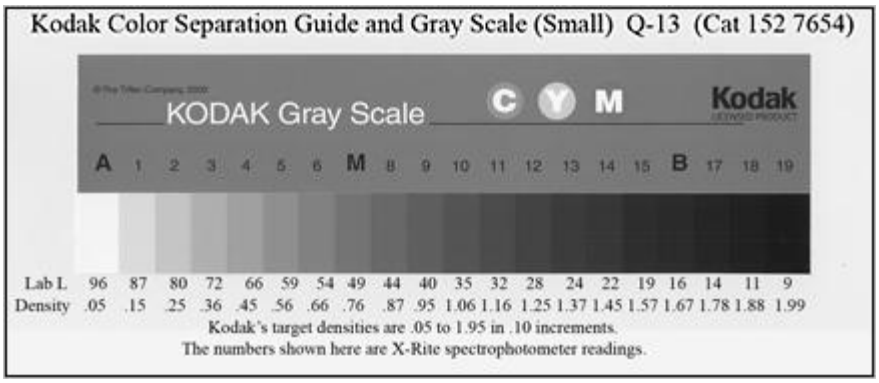


2. Scan the 21-test strip and include a known reference guide.

After the initial 21-step test strip print is dry (a hair drier is useful), it is scanned to obtain the relative density data Create ICC needs. I find that my Epson flatbed scanner does a reasonably good job of capturing the highlights and shadows when its auto exposure is used. It's critical that these end points not be clipped.

The main problem I see with the flatbed scans when used for this purpose is that the gamma is inconsistent. That is, the 50% print value does not necessarily end up at 50% in the scanned image. To correct the gamma, a known reference guide can be scanned along with the 21-step test strip.

While there are a number of alternatives that can be used for reference standards, the one I use is the Kodak "Color Separation Guide and Gray Scale." The small ("Q-13") version of it has a Kodak catalog number of 152 7654 and is available at larger photo stores for under $20. It has 20 steps from density .05 to 1.95 in .10 increments. Below is a scan of the Q-13 Guide, with the densities and Lab L values measured with a spectrophotometer and added to the image.



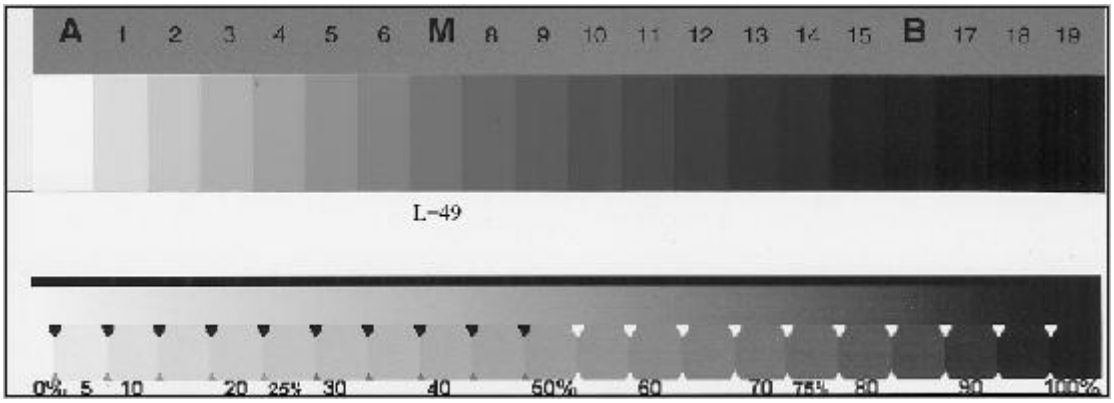
A 50% reference that many photographers have is an 18% gray card. These have a Lab L = 50 and can be used instead of the Q-13 Guide if they are in good shape. (One of mine that was exposed to light for years is badly faded.)

See http://www.paulroark.com/BW-Info/Making_B-W_ICCs-GrayCard.pdf for an example that uses these standard Kodak Gray Cards.

(Other possible reference guides for calibrating a scanner are listed at http://www.paulroark.com/BW-Info/Other-reference-guides.pdf)

Here, I'll use the Q-13 Guide.

When scanning the printed 21-step test strip, at the same time as the reference guide, use 12 bit – or other high bit depth – gray scale mode for scanning.

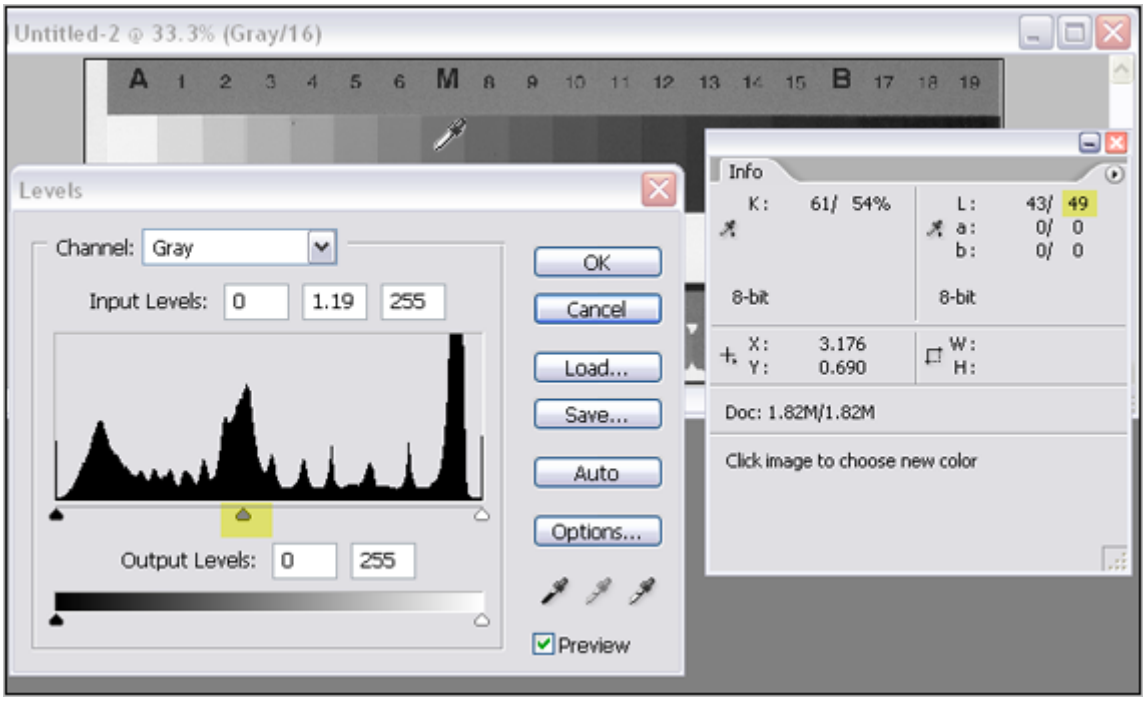


Here I've noted again that the "M" test patch has a Lab L = 49, which will act as my reference, known midtone value. (It was probably intended to be 50, but this sample measures slightly off with my spectro.)

3. Adjust the gamma of the scanned 21-test strip.

In Photoshop, the Levels adjustment is used to correct the gamma. The Levels graph or histogram should show that there is no clipping of the 21-step test strip end points. If there is clipping, re-scan the test strips with different settings.

Since the Epson scanner did a good enough job of capturing the end points, the only thing I need to do here is move the Levels center slider to the point where the Eyedropper tool shows the correct Lab L (or HSB Brightness in Elements) for the known reference value – here the M patch on the Kodak Q-13 guide. The Levels adjustment is applied to the scan of the 21-test strip and reference guide.



4. Read the Lab L values for the corrected scan.

In PS smooth out the scan by using, for example, the Gaussian Blur filter, and use the eyedropper at the 5 pixel size to read each of the 21 patches. In Photoshop, Lab L is what I use. In Elements HSB B (Brightness) is close enough to Lab L to work. The Information Palette options that allow one to choose these readouts are reached by clicking on the upper right arrow in the Info palette.

Put the values measured into a simple text file. I use Notepad. All that is needed is the values in order, as shown below. These are in order from the paper white at the top to the 100% black at the bottom. These are relative values that, particularly at the dark end, are not accurate, but they don't need to be. Each paper will have slightly different numbers; this is just one example.

96
91
88
85
82
79

76
74
71
67
65
61
57
54
50
45
40
33
23
15
13

Note that while only this bare-bones data is needed, these files can also contain color information that allows soft proofing of tones in Photoshop. However, I'm keeping things as simple as possible here.

Save the file to the Desktop with the printer, inkset, and paper names noted as well as the critical driver settings. I put the printer name first (e.g., "2200") so that all of the ICCs for that printer will be listed together. "QTR" will always precede the ICC name you enter. As such, all of these types of ICCs will be together in the list that will appear when you go to use them. For this example, where I was profiling Red River Green paper on the 2200 with Carbon-6 installed, and the printer set to Color Controls and gamma 2.2, an appropriate text file name might be "2200-C6-RR-Green-CC22.txt".

Making the ICC

The Create ICC program is part of the overall QTR (Quad Tone Rip) set and is initially installed in the Eye-One folder (c:\Program Files\QuadToneRip\Eye-One in Windows). It needs to be put on the Desktop after installation (copy and paste, or drag the icon).

The program is used by simply dragging the icon for the scan data text file (that was saved to the Desktop) to the icon for the Create ICC program. As long as the data is acceptable (for example, has no flat spots), the program produces an output data text file and an ICC with the same name that was used for the input text file.

Location of ICCs in different OSs

The ICC file needs to be in the correct location for Photoshop to “see” it. This location varies for different computer OS’s. Note the locations, below.

Windows XP or Vista folder: c:\windows\system32\spool\drivers\color\

Mac OS 9.x: Systems Folder/ColorSync Profiles

Mac OS X: User Library/ColorSync/Profiles

Windows 98/M: \Windows\System\Color

Windows NT/2000 or XP upgrade from NT/2000:
\Winnt\system32\spool\drivers\color

Shortcut method for putting the ICC in the correct folder -- Windows XP

In Windows a folder shortcut on your desktop can be made that allows you to simply drag the ICCs to the shortcut to put it into the correct folder location. This is the procedure to make such a folder shortcut.

1. Right click on the Desktop (anywhere on your computer monitor where no icon appears and when no program is running there.

2. On the menu that appears, highlight "New."

3. On the new menu that appears, click on "Shortcut."

4. In the space where it asks you to type in the location, copy & paste, or type in the full path: c:\windows\system32\spool\drivers\color\

5. Click on the Next button. "Color" should appear in the box. You might want to also add "ICCs" to this name so that it reads, "Color (ICCs)."

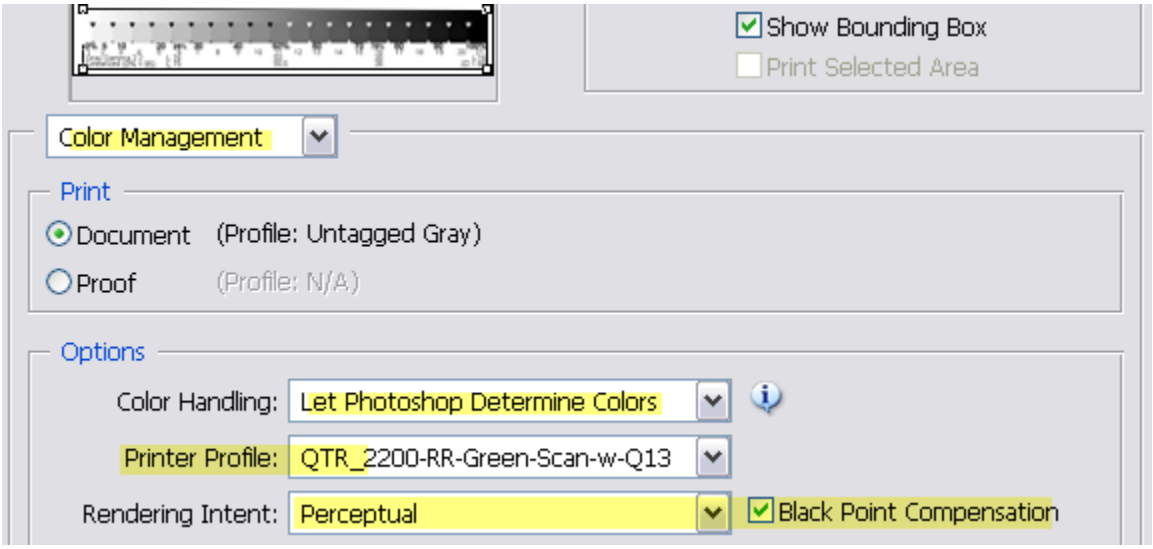
6. Press "Finish" and a folder icon should appear on your Desktop. This is a shortcut to the proper folder.

To use this, simply drag the ICC icon that has been saved to the Desktop over to the Color (ICCs) shortcut folder icon. The ICC icon should be transferred to the proper folder.

Note that if Photoshop has already been opened, it will not "see" the new ICCs until the Color Settings box (Edit>Color settings) is opened and closed.

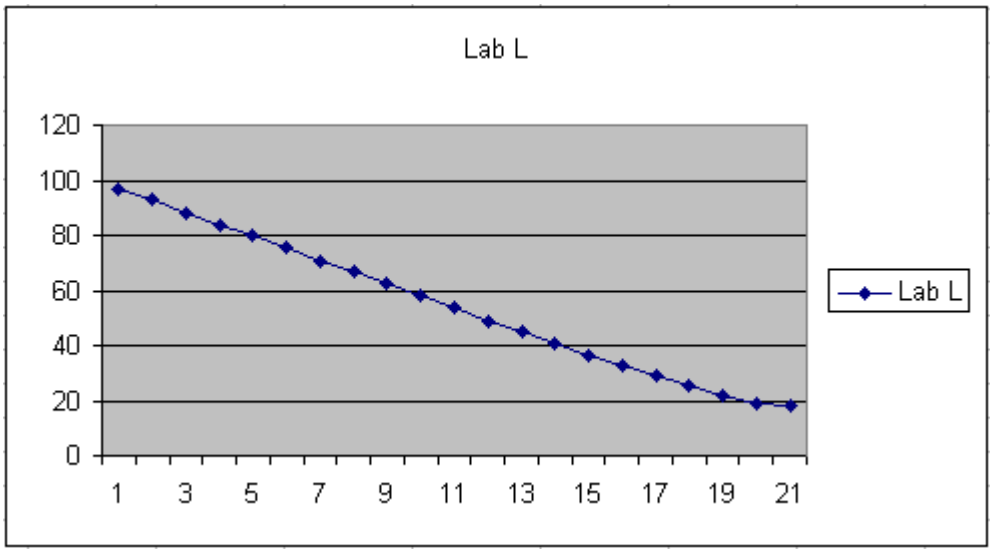
Using the ICC

In general, one simply inserts the ICC the Print Preview in PS. The lower part of the PS Print Preview is shown below.



With the usual default settings and a calibrated monitor (the Adobe Gamma manual procedure is better than nothing), the print should have a good grayscale ramp that reasonably matches the monitor's display.

Below is a graph of the Lab L values for a 21-step test print made with the ICC I made using this process. The working space was Gray Gamma 2.2, and the ICC controlled output reflects that tonal distribution.



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