Epson 2200, 7600, 9600
Printing & Calibration Tips, part II

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This is a two-part article. Part one is in the April/May CameraArts.

MONITORS, CALIBRATION & GETTING THE IMAGE TO MATCH MONITOR & PRINTER

A Bit About Calibration Products

It is important that you calibrate your monitor. These days, the best way to do this is with a hardware monitor calibrator. Some more expensive monitors come with their own calibration systems but there are also products that can be used to calibrate almost any monitor. The Monaco Sensor used with Monaco EZ Color or Monaco Proof, the Color Vision Spyder used with Color Vision Photocal or Optical and the Gretag Macbeth Eye One system are all good products. Any of those can calibrate most monitors. The one you choose may depend on whether you also need to make scanner and printer profiles.

If it is important to you to scan film and have the color of those scans match your film original then you may want to make a scanner profile. If you are planning to use media other than Epson papers with your Epson 2200, 7600 or 9600 or if you also have other Epson printers that use dye based inks, then you may need to make printer profiles. I've found that when using Epson papers with the 2200 and 7600 I have not needed to make my own profiles but I do sometimes tweak the canned Epson profiles that come with the printer. Atkinson's profiles are very neutral and have good color saturation so I have generally used them without tweaks so far. For my other Epson printers (1200, 1270, 1280 and 2000P) I have used Monaco EZ Color with the Epson 1600 or 2450 flatbed scanner and Monaco Proof with the X-Rite DTP-41 to make profiles.

If you only have one monitor to calibrate, and that is all you want to do, I'd recommend Color Vision PhotoCal with the Spyder sensor for just under $300. Color Vision Optical uses the same sensor but is more advanced for about $100 more. If you also want to make scanner and printer profiles and your budget is limited, you can do that and calibrate your Monitor as well using Monaco EZ Color with the Monaco Sensor for about $500. If you have lots of monitors to calibrate and also need to make high end printer profiles, the Gretag Macbeth Eye One system is very good but can cost up to $3,000.00 depending on which components you purchase. Monaco Proof with X-Rite DTP-41 solution can also cost a similar amount.

I have been very happy with my LaCie Electron 19 Blue monitor, and the Electron 22 Blue also comes highly recommended. You don't have to buy the more expensive LaCie calibrator with these, however, as the ones I mentioned above will do the job. Another monitor I've heard good things about, but haven't tested, is the Sony Artisan.

Color Temperature and Monitor Calibration

If you are using the canned Epson profiles that get installed with your 2200, 7600 or 9600 then I'd start out calibrating your monitor to 5000 Kelvin with a gamma of 1.8 on the Mac and 2.2 on the PC. If you are using Atkinson's profiles with the 7600 or 9600, I've found that they match my prints very well when my monitor is calibrated to 6500 and 2.2 using Optical. In both cases here the prints match my monitor when I'm viewing the prints under 5000k lights in my GTI Soft-View box. I've found that different makes of monitors each have their own characteristics. Some monitors, often cheaper ones, are inherently more contrasty, older monitors tend to be dull, etc. Calibrating a monitor will get it as close as the calibration hardware/software can to the color temperature and gamma you request. Different calibration products often give slightly different results. If you have several monitors that need to match each other exactly, more expensive calibration products, like Gretag Pro-Filemaker, will allow you to sync them to each other but the syncing forces each monitor get calibrated to the worse performing monitor you have in the bunch.

What To Do If Your Prints Don't Match Your Monitor

If your prints are really dark or way off, go through all the print dialogs again and make sure you are using them as I've recommended. Also make sure you are using the correct profile for the paper you are working with. There are many other ways you can use the Epson print dialogs, like Automatic, Photo-Realistic, Color Controls, etc. and I've seen people who have made nice prints using some of those settings. The problem with those other controls is that they do other things to the output besides what the profile does.

When you are working with a profile, you want to make sure that it alone is influencing the output. When I got my 7600 last July, the first thing I did was print my calibration image using the canned Epson Premium Luster profile along with Epson Premium Luster paper. I had my monitor calibrated to 5000k and gamma 1.8 and was quite happy with the way my calibration image looked on the monitor. The printed version looked a bit flatter and the colors were not as saturated. The good thing about the

printed version was that the neutrals were actually quite neutral. Having made quite a few profiles, my experience has often been that when you first make a profile, it often doesn't give you exactly what you want. If it's close then it is often easier to just edit the profile you've made than to start over from scratch and make a new profile. Because the print using the canned profile was quite close to my monitor and to what I wanted in the output, I decided to simply edit the canned profile. I had been calibrating my monitor to 5000k and 1.8 for a long time and the images in my calibration image were created within that environment so the calibration image looks great to me on my monitor.

I need to explain that you can use View/Proof Setup/Custom to have Photoshop 6 or 7 give you a more accurate on screen proof of how your image will look printed with a certain profile. Inside the Proof Setup dialog you choose the Profile and Intent that you will use when printing the image and Photoshop makes a "soft proof" on screen that should be very close to what your print will look like. See diagram 6; we'll come back to this in a minute.

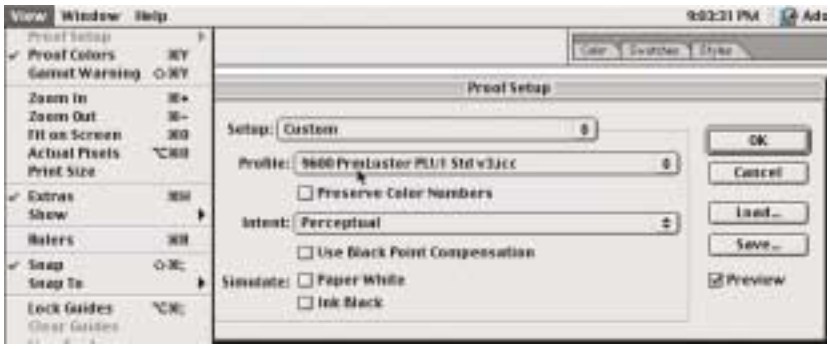

Diagram 6: Choose View/Proof Setup to bring up this Proof Setup dialog then choose the Profile and Intent you will be using when printing your image. With the Preview button on here, you'll see subtle changes in the image on your screen, which should mimic what happens to that image when you print it. I don't always find these soft proofs totally accurate but they do give you an idea what will happen to the image when it prints. Once you have this Profile set up here you can turn this soft proof on and off using Command-Y (Control-Y with Windows) or the Proof Colors menu.

There are products called profile editors, which allow you actually change a profile to make it do more of what you want. When you have a profile that is almost what you want, a profile editor can be used to actually tweak the profile. The problem I've found with profile editors is that the inexpensive ones don't have all the options you'd like and the expensive ones are expensive. I'll show you how to get a similar result, although technically not quite as clean as editing the profile, using the tools we all know and love within Photoshop.

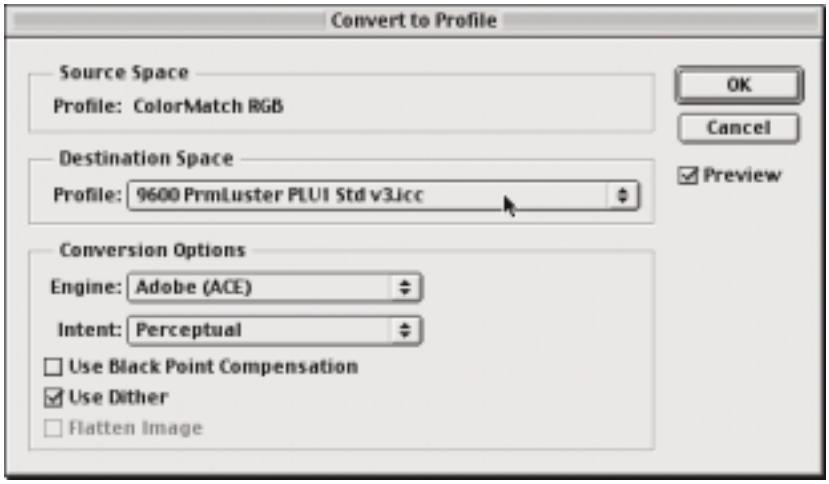

Diagram 7: Use Image/Mode/Convert to Profile to convert the copy on the right from the Source Space of your calibration image to the Destination Space you want to print with. Destination Space will be set to the profile you are using. The Destination Space profile you see here is probably not the pro-file you'll be using. Make sure your Engine and Intent are set the same way you have them in your print dialogs. If you are using a different calibration image than mine, your Source Space may be Adobe RGB or Lab.

The situation here is that we have printed our calibration image and the print of it doesn't look quite as nice as the image on the screen, the neutrals are not neutral, the contrast is off, or something like that. You want your calibration image up on the screen in its normal color space. This is ColorMatch RGB for my calibration image but it could be Adobe RGB or LAB for yours. Make sure View/Proof Colors is unchecked, off, for that calibration image. Now choose Image/Duplicate to make a copy of the Calibration image then Image/Mode/Convert to Profile to convert that copy to the Profile and rendering Intent you will want to print with. See diagram 7 for the picture of this step.

Arrange the windows on your screen so the original calibration image is on the left and the copy is on the right and you can see the same part of each image. See diagram 8 for a reference to this setup. If the soft proof of the calibration image looks just like your print of that image then you are in good shape and can skip this next paragraph. Otherwise add Curves, Levels or Hue/Saturation adjustment layers to the image on the right until it looks just like the print. For example, if the print looks flatter than the copy of the calibration image on the right of your screen then add a reverse-S Curve adjustment layer to that image to make the one on the screen look flat too. If the print looks less saturated than the copy on the screen then add a Hue-Saturation adjustment layer to desaturate the screen colors till they match the print.

Now you have the rightmost screen image looking like your print and the leftmost calibration image looks the way it normally looks. You will add adjustment layers in this step that will compensate your prints so they look the way you want them. Once you get this step right, you will then be adding these same adjustments to every print you make with this printer, paper and profile. Now you need to add more adjustment layers to the image on the

Diagram 8: Here is the window setup I would use to create adjustment layers that tweak the printout using a certain profile to match the original calibration image on my monitor. The calibration image is displayed on the left with its native color space then also on the right after converting to the printer profile one is working with. In this example, the first adjustment layer tweaks the rightmost image to match the printout of that image. The second two adjustment layers adjust the rightmost image to match the leftmost image. This second set of adjustment layers will later be used to tweak the printout with this profile so it matches the original calibration image within its native color space. Notice the Arrow cursor towards the bottom right. With this pop-up menu set to Document Profile, each Photoshop window shows you the profile being used to display the image within that window. Remember that you would only use this technique if the original calibration image were displayed more accurately on your screen than the printout of that image. If the printout of that image with a particular profile is accurate and correct, then you'd want to recalibrate your monitor to match that printout not adjust the printout.

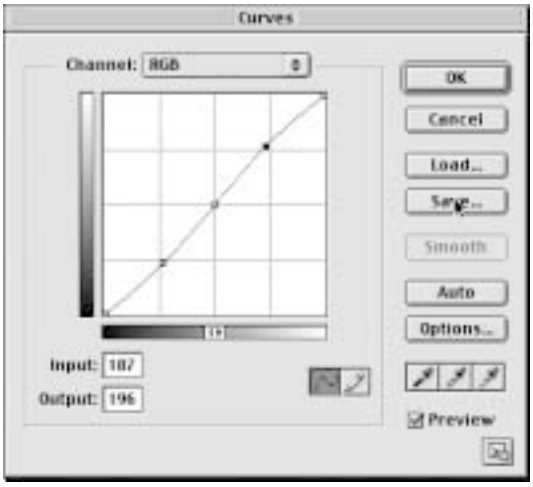

Diagram 9: Here we are using the Save button to save this curve adjustment. If we later want to reuse this same adjustment on another image, we can use the Load button to load it again from the file we saved.

right until it looks the same as the image on the left. After adding each of these adjustment layers, click on the Save button in each color adjustment tool, like Curves for example, to save that setting so you can use it again later. For example, my prints looked flatter and less saturated than my calibration image.

I added a Curves Adjustment layer with a subtle S-Curve, which added contrast to the rightmost image. In the Curves dialog I used the Save button (see diagram 9) to save this Curve. I then added a Hue/Saturation adjustment layer to saturate the colors and used the Save button in the Hue/Saturation dialog to save that setting. You will probably have to repeat the steps in this paragraph several times until you get a print that matches your original calibration image on the screen. It took me five tries and most of a day to get it right for the Premium Luster Paper. Once you get your printed calibration image to match the leftmost one on the screen, you then make an action script that first uses Image/Mode/Convert to Profile to convert any image to your profile. The script then Loads the one or two adjustment layers you created and Saved in this paragraph. You can then play this action script to quickly prepare any image for printing with this paper, profile and printer combination.

When printing this way you have to have first used Image/Mode/Convert to Profile to convert your image ahead of time to the printer profile. You need to do it this way so you can add the adjustment layers afterwards. In this case your Print With Preview dialog settings will be a little different. See Diagram 10 for an example.

The Epson print dialogs and this tweaking procedure are also described on pages 151 through 154 of *Photoshop 7 Artistry*. In the first and second printing of Photoshop 7 Artistry, there is a typo in the top-left dialog on page 151, the Use Black Point Compensation option was checked and it should have been unchecked. Also step two on page 153 should be 375 Pixels/Inch instead of 750. These typos have been fixed in the third and future printings. These procedures and other useful information are also described in the Printers section of the Latest Tips section of www.barryhaynes.com.

If the original print of the calibration image looked better and more neutral than the image on the screen, then we might want to adjust the calibration of the monitor so the image on the monitor looked like the print. When need to do that, Color Vision Optical gives you more options than Color Vision Photocal or Monaco EZ Color since Optical allows you to adjust the monitor to a large variety of color temperatures.

Getting Great Prints Once You're Calibrated

Once your calibration image prints well and also matches your monito, then, to get great prints, you need to know how to correctly capture and/or scan your images and how large a file you'll need for a certain size print. You need to learn how to color correct your images to achieve the contrast, colors and saturation for pleasing output. Other very important issues are sharpening and spotting your digital file before printing it. Maybe we can cover some of these issues in a future article. There are also many good books on these subjects. If you happen

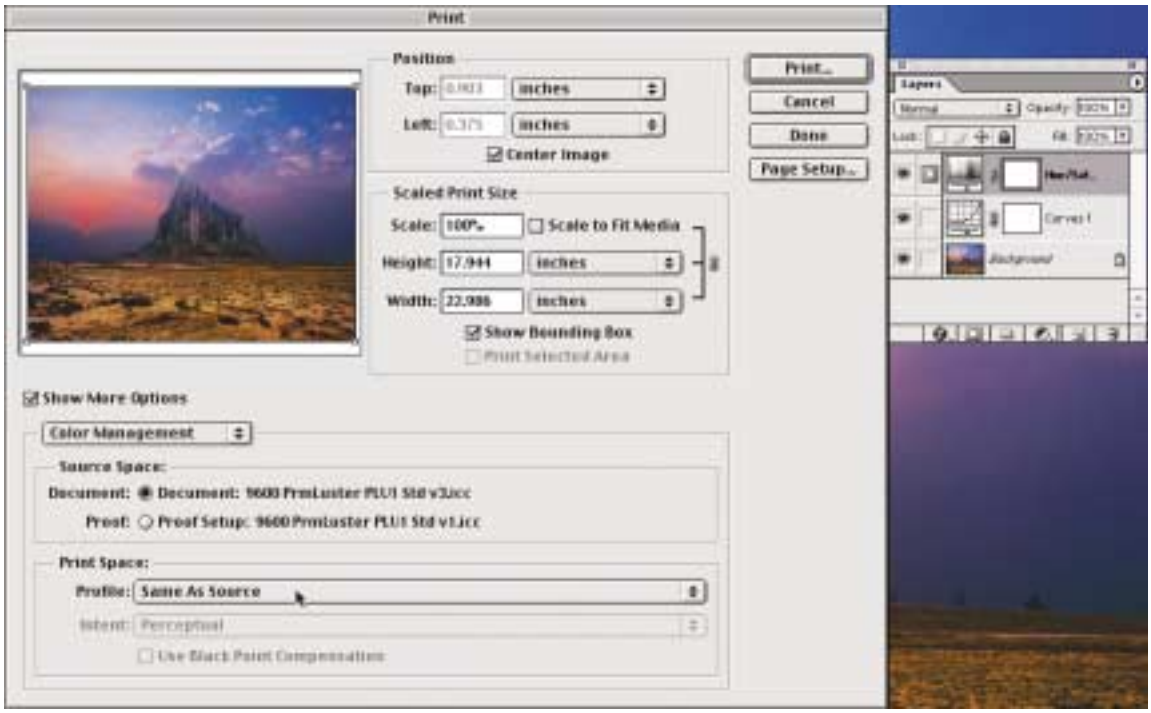

Diagram 10: Here we see the Print With Preview dialog as it should be set when you've used Image/Mode/Convert to Profile first then added several adjustment layers to tweak the print output. The Source Space will have already been converted to the printer profile so the Print Space needs to be set to Same As Source. The Advanced print dialogs and other print dialogs, will be the same as before. This Layers dialog to the right is typical of the way it will look when you use this method to tweak your output.

to have *Photoshop 6 or 7 Artistry* then I'd recommend you study chapters 12, 13, 14 and 15 to learn more about the issues covered in this article. Chapter 16 will tell you about file size, image resolution and scanning. Chapters 17, 19 and 20 will give you a good overview and workflow for color correcting. You'll also learn about sharpening and spotting in chapter 20, then chapter 26 will show you how to use the Sharpen Only Edges BH action script. This script only sharpens the parts of an image that really need to be sharpened. Sharpening just the edges is one of the advanced techniques that allows you to make much sharper digital prints without overly enhancing the sky grain or grain in other flat areas.

Black and White Digital Prints

Most of the printing I've done with my 2200 and 7600 has been color but recently I've been experimenting with black and white a bit more. The canned Epson profiles are OK for black and white but Atkinson's profiles produce the most neutral black and white images. I've found that adding a small S curve right before printing, to add a bit of contrast, makes them even better. If you are used to making black and white prints in the dark room using fiber based papers, you'll probably find that the look of an ink jet print is slightly different. Ink jet is a different medium than photographic emulsion. I sometimes find that traditional photographers want it to look exactly like their darkroom prints, when viewed from two inches away, or else they don't think it's a photographic print. Darkroom black and white prints are very moody, they have different tones, emotions and moods depending on the paper, developer and sometimes toner used.

If you really want a photographic emulsion, you should try Dan Burkholder's method, where you perfect your black and white image using Photoshop then output that image with an image setter using very high resolution halftone dots onto high contrast film at the actual size of your final print. This image setter film output is then contact printed onto traditional black and white paper. Hunt Witherall and my friend Dave McIntire use this technique and produce some of the most beautiful black and white prints I've ever seen! To learn more about it get Burkholder's book, *Making Digital Negatives for Contact Printing* (Bladed Iris Press, 1999).

The challenge doing black and white prints with an inkjet printer is getting shadows that don't have any color casts in them. The six inks in the previous dye based Epson printers, like the 1270, 1280 and 2000P, made it very difficult to get black and whites without these subtle and irritating color casts. The only way I found I could do it on those printers was to print using the black ink only. This worked fine but produced prints lacking the subtle tonality one gets with more inks. The new Ultrachrome inks for the 2200, 7600 and 9600 have a light black seventh ink, which greatly reduces this cast in the shadows problem. The black and white prints I've made with Atkinson's profiles on Premium Luster, Premium Glossy, Premium Semi-matte and Enhanced Matte paper don't show any casts when I view them under my 5000k lights. They also look very good outside viewed in daylight. When I look at them with halogen floods though, especially if the light is hitting the prints at a sharp angle,

there are sometimes very slight magenta casts that show up. I believe this is the old metamerism problem showing up again but ever so slightly here.

I met Phil Borges at the Fotofusion conference this year and was very impressed with his work. He makes beautiful traditional black and white prints of his portraits of Tibetan monks, children and other indigenous tribal people. In these prints only the flesh tones are sepia toned. If you ever get a chance to see an exhibit of Phil's work, it is well worth it! He showed me some test prints where he had been trying to do similar prints using the 7600. He was concerned about subtle magenta color casts in the shadows and when I first saw his digital prints, the casts seemed too subtle to mention. When I saw his darkroom prints though, I could see the difference and I did like the darkroom prints better.

Many people I've talked to in the industry are working with black and white prints to figure out the best way to make them on these printers. Atkinson's profiles are the best I've found so far and I'm quite happy with my black and white images. Portraits are the most difficult, I believe, since they often have very subtle shadows. A company named ColorByte makes a different set of drivers, called ImagePrint, for these Epson printers. I've heard many good reports about that product and some say it makes more neutral black and white prints. I've also heard some reports that it is more difficult to use and doesn't have the best user interface. I'll be working more with black and white prints and will hopefully get to try ImagePrint. Check the Latest Tips area of www.barryhaynes.com for updates on my quest for the best black and white.

Conclusions

For making color prints on my 2200 or 7600, the papers I like best are Epson Premium Luster and Epson Premium Semi-matte. The Luster has a slight texture or pearl effect on its surface, which usually works well, to reduce glare a bit. With some images though, light reflecting off this surface can be irritating. In that case, you'll find the Premium Semi-matte gives very similar color results but without the light reflections you get on the Premium Luster. I like both these papers a lot and they are probably the ones to use if you have been previously getting prints from the Light-jet 5000 on the Fuji Crystal Archive paper and want to get similar results on your Epson. The Premium Glossy Photo Paper is a very glossy surface and is what you would use to simulate a glossy Ilfochrome or the Supergloss Crystal Archive paper from the Lightjet. Large solid black areas in some images when viewed from an angle sometimes reflect light strangely with the Premium Glossy Photo Paper.

I have not experimented much yet with the Matte papers but I'll be moving in that direction soon. When you switch between Photo-Black and Matte-Black inks on the 7600 or 9600, these printers flush out all the old inks from their ink tubes. I've heard this can cost you over $70 in wasted ink since all the colors are flushed, not just the black you are changing. I'm glad that the printers are made with both inks and that you can switch them but switching is not something you would want to do all the time in a production environment. Maybe switching can be optimized with a print driver update. When I switch to Matte-Black, I'll be using that for a while. If you need to print with both inks all the time, it might be more efficient to get two printers and run Matte-Black in one and Photo-Black in the other. Switching black inks on the 2200 wastes very little ink and is quick to do. I've been using the Matte black on my 2200 and am finding it can give some nice deep blacks on Matte papers. ■

Other Useful Information

Windows Printer Driver Installation Issues

During a printmaking workshop I taught at Palm Beach Photographic Workshops, we installed Epson printers on several PCs. It seemed that all the profiles didn't get installed as they did on the Mac systems. I've also received e-mails from readers commenting that they didn't have the same set of canned profiles I seemed to get on my Mac. I mentioned this to my friends at Epson and they gave me the following info that may help some of you who have PCs.

"When our customers install the printer driver on a Windows system, the full set of ICC profiles are not installed," they said. "These customers can get the full set of profiles by installing the PIM Plug-in from the driver installation CD. The next version of the driver installation CD will have a separate GUI installation for the ICC Color Profiles. This new version will be in the box by the end of February for the SP2200, SP960, and SP1280 printers."

Download Addresses for Bill Atkinson's Profiles

Atkinson's profiles for the Epson Stylus Pro 7600 and 9600 are now available for download from the Epson support website, http://support.epson.com, and also from Atkinson's own public file-sharing folder at http://homepage.mac.com/billatkinson. He has not created a set of profiles for the 2200 and when I tried his 7600/9600 profiles on my 2200 they didn't work as well as the canned 2200 profiles. They work great on the 7600 and 9600, however!

Good places to get printer and other supplies:
IT Supplies: www.itsupplies.com (free shipping on orders over $75)
Lexjet: www.lexjet.com

Calibration Products, Advice and Consulting:
Alder Technology, 888-318-8230, www.aldertech.com
Monaco Systems: www.monacosys.com
Color Vision: www.colorcal.com
Gretag Macbeth: www.gretagmacbeth.com
X-Rite: www.x-rite.com