

Photoshop 5.0 and Color Management by Andrew Rodney

One of the most revolutionary changes in Adobe Photoshop 5.0 is the complete overhaul of how the application deals with color! For those of us that have worked in a color managed workflow using ICC profiles, this change is significant and will alter how we think about the ICC workflow. The changes Adobe made with 5.0 are radical, sophisticated, ingenious and complex! I had the honor to work with Photoshop 5.0 for 3 months prior to its release and yet I found that the new understanding of how 5.0 dealt with color took a great deal of rethinking on my part. Much like understanding a complex topic like Resolution, at some point in time the light bulb goes off and dealing with the subject seems logical and elegant.

In order to discuss all the new concepts and options in version 5.0 of Photoshop, we need to examine some definitions first.

Device Dependent and Independent Color.

RGB and CMYK are device dependent color spaces. Devices like digital cameras, scanners, monitors and printers are known as device dependent. We can't depend on each of these devices to deal with color in an identical fashion because each device has its own influence on the color files it interacts with. Think of these color files as being unique unto themselves, with each having a slightly different flavor biased by the individual device that interacts with the file. The problem with a device dependent colorspace is that it changes from device to device! This can cause some significant problems when we wish to manage color our output. Device independent color is a much better means of working because a device independent color is not affected by a particular device or it's characteristics. Photoshop 5.0 takes a very novel approach to dealing with both device dependent and independent color, as we will see.

Color Gamut.

Not only are RGB and CMYK device dependent color spaces, (with many flavors of RGB and CMYK) but the range of colors a specific RGB or CMYK file can describe can be vastly different. The range of colors in a colorspace is known as the color gamut. The range of colors a device can actually produce or display is also know as the color gamut of that device. Virtually all devices have differences in their color gamuts. If a printer is said to have a lower color gamut than a monitor, what we are actually saying is that there are colors that could be displayed on that monitor that can't be printed on the output device. The colors that can't be printed are therefore called "out of gamut". The color gamut of a color model will play an important role in setting up Photoshop 5.0's various preferences.

Before looking at Photoshop 5.0 and how it overcomes many of the problems faced by users of desktop color, it's worth looking at how versions previous to Photoshop 5.0 dealt with color files. Let's take CMYK files as an example. As I mentioned, CMYK is a highly device dependent color space. A CMYK file that has been optimized for a specific CMYK printer will likely not print the same on a different CMYK device. In addition, in order to properly view a CMYK file in Photoshop 4.0 or earlier, we needed to inform the application, via the color preferences, the exact condition of that CMYK file in order to properly view that file on our RGB display. This was done via the Separation Set up and Printing Inks Set Up along with the Monitor Preferences. When configured properly, Photoshop could then produce an on-the-fly CMYK to RGB conversion for our monitor. But should the opened CMYK file differ in its flavor from the CMYK preferences, the file was not viewed properly because of a mismatch between the file and the actual preferences we set up. This became a real problem with CMYK files provided to us with no clue as to how they were originally

converted from RGB to CMYK. Since we didn't know the exact preferences used when the file was originally converted from RGB to CMYK, we can't set those exact preferences in Separation Set Up and Printing Inks Set Up. The same problems came about when dealing with RGB files but far less so. Since Photoshop didn't have to do any on screen conversions when dealing with RGB files, the color preferences described above didn't play any role. Yet it was common for users moving files from machine to machine to notice that their files looked different on each monitor. One solution was to calibrate the monitors on each system to a known standard. While this solved a significant problem, namely files looking different on each display, those calibrated displays were still dealing with device dependent color. Think of it this way—if in order to get two displays to match, we need to alter one display more than the other, that difference was inherently a condition of that one device. Adobe came up with an ingenious way in which to allow us to calibrate our displays but still work with device independent color files.

The last area we should examine is the ICC workflow. In 1993 a group including Apple Computer, Adobe, Agfa, Eastman Kodak, Linotype-Hell, and others created a cross platform standard for device profiling. This group became known as ICC (International Color Consortium). Devices such as scanners, digital cameras, monitors and output devices could be characterized and the creation of profiles, small files containing numeric data which describes the characteristics of these devices could be used throughout a Color Management System. These ICC profiles are critical to the new color management workflow in Photoshop 5.0. As you will see, these profiles are necessary for all the various devices and files we will work with in Photoshop 5.0. Profiles are used in many different areas of Photoshop 5.0: to define a Working Space where you edit your files, and to define the calibration of your monitor for an accurate on screen proof. Profiles are also embedded into Photoshop files to provide information about the state of the files: their color origins, if you will. Profiles are used to alter the files for specific output devices.

The typical use of a profile in a workflow goes something like this: You need to define a source profile (where the file came from) and destination profile (where you want to take this file). This process of source and destination can happen numerous times in the life of a digital file. For example:

Scanner (Source)----> Monitor (Destination)
Monitor (Source)----> RGB Printer (Destination)
Monitor (Source)----> CMYK file for SWOP coated (Destination)

What is important to realize is that for the ICC workflow to work properly, files need to be tagged with a source and ultimately a destination profile.

Now on to Photoshop 5.0. The first step necessary is to calibrate the display and create an ICC profile reflecting the condition of that display. Some users calibrate their display using hardware colorimeters which set the display into a know standard such as D50, as well as create an ICC profile. Realizing that the majority of Photoshop users didn't have such devices, Adobe shipped a utility called Adobe Gamma with Photoshop 5.0 that allows the user to visually calibrate any display and create the ICC profile for that monitor. While this approach is not anywhere as accurate as hardware calibration, it's a step in the right direction. All users of Photoshop 5.0 should utilize either Adobe Gamma or a hardware calibration device and create that very important ICC profile which reflects the specific state of the calibrated display. As you will soon see, this monitor profile will

play a critical role. It allows multiple users who calibrate their displays to the same standard to view files in Photoshop 5.0 and have these files look the same regardless of platform or specific hardware. Be sure to open the ColorSync control panel on your Macintosh and load the ICC profile that either Adobe Gamma made after calibrating your display or the ICC profile your 3rd party calibration product created. Adobe Gamma can also set the system profile automatically but the user should double check in the ColorSync control panel. This is very important!

There are 4 color preferences in Photoshop 5.0 we will look at in some length.

RGB Set Up:

This preference has two main areas we need to closely inspect (see Fig 1). The first area at the top has a pop down menu where you will specify what is known as the RGB Working Space. Let's define just what a Working Space is because this area of the new workflow is bound to cause confusion. A Working Space is also known as an editing space. What Adobe has done is set up 10 different Working Spaces for dealing with RGB that are independent of any specific device. This is why they are "device independent" even for RGB (even though the RGB Colorspace technically isn't). Yet by dealing with files in this Working Space, we don't introduce specific device characteristics into the files we are editing. Think of this as a standardized method of dealing with RGB files by making the RGB work space independent of the system or monitor. This is a major departure to how users dealt with files prior to Photoshop 5.0 where everyone's individual monitor was their "editing space."

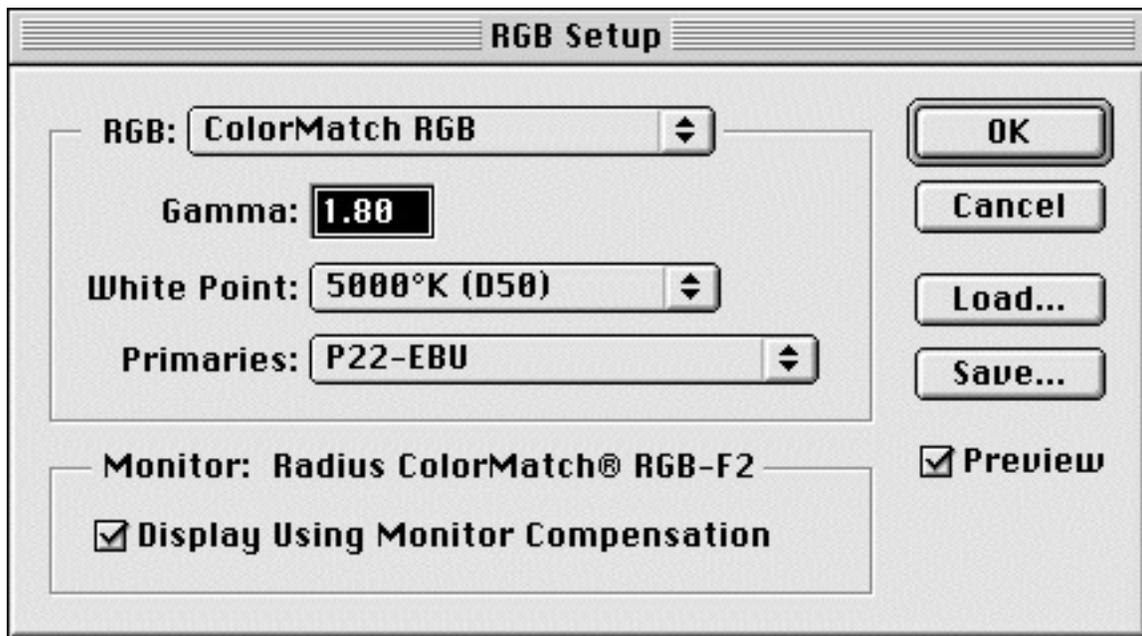


Figure 1. The RGB setup is where we define our RGB Working Space. Notice next to the "Monitor:" label that the monitor profile loaded into the ColorSync Control Panel is shown (Radius ColorMatch RGB F-2). When the "Display Using Monitor Compensation" check box is on as seen here, an on-the-fly conversion from working space to the monitor is in effect. The actual data in the file undergoes no change, just the on screen preview.

Each of the Working Spaces are based on standard RGB Working Spaces that have been used in various industries for some time. Each RGB Working Space has an increasingly wider color gamut; from sRGB to Wide Gamut RGB. I'll explain each in a moment. The idea we first need to understand is this: We want to pick an RGB Working Space based on the kind of work we intend to accomplish in Photoshop. We will convert all files we wish to edit into our Working Space thereby placing all these files into a known, consistent device independent state. Photoshop will ultimately embed (also known as tag) all our RGB files with this RGB Working Space for future use. Other users who happen to open this file with Photoshop 5.0 will also be informed of the RGB Working Space upon opening the file because we have embedded this crucial information into our files. As you will see later, should these other users have a different Working Space Setup on their machines, they will be informed of this and they will have the option of converting our file into their Working Space or loading our Working Space into their RGB Setup prior to opening the file. Think of the RGB Working Spaces as "standard" editing spaces for all users of Photoshop 5.0 to utilize. Some could argue that 9 different spaces is too many, while others may argue 9 is not enough. But like most standards, we don't want too many options and thus complicate the selection of one of these standards. Working spaces can be edited or modified but if this is done, it may be necessary to share the Working Space profile with other users who may wish to work with files in the same Working Space.

The choice of a Working Space is dependent on the kinds of work you expect to accomplish in Photoshop and where you ultimately intend to output your files. To make the concept of Working Space a little easier, think back about CMYK files and how I mentioned that specific CMYK devices will require a specific CMYK file. The specifics of that CMYK file IS this file's Working Space! But since RGB is far less device dependent than CMYK, rather than dealing with perhaps thousands of different flavors of CMYK, we now only need to deal with 9 different flavors of RGB:

1. sRGB is a standard RGB colorspace promoted by HP, Microsoft and a few other companies. It's been created and is intended for low end products such as consumer digital cameras and printers, as well as viewing on the internet. sRGB is based on the "average" PC monitor and reflects the HDTV broadcast standards. sRGB has the most limited color gamut of our 9 options. Frankly, unless you only wish to deal with low end output devices or the internet, sRGB is a very poor RGB Working Space because it's missing a good deal of RGB data needed for more sophisticated output needs including print work. sRGB just happens to be the Working space default found in the RGB Setup so my advice is to change this at once!

2. Apple RGB is based on the original Apple 13" Triniton monitor. While it's color gamut is not much better than sRGB, those working on a Macintosh using products such as Photoshop and Illustrator actually utilized this as their Working Space. So you see, we've actually been using an RGB Working Space all along, however it was not device independent like the Apple RGB Working Space in 5.0.

3&4. SMPTE-C and Pal/SECAM are both broadcast standards; one US, the other European. If you're working with video, go for it, otherwise move on to another RGB Working Space.

5. ColorMatch RGB. This RGB Working Space is based on the Radius PressView displays and is a fairly wide gamut RGB space. It's a good option for those doing prepress work and ideal for users that are currently working with Radius PressView displays. Since we use PressViews in our shop, we

have adopted this Working Space for the time being and legacy files (those files from older versions of Photoshop) seem to work well since they were originally created and edited with PressView displays and our various scanners.

6. SMPTE-240M. This Working Space has an even larger gamut than ColorMatch RGB and is based on HDTV production. Even better for prepress work due to its larger color gamut however, the downside is that this space also includes more unprintable colors for press output. Bruce Fraser, author of “Real World Photoshop” has started working with a modification of SMPTE-240M which he feels may be the ideal RGB Working Space for most professional uses. Once more long term tests are completed in what is being called “BruceRGB”, we may adopt and recommend this modified RGB Working Space.

7. Wide Gamut RGB is a VERY wide gamut RGB colorspace and includes a good deal of colors that simply can't be printed out. Some have suggested it would be a good colorspace for 48 bit digital camera files for output to film recorders. Wide Gamut RGB is so wide that there are colors that this space contains that can't even be displayed on your monitor! But, it does contain most of the Ektachrome gamut that has been, until now, unavailable to digital image editors.

8 & 9. NTSC and CIE RGB are older color spaces that Adobe wanted to continue to support in Photoshop 5.0 even though both have been replaced primarily by more modern and robust Working Spaces mentioned above.

Simplified Monitor RGB. Use this Working Space if you want Photoshop 5.0 to work like older versions of the application with the exception being that files will be tagged with this Working Space profile. The color is based on your monitor ICC and is the only Working Space that is not device independent. Adobe only recommends using this Working Space if all your other applications are ICC unaware and you don't want to work with one of the above RGB Working Spaces.

Now the question arises, why pick an RGB Working Space? First off, as I mentioned, these RGB spaces are NOT device dependent so if you pick the same Working Space as other users, you all end up with the same line drawn in the sand. Ideally you want to pick a Working Space that has a sufficient color gamut to handle all your output needs but not be too wide that the colors are either spread too far apart or can't be utilized. But there's another benefit to a standardized Working Space and it takes us to the second part of the RGB Setup. Notice in the RGB Setup a label named “Monitor:” which will show the ICC profile for your display that is loaded into the ColorSync control panel. Photoshop 5.0 receives information about the monitor ICC profile directly from this control panel and this information is very important. Do you see the check box that is labeled “Display Using Monitor Compensation”? What this check box does is provide an on-the-fly RGB conversion from the device independent ICC profile (your working space) to the device dependent profile (your monitor). This is an astonishing feature because it allows you to view files on virtually any machine and have all the images match (assuming the Working Space profile on each machine is the same and the display is properly calibrated)! Because each monitor is different even when calibrated, the monitor profile loaded into the ColorSync control panel has all the pertinent information about this device dependent monitor color. Since the RGB Working Space is always a set standard and device independent, Photoshop can compensate for the differences it finds in the monitor profile. If you turn off the “Display Using Monitor Compensation” check box, the profile for the monitor is taken out of the loop. For this reason, you want to keep this check box on at all times. When set properly, the

RGB color you view on your screen should be the same for someone looking at the image on another display regardless of the operating system they are using or the kind of monitor.

The bottom line:

Calibrate your display using either a 3rd party product that also creates a monitor ICC profile or use Adobe Gamma and load the resulting profile into the ColorSync Control panel. Pick an RGB Working Space based on the kind of work you do and the kind of output you intend to create. ColorMatch RGB and perhaps SMPTE-240M/BruceRGB would be what I'd consider using for a Working Space. Insure that others working in your environment pick the same RGB Working Space.

CMYK Setup:

This portion of Photoshop 5.0 is pretty straightforward (see Fig. 2) When you first open this preference notice the 3 radio buttons next to the CMYK Model label. The first and third radio buttons basically set the CMYK preferences like earlier versions of Photoshop. We want to click on the 2nd radio button labeled "ICC." You are presented with 3 Pop down menus:

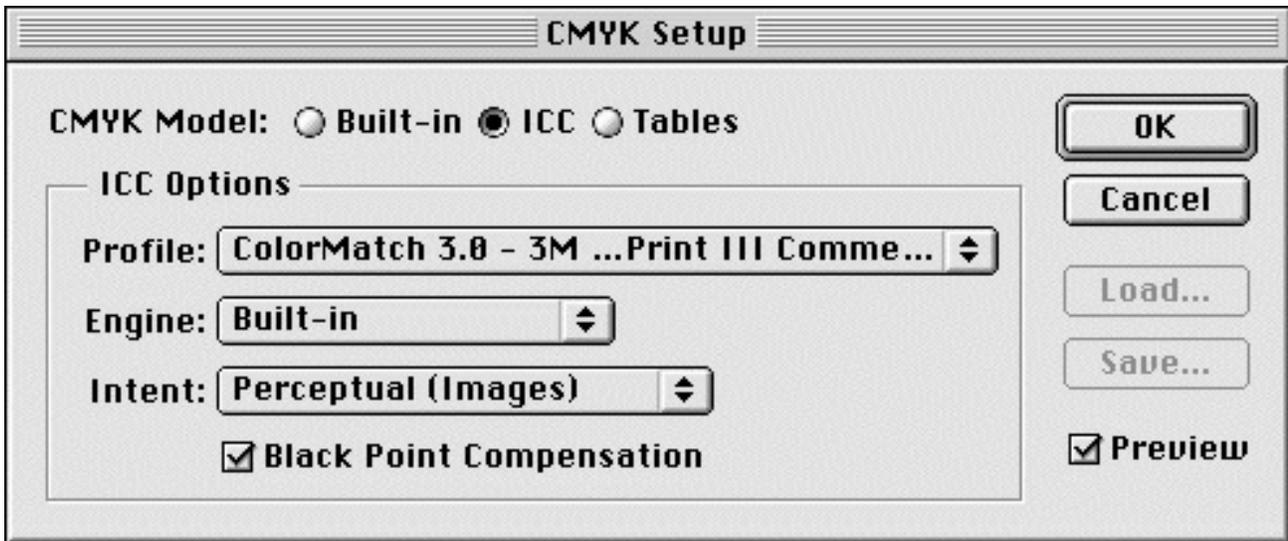


Figure 2 The CMYK Set up lets us define the CMYK ICC profile we wish to use for mode change. This profile also needs to match embedded profiles in existing CMYK files for proper viewing of those files and to avoid a profile mismatch.

Profile:

Profile is where you will be able to pick any CMYK ICC profile you have loaded in your ColorSync folder. Simply pick a profile based on the CMYK file you intend to open and use. This profile will also be used should you do a mode change from RGB to CMYK.

Engine:

Engine is where you pick the CMM (Color Matching Method) you wish to use. "Built in" is recommended and this option uses the Adobe CMM. You may see other CMM's in the pop down such as Kodak, Apple, Linotype or others. Adobe recommends you stick with the Built in CMM and I agree.

Intent:

Here's where you pick the rendering intent for the profile. For images, stick with perceptual. For more info on rendering intents see PEI Vol 40 #2 or peimag.com/clmgt_ar.html.

Black Point compensation check box should be on. This insures that blacks in the image are mapped to black for the output correctly (see my PDF on Black point compensation which can be found at

www.digitaldog.net for more details.. Also make sure the Preview check box is on.

The important concept about the CMYK Setup to remember is to load the correct CMYK profile for your intended output. Also, you will want to have a CMYK profile loaded to match the profile embedded in other CMYK files. As we will soon see, Photoshop will be most happy to inform you about which CMYK profile is embedded in files you open. We ideally want the CMYK profile in the file and the CMYK profile in this dialog box to match. Note: One other great feature is the ability to convert old Photoshop CMYK settings to ICC with Photoshop 5.0. Simply load the CMYK tables you've used in the past by clicking on the 3rd radio button in the CMYK setup. Then click on the Save... button and the resulting file is now converted and saved in the ICC format and can be placed in the ColorSync folder and used as you would other ICC profiles.

Grayscale Setup:

The dialog boxes get simpler still (see Fig 3). We only have two radio buttons in the Grayscale Setup: RGB or Black Ink. When set in RGB, the behavior of files are neutral whereby Red, Green and Blue are equal with no dot gain applied. With Black Ink, the grayscale images act like a black plate from a CMYK file with dot gain compensation as indicated in the CMYK Setup. This basically mimics the behavior "Use Dot Gain for Grayscale Images" which was found in the Printing Inks Setup in earlier versions of Photoshop. Unless you want grayscales files to mimic the black plate of a CMYK file, stick with RGB.

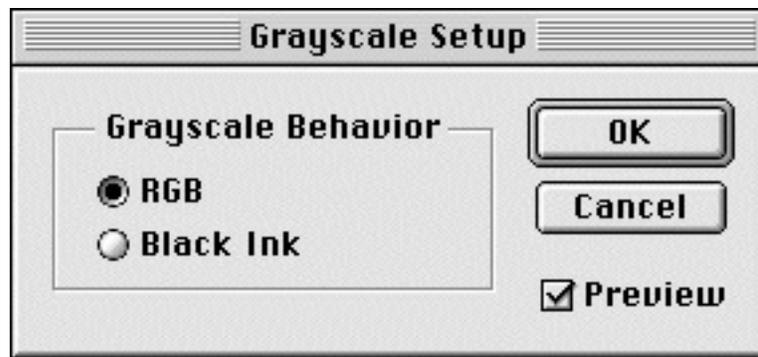


Figure 3. The Grayscale Set Up.

Profile Setup:

What we have done in the previous preferences is to essentially define all the various ICC profiles we will expect Photoshop to utilize based on the 3 colorspaces we work with. Profile Setup has 3 major functions; specifying if we will embed profiles into all the files we save, defining what we will do when we open files that have no profiles and alerting us to files that have profiles that don't meet our 3 Working Space Setups (see Figure 4).

Embed Profile

Here is where you have the option to embed ICC profiles into files you have opened and saved in Photoshop 5.0. You can embed profiles in some or all of the 4 colorspaces specified. I recommend you embed profiles in all your files!

Assumed Profile:

You know the old saying about making assumptions.... It would be great if all the files we dealt with had an embedded profile but this is not always going to be the case. In situations where you try to open a legacy file (files made prior to Photoshop 5.0) where no profile is embedded in the file,

Photoshop needs to make certain assumptions about how the file was created. When you open a file with NO profile, you will get a “Missing Profile” dialog (see Fig 5). If you recall, I mentioned that an ICC workflow requires we have a source and then ultimately a destination profile. But many files have no source profile since they were created without the ICC workflow in mind. In these cases, we need to make an intelligent assumption about a source for the files we wish to process through the rest of the ICC workflow. What you need to understand is that we will in many cases be converting legacy files into a Photoshop Working Space and that process requires we convert the file. Don’t be alarmed by this conversion however, it’s virtually lossless. This also insures that these old legacy files are brought into our new device independent color space and the specific conditions of the file are now embedded into the file for future use in Photoshop. They no longer have the negative stigma of being legacy files. You can specify an assumed profile for all three of your Working Spaces (RGB, CMYK and Grayscale). What you need to realize is that Photoshop can and ultimately should make a conversion into your new device independent RGB Working Space (or CMYK/Grayscale Working Space). Photoshop would like to know the source from which the file came from and since it’s a legacy file and no clue has been provided to it’s origin, we need to assume some kind of source profile. This assumption is specified in the Assumed Profile section of this dialog.

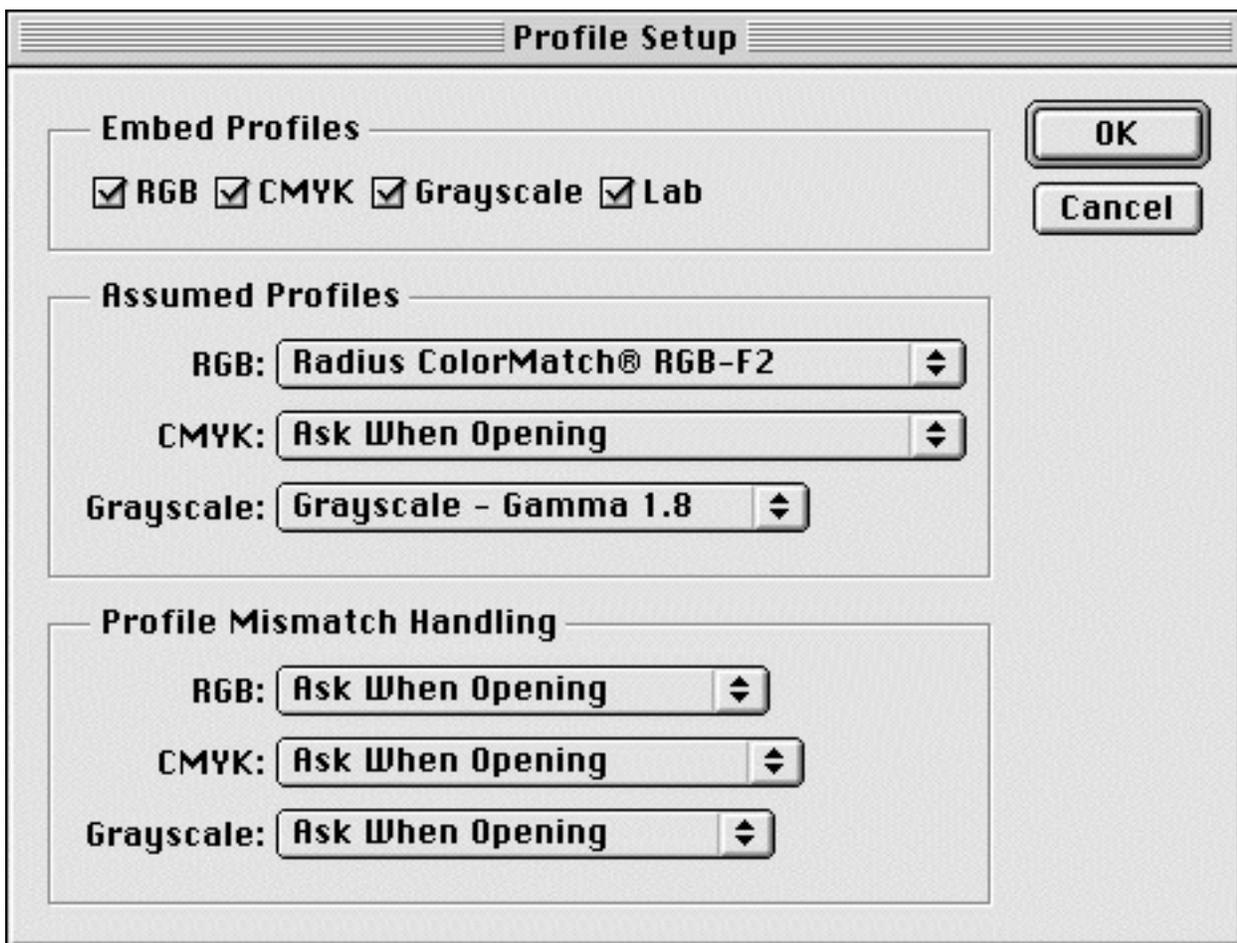


Figure 4. The Profile Setup contains 3 different sections. The top for specifying which kinds of colorspaces to embed profiles into. The Assumed Profile section is where we make our best guess as to the origin of legacy files. Notice in RGB pop down menu I have loaded the custom monitor profile as my assumed profile yet I wish to be alerted when opening CMYK files to pick an assumed profile. Profile Mismatch Handling is the third section where we tell Photoshop how we wish to proceed when the profile in the file doesn’t match the profiles we selected in our various Working Spaces (Fig 1, 2 and 3). In this case I’ve specified that I wish to be asked what to do in the case of a Mismatch.

RGB:

You can pick virtually any ICC profile in your ColorSync folder via the pop down menu. My advice is to pick your monitor profile as the assumed profile for RGB files. If you had been working with a calibrated display that had an ICC profile prior to version 5.0, this is an especially safe bet and thus a very good assumption. If you didn't, picking monitor RGB is also a good bet because as we've seen, previous versions of Photoshop used monitor RGB as its Working Space.

CMYK:

For CMYK, the complexities are a little more difficult due to the nature of CMYK files. Pick a CMYK profile most commonly used as your assumed CMYK profile. For example, if you happen to use an ICC profile named "SWOP Coated" for a lot of your CMYK legacy files, pick that profile in the assumed profile pop down menu. Figure 5 shows the kind of Missing Profile dialog you would get when opening a CMYK file with no profile. Should you have no clue to the origin of the CMYK file, you will have to use the pop down menu and make your best guess for converting the file from an assumed source profile into your CMYK Working Space Profile. Picking Don't Convert will bring the file into Photoshop with no conversion but you will not be able to view the file with any degree of accuracy because you will be viewing an unknown CMYK file with your CMYK Working Space Profile.

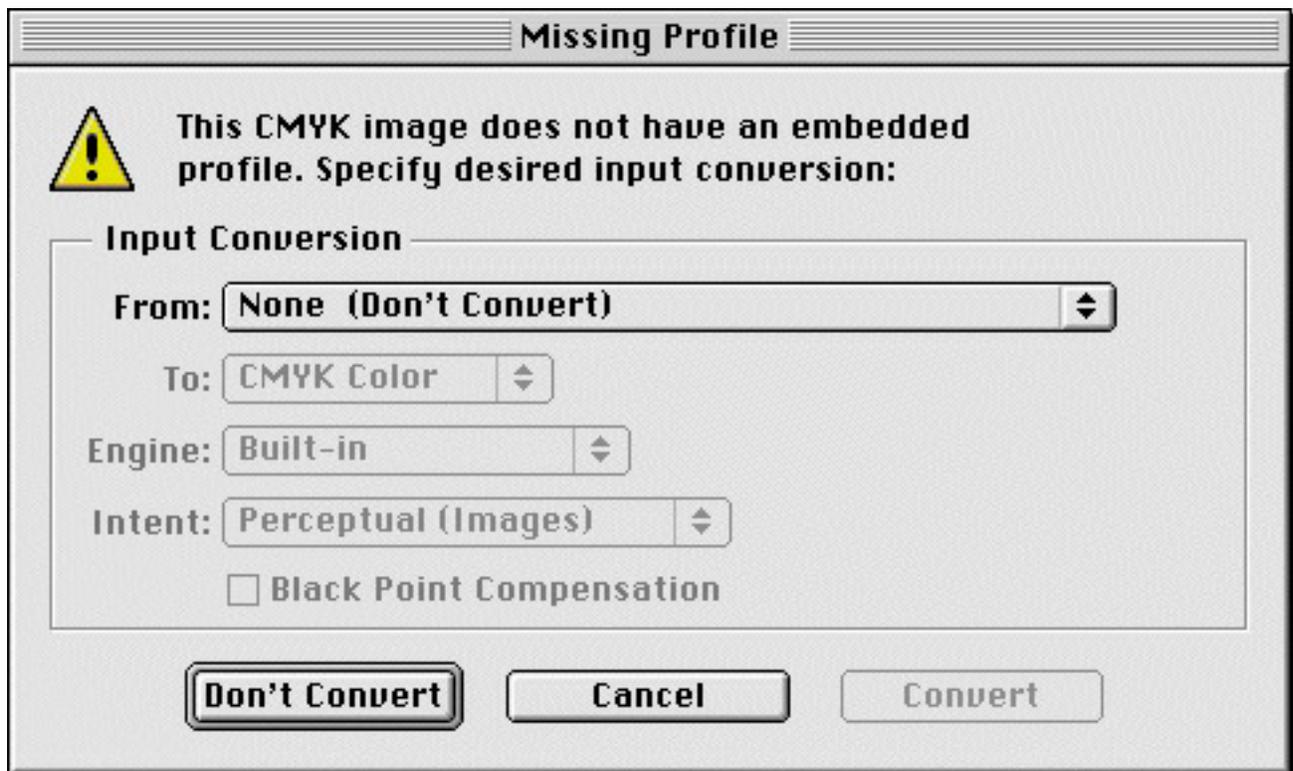


Figure 5. When you open a file with no ICC profile embedded in the file, you get this Missing Profile dialog. If you look back at Figure 4 you will see that I set up the Assumed Profile for CMYK files to ask me which profile I wish to pick as my assumption for its origin. Here you see "None, Don't Convert" but I could pick any CMYK ICC profile I have loaded on my Macintosh using the pop down menu.

Ask When Opening:

The other option of course is to Ask When Opening. This may be a good choice for CMYK files if you happen to use many different flavors of CMYK conversions on legacy files. You will be asked

when opening the file to then pick an assumed profile. For RGB, Ask When Opening will be a far too common experience and as I mentioned, picking your monitor profile is a safe bet. The last option is None. This is not recommend because without a source profile, the conversion to a Working Space profile can cause awkward colors depending on the Working Space you pick.

At this point in time we have several possibilities when dealing with files:

1. The files don't have a profile at all. That's been taken care of with our assumed profile settings. Convert into your Working Space after making an assumption about the source profile you should use. **2.** We have a file that has a profile embedded in our file but it doesn't match the tag Photoshop expects to find based on the Working Space profiles we picked. In this case we end up with a Profile Mismatch dialog when opening (see Fig 6).

Profile Mismatch:

When a file with an embedded profile doesn't match the RGB, CMYK or Grayscale Setup, we have a profile mismatch. For example, we have SWOP Coated ICC profile specified in our CMYK Setup but the file we are opening has a profile embedded called Kodak Approval. Another example is we have an RGB file that was tagged with sRGB as the RGB Working Space but our RGB Working Space is set to be ColorMatch RGB. Obviously we have a profile mismatch and in this section of the Profile Setup, we can deal with these minor difficulties. Depending on the kind of file we are dealing with, we can set each pop down menu in the Profile Mismatch to suit our needs:

Ignore: Don't do any conversion, just open up the file. Not usually recommended.

Ask When Opening: As the title suggests, a dialog box will come up in cases where a mismatch occurs and asks you what you want to do. This can be very helpful as you will see.

Convert: Go ahead and convert the file so it matches the Profile Setup. This option is sound in many cases because we did have an embedded profile in the file.

Unlike the assumed profile conversion, we actually can do an intelligent conversion since we really know the source and destination profiles.

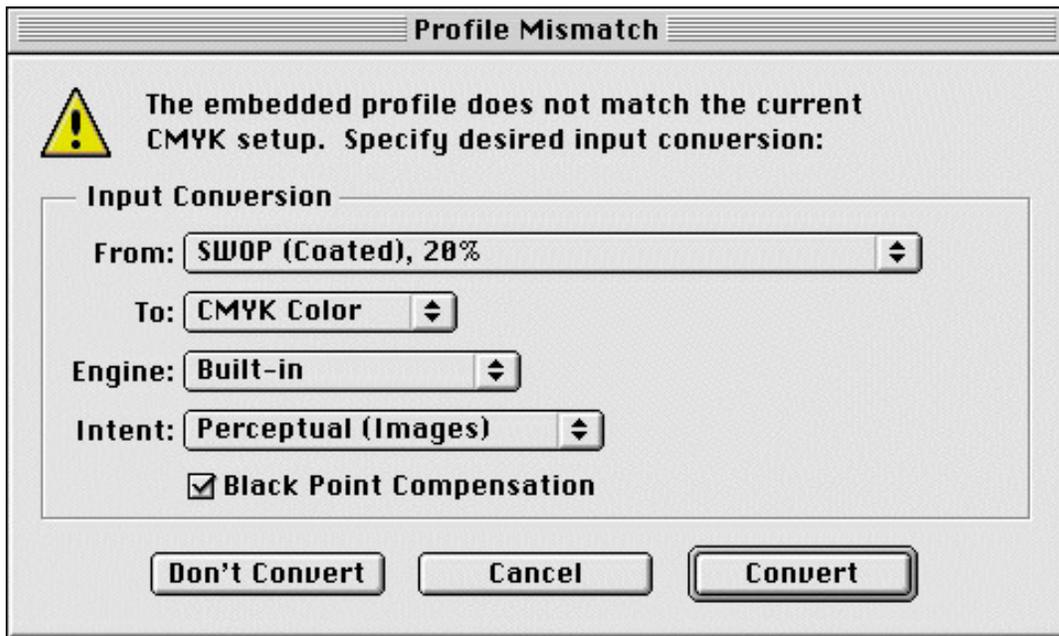


Figure 6. The Profile Mismatch dialog looks nearly identical to Figure 5 which is the Missing Profile dialog. But notice that in this case, the actual ICC profile embedded in the file is specified to us in the "From:" Pop down menu. We can see that SWOP Coated 20% was embedded in this file but since our CMYK Working Space is set to a different profile, we are alerted to the mismatch. Clicking on the Convert button will provide us with a CMYK to CMYK conversion from SWOP Coated 20% to the CMYK Working Space loaded in Figure 2.

Each Colorspace Setup (RGB, CMYK, Grayscale) will require a different course of action when you encounter a profile mismatch. For CMYK, you don't really want to convert from one CMYK file to another. I recommend you set the mismatch to "Ask When Opening." The real beauty of the profile mismatch when set this way is that when it encounters a CMYK profile IN the actual file it will tell you which profile was embedded. This allows you to take action. You can cancel opening that file, go into your CMYK Setup and simply pick the same CMYK profile to load (if you have it) which will then set Photoshop so the two profiles match. No more Profile mismatch, the CMYK file and your CMYK Setup match. Of course this knowledge, which is highly beneficial, comes from files that have an embedded profile. This is why the new Photoshop workflow will be such a great aid. For legacy files, we have to make assumptions about the origins of our files.

RGB mismatch is up to you. I recommend keeping Convert to RGB selected so you don't have to be reminded of a mismatch with all those legacy files. But if you have problems seeing a conversion going on without first being notified, select "Ask When Opening."

The bottom line Part 2:

- 1.**Using the Profile Setup, select all the check boxes to insure that Photoshop tags all files with the appropriate ICC profiles.
- 2.**In the Assumed Profile dialog, pick an ICC profile to utilize as a source profile in cases where you may open a file with no embedded profile. For RGB, pick a profile that closely matches the condition of your legacy files such as Monitor RGB. For CMYK, pick a profile that matches the profile you use most often (if such a case exists) or simply pick "Ask When Opening" so you can selectively pick a profile.
- 3.**Profile mismatch is the mechanism for informing you that files which are tagged do not meet the expectations of Photoshop (due to the Working Space profiles you've set). This mechanism allows you to convert files into the Working Space or if possible change the Working Space profiles you've set to match the files you intend to open. For CMYK files, it's probably a good idea to take the time and reset the CMYK Working Space profile to match the embedded profile in the file thus eliminating the Profile Mismatch warning and avoid converting the file. For RGB files, you will want to convert into your RGB Working Space. This will allow you to edit the file in the Working Space you routinely use. However, there may be cases where you may wish to use the Profile Mismatch as a source of information so you can change your RGB Working Space to match the file you are about to open. For example, should you normally use ColorMatch RGB for prepress work but someone gives you a lot of files intended for the internet, you may want to go into your RGB Setup and change your Working Space to sRGB (or whatever RGB profile was embedded in the files).

Profile to Profile:

There is one other new feature in Photoshop 5.0 that deals with ICC profiles; Profile to Profile found under the Mode Menu. This feature allows you to apply a source and destination profile to an open file. This is useful should you wish to apply the ICC profile to the data in your file directly in Photoshop for exporting to a printer for example. This function works in a similar fashion to the Apple ColorSync filters (specifically one called "ColorMatch"). What is very important to understand about Profile to Profile is that any time you use it, the working space profile, not the one you converted to, is the ICC tag that will be saved in the file. This can be a dangerous situation if used incorrectly. For example, suppose you open a file that has an ICC profile embedded into it (ColorMatch RGB). You use Profile to Profile to apply an output profile (Kodak 8650) so you can print that file directly from Photoshop. Should you save that file to disk accidentally, you have

altered the data in the file using Profile to Profile for the Kodak printer, but the original ICC tag, which was ColorMatch RGB, remains in that file! Profile to Profile is a powerful and useful feature in Photoshop 5.0 but you must realize that any time you use it, the original ICC tag in the file remains intact.

Working with other ICC applications:

Adobe Photoshop 5.0 is so novel in its approach to dealing with ICC and color management that virtually every other ICC savvy application on the market pales in comparison. This can cause some difficulties when bringing files from these applications into Photoshop. The single biggest problem I've encountered so far are applications that appear to fully utilize an ICC workflow that do not embed the profiles into their files. I have several scanners in our shop that deal with ICC at the scan stage. None so far correctly deals with these files in a fashion that fully supports Photoshop's advanced use of ICC! For example, our Linotype scanners use LinoColor which is well known for being an ICC savvy application. The problem is that once one scans a file into LinoColor, one can save the file and apply an ICC profile to the data yet, the file itself has no ICC profile (tag) embedded in it. Photoshop upon opening this file will inform the user with a "Missing Profile" dialog box (see Fig 5). The data in the scan has been run through the appropriate ICC profile but without a tag embedded in the file, there's no way Photoshop knows this. For example, should one scan into a specific CMYK ICC profile using LinoColor, the resulting file has been correctly converted into this CMYK Working Space. But without a tag embedded in the file, Photoshop will ask upon opening what to do. Ideally you should insure that the same ICC profile used in LinoColor is loaded into the CMYK Setup and specify that you do not want to convert the file. When you then save the file from Photoshop, the correct Working Space CMYK tag will then be embedded into the file. Since the ICC profile used to convert the file in LinoColor matches the CMYK Working Space Setup, the image can be opened without conversion (which saves time). The image will appear correctly on screen as well. Over time, vendors will update their ICC savvy software to always embed the appropriate ICC profile in the files they create.

To convert or not convert, that is the question....

The last point I'll cover is up to a bit of debate. One slightly hidden feature of the Working Space dialog is the Save... button. One can click on this button and actually save that Working Space as a standard ICC profile that can and should be placed into the ColorSync profiles folder. If you have an ICC savvy scanning application (LinoColor as an example), you can scan into this Working Space. When the time comes to open the file in Photoshop, you will be asked if you wish to convert into your Working Space (because unfortunately in this case the software didn't tag the file). Rather than spend the time converting the file, pick "Don't Convert" and the file will open quickly. Since the image was actually scanned into your Working Space, there's really no need to do a conversion and when you save the file from Photoshop, a tag will then be saved into that file. The advantage of doing this of course is speed. You forgo converting the file. The downside is that when you scan into a Working Space, you may be scanning into a smaller color gamut than the scanner could ultimately provide. In a production environment, not converting the files can save a tremendous amount of time. But, if you convert in the scanning application, you're at the mercy of whatever CMM the application uses. If you convert in Photoshop, you use Photoshop's built-in CMM and keep a LOT more precision/detail in the conversion. Happy Photoshopping.