
Adobe Photoshop 5.5 for Photographers by Martin Evening, ISBN 0 240 51591 9

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The title will be stocked in most major bookshops throughout the UK and will also be available for purchase through the online bookstore, Amazon.com. The following extract is a guide to Photoshop 5.5 color management

This is a challenging subject to be discussing so early in the book, principally because amongst the photographic community, there is no clear consensus on working in RGB or CMYK color. Every time the subject is brought up, you can guarantee a wide ranging discussion comparing the merits of working exclusively in either color mode, when the conversion takes place and should you the photographer be responsible for this?

First, what is RGB and CMYK color? You will be familiar with RGB color, because if you take color photographs, your transparencies and prints are made up of yellow, magenta and cyan dyes which absorb light from the blue green and red portions of the spectrum. The film therefore records in red, green and blue colors. The RGB color space is very large and includes many of the colors within the visual spectrum and few outside it. A large format, beautifully exposed transparency of a landscape will look great masked off on a lightbox, but when it comes to reproducing that same image in print it needs first be converted to CMYK (Cyan, Magenta, Yellow and blacK or Key color). This is where the disappointment often sets in, because compared with the millions of color that exist in RGB, a far more restrictive palette is available in CMYK. Some colors are particularly difficult to reproduce accurately, so some subject areas in this landscape picture example, like green grass and blue sky may well be hard if not impossible to match exactly to the transparency original.

Color photographers have always worked in RGB, supplying RGB originals as final art work and the difficulties concerning CMYK conversion were always someone else's problem. Except now, by getting involved closer to the point where the files are prepared for printing, that is no longer the case. If you are handling digital im-

ages, CMYK conversion should be very much at the front of your mind. You might argue: “Everything originates in RGB color – transparencies, prints, scanned images and digital cameras even – why don’t I stick to working in RGB mode and make the conversion later, or let the printer do this?” I believe we are seeing a shift towards this way of working for reasons that shall be explained later. In the meantime we have a situation where the expensive high-end scanners used at the printers both scan the image and create a good CMYK conversion, or rather the skilled scanner operator oversees the conversion using sophisticated, expensive kit. Printers have never before worked digitally in RGB color mode because there has never been any reason why they should – hence a reluctance to work from RGB files and sort out what is seen as your problem.

In essence the printers are reasonably enough covering themselves from the responsibility of converting your digital images to match the standard of CMYK output obtained using their own high-end equipment. If you are going to supply images digitally, your production route will overlap with the services provided by a professional repro company. If the digital files you submit do not fit in with that production process, you’ll suffer the humiliation of work being thrown back at you as unusable. As yet, converting an RGB file to CMYK is not a generally recognized bureau service option, unless you were to write a transparency from the digital file and supply this as an RGB original for the printer to scan from again, for them to carry out the conversion. This of course will incur extra delays and costs to the final client, so is not always a sensible route. The basic problem is “if you supply an RGB file, what are we converting those colors to?”

The need for color management

When digital imaging was in its infancy, the job of digitizing a photograph rested exclusively in the hands of the scanner operator operating inside the press house. This was way before the days of digital cameras, Photo CD or Photoshop even. You would supply a print or transparency to the printer and they would be charged with the responsibility of scanning the photograph and converting that data into four color separation plates which would be used to put ink on paper. From the start this was regarded as the most sensible way of converting from traditional to digital repro and ensure successful color reproduction. The methodology applied was entirely geared to the particular needs of print repro. Today, the vast majority of color printed images are still processed in this way – by a bureau scanning the film original and the scanner outputting a targeted CMYK file ready to match the requirements of the press.

The foregoing workflow is an established method for producing consistent color reproduction and known as a closed loop color management system. A newly installed scanner device will be carefully calibrated using standard film emulsion test strips. If the color is judged on a color monitor then the monitor will be adjusted to reflect the color of the internal loop. In an establishment such as this, the operators will have had years of experience, knowing how to treat each incoming original to optimize the CMYK print workflow.

The color management solution offered by Photoshop has until recently, followed the aim of allowing you to construct your own internal color loop or match your monitor view to that of another bureau and synchronize with their color loop. So long as the ultimate purpose of your endeavors is to match a specific output, there is nothing wrong with this working method. Here is an example of how one photographer I know successfully applies this approach to his working methods.

The 'all CMYK' closed loop

Ian McKinnell is an editorial photographer and experienced Macintosh Photoshop user (one of the first UK Lisa Mac owners in fact). Most of his work is destined for one time usage in magazines. He shoots all his pictures, whether people or still life, using 5" x 4" transparency film and has the chosen pictures drum scanned at his bureau (with transparency originals this size, there is no discernible grain in the digital image) to produce approximately a 35–40 MB CMYK file. The CMYK scan is made specifically for the requirements of the publication's printer settings. Ian does all his retouching and manipulation in CMYK and supplies the magazine with a digital output without ever producing a hard (printed) proof. As Ian says, "why work with colors that will never print?" The CMYK conversion takes place right at the beginning of production and this avoids difficulties of RGB to CMYK conversion and problem colors. He has a good rapport with the bureau who supply the scans. If as in the early days, a client's printers get funny about handling his digital files, he can even (via the bureau) go one stage further and supply his own repro ready CMYK films.

This working method does have an elegant simplicity to it. The CMYK conversions are all carried out by the same company and the photographer can build a good working relationship with the scanner operator. Color consistency is more reliable too. The drawbacks are: the lack of Photoshop features available when working exclusively in CMYK and the 25% increase in file size you get with four channel CMYK as opposed to three channel RGB. For some production jobs this is the best way to proceed. The speed penalty incurred by working in CMYK should not be too

much of a problem provided you boost the amount of RAM memory. One of the bureaux I use, even provide a CMYK scan on Photo CD to your precise printer settings in addition to the standard Image Pac for the same cost as a high resolution scan. You can see an example of Ian's work, showing how he constructed the Red Dwarf Radio Times cover, in chapter seventeen.

Open loop color management

The digital imaging industry has expanded enormously during the latter part of the nineties and is set to grow even more rapidly in the coming years. Everybody is now able to access digital image files, whether it is from CD discs, home scanners, digital cameras, Photo CD or the Internet even. At the professional level, many photographers and illustrators are now scanning or capturing their own digitized images. Seen in this context, the closed loop argument is looking less flexible considering the way professional and consumer digital imaging industries are continuing to evolve.

You see, the basic problem of how to reproduce color using a digital system was once solved using a customized in-house solution and this has served us very well over the years. The downside is that when each bureau setup is calibrated to control color internally, it does not necessarily follow that their color will match everyone else's color. Now if you as an outsider are working with just a single bureau or repro company that may not be such a problem. But it used to be the case that for each bureau you worked with, you would have to load the appropriate monitor setting in Photoshop in order to predict what the color output would look like.

Today there is an enormous proliferation of digital images being daily exchanged, coming from different devices and they have all originated in RGB color. This potentially allows clients the freedom to repurpose an image from a single digital master many times for different types of end usage and in less turnaround time too. Instead of having a transparency scanned over and over again, one can have a single digital file as the master and this has only to be scanned or digitally captured once. It is inevitable that clients will demand this level of flexibility, especially as the momentum to use digital cameras grows and will make such a workflow more cost-effective. For example, digital capture is already well established in news gathering. Many picture library images are sourced digitally instead of from a borrowed film dupe. In response to this market need, an open color management system has evolved.

ICC color management systems

In 1993, Apple introduced ColorSync and incorporated it into the Macintosh operating system and Apple, as members of the International Color Consortium (ICC) helped develop platform-independent profiles for pre-press devices and further develop ColorSync. Just like the World Wide Web consortium, who meet to discuss future HTML standards, the ICC consortium is an expert group and its cross-platform membership have helped establish it as a universally accepted standard of color management.

A profile can also be described as a tag. It is a small bit of code which can be embedded in an image file or saved as an independent ICC profile. The profile information describes the behavior of a particular device or process. A basic profile, like the one which is created when you use the Adobe Gamma utility, describes the white point color temperature, the gamma setting and color balance of a monitor etc. To create a profile of an RGB color device like a scanner, you would test scan an industry standard color swatch chart and then take measurements of the various color pixel values as they were recorded by the scanner. The IT-8 or Macbeth color chart has several hundred swatches which can be measured. As the characterization process progresses, the collected data tells us how the scanner will respond to different colors of the spectrum. The information gathered is compared with a standard reference and from this a profile is written which will accurately describe the characteristics of that device. The same technique of building a profile can be applied to any digital capture or output device. ICC profiles are now available for most known devices. High quality scanner and digital camera systems should have the necessary software drivers to automatically embed an ICC profile in the files, which Photoshop 5.0+ will be able to read upon opening (assuming the Photoshop preferences are configured correctly).

PC computers running on Windows 95 or later operating systems, incorporate Kodak CMS color management. Kodak CMS you will remember is at the heart of Kodak Photo CD, which uses what are called Precision Transforms to define the Source (i.e. emulsion type) and Destination (Color space or print output). Kodak profiles are not in such plentiful supply and some may have to be purchased separately. Photoshop however, utilizes its own built-in ICC color management engine. The color management system incorporated in Photoshop 5.0 is now designed to work identically for both modern Macintosh and PC systems. The only difference is that on the PC system, a profile is appended with the .icm tag.

Factory standard or 'Canned' ICC ColorSync profiles may not be accurate enough for everyone's taste. There are hardware/software packages which enable you to generate your own precision, custom profiles. Be warned – these can vary quite a lot

in price. Or, you can commission a color management expert to calibrate and write profiles for your custom setup. Devices will also alter their performance as they age. The most widely fluctuating RGB device of all is the monitor. The changing ambient room lighting conditions which occur during a day will be enough to throw the monitor calibration off course.

So, if digital devices keep altering like this, is the goal of ICC color management a futile exercise then? No, not if you keep everything in perspective. Granted, the monitor is a weak link, but it is also easy to calibrate. A regular check with the Adobe Gamma utility will not take up much more than a few minutes of your time. Or you can perform a more advanced check with a hardware calibrator. My Epson inkjet proofer has consumed numerous color ink cartridges, yet the canned profile continues to work as consistently as it did the day I bought it. My Fuji Pictograph printer has a hardware calibrator (this is not the same as a densitometer used to record and build a profile). I run this at least once a month, or every time I change a roll of donor paper. I calibrate the device to reset it to the factory standard. If I follow this procedure then a default profile for the Pictograph will also work consistently.

The early incarnations of ColorSync and ICC did have problems. The color conversions made using ICC did not compare favorably with the then current software solutions. The new Photoshop 5.0+ implementation of ICC color management system is different though. The Adobe built-in ICC color engine calculates all its conversions at a color depth of 20-bits per channel. Such precise image processing takes a little longer, but is now easily achieved on today's powerful Desktop PC.

Photoshop color management history

It is worth having a quick reminder of how Photoshop color management used to work before version 5.0 came along. This will help you understand how legacy (pre-version 5.0) files should be handled when opening them up in Photoshop 5.0+. Like other color management systems, Photoshop has always relied on the device independent Lab color space for translating color between RGB and CMYK. Lab is the go-between, the all seeing, all knowing color space. But crucially, the RGB color space was defined by the color space of your particular monitor setting, which would not necessarily be the same RGB color space of another user's monitor. To proof CMYK colors on the screen, a translation was made from CMYK via Lab to the monitor RGB color. The way these colors were displayed on screen was determined by the monitor setting and the settings entered in the Printing inks and CMYK separation setup. The settings had to be entered before making the CMYK conversion, as the display was determined by a combination of all these factors.

This mostly worked satisfactorily, except for the odd occasion where one could detect image banding when displaying a CMYK file in RGB. In that case, you could change the composite display preferences from faster to smoother, which would adjust the display on the fly but consequently slow down the screen redraw. CMYK color display accuracy was therefore a problem, as was the limitation of having varying, RGB device dependent, color spaces used in the color management process. The monitor gamma setup procedure differed between PC and Macintosh owners. The Macintosh Gamma Control Panel affected the global monitor display, while on a PC the Gamma correction was applied at the application level only. This was a system issue which the Adobe engineers did their best to address. Now that Microsoft are supporting ICC profiles in their operating system using ICM 2.0, PC computers have the potential to manage color the same way Macs do.

Photoshop 5.0+ color management

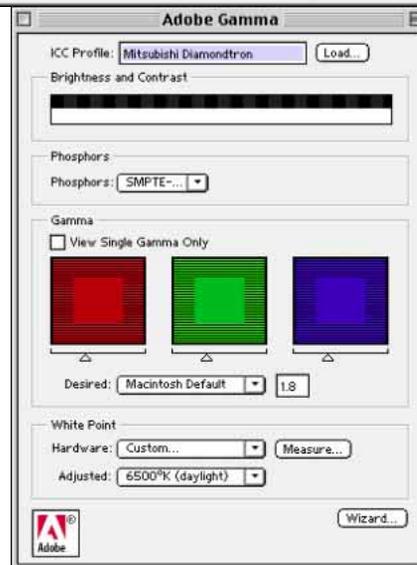
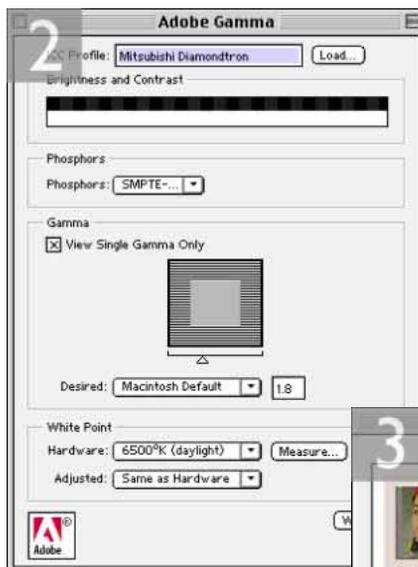
You are now given a choice as to which type of color management you wish to work with. The first time you run Photoshop 5.5 (or the earlier version 5.02 update) a Color Wizard will appear on screen. This asks you a series of questions about your preferred color management settings. This wizard will allow you to easily disable Photoshop 5.0+ color management altogether so you can make Photoshop 5.5 perform and handle color exactly like Photoshop 4.0 and earlier if you wish. But I think there are very good reasons why you should not do that and instead take advantage of the superior color management capabilities of version 5.0+. To understand what these benefits are exactly, you need to take on board the combined components of Photoshop 5.0+ color management: a device independent RGB work space or editing space, consistent RGB across platforms and individual work stations, better conversions from RGB to CMYK and high precision ICC color conversions using the Adobe built-in engine. Taking all these factors into account makes you appreciate the value of this versatile, professional color management solution.

We'll start with the RGB color space issue. The most significant change Adobe made was to settle on a standardized approach by making the *RGB work space* independent of the system or monitor you are using. The Photoshop 5.0+ RGB work space is now device independent, just like Lab color is. The monitor profile is important as a means of interpreting how the RGB data is displayed, while the actual RGB values can conform to a universally recognized standard. All people have to do is calibrate their monitors to generate a profile description of the viewing monitor they are using and make sure they have selected this monitor profile. The RGB color you view on your screen should be the same for someone looking at the image on another monitor regardless of the operating system they are using or make of monitor, provided that

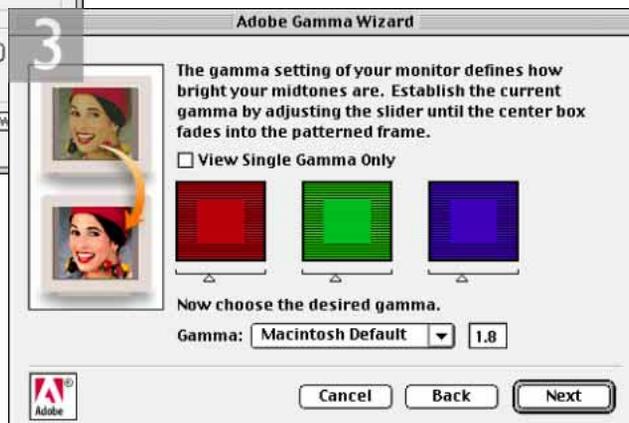
1 The Adobe Gamma Control Panel and calibration procedure now operates identically for both Macintosh and Windows PC systems. The Adobe Gamma Control Panel is located in the Application > Goodies > Calibration folder. Install a copy in your system folder, i.e. on a Macintosh, inside the Control panel folder. When opened you have a choice between using the Control panel method of operation or the Wizard.



2 In Control Panel mode the interface option settings will be familiar to Photoshop users who knew the Thomas Knoll Gamma Control Panel. You can load existing ICC profiles or make your own custom profile and save as an ICC profile.



3 The Wizard option will guide new users through all the steps necessary to adjust the physical monitor settings for brightness and contrast and then fine tune the Gamma to optimize your monitor display if not listed as an ICC profile.



is, they too have followed the correct calibration procedure. To picture what is happening, you have to imagine that all Photoshop operations take place in the RGB color space which can be one of several recognized standards. This is what is called the 'work space' it is the color space which Photoshop does all its calculations in. Activities surrounding the Photoshop RGB work space, like the importing of images, the display of RGB data on screen and CMYK conversions, are moderated by ICC profiles to maintain color consistency throughout the workflow. Therefore, if you import an image which has an ICC profile embedded in it, this is recognized upon opening and if the profile does not match the current setup the image data can be adjusted accordingly (or not, if you wish). The ICC profile of your monitor is taken into account and the RGB display values are calculated on the basis of the work space primaries plus monitor profile. The CMYK conversion can be specified too with an ICC profile (see Color Settings > CMYK setup) or manually by entering in the custom separation setup information.

Monitor calibration

Central to everything is the appearance of the image on the monitor and how we read and understand that information. So the first step is to get the monitor calibrated and make sure the display will be in sync with other users. An Ektachrome transparency has a dynamic range in the region of 2.85 and a printed image a dynamic range of around 2.3. A typical computer monitor has a dynamic range of only 1.4–1.6. The range of colors which can accurately be displayed is rather limited compared to the full tonal range of the final print. To get round this problem, the display of digital information has to be compressed to fit within the brightness range of the monitor, so the whitest portions of the image appear as the brightest values on the screen and the blackest parts of the image are represented by the darkest values on the screen. A linear compression of the tones displayed on the monitor would be one answer, but not the most practical. The solution used is nonlinear compression. Least compression is applied to the tones where image information matters most and more compression where it doesn't. In practice this means there is usually slight compression of the high-light tones and most compression takes place in the shadow tones, with the mid to high-light tone separation displayed most accurately of all.

The very best monitors such as the Barco Calibrator and Radius Precision View come with their own calibration software and hardware. Otherwise closely follow the instructions in the Photoshop manual on monitor calibration. Use one or the other, but not both. The objective of calibration is to neutralize the screen display color and optimize the way the tonal range is displayed within the constraints of the Cathode Ray Tube (CRT).

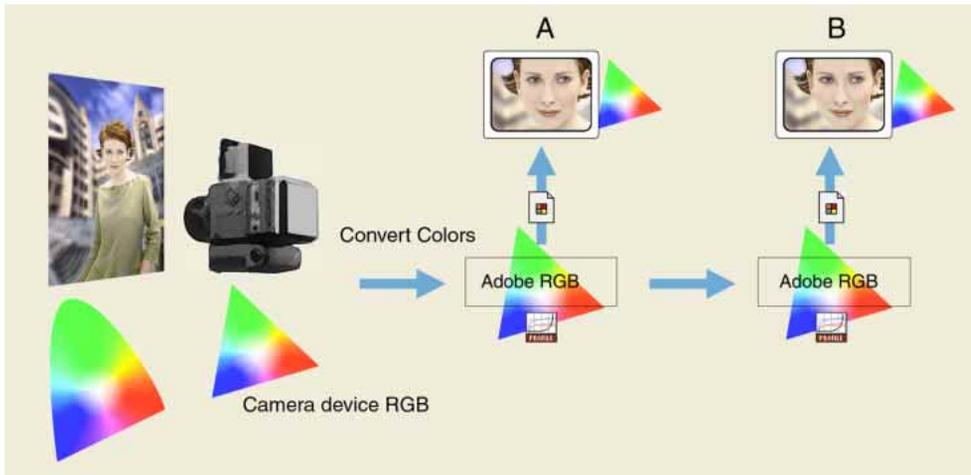


Figure 4.1 This and the following figure 4.2, show a typical use of profiled, RGB work flow. The original subject is perceived in a color space which can best be defined using the CIE Lab color model. The digital camera used to capture the scene has its own color characteristics and the fuller CIE Lab gamut is constrained by what the camera is able to capture in RGB. Adobe Photoshop 5.0+ is set to read the identifying camera ICC profile and converts the colors to the Adobe RGB work space. This RGB file can now be shared directly with other Photoshop 5.0+ users editing in Adobe RGB color.

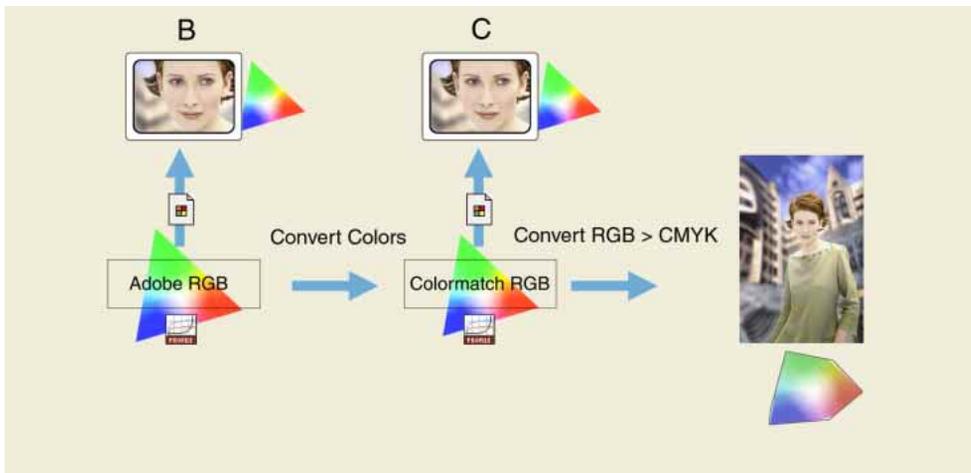


Figure 4.2 The Adobe RGB work space is a virtual space – you cannot actually see it. The monitor profile is generated by the Adobe Gamma control panel. This profile converts the Adobe RGB data 'on the fly' to render the monitor screen image. The monitor RGB space is smaller than the Adobe RGB space. Using the monitor alone as your guide, you may not be able to see all the colors that end up in print. Nonetheless, they are preserved in the Adobe RGB edit space. An end Photoshop 5.0+ user may be using a different RGB space, like ColorMatch RGB. No matter, Photoshop converts with high precision from one space to another. When the RGB to CMYK conversion occurs, it is made from an RGB file which has been carefully color managed throughout. In this example, CMYK gamut clipping is avoided, because the limiting monitor RGB space has been taken out of the equation.

Before following the calibration procedures pay attention to how your computer is physically sited and the lighting. Dim lighting helps conditions improve the contrast of your monitor by reducing flare on the screen, which is fine as long as doing so does not impede others working around you. Think about the color of the walls and color temperature of the light sources. I suggest neutral color painted walls. If you have daylight coming in, fix up some shuttered blinds to regulate the amount of light coming in and using daylight balanced lighting for working after dark. Even reflections off the clothes you wear may have some impact on the screen color. Make sure your monitor has been left switched on for at least half an hour so it has had a chance to stabilize itself. After the manual brightness and contrast controls have been set, ensure these are not touched again as to do so will upset the whole calibration process and, lastly, get rid of any colored desktop patterns. Choose a neutral gray instead. With the monitor successfully positioned and warmed up, go to the Adobe Gamma Control Panel and follow the wizard step by step instructions as described earlier.

RGB Spaces

We are looking towards a color management system in which the user only has to calibrate their monitor and everything else fits into place. Afterwards it should not be necessary to manually tweak your gamma control settings to match your output devices – the device ICC profile will take care of the translation. The only tweaking necessary will be to regulate the monitor brightness and neutrality. If everyone chose to adopt this approach to color management, it would not have to be a complicated issue. And, oh yes, wouldn't it be nice if clients all paid their bills on time? In reality bureaux will be sticking to their own closed color loop systems and whatever you supply them with for output will have to match in with that. There is nothing to prevent you basing your own studio/office system loop on an ICC profiled system and it is highly recommended you do so, but don't assume everyone else will. What about bureaux running outputs from your files, who do not have version 5.0+, or are not bothering to calibrate their systems properly. Also, which RGB color space shall we all be using? Among Photoshop 5.0+ users it matters less individually which RGB color space you choose in the RGB setup, as long as you stick to using the same space for all your work. Photoshop 5.0+ can safely convert between RGB spaces with minimal loss of data, but the space you plump for does matter. Once chosen you should not really change it. Whichever work space you select in RGB setup, you will have to be conscious of how your Photoshop 5.5 RGB files may appear on a non-Photoshop 5.0+ system. What follows is a guide to the listed RGB choices.

Apple RGB is the old Apple 13" monitor standard, while the sRGB space is the choice for Windows PC users and is based on the high definition TV color standard (for broadcast). sRGB might be the color space to use for web design projects but is not well suited for repro quality work. The sRGB space clips the CMYK gamut and you will never get more than 85% cyan ink in your CMYK separations. The CIE RGB space is based on the CIE color model upon which Lab color is also based on. The greens tend to be a bit yellow and the space is too close to Lab to be of any real advantage. Wide Gamut RGB is there as a very large space which will encompass all the RGB primaries at their extremes and you can include a huge range of RGB colors. Although there may be larger gaps in color tone information between one bit and the next, when used with care you can obtain richly saturated RGB transparency outputs, without as had been predicted, the risk of banding. The NTSC and PAL/SECAM are old TV video standards. ColorMatch RGB is an open standard monitor RGB space used by Radius, which was around for a while. SMPTE-C (Society of Motion Picture and Television Engineers) is the current standard for television in the US. The space formerly known as SMPTE-240M was based on a color gamut proposed for HDTV production. As it happens, the coordinates Adobe went ahead with did not exactly match the actual SMPTE-240M standard. Nevertheless, it proved such an ideal space for pre-press editing, that it has officially been adopted as the Adobe standard space for repro work and is now known as Adobe RGB (1998). I originally adopted SMPTE-240M as the RGB default, because it was a large enough space to accommodate both CMYK print and RGB transparency output. Despite now being renamed Adobe RGB (1998) the coordinates are nevertheless identical to the former space.

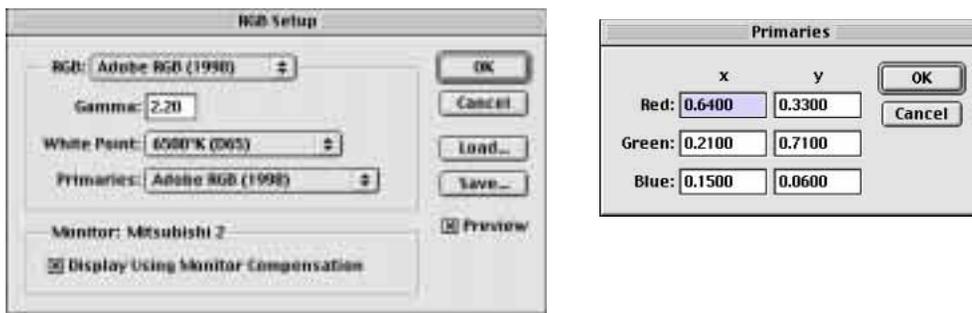


Figure 4.3 The RGB setup. Choose here your desired RGB workspace. The saved Adobe Gamma monitor profile will be identified in the RGB setup dialog. A custom color space can be set by choosing Custom... from the Primaries: pop-up menu, or loading a custom profile, like the Bruce RGB profile contained on the CD-ROM.

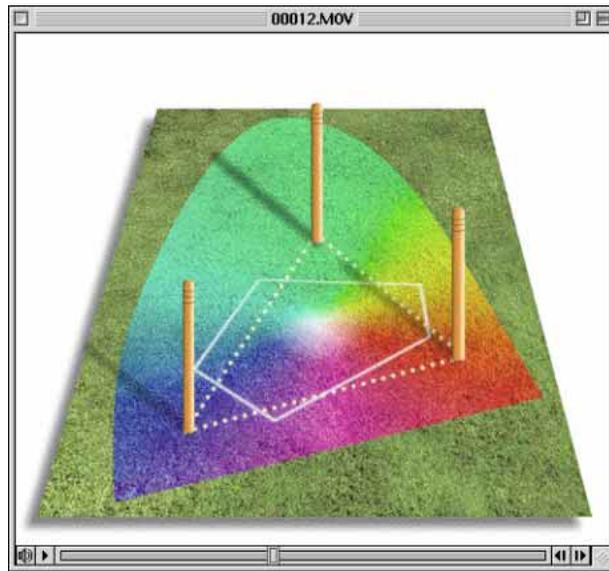


Figure 4.4 The CD-ROM accompanying the Photoshop 5.5 for Photographers book contains a short movie which helps to explain the RGB space issue by graphically comparing some of the main RGB spaces,

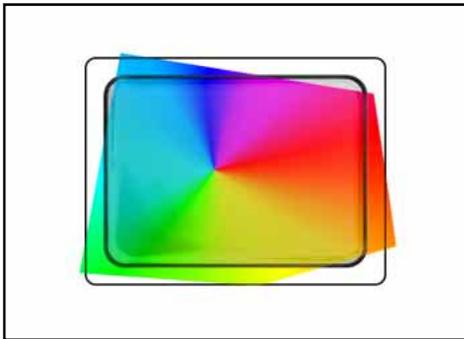


Figure 4.5 Just because a monitor is an RGB device, this does not mean that it is displaying the entire RGB spectrum, or that the RGB colors one monitor displays is identical to that of another monitor. Every RGB device has its own individual color characteristics and a monitor is usually weak in not being able to display RGB greens and Cyans. Photoshop can operate in an RGB color space that is larger than the average monitor's display limits.

Figure 4.6 A CMYK color space will be smaller than a monitor RGB color space. This is self-evident whenever you try to convert bright RGB greens or blues to CMYK. However, this is not strictly true – there are CMYK colors such as Cyan and Yellow which also fall outside the display capabilities of the average monitor. Not all CMYK colors can be displayed accurately due to the physical display limitations of the average computer monitor.



Fellow beta tester Bruce Fraser, came up with his own RGB space specification which was intended to provide a better RGB space than SMPTE-240M. His space includes most of the CMYK gamut and makes less of an excursion into the greens. If you want to test this alternative space for yourself, it is fairly easy to enter your own custom RGB space settings in the RGB setup dialog. These are: White point: D65. Gamma: 2.2. Red x: 0.6400 y: 0.3300 Green x: 0.2800 y: 0.6500 Blue x: 0.1500 y: 0.0600. You can name it Bruce RGB if you like — a loadable Bruce RGB profile can be found in the Samples folder on the book CD-ROM.

Figure 4.5 illustrates the concept behind choosing an ideal work space. It is not a technically accurate drawing, but gets across the idea that the work space can be larger than the actual RGB monitor. Figure 4.6 examines the same issue from the perspective of displaying CMYK color on an RGB monitor screen. If you select an RGB work space which is the same size as the monitor space, you are not using Photoshop to its full potential and more importantly you are probably clipping parts of the CMYK gamut. Select too wide a space and you are stretching the work space gamut unnecessarily beyond the normal working requirements.

The versatility of RGB

The proliferation of Photoshop use and the advent of quality digital cameras is forcing a rethink. If you the photographer shoot film, get it scanned and supply a digital file, the printer might argue that they need the original film to scan from themselves. If digital capture takes off, that option will no longer exist, so one way or another the RGB to CMYK issue will have to be resolved. The early adopters of digital camera systems were repro houses and they are therefore having to investigate ways and means of handling RGB files and the use of independent hardware/software solutions to carry out the conversion to CMYK. If professional quality digital cameras become more widely used (as is expected), either we photographers will all be a) making transparencies from our digital files and sending these to be scanned again at the printer or b) supplying digital files direct. As I see it, the only issue really is whether the files will be converted by the originator or the printer to CMYK. So how do photographers currently address these issues? To illustrate the above points I have outlined a few different scenarios.

A major advantage of working in RGB is that you can access all the bells and whistles of Photoshop which would otherwise be hidden or grayed out in CMYK mode. Mixed final usage also needs to be taken into account – by this I mean jobs where the final picture may be used in a variety of ways and multiple CMYK separations made to suit several publications, each requiring a slightly different CMYK conversion be-

Problems to be avoided when exchanging RGB files

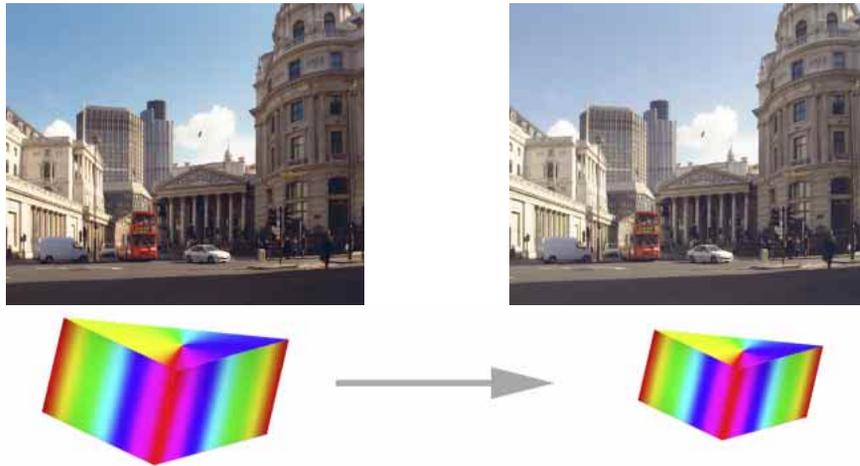


Figure 4.7 A Photoshop 5.0+ image (left) opened in Photoshop 4.0 (right). If the RGB work space selected in Photoshop 5.0+ is going to be wider than the basic monitor RGB work space used in Photoshop 4.0, then the latter will interpret a Photoshop 5.0+ file as being like any other 4.0 legacy file. The RGB colors will appear much compressed and consequently desaturated in version 4.0. The only way round this is to either convert the version 5.0+ RGB in Image > Mode > Profile to Profile to the smaller RGB color space used in Photoshop 4.0, or convert the image from RGB to Lab mode in 5.0+. Lab mode is always going to be common to both versions of Photoshop.

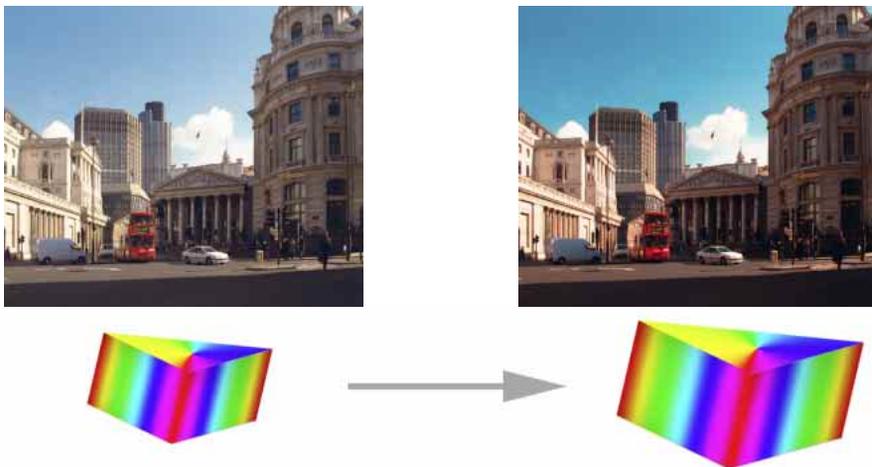


Figure 4.8 A Photoshop 4.0 image opened in Photoshop 5.0+ without converting the colors. If the RGB work space selected in Photoshop 5.0+ is going to be wider than the basic monitor RGB work space used in Photoshop 4.0, then Photoshop 5.0+ will expand the RGB color space as shown here, *unless* you have the Profile mismatch settings set correctly either to Convert RGB Colors or Ask When Opening and you click Convert. In both these examples, if you alter the RGB setup from the default work space, you must be aware of how these files might be interpreted when viewed in a different RGB work space and not override such a conversion without thinking.

cause CMYK is not a ‘one size fits all’ color space. High-end retouching for advertising usage is usually done in RGB mode and a large format transparency output produced. That transparency can be used as an original to be scanned again and converted to CMYK but the usual practice is to just use the transparency output for client approval and produce CMYK conversions and film separations direct from the digital file to suit the various media publications. When you think about it, a transparency proof for all its glory, is actually quite useless considering the end product is to be printed on paper. The ideal proof should be a CMYK output printed on the same stock as that used for the final publication.

There is life beyond CMYK, I should not forget to mention Hexachrome printing: a six-color ink printing process which extends the range of color depth attainable beyond conventional CMYK limitations. This advanced process is currently available through specialist print shops and suitable for high quality design print jobs. Millions have been invested in the presses currently used to print magazines and brochures, so expect four-color printing to still be around for a long time to come, but six-color Hexachrome will open the way for improved reproduction from RGB originals. Photoshop supports six-color channel output conversions from RGB, but you will need to buy a separate plug-in utility like HexWrench to do this. Spot color channels can be added and previewed on screen – spot color files can be saved in DCS 2.0 or TIFF format. How about screen based publishing – Multimedia CD-ROMs and the Internet? Viewers who have monitors displaying more than the basic 256 colors will appreciate the color depth of a fuller RGB color range. Again, if you are working in these areas or are producing images for mixed media, there is no reason why you should always be limited exclusively to CMYK.

Handling legacy files

As I mentioned earlier, if you alter the RGB settings to adopt a new RGB work space you have to take into account that this will potentially cause confusion when exchanging RGB files between your machine running Photoshop 5.0+ and someone who is running Photoshop 4.0 where the RGB they use is based on the monitor space. Figures 4.7 and 4.8 are actual screen shot examples of how an RGB file will be displayed on the monitor if this change in working procedure is not correctly recognized. If you are sending an RGB file to someone else for them to view then one of four things should happen.

(1) They open the file in Photoshop 5.0+ with the RGB Color Mismatch Settings set to the default of Convert Colors on Opening.

(2) They open the file in Photoshop 5.0+ with the RGB Color Mismatch Settings changed to Ask on Opening and they click Convert Colors.

(3) Before sending, you convert RGB image to Lab mode in Photoshop 5.0+. This does not lose you any image data and is a common color mode to both programs.

(4) You convert the RGB image in Photoshop 5.0+ from the work space RGB to match the RGB profile of the other user before saving. Go Image > Mode > Profile to Profile... and select the destination RGB space from the extensive pop-up list. This could be something like Apple RGB. The danger of doing this, is that a user who has Photoshop 5.0 will read the original embedded profile and open it assuming it to be in the correct space! To get round this, in the Profile Setup (see figure 4.9) uncheck the embed RGB profile option. No profile will be embedded and therefore the chance of such confusion avoided.

The last two examples take into account the limitations of Photoshop 4.0 (or an earlier version) not being able to understand and read a Photoshop 5.0+ RGB file in anything other than the monitor RGB color space. If you are sharing files and you want to preserve all the color information, but don't know what system is going to be used to read them, the safest and surest thing to do is save a copy in Lab mode. If you are designing images for universal screen display – web design, for example – then either convert your images to the sRGB profile in the Image > Mode menu or temporarily change the RGB work space to sRGB. The reverse situation – opening a legacy file in Photoshop 5.0+ – has potential pitfalls too, but these will only happen if you incorrectly specify your color settings and you choose to ignore all Photoshop's attempts to warn you that the RGB profile settings are different and the colors need to be converted.

Profile setup

The file opening procedure is really quite straightforward, but until you get a grasp of how Photoshop 5.0+ works it is still easy to get tied in knots trying to work out why deviating from the recommended setup produces such anomalies on the screen.

When you open a file in Photoshop 5.0+, Photoshop looks for an ICC profile at the end of the opening sequence. The profile contains specific information regarding the color gamut of the file. If an ICC profile tag is present and it matches the current Photoshop setup (in either the RGB or CMYK setup), all is well and the file is automatically opened in the respective color space. The characteristics of the monitor used to view the screen image will vary from system to system so the variance of the monitor is taken into account when calculating the display colors and you do this by

letting Photoshop know which monitor ICC profile to use. This is specified either in the ColorSync system profile, ICM control panel or with the Adobe Gamma control panel. The application level Monitor setup is no more. The monitor settings and the RGB work space are two entirely different things. If two users are sharing the same RGB work space setting, but using two different makes of monitor, the Monitor ICC profile interprets the image data so that it appears identical on the two screens. Ultimately you want the monitor to reflect an accurate impression of what the print output shall look like. When it comes to printing, you select an ICC profile which matches the output device and this too will interpret the image data, taking into account the known characteristics of the output device. When ICC color management is used correctly and all devices are calibrated, the monitor preview should match the colors and lightness of the output.

If for some reason the colors do not match up and the shift is identical from device to device then this would suggest that the monitor calibration is at fault. If the mismatch occurs with a specific device, the wrong device profile may have been selected or else the profile for that device is no longer accurate due to physical changes in the output device. This is not necessarily a problem. Custom ICC profiles can be made for any output device using inexpensive software. The other possibility is that the Photoshop settings are awry, as was shown in Figure 4.8.

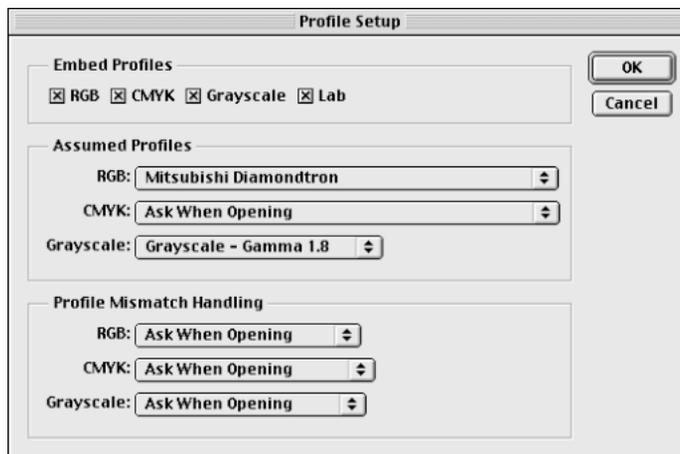


Figure 4.9 The Profile Setup preferences. Follow the guidelines in the text for configuring these preferences. Basically you want to have all the Embed profile boxes checked on and the Assumed profile for RGB set to match the monitor profile. This will take care of legacy files created on the same system. Not all legacy files will be your own, so for this reason it is maybe best to keep the mismatch handling for RGB files left as Ask When Opening.

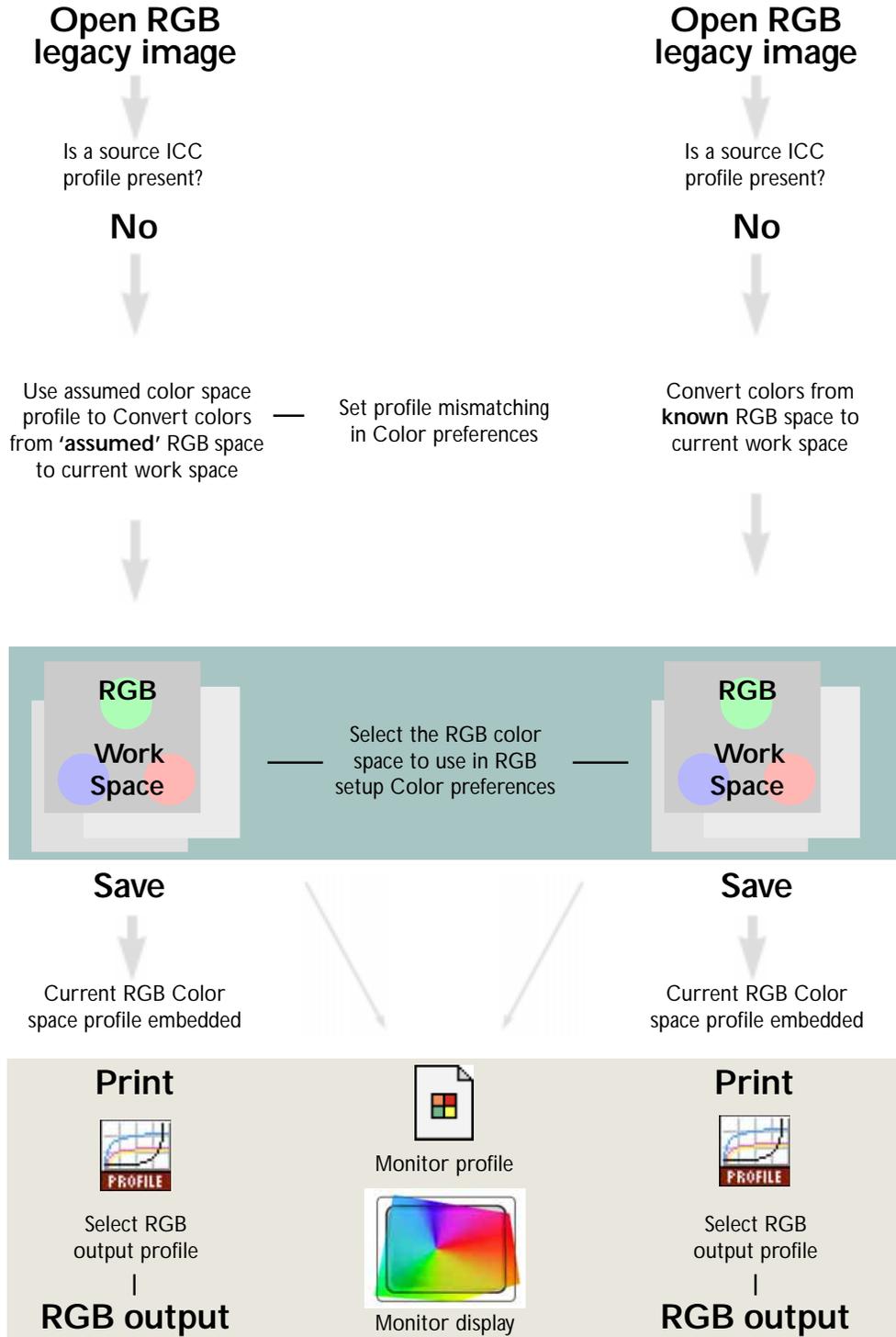
When you save a Photoshop 5.0+ file, the profile tagging options (go to Profile setup in Color preferences) must be switched on. So where it says Embed profiles, ensure all these boxes are checked. Without this no record of the Photoshop color space settings will be saved with the file. When Photoshop 5.0+ interrogates a file on opening, the ICC profile may be different, in which case it will want to convert the image data to match the current system setup. When you save that file, tagging will be employed, identifying the new setup and when you open that file again, the tag will be recognized as compatible and open without having to convert the colors again.

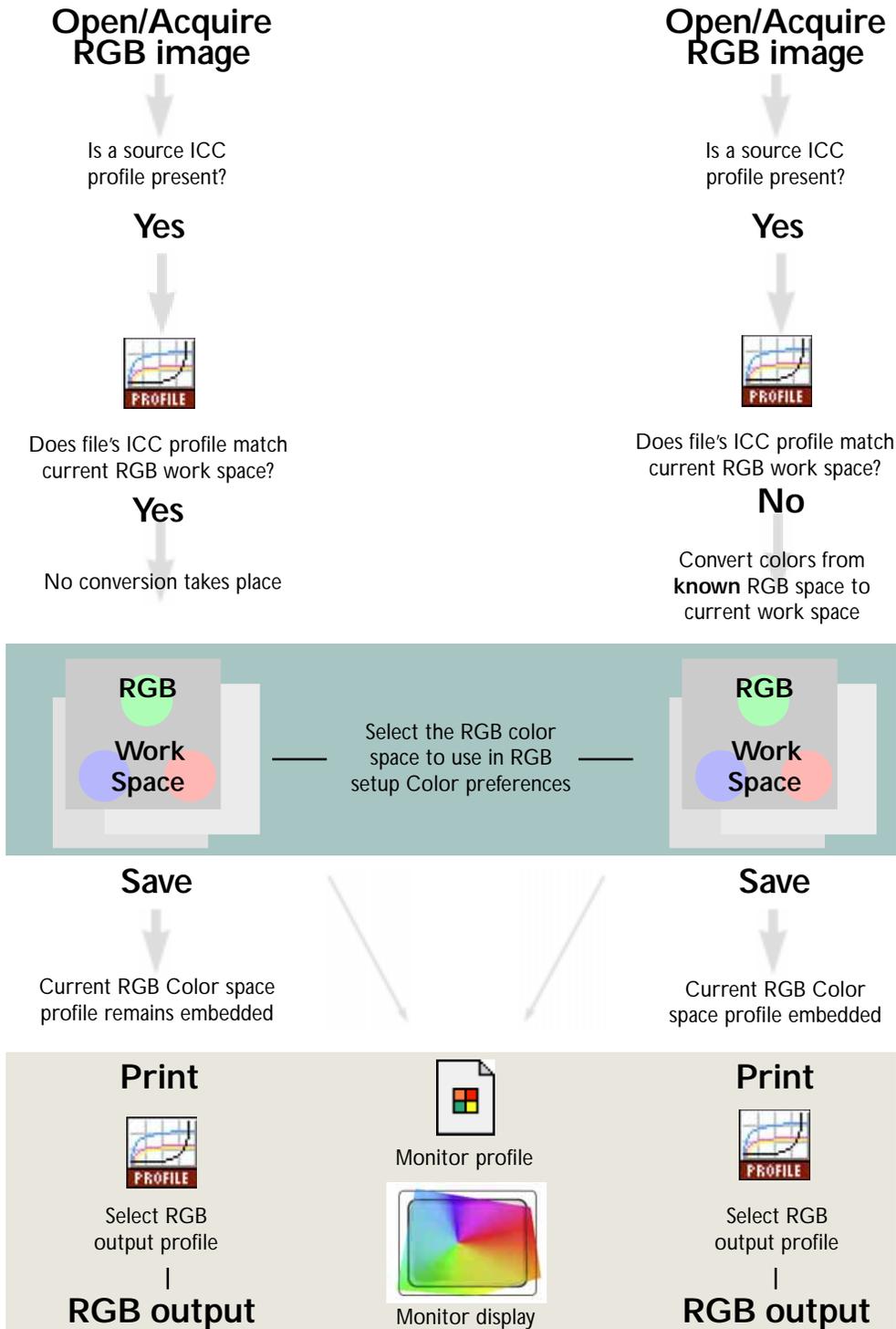
If no ICC profile is present, this will be spotted and at this point you can either instruct Photoshop to ignore the lack of a tag (see Figure 4.8 again to remind yourself of the horrors that can lead to) or you can allow Photoshop to convert the colors to the current color space (RGB or CMYK), using the best guess of the file's provenance. This is where the Assumed Profile business comes in. If you go to the Profile Setup preferences, below Embed Profiles you can specify the assumed profile in absence of an ICC profile tag. None of your legacy files are likely to contain an ICC tag, so the best thing to do here is to select the monitor profile tag from the pop-up menu as your assumed RGB profile and the most commonly used CMYK setup as your assumed CMYK profile. Or you can leave both set to Ask When Opening and enter the mismatch handling there when the dialog box opens at the end of the file opening routine.

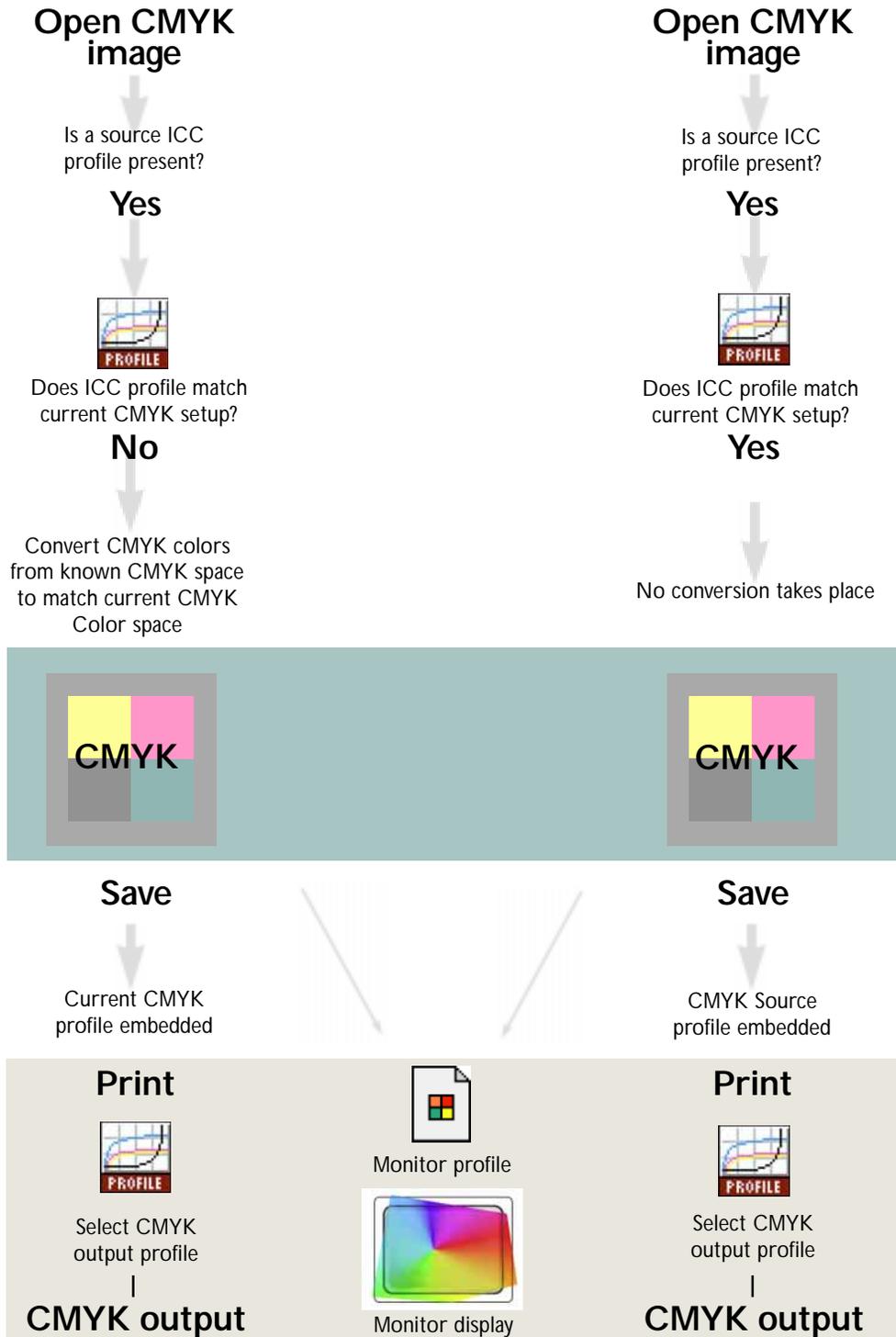
Sample file opening tables

Information on CMYK conversions and the CMYK setup will follow next, but first I have prepared a series of tables covering the points just discussed relating to file opening from Photoshop 5.0+ and legacy files in the three color modes: RGB, CMYK and Lab. Each table starts with the file being opened at the top and showing the progress of a file opening down to saving and proofing at the bottom. The aim is to show the opening procedures Photoshop uses in order to determine whether a file's image data needs converting or not.

The opening routine is automatic. Photoshop asks all the questions and makes decisions as to how the image's data is treated based on the way you have configured your program settings. In the central column are reminders where you the user should specify settings which will inform Photoshop of the device profiles and color space you intend using. At the bottom I have linked the monitor display and image output together, because after all, if the system has been properly calibrated, this is where you will be comparing the output with the monitor display and expecting both to match up.







Open CMYK image

Is a source ICC profile present?

No

Use assumed CMYK color space profile

Set profile mismatching in Color preferences

Convert CMYK colors from 'assumed' CMYK space to match current CMYK setup via Lab Color space



Save

Current CMYK profile embedded

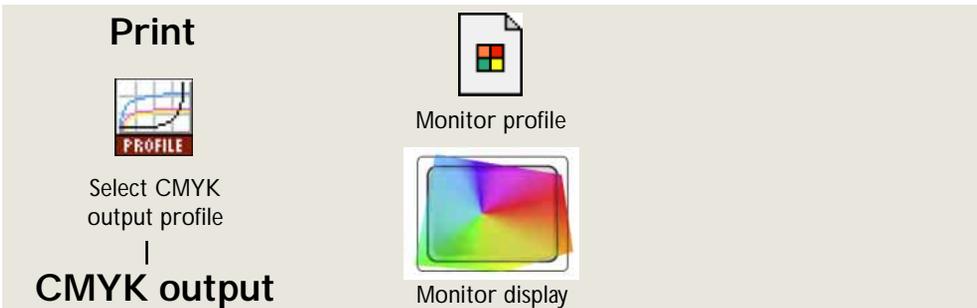
Print

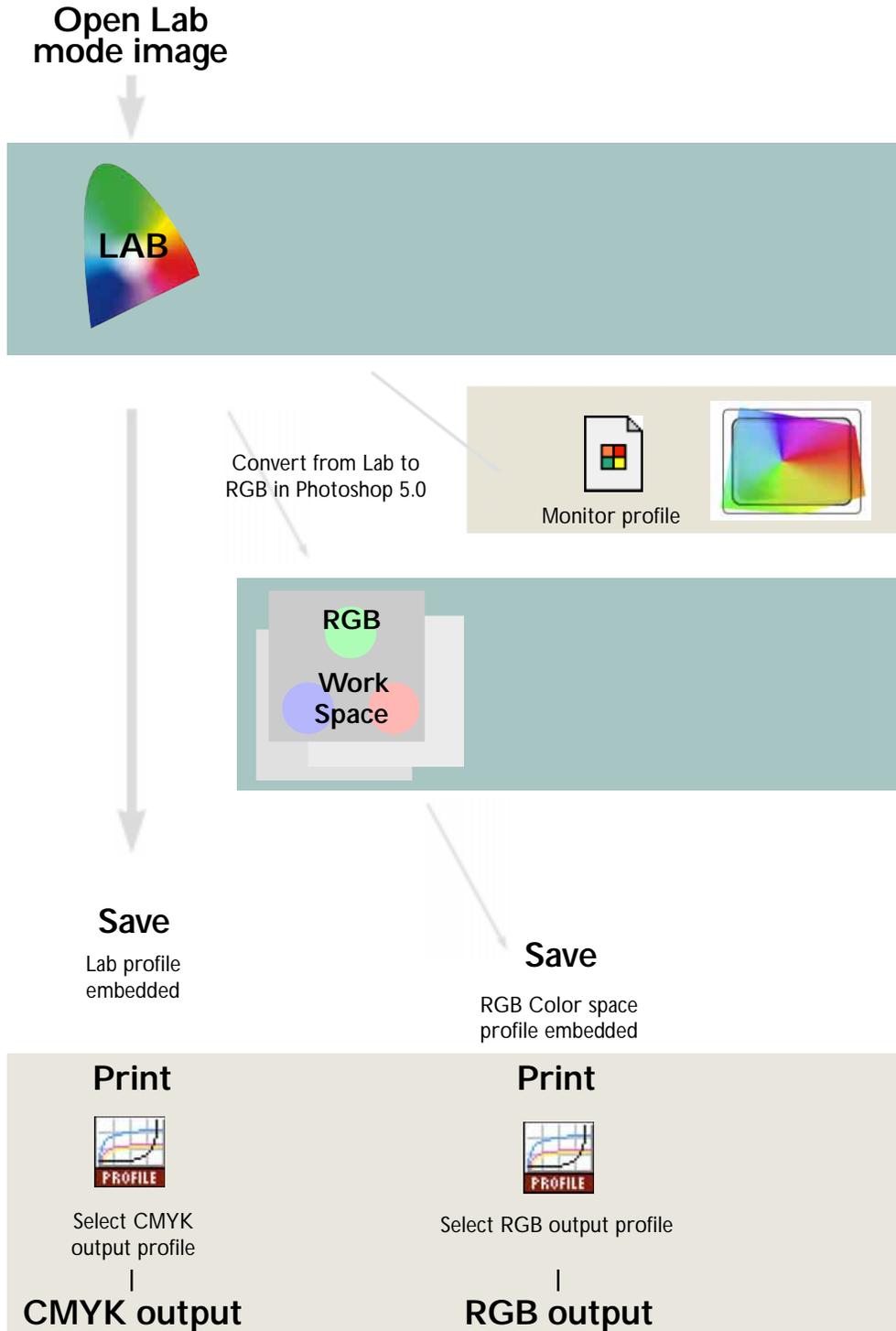
Select CMYK output profile

CMYK output

Monitor profile

Monitor display





RGB conversions to CMYK and CMYK setup

Two methods of converting an image from RGB to CMYK are described here. In either case, the CMYK separation setup settings must be established first before you convert. Altering the settings will have no effect on an already converted CMYK file, other than to change the on-screen appearance and maybe screw up the embedded ICC profile information.

All the CMYK setup specifications are entered in the one CMYK Setup Color preference. Previously, you had four Color settings preferences: Monitor setup; Printing inks; Separation setup; Separation tables. Information entered in the above preferences were used to determine the way Photoshop converted from RGB to CMYK, in terms of how the actual image data was converted and how the information was displayed on the screen. The Macintosh method was to change the screen display when viewing the CMYK file to reflect dot gain, while the PC method was to alter the screen display of Photoshop in RGB mode to reflect the impact of dot gain. Two conflicting approaches which worked well enough for each system but created confusion when PC and Mac users compared notes on setup procedures.

The color management in version 5.0+ has unified things across the two platforms and brought with it the benefit of improved CMYK conversions from RGB, because the RGB gamut is now independent of the monitor space and depending on the RGB work space you select, there is less chance of clipping the CMYK gamut. Second, Adobe's built-in ICC color management engine is superior for the majority of RGB to CMYK conversions. Monitor Setup is no longer there because Photoshop 5 now gets this information from the system (ColorSync or ICM) or the Adobe Gamma control panel. In RGB Setup, Photoshop shows you the name of the currently active monitor profile, but only allows you to enable or disable the monitor compensation. You choose a monitor profile at the System level or generate your own custom monitor profile using the Adobe Gamma control panel. All other CMYK preferences are now set in the one dialog. Of the three options, it is recommended that you either select the 'built-in' CMYK model or click on the ICC radio button to switch the CMYK setup to list the ICC conversion options.

ICC CMYK model

The ICC CMYK conversion option takes you to the ICC setup dialog shown in figure 4.10. A little bit of confusion is thrown in here because you have a choice of three Color Management Modules (CMM): the Apple ColorSync, Linocolor Lite or Built-in. Built-in here refers to the Adobe ICC engine and this is the preferred option as it

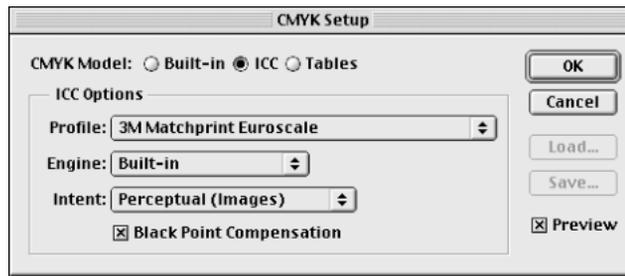


Figure 4.10 The ICC CMYK setup dialog.

will carry out the mode conversion using 20-bit per channel calculations. In the ICC Options, select the Profile of the space you intend converting to. As with the Built-in, manual setup, the profile selected here will be the CMYK space the CMYK preview and all future CMYK conversions will convert to. Changing the CMYK setup will not alter the color space of an already open CMYK file.

Rendering intent

Relative Colorimetric is identical to the manual Built-in CMYK conversion method found in Photoshop 4.0 and earlier and is still available in Photoshop 5.5. Relative Colorimetric rendering, maps the colors which are out of gamut in the target color space to the nearest 'in gamut' equivalent. When doing an RGB to CMYK conversion, an out of gamut blue will be rendered the same CMYK value as a 'just in gamut' blue. Out of gamut RGB colors are therefore clipped.

Perceptual (Images) rendering is the best rendering method to use for photographic images. Perceptual rendering compresses the out of gamut colors into the gamut of the target space when colors are out of gamut, while preserving the visual relationship between those colors, so they are not clipped. More compression occurs with the out of gamut colors, smoothly ramping to no compression for the in-gamut colors. Figure 4.13 illustrates how these two different rendering methods work.

One professional bureau I spoke to, claimed they found that the Perceptual rendering usually performed an excellent job 80% of the time, first time. If the conversion did not look good, they would try using the manual 'Built-in' conversion and adjust the RGB colors in Photoshop. before converting.



Figure 4.11 This example illustrates an RGB image which was acquired and edited in RGB using the Adobe RGB space. A CMYK conversion was carried out using an ICC profile conversion from Adobe RGB and the Perceptual (Images) rendering intent.



Figure 4.12 The image was assembled with a gradient chosen to highlight the deficiencies of sRGB. The master RGB file was then converted to fit the sRGB color space. A CMYK conversion was made using the same CMYK setup as in figure 4.11. sRGB is weaker at handling cyans and greens. There is also a slight boost in warmth to the skin tones.

CMYK Info	A	B	C
Cyan	97	75	95
Magenta	10	6	9
Yellow	96	8	5
Black	0	0	0

CMYK Info	A	B	C
Cyan	84	72	75
Magenta	18	7	10
Yellow	80	8	6
Black	1	0	0

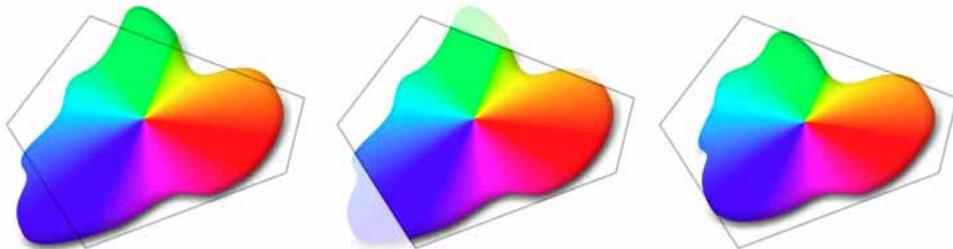


Figure 4.13 Each RGB image will have its own signature color space. In this example, imagine a scene with some blue sky and bright green colors going out of gamut. The middle example shows you the effect of a Relative Colorimetric conversion – clipping the out of gamut colors. A perceptual rendering will squeeze the out of gamut colors in more gently to fit the CMYK space, while preserving the relationship between the out of gamut colors

The Saturation (Graphics) rendering intent preserves the saturation of out of gamut colors at the expense of hue and lightness. Saturation rendering will preserve the saturation of colors making them appear as vivid as possible after the conversion. This is a rendering intent best suited to the conversion of business graphic presentations where retaining bright, bold colors is of prime importance.

Absolute Colorimetric maps in-gamut colors exactly from one space to another with no adjustment made to the white and black points. This rendering intent can be used when you convert specific ‘signature colors’ and need to keep the exact hue saturation and brightness, like the colors in a commercial logo design. This rendering intent is seemingly more relevant to the working needs of designers than photographers. However, you can use the Absolute Colorimetric rendering intent as a means of simulating a target CMYK output on a proofing device. Lets say you make a conversion from RGB to CMYK using either the Relative Colorimetric or Perceptual CMM and the target CMYK output is a newspaper color supplement printed on uncoated paper. If you use the Absolute Colorimetric rendering intent to convert these ‘targeted’ CMYK colors to the color space of the proofing device, the proofer will reproduce a simulation of what the printed output on that stock will look like. The forthcoming Adobe PressReady™ program will help you achieve this type of targeted proofing with a select number of desktop inkjet printers. For more about targeted proofing and Adobe Press Ready, see the following chapter.

Black Point Compensation

This will map the darkest neutral color of the source RGB color space to the darkest neutrals of the destination color space. When converting RGB to CMYK, it is recommended you leave this item checked. Under other circumstances the option will have little effect at all, such as when you convert from RGB to RGB. Some RGB to

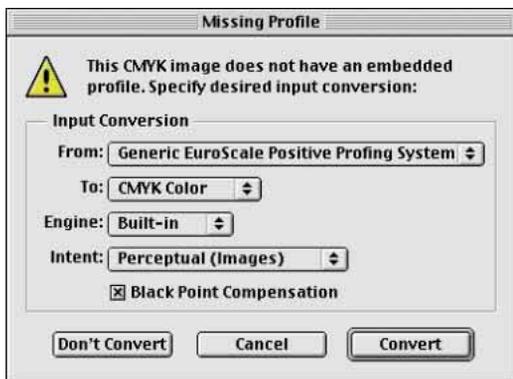


Figure 4.14 If on opening a CMYK file, no embedded profile found, you can convert the file to the CMYK setup currently specified in Color settings. The dialog shown here has the Euroscale Positive proofing system as a default. If the provenance of the file is known, then change this to match the setup used. If you do not want to modify the CMYK file's colors in any way, choose Don't Convert.

RGB profile conversions (see Profile to Profile) may be adversely affected and you can end up with weak, muddy blacks as a result of this. It can pay to experiment when you test a new profile.

Opening CMYK and Lab files

Files created in Photoshop 5.0+ and saved in Lab or CMYK should be embedded with an ICC profile. In the case of Lab, it is a universally understood color space. In the absence of an ICC tag the file will open without interruption and saving in Lab mode is one sure way of surmounting RGB color space mismatch worries. The received wisdom regarding CMYK files is that these should not be converted back and forth to RGB. I always prefer to keep an RGB master and convert to CMYK using a custom conversion to suit each press requirement, but always refer to the same RGB master file. Converting from one CMYK space to another is not normally recommended but in the absence of an RGB master, this will be the only option available. Photoshop 5.0+ makes the process of CMYK to CMYK conversion easier to accomplish. You specify the known or assumed CMYK profile in the Profile mismatch handling dialog box. When you choose Convert Colors, the CMYK image data is mapped from the known or assumed CMYK profile to the one currently specified in the CMYK setup.

The Built-in conversion engine

If you prefer not to use the ICC method to carry out a CMYK conversion, then you can always use the manual, built-in conversion method instead. As was illustrated in figure 4.13, the manual built-in conversion converts out-of-gamut RGB colors to their nearest CMYK equivalent. Because of this, you need to therefore think more carefully about how you intend to convert an image to CMYK using this method. The View > Preview > CMYK and the View > CMYK Gamut Warning are two valuable tools which will help you pre-adjust an image to ensure the out-of gamut colors are manually brought into gamut before converting. So, if the ICC conversion is not giving you the best result on a particular image and you want to override this, use the manual conversion method. Prior to converting, set the RGB image to show the CMYK preview and make an image adjustment to bring the out-of-gamut RGB colors into gamut. In chapter nine you will find advice on how to make such a pre-adjustment.

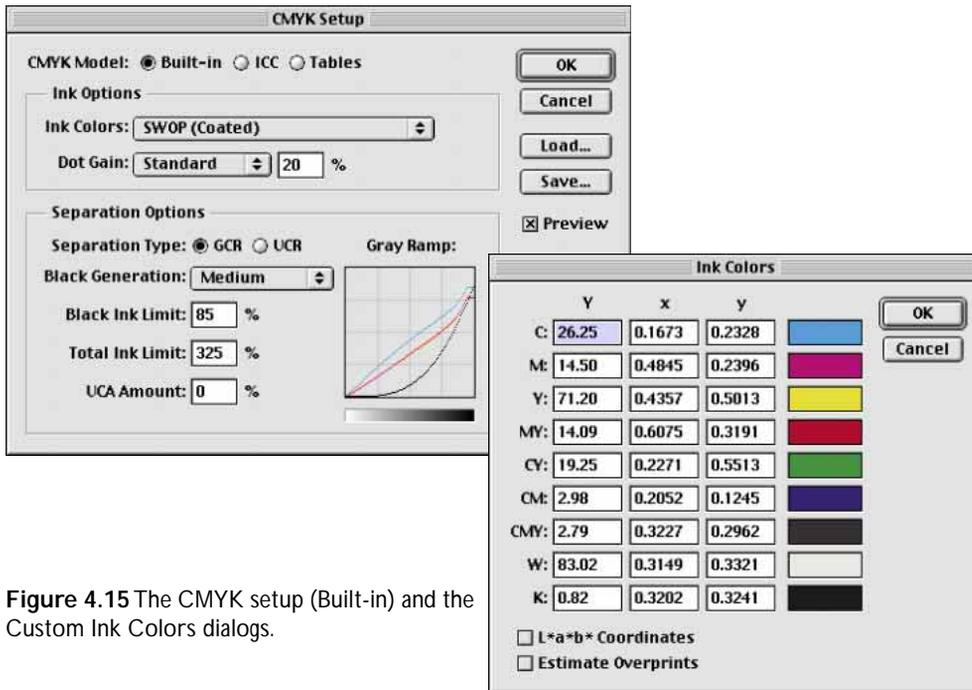


Figure 4.15 The CMYK setup (Built-in) and the Custom Ink Colors dialogs.

Ink options

Where it says Ink Colors, choose the setting recommended by your press and enter the suggested Dot Gain below. If you cannot find the press type listed in Ink Colors, select Custom from the menu. This will open the Custom Ink Colors dialog box. Check with the printer as to the custom values to be entered here or Load... a pre-supplied Ink Colors profile.

Dot Gain

Dot gain refers to the spread of ink on the paper after it is applied. A CMYK image has to be lightened to compensate for this factor which is dependent very much on the type of press and paper stock being used. The Dot Gain value affects the brightness of the image display on the monitor screen only and simulates the impact dot gain will have on the printed file.

The higher the dot gain, the lighter the plate needs to be, because less ink needs to be laid down to produce the correct sized halftone dot. The dot gain value you enter here will impact on how the CMYK conversion turns out. A high dot gain value, such as for news print, will cause the CMYK conversion to produce light looking

plates. A lower dot gain value for a coated paper stock will mean that the plates look darker. In either example, Photoshop will compensate to display the image at the same brightness on the screen, so you are able to correctly evaluate the converted image. If you were to compare the outputted films, they would both have very different densities. Dot Gain Curves are a welcome addition (Choose Curves from the pop-up menu next to Dot Gain). In the preparation of this book I was provided with precise dot gain information for the 40% and 80% ink values. If you select the Dot Gain Curves option, you can enter custom settings for the composite or individual color plates, as guided by your printer.

Separation options

This controls what type of separation will be used and the total ink limits permitted. The default Photoshop setting is GCR, Black Generation: Medium, Black Ink Limit 100%, Total Ink Limit 300%, UCA Amount 0%. To know what should be entered here, check with the printer. Unfortunately it is not always that simple. In my experience, I am nearly always told to use the default Photoshop settings. So that being the case, I have asked around various printers here in the UK and abroad what default settings would they suggest? For European printing I am told use UCR, a black ink limit of 85–95% and set the Total Ink Limit to 280%–320%.

UCR is the preferred separation method in use today and commercial printers will recommend this as the separation method they use on their systems. The UCR setting is also favored as a means of keeping the total ink percentage down on high speed presses, although is not necessarily suited for every job. Low key subjects and high quality print jobs are more suited to the use of GCR with UCA. However, in the case of Photoshop conversions, you are better off sticking with the default GCR with 0% UCA. This produces a longer black curve and better image contrast. I asked Tim Piazza of TAGS studio for his advice on settings. Here is what he recommends:

If it is commercial printing (sheetfed, short run web): GCR Medium, 85% Black Ink Limit, 325% Total Ink coverage.

If it's going to a publication as an advertisement: GCR Medium, 85% Black Ink Limit, 287% Total Ink coverage (unless there's a great deal of black).

If there's a great deal of black and going to publication: GCR Medium, 80% Black Ink Limit, 280% Total Ink coverage.

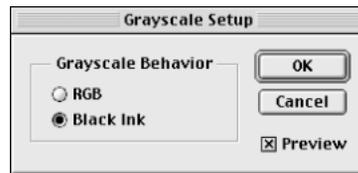
If it's going to a packaging printer, silk screen, or gravure, **talk to the printer.**

Grayscale setup

If all the grayscale work you do is for going to print, you must have the Black Ink option selected in the Grayscale setup. In this mode of operation, Photoshop will display the grayscale file on the monitor using the current CMYK separation settings to make allowance for dot gain and simulate the expected brightness of the print output. Checking the RGB button will display the grayscale image using the RGB settings of the RGB setup, not the monitor setup. This means that if you are editing in a wider gamut space like Adobe RGB or the sRGB space, both of which have a gamma of 2.2, the grayscale image will often appear darker. Before it was the case that RGB viewing on a Macintosh would show a lighter image. That was because prior to Photoshop 5.0, the RGB editing space was always the monitor space, which on Macintosh has a gamma of 1.8.

If you are editing grayscale images to be used for screen publishing type usage, then your RGB editing space should be something like sRGB and you will want the Grayscale setup for that type of work to be always set to 'RGB'.

Figure 4.15 The Grayscale setup with Black Ink behavior chosen



Information palette

Given the deficiencies of display on a monitor – its limited dynamic range and inability to reproduce colors like pure yellow on the screen – professionals rely on the numeric information to assess an image. Certainly when it comes to the correct output of neutral tones, it is possible to predict with greater accuracy the neutrality of a gray tone by measuring the color values with the eyedropper tool. If the RGB numbers are all even, it is unquestionably gray. The CMYK values are different. When printing a neutral gray, the color is not made up of an even cyan, yellow and magenta. If you compare the color readout values between the RGB and CMYK Info palette readouts, there will always be more cyan ink used in the neutral tones, compared with the yellow and magenta inks. If the CMY values were even, you would see a color cast. This is due to the fact that the process cyan ink is less able to absorb its complimentary color – red, compared to the way magenta and yellow absorb their complimentary colors. This also explains why a CMY black will look reddish/brown, without the help of the black plate to add depth and neutrality.

Profile to Profile

This apparent oddity provides some useful options whenever you wish to take a shortcut across the ICC color management work flow or manually convert the color data to another color space. Here are a few sample uses of Profile to profile.

On a busy day, opening and converting images on a slow computer can take an age to complete should there be a profile mismatch. If your Profile mismatch setup is configured to 'Ask When Opening', then you have the option of bypassing the profile conversion and previewing the file much faster. If you then want to continue working on that file, you can choose to perform an Image > Mode > Profile to Profile conversion from the known source (or assumed) profile to the actual color space. When the image is overwritten, the tagged and actual color space will be the same.

If the software for a digital capture device does not implement ICC tagging, then it is easy enough to configure the file opening Profile mismatch settings for you to select the appropriate input profile upon opening. If the output device you are using does not recognize ICC profiles then Profile to Profile can come to the rescue. Use the Profile to Profile adjustment to convert the completed image data to the profile of the output device. This is something you would do at the very end of an editing session and as a temporary measure only. The resulting screen preview will look totally wrong, but if ICC color management is doing its job, the print result will match the undone version. The screen preview alerts you that the RGB conversion has resulted in the RGB data no longer matching what the ICC tag is saying. This is happening because the Preview box is checked in the RGB setup dialog. Normally it makes no difference to the display whether this is checked or not, but is a useful reminder to have when doing Profile to Profile conversions.

If you were to then save the image, it would be identified as having a tag belonging to the current color work space, while the color is actually that of a completely different space. This would not matter of course if you intended to strip out all the ICC information anyway. If you were preparing an image to be uploaded to a web site, you could for example convert the RGB data from Adobe RGB to sRGB, using Profile to Profile. Again the colors would look all wrong in Adobe RGB but when seen in sRGB, they would look near enough the same. In this situation you would definitely want to strip out the ICC profile. The Save for Web option allows you to do this as does the Save a Copy option.

Back to closed color loops

Given that not everyone you work with will be using ICC profiles in their color management, you will find many bureaux who still have their own closed color loop. Anything that they scan and output will reproduce reliably on their system with the same colors as the original providing you don't tamper with the color balance of the image data. So if you visit your favorite lab/bureau, they supply you with a scan, you retouch it and pass it back for output, the colors are guaranteed to be faithful to the original, as if they had retouched it themselves. If the color loop they utilize does not match your system, the answer is to modify your display monitor profile to match their output. You don't want to mess up your carefully calibrated settings, so the answer is to use the Adobe Gamma control panel to make a new custom monitor profile which matches the bureau color loop output. Load this monitor profile at the system level, whenever you are working with their supplied files. Any color changes you do happen to make will be relative to the original.

Compare the bureau output with the digital file on screen and use the Adobe Gamma control to change the screen appearance to match what you see in the output. If further correction is required, repeat the process, gradually fine-tuning the monitor appearance. Once you are satisfied that the two look close enough, then save the modified monitor profile using a different name and that's it. Load this custom ColorSync system profile whenever you want to get in sync with their color loop. Remember though to revert to the standard monitor profile afterwards. If you have the relatively simple task of creating color consistency from your own desktop scanning setup, the scanner software should provide you the means to run a test strip through the scanner. Check the monitor display with the original and fine tune the ICC profile settings in the scanner software to maintain a consistent device profile.

Device dependent or independent?

Two choices, but both with the same outcome in mind – faithful four-color print reproduction. In a closed loop or traditional CMYK color management workflow, the advantages are that you are working within an established production process and you can specify precise CMYK values for the final print output. If you have the right experience, Photoshop contains all the necessary tools to achieve precise color control. The downside though is that you are limited in the number of Photoshop filters you can use in CMYK mode, the file size is 25% larger and you are restricted in how you can repurpose an individual CMYK file.

A CMYK workflow is therefore very much device dependent. Once the RGB data has been converted to a targeted CMYK space, your options are limited as to how you can repurpose that file. It is possible to do a CMYK to CMYK conversion, but you would mostly be far better off re-separating from a Lab mode or an RGB master. This is the guiding principle of a device independent workflow. Photoshop 5.0+ makes it possible for a studio plus any other Photoshop 5.0+ users to share image files and maintain a fine degree of color control prior to deciding what to do with the images. This flexible workflow approach fits in better with the changes taking place in our industry today. It also takes account of the growing demand for non-print media, where an RGB file is the preferred choice. The problems associated with a device-independent, RGB workflow include the dependence on accurate device ICC profiling, the inability to set precise CMYK colors in the absence of any specific CMYK output information and the problems to do with how non-ICC savvy users are going to cope when they receive your files or the hassle of having to perform a color conversion should their program be able to read ICC profiles and the other user is working in a different color space.

Even critics of ICC color management, who have reservations over its implementation in pre-press work, have acknowledged that ICC color management is well suited to a photographer's RGB workflow. If you are interested in learning more about ICC and the Photoshop 5.0+ color management system, then I recommend you visit the Photoshop page on my web site. Go to: www.evening.demon.co.uk/photoshp.html, there you will find links to various papers on color management as well as other useful Photoshop links.

Author's note:

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