ProfilerPRO™
User Guide

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All efforts have been made to ensure the accuracy of this guide. However, should any errors be detected, we would appreciate being informed of them. Changes are periodically made to the information and will be incorporated in new editions of this guide. ColorVision Inc. reserves the right to make improvements and/or changes in the product(s) and/or program(s) in this guide at any time.

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Overview

ProfilerPRO is an Adobe® Photoshop® plug-in that creates custom printer profiles for a wide range of color printers, papers, and inks. It creates ICC compliant color profiles on Windows® and Macintosh® for either platform. It builds both RGB profiles **and** CMYK profiles.

Today's color printers can be used with a wide variety of inks and papers. You can make better prints by building your own "custom" profiles for specific combinations of printer, paper and ink, even if you use only the "standard" papers and inks provided by the printer's manufacturer. Custom profiling is even more critical if you want, or need, to print on other manufacturers' papers, and (on certain printers) with other manufacturers' inks. The standard profiles for the printer often fail to address those circumstances.

ProfilerPRO provides **adjustment sliders** that let you alter brightness, contrast, saturation and color balance *as the profile is being built*. This lets you make subtle adjustments to the profile, to take into account personal preferences and to make profile variations that can adjust for special problems, such as metamerism in prints made with pigmented inks.

Advanced printer profile editing can be accomplished using the copy of DoctorPRO™ bundled with ProfilerPRO.

In addition to the adjustment sliders, ProfilerPRO lets you use all of The Adobe Photoshop CMYK separation and black generation controls to adjust the targets that are used to build a CMYK profile.

ProfilerPRO builds profiles based on measurements taken with colorimetric measuring devices. This provides the highest possible profile quality, as colorimetric measuring devices provide the most accuracy. However, it will take longer to build profiles this way, as even a scanning colorimeter will take between 5 to 10 minutes to measure 729 patches.

ProfilerPRO can also build profiles based on "measurements" taken by a flatbed scanner; in other words, you can build a profile from a scan of a calibration chart print, in the same way that you can with ProfilerPLUS™. This provides the best possible speed, a flatbed scanner can "measure" 729 patches in a single pass scan much more quickly than a measuring device. This feature is ideal for frequent re-profiling of variable devices such as color laser printers.

ProfilerPRO is faster than any other colorimetric-based calibration software. It can build a high quality printer profile in 10 seconds or less once you've printed and measured the calibration chart patches. By using the sliders and/or Adobe Photoshop separation controls, you can build several profile variations from a single measurement file in under a minute.

System Requirements

Mac OS 8.6 to 10.x; Windows 98, ME, XP, 2000 USB; Adobe Photoshop 5 or greater; color printer/PostScript printer or RIP, 300 dpi flatbed scanner or better for scanner-based profiling, or supported spectrophotometer for spectro-based profiling.

Measurement-based Profiling

If you are using a colorimetric measuring device to build profiles, ProfilerPRO requires the measurement values for target patches to be saved in a text file. To create such a text file, you will need to use the software that your vendor has provided with the supported measuring device as follows:

- X-Rite® DTP22 Digital Swatchbook®: ColorShop software version 2.6.1 or later.

- X-Rite DTP41 Strip Reader: ToolCrib utility, version 2.1 or later for Mac, or version 3.0 or later for Windows.

- ColorSavvy ColorMouse™: ColorMouseTrap™ application (Mac) or CSConnect software (Windows)

- Spectostar Spectrocam: Spectrocam software version 1.6.2 or later for Macintosh. Spectrocam software version 1.09 or later for Windows.

- GretagMacbeth™ Spectrolino®: SpectroChart Lite software, for measuring the entire calibration chart using the GretagMacbeth plotter bed, or MeasureTool software, used with the EyeOne targets noted below..

- GretagMacbeth EyeOne™: MeasureTool software, part of GretagMacbeth ProfileMaker™ demo software, version 3.1.5 or later, available from the GretagMacbeth Web site.

ProfilerPRO can also be used with other unsupported (untested) measuring devices, as long as you can use the device to create a simple text file of the following format:

- The file must contain one line of text for each color swatch measured, and each line should contain 3 floating point values (one each for L, a and b) in a tab delineated format.

- If you are using a single-patch measuring device like the Digital Swatchbook or ColorMouse, you should not measure the “grayed out” checkerboard patches in the lower right corner area of the 27 and 125 patch targets.

- If you are using a scanning measuring device like the DTP41 or Spectrocam, then you should measure all patches in a target, including any “grayed out” checkerboard patches.

Scanner-based Profiling

ProfilerPRO can also be used with a flatbed scanner, using the same techniques that are documented for ProfilerPLUS by loading and printing the “729 Patches/Scanner” target image; “measuring” this print with a flatbed scanner; and building a profile using the “d. Build Profile From Chart Scan” command. See the brief description of using scanner-based profiling later in this User Guide and the ProfilerPLUS User Guide for full details.

Installation

For Macintosh

Run the ProfilerPRO installer application.Click on the Install button and choose the "Plugins" folder that you want to install the "PANTONE COLORVISION Plugins" into. **Be aware:** When choosing the Plugins folder make sure you choose the correct "Plugins" by checking the path of the Plugins folder displayed along with the Plugins folder. In the Plugin folders listed by the installer please ignore the Plugin folders of other applications like Internet Explorer, Netscape Navigator, .
After the installer is set for the appropriate Plug-Ins folder, let it proceed to install the software. It will put the two files for the ProfilerPRO plug-in into the Plug-Ins folder, and another "Horses" folder containing assorted support files and images (such as the Calibration Chart) into your System:Preferences folder. Assorted files that may be of use to the user can be found at the root level of your hard driver in the PANTONE COLORVISION folder.

For Windows

Run the ProfilerPRO setup application. The Setup program will attempt to locate the Adobe Photoshop Plug-ins folder belonging to the "highest" version of Adobe Photoshop on your system.

Note: If you have more than once copy of Adobe Photoshop on your system make sure that you've selected the Plug-Ins folder for the Adobe application into which you wish to install. You may need to manually select a different "path" in the setup screens.

After the installer is set for the appropriate Plug-Ins folder, let it proceed to install the software. It will put the two files for the ProfilerPRO plug-in into the Plug-Ins folder, and another "Horses" folder containing assorted support files and images (such as the Calibration Chart) into your C:\PROGRAM FILES directory. Assorted files that may be of use to the user can be found in the C:\PROGRAM FILES directory in the PANTONE COLORVISION folder.

Configuring Your System

For Macintosh

Even though Virtual Memory is turned **on** by default in recent Mac OS versions, we normally recommend turning Virtual Memory (in the Memory control panel) **off.** The virtual memory system in the Mac OS can sometimes conflict with the Adobe Photoshop internal virtual memory system. A common symptom of this is getting "not enough memory" error messages when trying to build profiles.

You should not need to turn Virtual Memory on as long as you have at least 128 megabytes of RAM on your system. If you have only 64 megabytes of RAM, then leave it turned on; otherwise, your system performance will suffer.

Note: If you are using the X-Rite DTP41 with ToolCrib 2.0, make **sure** you turn off Virtual Memory. ToolCrib will "lose" the earlier measurements in the 729 patch target if you run it with virtual memory turned on.

For Windows

No current issues.

For Adobe Photoshop 6 or later

If you are going to build CMYK profiles, locate the ColorVision ".csf" files in the "ProfilerPRO:CMYK Profiling Support Files:Adobe Photoshop 6 .csf's" folder that was installed into the main window of your startup drive (Macintosh) or root of your installation drive (Windows).

Copy the three .csf files from this folder into the System:Application Support:Adobe:Color:Settings folder of your startup drive (Macintosh) or the C:\PROGRAM FILES\COMMON FILES\ADOBE\COLOR\SETTINGS directory (Windows), if the installer has not already placed copies of them there. These are pre-configured Color Settings for the three most common working spaces (Adobe RGB, ColorMatch, and sRGB). Selecting and loading one of these settings files will also set the ProfilerPRO defaults for CMYK profiling.

Once copies of these files are in the location described above, Adobe Photoshop 6 will automatically display these special color setting names in its Color Settings:Settings pop-up. See the instructions on profiling later in this document for more details.

Note: These settings are for profile building only, not for use as settings with the resulting profiles.

Note: If you are only going to build RGB profiles, then you don't need to use these files.

Configuring Adobe Photoshop

After you have installed ProfilerPRO, you should do some preliminary setup in Adobe Photoshop as follows.

Adobe Photoshop 5

Use Adobe Photoshop 5's File:Color Settings:RGB Setup command.
The RGB pop-up at the top of the window lets you select what is known as the "RGB Working Space" for Adobe Photoshop 5. This is the **only** setting in Adobe Photoshop 5 that directly affects the results that you get when you build RGB profiles with ProfilerPRO.

Note: If you are building CMYK profiles, then the parameters in the CMYK Setup dialog, as described in the next section, will also affect the loading and separation of the targets as well as the profile creation process.

Adobe Photoshop 5 comes with the RGB working space set to sRGB, which will produce lower quality profiles. We highly recommend changing this to Adobe RGB (1998) for the best results when building profiles. The other most commonly used working space is ColorMatch. If you are an Adobe Photoshop expert and prefer to work in and print with ColorMatch, feel free to set it this way, but for most people, Adobe RGB is the best choice.

After you have selected a working space in the topmost pop-up, Adobe Photoshop will fill in the remaining settings for you (Gamma, White Point, and Primaries). Don't touch these settings; leave them at the values that Adobe Photoshop sets.

At the bottom of the dialog, make sure that "Display Using Monitor Compensation" is checked.

For CMYK Profiling Only: Go to the CMYK Settings dialog and click on the Load button, to load the custom ColorVision "inks" file that corresponds to the RGB working space you chose in the previous step. These are found in the "ProfilerPRO:CMYK Profiling Support Files:Adobe Photoshop 5 Inks" folder that the installer left in the main window of your hard drive (Macintosh) or in the root of your installation hard drive (Windows).

For example, you would load the custom inks file for Adobe RGB if you had previously chosen Adobe RGB in the RGB Setup dialog. **It is important to load from the "inks" file which**

matches your chosen RGB working space for the best CMYK profiling results.

Everything is then set up for loading targets and creating CMYK profiles, using the default values for black generation shown above. If you want to change the separation and black generation settings, you can use any of the Dot Gain or Separation Option controls that are visible in the CMYK Setup dialog as shown above, after you've loaded the default custom settings. The settings in this dialog are used both when you load a target and subsequently create a profile.

Note: If you customize your black generation settings for a particular printer/paper/ink combination, you can use the Save button to save your own, named set of custom settings, so that the name you give these settings will subsequently show up in the Settings pop-up.

Adobe Photoshop 6 or later

For RGB Profiling: Go to the Edit menu and use the Color Settings command. When the ColorSettings dialog appears, check the "Advanced Mode" box so that you can see all of the controls.

The RGB pop-up at the top of the **Working Space** section lets you select what is known as the "RGB Working Space" for Adobe Photoshop 6. This directly affects the results that you get when you build RGBprofiles with ProfilerPRO.

For CMYK Profiling: Go to the Edit menu and use the Color Settings command. When the Color Settings dialog appears, select a "ColorVision" settings file in the Settings pop-up at the top of the dialog, based on the working space you want to use. For example, you could select the custom setting ColorVision/Adobe RGB, which we recommend.

You need to load a custom ColorVision color setting to build CMYK profiles; doing this loads values for both RGB and CMYK conversions into the dialog. Everything is then set up for the creation of CMYK profiles, using **default** values for black generation. If you want to change the separation and black generation settings, use the "Custom CMYK" command at the top of the CMYK Working Space pop-up after you've loaded the default custom settings.

Note: If you customize your black generation settings for CMYK profiling of a particular printer/paper/ink combination, you can use the Save button to save your own, named set of custom settings, so that the name you give these settings will subsequently show up in the Settings pop-up.

Whether you are using the defaults or your own customized values for black generation, the RGB working space and Custom CMYK values are used when you load a calibration chart or target and subsequently build a CMYK profile.

About RGB Working Spaces

Adobe Photoshop 6 or later comes with the RGB working space set to sRGB, which will produce lower quality profiles (i.e., since this is a somewhat smaller RGB color space). We highly recommend changing this to Adobe RGB (1998) for the best results when building profiles (and, if you build CMYK profiles, use the ColorVision/Adobe RGB custom color setting). The other most commonly used working space is ColorMatch. If you're a Adobe Photoshop expert and prefer to work in and print with ColorMatch, feel free to set it this way, but for most people, Adobe RGB is the best choice.

Regardless of what you choose as your working space, it is **IMPORTANT** to remember this: to avoid color shifts in your prints, you should use the **same** working space for both building profiles and subsequently printing images. If you build a profile with Adobe RGB as the working space and print later on with your working space set to ColorMatch, there may be noticeable color shift in the output, especially with highly saturated colors. Likewise, if you have images which are tagged as ColorMatch, you will probably want to set your Adobe Photoshop working space to ColorMatch, build a profile for your printer/paper/ink combination with ColorMatch in effect, and use this profile when printing.

The bottom line is: working space mismatches can cause color shift in prints. To avoid this, the safest thing to do is pick a working space you like (Adobe RGB, ColorMatch, or perhaps a custom working space such as the EktaRGB space), configure Adobe Photoshop with it, and then leave that space in effect when building your profiles, editing your images and printing.

The CMYK, Gray and Spot Color working spaces can be set any way you like; they have nothing to do with ProfilerPRO.

Set the **Color Management** controls appropriately to take advantage of Adobe Photoshop 6 or later's color management capabilities. However, when you run ProfilerPRO, it may automatically open small RGB support files from time to time, as well as the various Calibration Chart targets. All of these are tagged, by default, with Adobe RGB. With the Color Management controls set this way, Adobe Photoshop 6 will ask you what to do with these files every time that they open:

Respond "Use embedded profile" and click OK to continue. Do **not** click Cancel.

Note: If you click Cancel, then the process of opening a Calibration Chart, or another ProfilerPRO "support" image, will halt. The image in question won't appear, and Adobe Photoshop will also put up a warning alert saying that the image window could not be selected; this is normal.

Very Important: Make sure that you check the "Ask When Opening" box for Profile Mismatches. This forces Adobe Photoshop to alert you if it is about to alter the colors of the Profiler Calibration Chart when you load it; you do **not** want the RGB values in the chart to change.

In the **Conversion Options** section, set the Engine to Adobe and change the rendering intent from Relative Colorimetric to either Perceptual or Saturation. Check "Use Black Point Compensation." The other controls don't matter.

Note: Unlike Adobe Photoshop 5, there is no longer a "Display Using Monitor Compensation" checkbox. This feature is *always* turned "on" in Adobe Photoshop 6.

Measuring Devices

Supported Devices

For building measurement-based profiles, ProfilerPRO supports these devices:

- The **X-Rite DTP22 Digital Swatchbook** and **ColorSavvy ColorMouse** can be used to take spot readings for individual patches one at a time. With these devices, it is most practical to build profiles from either 27 or 125 patches, and it is technically possible (although time consuming) to measure and build a profile from 729 patches. It takes 2 to 3 minutes to measure 27 patches and 12 to 15 minutes for 125 patches.

- The **X-Rite DTP41 Strip Reader** can be used to measure the patches in strips, one strip at a time. With this device, it is most practical to build profiles from either 125 (10 strips printed on a single sheet) or 729 patches (27 strips printed on 2 sheets). If you have a wide format printer, it's also possible to print special "wide" 729 patch targets which are designed for 24" wide printers, as well as 36" and wider printers. The DTP41 calibration targets are listed separately in the target pop-up in ProfilerPRO.

- The **Spectostar SpectroCam** can be used to very rapidly measure rows of patches in the printed targets, using the supplied measuring base and plastic ruler to move the measuring device by hand and guide it across the target patches. The 27 or 125 patch targets can be measured in under 2 minutes, and even the 729 patch target can be measured in less than 10 minutes.

- The **GretagMacbeth Spectrolino** is used with its measurement base and GretagMacbeth SpectroChart Lite software (or MeasureTool and the EyeOne targets as noted below) to automatically measure the 27, 125 and 729 patch images. Once SpectoChart Lite starts measuring the target, you can walk away until it finishes.

- The **GretagMacbeth Eye One** is used with its strip measuring ruler and Gretag's Measure Tool software (part of the ProfileMaker demo package) to automatically measure the 125, and 729 patch images by strips. Once you have selected the appropriate Eye One test chart from the two supplied in the PANTONE COLORVISION folder on your hard drive, Measure Tool will build the required text file of Lab values for use by ProfilerPRO.

For all devices other than the DTP41 and Eye One, the complete target for up to 729 patches is printed on a single sheet of paper. This saves both paper and the time it takes to print the targets.

On the DTP41 or Eye One, the 729 patch target is divided into strips and is printed on 2 separate sheets of paper.

Note: You can experiment with printing and measuring the DTP41 729 patch, 2 page targets to build profiles for the manual spot measuring devices, if you like. The sequence of color measurements is all that matters, and the order of the larger patches in the 2 page target is the same as in the single page.

Measuring Device Software Interfaces

- To measure with the X-Rite DTP22 Digital Swatchbook, use X-Rite's ColorShop software, v2.6.1 or later.

- To measure with the X-Rite DTP41 Strip Reader, use X-Rite's ToolCrib utility, version

2.1 or later for the Mac, or version 3.0 or later for Windows. After you run ToolCrib and connect to the DTP41, you must type a few simple commands into ToolCrib to set up the DTP41 for your target; press the button and measure the strips; copy and paste the ToolCrib window contents into a text editor such as SimpleText on the Mac and the Notepad accessory under Windows; and save into a text file that ProfilerPRO will read directly. **Note: Make sure you are using a recent version of ToolCrib; early versions may produce a text measurement data stream that ProfilerPRO cannot read correctly. On the Macintosh, make sure that Virtual Memory is turned off.**

- To measure with the ColorSavvy ColorMouse, use the ColorSavvy ColorMouseTrap application on the Mac (the CSInstrumentInit must be in the System:Extensions folder for it to work) or the ColorSavvy CSConnect software under Windows.

- To measure with the Spectrocam, use Spectrocam software to save a text file that ProfilerPRO can read. Three measurement templates for the Mac version of the Spectrocam software are included (you can find these in the ProfilerPRO folder that the installer creates), one for each of the ProfilerPRO targets. If you are using the Windows version, you will need to manually enter the number of rows and columns for your target in the Options dialog of the Scan window before you take a set of measurements.

Note: You **MUST**use Spectrocam's Export command for this to work correctly. For SpectroCam software for the Mac choose the ProfilerPRO export format.

Note: If you have Spectrocam 1.09 for Windows or later software, save the measurements from your scan window into a text file in "ProfilerPRO" format.

- To measure with the Spectrolino, use the GretagMacbeth SpectroChart Lite software in combination with the plotting bed. ProfilerPRO includes three template (.csv) files, one for each target, that you can use with SpectroChart to automatically measure the patches. Then save the results into a text file, which ProfilerPRO can import directly.

- To measure with the Eye One, use the GretagMacbeth MeasureTool software version 3.1.5 or later. ProfilerPRO includes two template files, one for each target, that you can use with Measure Tool to automatically measure the patches. Then save the results into a text file, which ProfilerPRO can import directly.

Calibration Chart Targets (Measurements)

There are 3 different "resolution" measurement targets that ProfilerPRO can print, measure and subsequently build a **measurement-based** profile from:

- **27 patches.** This target is most suitable for the DTP22 and ColorMouse, which must be used to measure the patches one by one. Certain printers do not profile well with only 27 patches. The 27 patch target is also valuable for producing a quick profile or test profile in certain situations.

- **125 patches.** This produces higher quality profiles than the 27 patch target. This number of patches is suitable for all supported measuring devices; however, some printers may have some posterization in the shadows and/or highlights. You can measure it with the DTP22 or ColorMouse in about 10 minutes. With a scanning device, it will take 2 minutes or less.

- **729 patches.** This provides the best accuracy and makes the highest quality profiles. The DTP22 or ColorMouse will take at least an hour to measure these one-at-a-time. With a Spectrocam or Eye One, or DTP41, you can measure them in less than 10 minutes. The Spectrolino measures the patches in about 45 minutes, but requires no user intervention during

the process.

• There are additional variations of these targets provided for the X-Rite DTP41 strip reader. The DTP41 targets are arranged in numbered strips; for 729 patches, they are larger and printed on two pages instead of one. If you want to, you can measure the DTP41 729 patch targets on the Spectrocam, Digital Swatchbook or ColorMouse in place of the single page 729 patch target, as long as you read the patches in the correct order (always starting from the **numbered** end of the strip and measuring from left to right). **Note:** You cannot use the DTP41 targets with the GretagMacbeth Spectrolino or Eye One.

Note: All of the targets are RGB image files that are tagged with Adobe RGB as a default, and are stored in a "Horses" folder or directory. On the Macintosh, this folder can be found at System Folder:Preferences:Horses. Under Windows, this directory is found at C:\PROGRAM FILES\HORSES.

When you use ProfilerPRO to open a chart with its "Load Calibration Chart" command, and if you are using a non-Adobe RGB working space, Adobe Photoshop may ask whether you would like to convert the target – if so, answer "Don't Convert" (Adobe Photoshop 5) or "Leave As Is" (Adobe Photoshop 6 or later). The target file is locked/write protected and should remain that way; you should not overwrite it or change it in any way. **Note: The 2.1 software and later uses a new "ordered" color sequence. You will not be able to build profiles from target prints and/or measurements that you previously saved with older versions.**

Calibration Chart for Scanner-based Profiling

ProfilerPRO also provides a "729 patches/scanner" chart for you to print. This is the same file used by ProfilerPLUS RGB and ProfilerPLUS CMYK. After printing this, you will "measure" this print with your flatbed scanner by scanning it. Finally, you can open the scanned image into Adobe Photoshop and use ProfilerPRO to build an RGB or CMYK profile from the image window contents. To do so, you must have an RGB image window open which contains a scan of the calibration chart, and then use the "d. Build Profile from Chart Scan" command in the ProfilerPRO pop-up. See the ProfilerPLUS RGB and ProfilerPLUS CMYK documentation for more details on building scannerbased profiles.

The Calibration Chart in version 2.1 and later contains an ordered "quilt" of color squares, as shown below. **Note: You must use scans of the "ordered" chart with 2.1 software and later. You will not be able to build profiles from chart prints and/or scans from older versions of ProfilerPRO.**

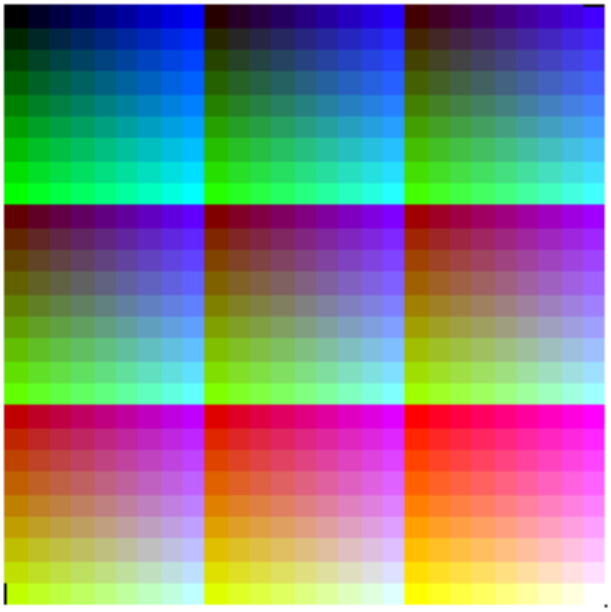


Figure 1: Calibration Chart for Scanner-based Profiling

When you use ProfilerPRO to open this chart with its "Load Calibration Chart" command, and if your working space is not set to Adobe RGB, Adobe Photoshop may alert you. If so, answer "Don't Convert" (Adobe Photoshop 5); or "Use the embedded profile" or "Discard the embedded profile" (Adobe Photoshop 6 or later). If Adobe Photoshop asks you whether you want to save any changes to these targets when you close them, always say "no." The target file is locked/write protected and should remain that way; you should not overwrite it or change it in any way.

"Quick Start" Instructions for RGB Profiling

The Create RGB Profile command in the ProfilerPRO plug-in produces printer profiles that are optimized for the color output of your favorite printer for any paper and ink combination. It creates ICC compliant color profiles on Windows and Macintosh for either platform. Once you have installed ProfilerPRO and configured your system as previously described:

- Start up Adobe Photoshop and run the **ProfilerPRO** plug-in (using the **File** —> **Automate** —>

ProfilerPRO command).

• With **Create RGB Profile** selected, choose **a. Load Calibration Chart** from the pop-up menu. In the pop-up next to that, choose a target that is compatible with your measuring device. Click **OK**. You will see the selected Calibration Chart target open into an image window. (See the Step 1 documentation in the following sections for more details).

• Print the Calibration Chart target using *no color adjustment*, and using the paper, ink and printer you want to profile. Set the printer driver to use the same resolution, paper type and other settings (i.e. media/paper type, 1440 dpi, error diffusion, high quality) that you will use when making "real" prints through the profile. (See the Step 2 documentation in the following sections for more information on Print dialog settings in both Adobe Photoshop 5 and 6.)

• Use your colorimeter to measure the patches and create a text file which contains the measurements. (See the Step 3 documentation for details.)

• Return to the ProfilerPRO plug-in as described above. With **Create RGB Profile** selected, choose **b. Select Measurement File…** from the pop-up menu, then select the text file which contains your measurements. ProfilerPRO will then display the file name and the measured white and black values that it contains.

• With **Create RGB Profile** still selected, and the pop-up set to **c. Build Profile from Measurements…**, click **OK.**

• Save the profile under an appropriate name. The program defaults to the appropriate location: the System Folder/ColorSync Profiles folder (Macintosh) or C:\WINDOWS\SYSTEM\COLOR folder (Windows).

That's it! You're now ready to print an image using the profile you just made.

Detailed Instructions for RGB Profiling

The following are detailed instructions using an Epson® 3000 printer as an example. How to build a printer profile in 4 easy steps:

Step 1 - Load The Calibration Chart

The first step is to load one of the ProfilerPRO Calibration Charts, which are RGB image files tagged as Adobe RGB. Based on your selection in the "Patches" pop-up at the right, it will contain either 27, 125, or 729 color patches which are used to represent the entire range of colors that can be sent to your printer.

- Start up Adobe Photoshop.

- Start up ProfilerPRO (using File—>Automate—>ProfilerPRO) and make sure that "Create RGB Profile" is selected. You should then see the main ProfilerPRO window
- With **Create RGB Profile** selected, **a. Load Calibration Chart** chosen from the pop-up menu, and the number of patches you're going to measure also selected in the pop-up next to that, click OK. ProfilerPRO will load one of the calibration chart "targets" based on your selection in the rightmost pop-up. If Adobe Photoshop asks if you want to convert the chart to a color space, answer "Don't Convert" (Adobe Photoshop 5); or "Use the embedded profile" or "Discard the embedded profile" (Adobe Photoshop 6).

Step 2 - Print The Calibration Chart

Once the chart is loaded, we need to send it to the printer, **after** turning off all existing printer calibration. This is crucial: you **must** turn off any "profiling," "color adjustment" or calibration for the printer **before** you print the chart.

The result will be an "uncalibrated" print of the chart squares, which represents the uncalibrated state of the printer. This is what the printer does *without* any profiling. Typically, the print of the chart squares will be darker and color shifted compared to what you would normally want, due to the "dot gain" of the printer, the effect of the printer inks, and the kind of paper on which you are printing. If you printed a normal (photographic) image without calibration, you wouldn't like the results. This is the reason for building a profile: to adjust for the uncalibrated state of the printer so that images you print will look "correct" when you use the profile you've created.

Note: Make sure that you use the paper, ink and printer you want to profile, and set the **printer driver** to use the **same** resolution, ink and paper type, error diffusion, quality and any other settings that you will use when making "real" prints through the profile you build. For example, if you are printing to an Epson, you might typically choose HeavyWeight Matte paper, color ink, 1440 dpi, error diffusion, high quality halftoning. **Do not** set the printer driver's resolution at a lower dpi if you are going to be printing at 1440 dpi through the resulting profile!

Note: This has nothing to do with the internal resolution setting of any of the targets (the DPI that shows up in Adobe Photoshop if you use the Image Size command). That has been preset at an appropriate dpi so that the image will fit properly on a typical output page and it does not need to be changed. The targets do not need to be resized or resampled after you open them.

Note: There are differences in the Print dialog controls you should use for Adobe Photoshop 5 and Photoshop 6 or later when you are printing the calibration chart.

Example 1: Adobe Photoshop 5 for the Mac, Epson 3000 settings

In Adobe Photoshop 5Print dialog, set the "Space" pop-up and "Printer Color Management" as shown above. Click on the "More Settings" button to be sure that color adjustment is turned off when you make this print.

Make sure that Media Type, Print Quality, and Halftoning are set properly for the type of print and materials you'll be using. Then go to the Color Management section and set Color Adjustment to "No Color Adjustment."

After you have done this, click OK to return to the previous screen and then Print. The calibration chart should then print on a single piece of paper.

Example 2: Adobe Photoshop 6 for the Mac, Epson 1270 settings

In Adobe Photoshop 6 Print dialog, Set “Source Space” and “Print Space”. Click on Advanced.Click on “No Color Adjustment” and set the left side controls appropriately for your media and resolution settings. Please note that the media setting matching your paper type does not always produce the best result. If in doubt, try prints at assorted media settings.

Example 3: Adobe Photoshop 5 for Windows, Epson 3000 Settings

Use Adobe Photoshop 5 Print command.

Set the "Space" pop-up to RGB Color. We recommend turing Printer Color Management **off** for Windows).

You'll need to click on the "Setup" button to be sure that color adjustment is turned off when you make this print.

Click on the **Properties** button, and

choose the advanced radio button, click **More Settings**, and
make sure that Media Type, Print Quality and Halftoning are set properly for the type of print and materials you'll be using. Then go to the Color Management section and set Color Adjustment to No Color Adjustment.

After you have done this, click OK to return to the previous screen, hit the apply button, and then hit the OK button. You are now at the Page Setup window. Hit OK and you are in the Print window. Hit the OK button to make a print. The calibration chart should then print on a single piece of paper.

Step 3 - Measure The Target Print

Once you've printed a Calibration Chart target, you need to measure the color patches with your colorimetric measuring device. The following sections describe how to do this with each of the supported measuring devices.
ColorSavvy ColorMouse

ColorMouse for the Macintosh

• Attach your ColorMouse to a serial port and run ColorSavvy ColorMouseTrap software. If ColorMouseTrap can't locate your ColorMouse, use the Edit:Connection command to establish a connection with it.

• Use the Edit:Preferences command to set up the proper export format. The Default Observer should be 2 degrees; Export Clipboard data as Tab-delimited text (make sure that PICT is **not** checked); and in the Color Data for Clipboard and Log section, make sure that L*a*b* is checked and that none of the other entries are checked. **Note:** Once you've done this, you won't need to reset Preferences every time you measure a target.

• Go to the ColorMouse menu and make sure that "Profile Mode," rather than "Pickup Mode," is checked, to produce the highest quality measurements.

• Use the Edit:Calibrate command to calibrate the ColorMouse.

• Go to the ColorMouse menu and select the "Log Measurements" command so that it is checked. ColorMouseTrap will ask you to name the log file – call it something meaningful (such as "Epson 3000 photo paper 125") and use the file dialog to create it in a location where you can find it later.

• Make sure that the ColorMouseTrap window is visible. In the Illuminant pop-up, select D50 – USA Proofing. The Output Profile setting isn't important, but you can set it to Adobe RGB (1998) in any case.

• If you're using the 729 patch target, measure each patch in the target, from left to right, starting with the leftmost column (1) in the first row (1). At the end of the row, move on to the next.

• If you're using the 125 patch target, measure all 15 patches for rows 1-5, and measure only the leftmost 10 patches for rows 6-10. **Don't** measure the alternating white and gray patches at the ends of rows 6-10.

• If you're using the 27 patch target, measure all 6 patches for rows 1-3, and measure only the leftmost 3 patches for rows 4-6. **Don't** measure the alternating white and gray patches at the ends of rows 4-6.

• When you're finished measuring, turn off the Log Measurements command. You can then import the log file text directly into ProfilerPRO.

ColorMouse for Windows

• Attach your ColorMouse to a serial port and run the ColorSavvy CSConnect.exe. If CSConnect can't locate your ColorMouse, use the port pop-up in the Communications controls to locate it on the correct serial port.

• Set up the Data Types controls as follows: Data Type To Return should be Colorimetric; in the Colorimetric Parameters area, set ColorSpace to L*a*b*, illuminant to D50 and Observer to 2 degrees; Fast Mode, AutoButton and Extended Precision should be turned OFF. In the Data Format area, uncheck "Direct output to an application" and check "Direct output to a file". Click on the Browse button and select a file name to save into such as "c:\mydocuments\1270.matte.125.txt". Leave Formatting at the default settings, which should be: Number <tab> Number <tab> Number <tab> <enter>.

• Use the Calibration commands to calibrate the ColorMouse. After you've finished, click OK and CSConnect will disappear. It will continue to run in the background (invisible), but every measurement you take with the ColorMouse will be automatically saved into the file you specified above.

• Measure each patch in the target, from left to right, starting with the leftmost column (1) in the first row (1). At the end of the row, move on to the next.

• If you're using the 125 patch target, measure all 15 patches for rows 1-5, and measure only the leftmost 10 patches for rows 6-10. Don't measure the alternating white and gray patches at the ends of rows 6-10.

• If you're using the 27 patch target, measure all 6 patches for rows 1-3, and measure only the leftmost 3 patches for rows 4-6. Don't measure the alternating white and gray patches at the ends of rows 4-6.

• When you're finished measuring, the text file you've created can be imported directly into ProfilerPRO.

This is similar to the ColorMouse procedure, only you will use the X-Rite ColorShop software to take the measurements and save to a file. This procedure has been tested on the Macintosh; ColorShop for Windows should work in a similar way.

• Attach your DTP22 to a serial port and run ColorShop. If you can't connect initially, go into the Edit:Connection menu; select X-Rite Digital Swatchbook in the Device pop-up; and select the serial port to which it is attached in the Connection pop-up.

• In the Edit menu, use the Preferences command and configure ColorShop as follows: In the Export Clipboard Data section, select "Tab-Delimited Text" and check the "Include Header" box. In the Color Data To Export section, make sure that only "CIE Lab" is checked. **Note:** Once you've done this, ColorShop will remember the settings and you won't need to do it again.

• In the Control Palette window, set things up as follows: Document Profile to "None"; Rendering Intent will be dimmed; Illuminant should be set to D50-Proofing Illuminant; Measurement Mode should be set to Absolute Reflective.

• At the bottom of the Control Palette window, click on the black/white square to calibrate the DTP22.

• Measure each patch in the target, from left to right, starting with the leftmost column (1) in the first row (1). At the end of the row, move on to the next.

• If you're using the 125 patch target, measure all 15 patches for rows 1-5, and measure only the leftmost 10 patches for rows 6-10. **Don't** measure the alternating white and gray patches at the ends of rows 6-10.

• If you're using the 27 patch target, measure all 6 patches for rows 1-3, and measure only the leftmost 3 patches for rows 4-6. **Don't** measure the alternating white and gray patches at the ends of rows 4-6.

• When you're finished measuring, go to the File menu and use the "Export As…" command to save your measurements into a text file. In the Format pop-up, choose Tab-Delimited text. You should then be able to open that file directly in ProfilerPRO to build a profile from it.

X-Rite DTP41 Strip Reader

To use the X-Rite DTP41 Strip Reader with ProfilerPRO, you will need to use the X-Rite ToolCrib 2.0 software utility to connect to the DTP41 and take measurements. The procedure is the same for both Macintosh and Windows.

• Use ProfilerPRO and Adobe Photoshop to print one of the DTP41 target images. If you want to build the best quality profile, use the 729 patch targets. There are two of these; print each on a separate sheet of paper, for a total of 27 strips. We'll use this in our example.

• Run the ToolCrib 2.0 utility and use it to connect. In the Instrument Selection dialog that appears, select DTP41 as the instrument, and use the Port menu to select the serial port to which it is connected.

Note: If you are using the DTP41 on a USB-based Macintosh, you will need to connect it via a USB-serial adapter such as the Keyspan Twin Serial Adapter. If so, configure your system as follows: Set up the Keyspan control panel so that Port #1 is emulating a printer port; and when you run ToolCrib, select "Printer Port" in the serial pop-up to establish serial communications. You may need to use either the Control Strip or the AppleTalk® control panel to turn off AppleTalk on your system for this to work correctly; if so, don't forget to restore AppleTalk to it's previous state after taking measurements.

Note: If you are using ToolCrib 2.0 on a Macintosh, make sure that Virtual Memory is turned off in the Memory control panel. If not, ToolCrib may not be able to store all measurements for the 729 patch target in its text buffer.

• Once ToolCrib 2.0 is running and connected, go to the Tools menu and use the Setup command to make **sure** it is configured correctly. Set the pop-ups as follows: Baud Rate: **9600**; Color Data: **Lab**; ILL/OBS: **D50/2deg**; Protocol: **RCI**; Personality: **DTP41 Reflective**. Note: Once you've done this the first time, you won't need to do it when you read another set of strips.

• Before you read the strips, use the Calibration command in the Tools menu to calibrate the DTP41. Follow the instructions in the Calibration command and feed your calibration reference strip through the DTP41.

• Now, you're ready to read the strips in your target prints. In this example, you've printed both pages of the 729 test patch calibration target. The strips are numbered 1 through 27, clustered in 4 groups on the two pages. You must read the strips in order, starting with strip 1 and finishing with strip 27. For each strip that you read, feed the paper into the DTP41 so that the number for the strip enters the device first, underneath the rollers.

• Go to the Tools menu again and use the Terminal command. An empty window will appear. You need to type the following commands in to set up the DTP41 for reading the 27 patch strips in these particular targets:

• Type: **0270700010008DS** and then hit Return. This tells the DTP41 that there are 27 patches in a strip, that they are approximately 7mm wide, and that the gap between patches is approximately 1mm. After you've done this, the DTP41 should respond <00> in the Terminal window.

• Type: **0105cf** and then hit Return. This tells the DTP41 to return its Lab measurements and list them in the terminal window after it measures each strip. Again, the DTP41 should respond with <00>.

• The DTP41 is now configured correctly and you can proceed with reading the strips. To read a strip, align it in the DTP41 so that the center of the strip (from left to right) will feed along the DTP41's sensor. Push the strip in, strip number first, until you feel the front edge of the paper grip beneath the rollers in the DTP41. Then push the DTP41's measurement button; after a few seconds, the DTP41 will pull the paper through and measure the patches in the strip.

Note: Make sure that the paper remains aligned correctly as the strip is being read. You can use your fingertips to help guide the paper as it is pulled through the DTP41, if necessary.

• Once the strip is measured, the DTP41 should place another 27 lines of measurement data into the Terminal window, followed by <00>. Continue reading subsequent strips until you've measured all 27 of them, in order from 1 through 27.

Note: After each strip is read, make sure that the DTP41 responds with <00> in the Terminal window. If an error code such as <A8> appears instead, the strip was not read correctly. If this happens, you can either: close the terminal window and start over again, starting with the first strip; or remeasure the strip. If you remeasure successfully without starting over, you may continue, but you will need to manually remove the incorrect strip data from the text file, using your text editor, before you can build a profile from it. ProfilerPRO will warn you if it finds non-zero error codes in a DTP41 data file.

• Once you've measured all of the strips, drag the cursor over the entire Terminal window (or use command A for Select All), so that the entire contents of the Terminal window are selected. Then use the Copy command (command-C) to copy the text to the clipboard.

• Run any text editing application (such as SimpleText on the Mac, the NotePad accessory under Windows), and use the Edit:Paste command to paste the DTP41 text data from the clipboard into a new text document window.

• You can then import this text file directly into ProfilerPRO.

• **Important**: Depending on your printer, you may need to be careful about what happens near the edges of your strip prints. If you are printing on letter-sized paper on inkjet printers, this shouldn't be an issue; but, if you are printing on larger paper sizes on desktop or wide format printers, you need to be sure that, when you trim the paper down towards the strips, there is enough white "leader" at each end.

If you trim away **too much** white, then the leading and trailing white space on the strip will be too short. You may not correctly read the first patch or two in each strip because the sensor of the DTP41 will already be on, or past, the first strip by the time you push the paper up into the DTP41's rollers.

If you trim away **too little** white, then the leading white space will be too long. When you push the strip into the DTP41, the sensor won't start off in the blank gap between the strip number and the first patch, and it may misread when it passes over the strip number.

The following are recommendations based on how these targets normally print on letter-sized paper:

729 patches: There should be between 1 7/16" and 1 3/4" (3.5 to 4.5 cm) of leading white space from the trimmed edge of the paper to the leftmost edge of the first color patch on the strip. The strips themselves should print for a total width of approximately 8.5" (21.5 cm) from the leading edge of the first patch to the trailing edge of the last patch. There should

be a white trailer of at least 3/4" (1.8 cm).

125 patches: There should be a minimum of 2" (5.2 cm) of leading white space, from the trimmed edge of the paper to the leftmost edge of the first color patch on the strip. The strips themselves should print for a total width of approximately 7.8" (19.8 cm) from the leading edge of the first patch to the trailing edge of the last patch. There should be a white trailer of at least 1 1/4" (2.8 cm).

Also: Be aware of these guidelines if you are using a photo printer which prints on black stock. You may need to use the Canvas Size command in Adobe Photoshop and force some additional white space to print around the borders of the target.

Using The Other DTP41 Targets

The procedure for measuring and building profiles from the other targets is nearly the same:

• If you are using the 27 patch target, initialize the DTP41 with the following command in the terminal window: **0140700010008DS**, followed by Return. You will measure 2 strips of 14 patches per strip.

• If you are using the 125 patch target, initialize the DTP41 with the following command in the terminal window: **0250700010008DS**, followed by Return. You will measure 5 strips of 25 patches per strip.

• If you are using one of the 729 patch "wide" targets for a wide format printer, initialize the DTP41 with the command that's printed on the target, followed by Return. There are two of these special targets, one designed for printers that are 24" wide, the other for printers that are 36" wide and up.

Note: The command string for each target is printed on the target itself, so that you can read and type directly into ToolCrib without referring to this manual.

Spectrostar Spectrocam

Spectrocam for the Macintosh:

• Connect the Spectrocam, then run the Spectrocamthe software. In the Preferences command, set the Illuminant for **Spectrocam**, the Observer for **Spectrocam**, and Density Status for **"I."** For Single Measurement Options, choose 16 measurements per patch (the default), and check the "Wait for dark" box. For Scan Options (which you'll be using here), choose 4 measurements per patch, stable level 400, time out 20, and missed count 15 (all of these are the defaults). In Sensor options, check the "Sensor Active" box, and adjust the Sensitivity slider so that you can start measuring a scan by placing your finger over the sensor switch. All of this is described in more detail in the Spectrocam documentation.

After you have done this and are familiar with using the Spectrocam to take measurements, it is a simple matter to measure a ProfilerPRO target:

• Double-click on one of the three Spectrocam "chart" templates that are included with ProfilerPRO. For example, if you're going to build a profile from 125 measurements, use the "ProfilerPRO 125 Patches" template.

• After the template opens, resize it so that it fills most of your screen, and tell the

Spectrocam software to scale it down so that it fits inside the window. You'll need to visually check the results for each row, as you scan it, to make sure that all of the patches were measured correctly.

• Put the ProfilerPRO target print on the plastic Spectrocam base. Using the alignment ruler, start with the first row and move the Spectrocam smoothly from left to right. Make sure that the ruler is aligned so that your measurement starts near the center of the first patch.

• After you measure a row, visually check the two or three leftmost and rightmost color patches in the row, on-screen, to make sure they match the patches in the calibration target. If the row didn't measure correctly, click the mouse in the leftmost patch of the row and measure it again. Continue measuring rows until you have completed the last row.

• Use the Export command in the File menu to save the data into a text file. **Note:** If you are using Spectrocam Pro 1.5 software, you must use the "Plain Lab" setting in the Export pop-up when you save.

Spectrocam for Windows:

• Connect Spectrocam, then run the Spectrocam software. Depending on what COM port you are connected to, the software may immediately locate your device (in which case you will hear it "click" rapidly) or it will not (you will need to specify the proper COM port and try again). After you've done this, you should measure the white reference.

• Before you can properly preview the RGB values for the measurements that you are taking, you will need to take some measurements from the screen (this is a one-time procedure). Go to the View menu, use the Monitor Window command, and click on the Monitor Options button. Click on "Measure Sync," hold the Spectrocam up onto the screen, and click Measure Frequency. Then click Recalibrate and follow the instructions. Once you've done this, the Spectrocam software will remember your settings and you can close the Monitor Window.

Note: If you haven't configured the Spectrocam software for your screen with the Monitor Window, the Scan window will **not** display proper colors for the patches as you scan them!

• Open the CIE Data Window, and use its menu commands to set: Observer to **2 degrees**; Illuminant to **D50**; Density Status to **"I"**; and make sure the **Absolute** radio button is selected. After this, you can close the CIE Data Window. The Spectrocam software should remember these settings for your next session.

• In the Measure menu, set the Store command to File. The Spectrocam software should remember this setting. Once "File" is checked, then the software will prompt you to save measurement values into a text file whenever you finish scanning the final row in a chart.

• Open the Scan Window and click on the Options button. For "Number of Patches Per Line," enter a value based on the calibration chart target that you're going to measure (27 for the 729 patch target; 15 for the 125 patch target; or 6 for the 27 patch target). For "Number of Lines", enter 27 for the 729 patch target; 10 for the 125 patch target; or 6 for the 27 patch target. Leave the other settings at their default values.

• With the Scan Window still open, go to the View menu and use the Large Size command. This will resize the Scan Window as large as possible, so that it will be easier to preview the patch colors as they measure.

Note: If you don't resize the Scan Window, then the patch measurements for the 729 patch

target will be too small to preview!

• In the Scan window, check the "Activate Eye" box if you wish to use the photosensitive button on the Spectrocam to start measuring each line. Otherwise, leave it unchecked, and click on the Scan button to start measuring each line.

Nearly all of this is initial setup; once you've done it, you won't need to do it again. For scanning subsequent charts, you shouldn't need to do much more than specify the number of rows and columns in the Scan Window.

After you have finished all of this initial setup, it is a simple matter to measure a ProfilerPRO target:

• Put the ProfilerPRO target print on the plastic Spectrocam base. Using the alignment ruler, start with the first row and, once you've started scanning that line (either by putting your finger over the sensor or clicking the Scan button), move the Spectrocam smoothly from left to right. Make sure that the ruler is aligned so that your measurement starts near the center of the first patch.

• After you measure a row, visually check the two or three leftmost and rightmost color patches in the row, on screen, to make sure they match the patches in the calibration target. If the row didn't measure correctly, **double-click** the mouse in the leftmost patch of the row until the software asks if you want to remeasure, and then measure it again. Continue measuring rows until you have completed the last row. It's not unusual for this to happen for a row or two if you're scanning the 729 patch target.

• After you have finished measuring the last row, the Spectrocam software will automatically ask you to save the data into a text file. Use the **Plain Lab** setting in the Export pop-up when you save, **not** the ProfilerPRO setting, which does not work correctly in the current version of Spectrocam software.

Note: If the Spectrocam software doesn't prompt you to save a file after measuring the final row, then you don't have "File" checked in the Store command in the Measure menu; or you haven't measured enough rows to match the number you entered in the Options dialog for the Scan window.

Note: Unlike the Macintosh version, there appears to be no way to save and then reopen a scan window in the Windows version, so that measurements from an existing chart can be resumed at a later time.

GretagMacbeth Spectrolino

To use the GretagMacbeth Spectrolino to automatically measure patches from ProfilerPRO targets, you must connect it to the GretagMacbeth measurement base – follow the GretagMacbeth instructions for doing this… then connect the measurement base to the serial port.

Run the GretagMacbeth SpectroChart Lite software and use it to set up communications to the Spectrolino (serial port, etc.), as well as the measurement parameters; or use the EyeOne targets and MeasureTool software as noted in the EyeOne section. We recommend that you use the "U" filter (rather than the D65 or Polarizing filters) for taking measurements and building profiles. Choose D50 as the illuminant, 2 degree observer.

Use SpectroChart to open one of the ".csv" files that are included in the ProfilerPRO folder. There is one file for each of the targets. Use the Spectrolino controls to locate the corners of

the measurement chart, and then let it measure the values. Save the results into a text file, which you can then use directly in ProfilerPRO as described in the next section, Step 4.

GretagMacbeth Eye One

To measure with the Eye One, use the GretagMacbeth MeasureTool software version 3.1.5 or later (earlier versions will not recognize the Eye One device). This software is part of the ProfileMaker demo software available from the GretagMacbeth Web site. ProfilerPRO includes two template files, one for each target, that you can use with Measure Tool to automatically measure the patches. Select the appropriate file from the PANTONE COLORVISION folder using the "Custom" selection in the Test Chart pop-down menu. This will preload the target size and configuration, as set approximate values for all the patches. Set the Measure Tool software to mode: Strip. Now the Eye One can then scan each row, starting on the white margin, pressing the measure button, and holding the button until the white margin at the far edge is reached. The Measure Tool software will let you know which strip to measure and will sound a warning if a strip requires remeasuring. Once completed, save the results into a text file, which ProfilerPRO can import directly.

Editing Data Files

If data files from any of the measuring devices fail to import correctly into ProfilerPRO (listing incorrect white or black values or building erratic profiles) then you may have unusual data in the text file that is not parsing properly. To correct this situation, open the text file in a spreadsheet program such as Excel, accepting the default import settings. Check that the body of the file is Lab values consisting of three decimal numbers per line, separated by tabs such as:

84.03 12.07 –19.53

The first (L) value should be between 0 and 100, and the second and third numbers should be between –128 and 128. Any header information above the first row of Lab values can be deleted by selecting the Row number on the left and pressing Command-K on the Mac or Control-K on Windows for each header row. Extra columns of row numbers or other color data such as XYZ values can be similarly deleted by selecting the Column letter and deleting. Commands and methods may vary somewhat with other spreadsheet programs. For DTP41 files, the entire body of the file should be scrolled through, removing rows containing device commands instead of Lab values.

The resulting "clean Lab file" should consist of exactly 125, 150 or 729 Lab values, and no other data. If your file contains more or fewer lines than this, errors in patch measurement occurred while reading the target, and the target should be reread, unless the 729 patch target you originally read had extra patches at the end, in which case these extra "dummy" rows can be deleted as well. A Clean Lab file of the correct length should run properly through ProfilerPRO since any excess data causing parsing errors has been deleted. The first Lab value in such a file is the black patch value, and the last is the white patch value. Note them and check that approximated versions of them are displayed in ProfilerPRO on import.

Step 4 - Build An RGB Profile

Before you can build a profile, you must select the text file containing measurements for the target print that you created previously in Step 3.

• Run ProfilerPRO. With **Create RGB Profile** selected, choose **b. Select Measurement File…** from the pop-up menu. Use the file dialog to select the text file exported from your measuring device for the RGB target you printed and measured. You will then see:

The “L a b” values next to the Ref White and Ref Black buttons correspond to the black and white measurements at the start and finish of your measurement file.

The controls at the bottom of the dialog affect the way that the profile is built. The default settings of “High” precision, Show Edits in Preview turned on, and 0s for the six adjustment sliders are appropriate for building your first profile for a printer/paper/ink combination.

• Look at the measurement values listed under the Lab columns for black and white. The Lightness (L) value for White should be high, typically in the high 80s to low or mid 90s, and the L value for Black should be low, typically below 25. The "a" and "b" values for each of these should be positive or negative numbers that are close to 0 (typically between plus and minus 15). If this isn't the case, then you may have incorrectly measured the sequence of patches. If you're using a DTP41, then you may have skipped or repeated a strip, or you may have used an older version of the X-Rite ToolCrib utility (make sure you have ToolCrib 2.0). If you're using a Spectrocam, one or more of the measurement rows may have skipped a measurement or gotten "out of sync."

Note: If the White and black Lab values don't look reasonable, then the data is most likely incorrect and you won' t be able to build a good profile from it; you will need to check your device settings and technique and remeasure.If you have a DTP41, make sure that you've configured ToolCrib for Lab(**not** spectral) data.

When you click "OK", ProfilerPRO will ask you to enter a name for the profile you are going to build and to specify where that profile will be stored. It will take about 10 seconds, more or less, to build a profile after you've entered it's name and clicked "Save," and then you're done.The profile is built!

The general technique to build the best quality profiles is as follows:

• Build an initial profile as a "reference," with the sliders set to 0, and print a sample photographic image through it as a test. Evaluate the print by looking at it under the lighting that you intend to view your final prints.

• If you want to adjust the color that the profile produces, you can change one or more of the sliders and subsequently rebuild different variations of the "reference" profile, based on your test prints. Go back into ProfilerPRO; reselect the measurement text file for a printer/paper/ink combination; adjust the sliders, and build one or more new profiles. Make new test prints, evaluate and repeat, if needed.

• When building profile variations, change the sliders carefully after making test prints. Even with a calibrated monitor, the most accurate way to judge what the sliders will do is to look at an actual test print after you've built a new profile.

• You can use the white and black reference value buttons to visually adjust how white and black will look when proofing, or cross-proofing, through your profile without affecting actual prints through the profile.(

Profile Editing Sliders

These important tools let you "tweak," or adjust a profile *as you build it*. It's important to understand that these sliders don't let you tweak a profile that you've *already* built; you can only adjust a *new* profile as you build it. This technique produces higher quality results than what could be obtained by applying simple editing tools to existing profiles.

Brightness

This adjusts the brightness produced by the profile, similar to how gamma adjustment in the Levels command works within Adobe Photoshop. It won't suddenly blow your highlights out if you increase brightness, or suddenly block up your shadows if you decrease brightness. Typically, you will find that an increase or decrease of 5 is enough to produce a visible change in the output.

Contrast

This adjusts the contrast produced by the profile. You may use this control if you wish, but our recommendation is to make adjustments to the other sliders first and to use this control only if you can't obtain the results you want by adjusting brightness, saturation and color balance.

Saturation

This adjusts the saturation produced by the profile. This control is somewhat unique, in that it has a stronger affect on the colors in your prints which are *more saturated*, and less effect on colors which are *less saturated* (nearer to gray). This keeps saturation adjustments from emphasizing any slight color casts that might exist in the near-grays that might be in your images. The slider is fairly sensitive; an increase in saturation of +5 is enough to boost saturation visibly in the output, and you probably won't need to go higher.

Color Balance Sliders

These let you adjust the color balance produced by the profile. If your reference profile prints with a slight yellow cast (typical for Epson 870/1270 prints on Epson paper), then dial in a blue +10 and rebuild a new profile to remove the yellow cast. Normally, you shouldn't need to go higher than 10 or 15 on the sliders to produce an acceptable print.

Note: We recommend using the Color Balance sliders first, if you need to neutralize your print from the reference, before adjusting the other sliders.

Precision

This lets you specify either normal or high precision. "Normal" produces profiles that are about 70K in size. "High" bumps up the internal resolution of the profiles and produces about 300K of data. This may improve smoothness in some cases; it also makes larger profiles and they take a bit longer to build.

Show Edits in Preview

If unchecked, the effect of the color editing sliders will be seen *only* in the prints that you make through the new profile. If checked, the effect of the color editing sliders will be displayed both in the prints that you make *and* when using the **Preview** command. What does this really mean?

• If "Show Edits" is checked when you build a profile, then your preview will change as well as your print when you use the profile. If your monitor is well calibrated, and if your initial print through the reference profile matches what you see on the screen, then this is the best setting for building subsequent profile variations. If you add saturation to a profile, and then Preview through it, you will see this increase in saturation in the screen preview, as well as in any prints that you make through the profile.

• If "Show Edits' is unchecked when you build the profile, only the prints you make will change as a result of slider adjustments. If your monitor isn't well calibrated, or if your monitor is calibrated but your initial print still doesn't match well to what you see on the screen, then this is the best setting for building subsequent profiles. If your prints are more saturated than your screen preview, you'll probably want to decrease the saturation slider and build a new profile, which will then make prints that are less saturated. These should match your monitor more closely, but you don't want the Preview through the profile to also get less saturated in the process. This gives you a way of adjusting the print to better match the screen, without affecting the way that the profile previews on the screen.

White and Black Reference Values

This feature (available only when building from measurements) lets you adjust the white and black point that will be used for **previewing** through the profile when you use the **Colorimetric** rendering intent or Adobe Photoshop 6 and above's Paper White Proofing feature. **Note:** This has no effect on the actual data that will be sent to the printer and the resulting prints will look the same regardless of how this is adjusted.

The reference white/black feature can be extremely useful, because many papers "measure" differently than they appear by eye, especially with a non-UV filtered device. Some Inkjet papers use brighteners which cause measuring devices to read the paper's white with more "blue" or "lavender" than they appear to the eye. Without using this feature, previewing through the profile will produce a preview that will look too blue. Similarly, papers with a weak black can appear to have an exaggerated degree of weakness in the preview blacks. Lowering the L value of the black point can assist in balancing this. Using the picker in Adobe Photoshop to select a more appropriate white and/or black by eye, or editing the Lab values numerically will improve the screen preview in such cases.

Note: The reference white/black feature will have no effect on preview through the saturation or perceptual rendering intent except through the Adobe Photoshop proofing feature. You can edit the white and black reference values by clicking on the buttons and using the picker in Adobe Photoshop to change white and black to different visual values.

Note: Editing the white and/or black references will affect only the **preview** through the profile, not the **printed** results.

Step 5 - Saving The Profile

Once the profile building controls are adjusted the way you want, click **OK.** ProfilerPRO will ask you for a profile name; choose something meaningful, such as the name of the printer and paper (i.e. Epson 1270 Matte). Save the profile in the System Folder/ColorSync Profiles folder on the Macintosh, or C:\WINDOWS\SYSTEM\COLOR directory using Windows.

Note: ProfilerPRO should automatically take you to the right folder or directory on your system; you will not normally need to switch folders/directories (double-check to make sure). If you don't save your profiles in the proper place, they won't be available to Adobe Photoshop, the printer drivers or other applications for use when printing.

After calculating for somewhere between 5 and 10 seconds, ProfilerPRO will finish building the profile and will save it under the name that you had specified. That's all there is to it! You're now ready to print an image using the ColorSync profile you just made.

Once you've built a profile, you can quit Adobe Photoshop and relaunch it before you attempt to use the profile. (You only need to quit Adobe Photoshop and restart it; you don't need to shut down and restart your entire computer.) This is because Adobe Photoshop 5 (and, in some situations, Adobe Photoshop 6) will not recognize newly created profiles unless they are present when Adobe Photoshop first starts up. In Adobe Photoshop 6 choosing the View> Proof Setup> Custom menu selection, waiting for the profile list to be rebuild, then selecting Cancel will add your new profile to the necessary lists without restarting the program.

Step 6 - After Building: Detailed Measurement Check

You can perform a more visually detailed check of the measurements, *after* building a profile, by using the ProfilerPRO plug-in to load the "Measurement Check" file (look at the bottom of the target file pop-up) with the radio buttons set for "Build RGB Profile." Then, depending on your version of Adobe Photoshop:

- If you have Adobe Photoshop 5, you must quit and relaunch Adobe Photoshop after building a profile before loading the Measurement Check file. Then, go to the Image menu, Mode submenu, and use the Profile to Profile command. Convert **from** the printer profile that you've just created **to** Lab space. Use the Saturation rendering intent.

- If you have Adobe Photoshop 6 or later, go to the Image menu, Mode submenu, and use the Assign Profile command. Check the Preview box and Assign the printer profile that you've just created.

After doing this, look at the contents of the image window. They now correspond to converted RGB values for the patches that you've measured. They should be darker than they were in the original image, and the color may be shifted, but there shouldn't be any patches that stand out as being obviously and considerably different *from their neighbors*.

If you see scrambled, "out-of-place" colors, or if one or more of the patches are much darker, much lighter, or considerably off-hue from their original values, this indicates one or more bad measurements.

Step 7 - Printing RGB from Adobe Photoshop

There are several ways to print RGB images from Adobe Photoshop using a profile you've created. Different variations, based on whether you're using Macintosh or Windows and Adobe Photoshop 5 or 6, are described in the following sections. All examples use the settings found in an Epson inkjet, other printers will vary, but the concepts remain valid. In general, the methods are as follows:

Method 1: Leave the controls in the main Print dialog as they were when you printed the calibration chart and hook your custom profile in at the "lowest" level in the Epson driver.

On the Macintosh, this method works flawlessly and is the easiest to use. You select ColorSync in the Advanced section of the Epson driver, select the custom profile from the profile pop-up, choose a rendering intent and you're done. The Epson driver will remember the setting, and every print you subsequently make will automatically use your custom profile.

With Windows, you select ICM in the Color Management properties of the Epson driver inside Adobe Photoshop; and in Windows, you associate your custom profile with the printer, so that any use of ICM with the printer driver will subsequently use your custom profile. In theory, this should work flawlessly; in practice, it doesn't always work, as a result of some unknown flaw in different combinations of Windows versions and Epson driver versions. You can try this to see if it works. If it doesn't, we recommend using Method 2 instead.

Note: With Windows, Method 1 is the only way to use an RGB printer profile with most programs other than Adobe Photoshop.

Method 2: Leave the Advanced settings of the Epson driver set for No Color Adjustment, as when you printed the Calibration Chart, and select your custom profile in the Space pop-up (Adobe Photoshop 5) or Print Space pop-up (Adobe Photoshop 6). This works flawlessly on both Mac and Windows. One disadvantage is that you are not allowed to choose a rendering intent; as a result, you will get the Percepual rendering intent (Adobe Photoshop 5) or the intent

you've specified in Color Settings as previously described (Adobe Photoshop 6). Another is that this method works only when printing from Adobe Photoshop.

Method 3: Leave *everything* set exactly as it was when you printed the Calibration Chart. To use your profile on an image window before you print, use the Profile to Profile command (Adobe Photoshop 5) or Convert to Profile command (Adobe Photoshop 6). This works flawlessly on both Mac and Windows. One disadvantage is that you must do this on *each* image that you open, right before you print it. Another is that this method works only when printing from Adobe Photoshop, unless you save the converted result for placing in other applications.

Method 1, Adobe Photoshop 5 for the Macintosh: Set the Space pop-up to RGB and check the Printer Color Management box.

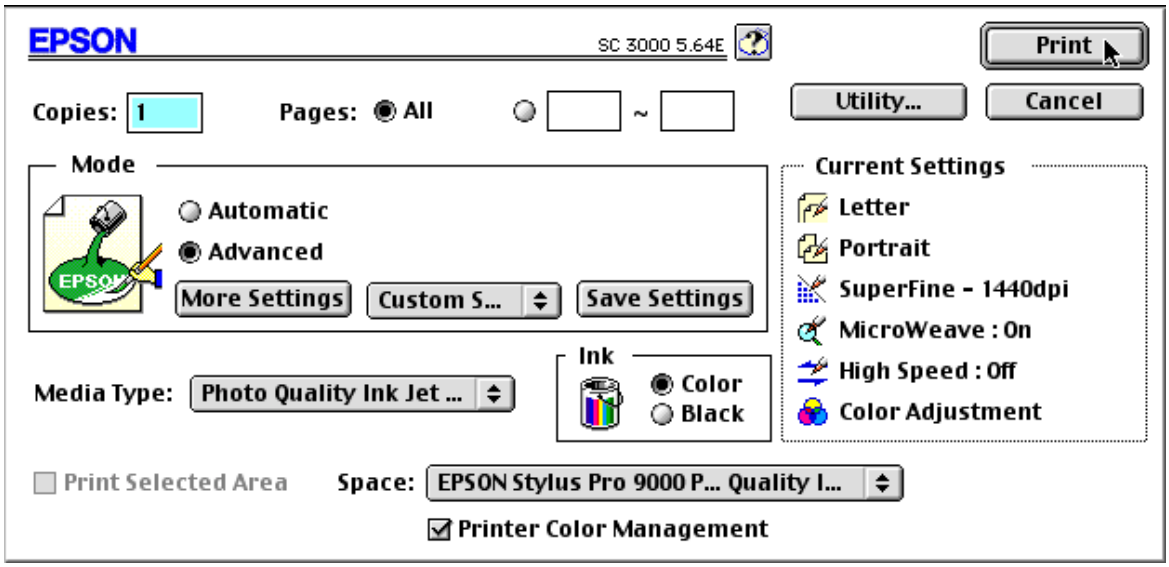
Set the Mode to Advanced, click on More Settings, select ColorSync in the Color Management section, and then select your profile in the Profile pop-up list.
Method 1, Adobe Photoshop 6 for the Macintosh: Set Source Space to Document and Print Space to Printer Color Management. Set the Mode to Custom, click on Advanced, select ColorSync in the Color Management section, and then select your profile in the Profile pop-up list.
Method 1, Adobe Photoshop 5 for Windows: First, add the profile that you just made to the print driver (in this example, we'll use the Epson 3000). In Windows, open the Printers folder. Select the printer and click the **Properties** button.

Click on the **Color Management** tab. Select the **Manual** radio button and click the **Add** button.

This opens up the Add Profile Association window. Now select the profile from the Color folder and click the **Add** button.
First, click "Set As Default" to set the profile as the default. Next, click the Apply button. Finally, hit the OK button.

You can now print with the default ICM profile you just installed by selecting the ICM radio button in the More Settings window back in Adobe Photoshop.

Method 2, Adobe Photoshop 5 for the Macintosh: Print by choosing the profile in the Space pop-up menu in the Epson print window. In Advanced settings, use no color adjustment, just the wayyou printed the Calibration Chart target.



Method 2, Adobe Photoshop 6 for the Macintosh: Print by choosing the profile in the Print Space pop-up menu in the Epson print window. In Advanced settings, use no color adjustment, just the way you printed the Calibration Chart target.

Method 3, Adobe Photoshop 5 for the Macintosh: Convert your image with the Image: Mode: Profile to Profile command, as illustrated below using the newly created ColorSync profile called Epson Stylus Pro 9000 PhotoQuality. **Note:** The image window will change to "strange" looking colors. Don't be alarmed, this is normal. Print the converted image window with no color adjustment, just the way you printed the Calibration Chart target.

Method 3, Adobe Photoshop 6 for the Macintosh: Convert your image with the Image: Mode: Convert to Profile command to a color-corrected image.
Note: This will change the image window colors only slightly, if at all. This is normal for Adobe Photoshop 6 (a very different visual behavior than Adobe Photoshop 5). Then print with no color adjustment, just the way you printed the Calibration Chart target.

Step 8 - Previewing RGB in Adobe Photoshop

The **Preview** command produces an RGB print simulation of the current image window in Adobe Photoshop. The idea is to show you, on screen, what the image will look like when you print through the profile that you select for preview.

- In Adobe Photoshop, open the RGB image you want to preview in a window.
- Run the **ProfilerPRO** plug-in, using the File—>Automate—>ProfilerPRO command.
- Select **Preview**. (If no RGB image window is open, **Preview** will be dimmed.)
- Select a printer profile from the pop-up menu, select a rendering intent (typically the default setting, **Perceptual**, which is how most images are printed), and click **OK**.

After a few moments (if you are using Adobe Photoshop 5, you'll see some temporary image windows open and close – this *doesn't* happen in Adobe Photoshop 6), you'll see a print-simulated preview of your image. Use **Command-Y** to toggle this "live" RGB preview mode

on or off in either Adobe Photoshop 5 or 6.

Note: If you are using Adobe Photoshop 5: After you've made a profile with **Create RGB Profile** and saved it in the ColorSync folder, you must quit Adobe Photoshop and restart it before Adobe Photoshop can see your new profile. This means you must quit and restart Adobe Photoshop before **Preview** will work properly with a newly created profile. This does not apply to Adobe Photoshop 6 – after you build a profile, it is immediately available for general use and preview, without quitting.

Note: Once you've "hooked in" Preview (in Adobe Photoshop 5 only), your CMYK Setup will be switched to "Tables" and connected to a set of custom CMYK preview table files. These will subsequently have undesirable effects if you attempt to do any CMYK-related work in Adobe Photoshop. After you are done previewing, make sure that you go into the CMYK setup dialog and manually reset the CMYK mode to either "Built-In" or "ICC," depending on how you normally use it.

Note: In Adobe Photoshop 6, the Preview command in the ProfilerPRO plug-in works by internally hooking into Adobe Photoshop 6's **View:Proof Setup** command. After turning on proofing this way, you can go into the Proof Setup:Custom dialog and further change the preview by switching rendering intents and/or turning the Paper White simulation on/off.

"Quick Start" Instructions for CMYK Profiling

The Create CMYK Profile command in the ProfilerPRO plug-in produces CMYK printer profiles that are optimized for the color output of your favorite printer for any paper and ink combination. On the Mac, these are saved as ColorSync profiles; under Windows, they are saved as ICM profiles. Once you have installed ProfilerPRO and configured your system (as previously described):

• Start up Adobe Photoshop.

• If you are using **Adobe Photoshop 5**, use the File:Color Settings:CMYK Setup command. Click on Built-In, then click the Load button, and load the "ColorVision" inks file that corresponds to the working space that is selected in RGB Setup. This will establish the default separation and black generation for loading the target and building a profile (see the detailed CMYK profiling instructions for more info). If you want to change the separation and/or black generation settings that will be used for loading the target and subsequently building the profile, do it here.

• If you are using **Adobe Photoshop 6**, use the Edit:Color Settings command; in the Settings pop-up, choose the "ColorVision" Color Settings file that corresponds to the working space you will be using when building and printing profiles. This will establish the default separation and black generation for loading the target and building a profile (see the detailed CMYK profiling instructions for more info). If you want to change the separation and/or black generation settings that will be used for loading the target and subsequently building the profile, go to the CMYK Working Space pop-up and use the Custom CMYK command (at the top of the list).

• Run the **ProfilerPRO** plug-in (using the **File** —> **Automate** —> **ProfilerPRO** command).

• With **Create CMYK Profile** selected, choose **a. Load Calibration Chart** from the pop-up menu. In the pop-up next to that, choose either 27 Patches, 125 Patches or 729 patches, based on the number of patches you want to build a profile from. Click **OK**. This will load the selected Calibration Chart and convert it into a CMYK target that is ready to print. (See

the Step 1 documentation in the following sections for more details). **Note:** If you have an X-Rite DTP41, you must use either the "DTP41, 27 Patches," "DTP41, 125 Patches," or "DTP41, 729 Patches" target from the pop-up instead.

• Print the Calibration Chart through your CMYK RIP using *no color adjustment*, and using the paper, ink and printer you want to profile. If you are using Adobe PressReady™, go to the Adobe Print Color control panel and set the pop-up for CMYK Objects to "Unspecified – For Advanced Users Only." Configure the printer driver or CMYK RIP to use the same resolution, paper type, and other settings (i.e. media/paper type, 1440 dpi, error diffusion, high quality) that you will use when making "real" prints through the profile you build. (See the Step 2 documentation in the following sections for more information.)

- Use your colorimeter to measure the patches and create a text file from the measurements. (See the Step 3 documentation for more details.)

- Return to the ProfilerPRO plug-in as described above. With **Create CMYK Profile** selected, choose **b. Select Measurement File…** from the pop-up menu, then select the text file which contains your measurements. ProfilerPRO will then display the file name and the measured white and black values that it contains.

- With **Create CMYK Profile** still selected, and the pop-up set to **c. Build Profile from Measurements…**, click **OK.**

- Save the profile under an appropriate name in the System Folder/ColorSync Profiles folder (Macintosh) or C:\WINDOWS\SYSTEM\COLOR folder (Windows).

- When you're finished with CMYK profiling (the processes of loading and separating the chart targets, and subsequently building profiles), go back into File:Color Settings:CMYK Setup (Adobe Photoshop 5) and restore this to your usual configuration. (On most systems, this will be SWOP.) If you have Adobe Photoshop 6, go back into Edit:Color Settings and restore your usual configuration.

That's it! You're now ready to print an image using the profile you just made.

Detailed Instructions for CMYK Profiling

The following are detailed instructions using an Epson 3000 printer with Adobe PressReady as an example. Here we go: how to build a CMYK printer profile in 4 easy steps:

Step 1 - Load The Calibration Chart

The first step is to load one of the ProfilerPRO Calibration Charts, which are RGB image files with the Adobe RGB tag. Based on your selection in the "Patches" pop-up at the right, it will contain either 27, 125 or 729 color patches which are used to represent the entire range of colors that can be sent to your printer.

- Start up Adobe Photoshop.

- Before you load a calibration chart target, print it or build a profile, you need to set up the Adobe Photoshop working space, as well as default black generation and separation controls. In previous versions of ProfilerPRO, this was done directly in ProfilerPRO, using a

set of controls which appeared in its user interface. This technique was compatible with Adobe Photoshop 5 but did not work in Adobe Photoshop 6.

ProfilerPRO 2.1 and later uses a new CMYK workflow/technique which is more streamlined; compatible with both Adobe Photoshop 5 and 6; and which also lets you use all of the Adobe Photoshop black generation and separation controls directly. The difference is that the controls are no longer in ProfilerPRO. You will now use the **Adobe Photoshop CMYK setting controls** to do this, and you will need to configure these controls in Adobe Photoshop, but *outside* of ProfilerPRO. There are two slightly different variations of the workflow, depending on whether you are using Adobe Photoshop 5 or 6, described on the following pages.

Note: These workflows assume that you will be using one of the most common RGB working spaces for building your profiles. If you need a Color Settings (Adobe Photoshop 6) or Inks (Adobe Photoshop 5) file for a working space that is not provided, contact ColorVision tech support for assistance.

- If you have **Adobe Photoshop 5**, go into the File: Color Settings:CMYK Setup command. Click on the Load button, and then load the Adobe Photoshop 5 ink settings file that corresponds to the RGB working space that you currently have selected in File:Color Settings:RGB Setup dialog. In this example, we've loaded the inks for Adobe RGB.

  Note: You can find the ColorVision ink settings files in the "ProfilerPRO: CMYK Profiling Support Files:Adobe Photoshop 5 Inks" folder/directory that the ProfilerPRO installer left in the main level of your hard drive (Macintosh) or in the root of your installation hard drive (Windows).

  In Adobe Photoshop 5, the black generation and separation controls (described in the following sections) are visible directly in the CMYK Setup dialog. You can change these parameters if you want to depart from the defaults. You can modify anything in this dialog **except** for the Ink Colors before you load a target, print and build a profile. This includes the ability to use dot gain curves and custom black generation curves, which were not available in previous versions of ProfilerPRO.

  Note: Make sure you leave CMYK Model set to **Built-in** and **Ink Colors** set to the appropriate choice for the RGB working space you are using.

- If you have **Adobe Photoshop 6**, go into the Edit:Color Settings command. If you have copied the Adobe Photoshop 6 .csf files into the proper location, as described in the "Configuring Adobe Photoshop" section of this document, then assorted "ColorVision" settings will appear in the pop-up (if not, you can use the Load button to access them manually). Choosing a ColorVision Color Settings file not only sets the RGB working space to Adobe RGB, but also loads the default settings for CMYK profiling into the CMYK working space pop-up.

  Note: You can find these color settings files in the "ProfilerPRO: CMYK Profiling Support Files:Adobe Photoshop 6.csf's" folder/directory that the ProfilerPRO installer left in the main level of your hard drive (Macintosh) or in the root of your installation hard drive (Windows).

  In Adobe Photoshop 6, you access the black generation and separation controls (described in the following section) by using the *Custom CMYK…* command at the top of the CMYK Working Space pop-up. A dialog (equivalent to the comparable dialog in Adobe Photoshop 5) will appear. You can change the parameters if you want to depart from the defaults. You can modify anything in this dialog **except** for the Ink Colors before you load a target, print, and build a profile. This includes the ability to use dot gain curves and custom black generation curves, which were not available in previous versions of ProfilerPRO.

  Note: Leave **Ink Colors** set to "Other" and do not change it before loading a target or building a profile.

Step 2 – Select CMYK Separation and Black Generation Controls

The Adobe Photoshop CMYK Setup dialogs control the separation of the selected Calibration Chart as it loads. The default settings (40% dot gain, 100% Black Ink Limit, 275% Total Ink Limit, GCR, Medium black generation, 0% UCA Amount) are a good starting point for building CMYK profiles for inkjet printers. The 275% total ink limit will keep the ink from oversaturating the paper. If you are printing on a color laser, you may want to increase the total ink limit to 400%.

Note: If you vary these controls, you will find that the calibration chart will separate differently and produce different targets when it loads and prints. You can verify this by looking at the CMYK channels display.

Dot Gain

Normally (most papers) you should leave this setting as-is and adjust the other controls first. If you are printing with an inkjet printer to an unusually high gloss or smooth surfaced paper (which will print with greater-than-average sharpness), you might want to use a bit less dot gain percentage. As you come to use, understand, and evaluate this process, you can also use custom Dot Gain curves for even more control.

Separation Type

There are 2 choices: **UCR** (Under color Removal) or **GCR** (Gray Component Replacement). With UCR, black ink is used to replace CMYK ink for colors which have equal amounts of CMY ink (neutrals). This reduces the total amount of ink used for the print and can produce more depth in the shadows. UCR is typically used when profiling for, and printing on, uncoated stock and newsprint.

GCR not only uses black ink to replace CMY inks in neutrals; it also uses black ink to replace portions of CMY inks in colored areas. This lowers total ink usage even further. GCR may produce more pleasing results with dark, saturated colors.

Undercolor Addition, or **UCA**, is available only when GCR is the separation type. UCA adds CMY inks (color) *back* into the neutral shadow areas. This increases the total ink for shadows and makes them look richer than if they were printed only with black ink, which sometimes tends to be "flat". Without UCA, the shadows also might never approach the specified Total Ink limit.

Total Ink Limit

This is the maximum amount of ink that will be printed for the target. 400% means that, at most, a full 100% ink would be printed for black for each ink (100% C, 100% M, 100% Y and 100% K).

When profiling an inkjet, you will typically want to use a smaller value to keep the ink from over saturating the target. The starting value of 275% is suitable for printing a test target on typical inkjets that you might profile. Look at the patches and seeing if any of them bleed and run significantly. If so, reducing the Total Ink Limit a bit further should reduce or eliminate this effect. Typically, you would decrease Total Ink for a glossy paper. On the other hand, if you are looking for darker blacks on a heavy absorbent uncoated paper like watercolor paper, you might try *increasing* total ink.

Note: If you have a color laser printer rather than an inkjet, you will probably want to start with a total ink limit of 400%, since you don't need to worry about ink soaking through the paper.

Black Ink Limit

This establishes the maximum amount of Black ink that can be printed, and it is used for both Separation types. If you are profiling an inkjet or color laser, the default setting of 100% is usually appropriate. If you are profiling a press, you may want to experiment with lower values.

Black Generation Method

This controls how much black is generated. **None** means that no black ink at all will be used for printing the target. Only the CMY inks will be used, and the profile that you subsequently generate will not use black ink at all. **Medium** generally produces the best results and is the heaviest you would want on an inkjet, to avoid black specks in light areas. **Light** and **Heavy** produce less black ink and more black ink, respectively. **Max** produces the most. You can also use custom black generation curves, if you like.

- Start up ProfilerPRO (using File—>Automate—>ProfilerPRO) and select "Create CMYK Profile."

- With **a. Load Calibration Chart** chosen from the pop-up menu, and the number of patches you're going to measure also selected in the pop-up next to that, click OK. ProfilerPRO will load one of the calibration chart "targets" based on your selection in the rightmost pop-up and automatically convert it to CMYK. If Adobe Photoshop asks if you want to convert the

chart to a color space, answer “Don’t Convert” (Adobe Photoshop 5); or “Use the embedded profile” or “Discard the embedded profile” (Adobe Photoshop 6).

After the chart is loaded and converted, you will be left with a CMYK mode image window, which contains the calibration chart that has been separated according to your Adobe Photoshop settings for CMYK separation and black generation, as previously described.

Step 3 - Print The Calibration Chart

Once the chart is loaded and separated, it must be processed and sent to the printer through your PostScript RIP or driver.. To turn turned off all existing printer calibration in the Adobe PressReady RIP, for example, go to the Adobe Print Color control panel and make sure that the CMYK objects pop-up is set to “Unspecified (For Advanced Users Only)”. This ensures that the data in a CMYK image window from Adobe Photoshop is printed without any additional color adjustment by the RIP itself.
The result will be an “uncalibrated” CMYK print of the chart squares, which represents the uncalibrated state of the printer. This is what the printer does *without* any profiling. Typically, the print of the chart squares will be darker and color shifted compared to what you would normally want, due to the “dot gain” of the printer, the effect of the printer inks, and the kind of paper you are printing on. If you printed a normal (photographic) image without calibration, you wouldn’t like the results. This is the reason for building a profile: to adjust for the uncalibrated state of the printer so that images you print will look “correct” when you use the profile you’ve created.

Ink Limiting and Black Generation

When you print to an inkjet through an RGB driver, there is built-in ink limiting in the printer driver to keep too much ink from being put down on the paper. A print of a Calibration Chart target through ProfilerPRO and a standard RGB driver to an inkjet, with no printer calibration, still experiences this internal ink limiting (as well as black channel generation) in the driver, even though these processes are hidden.

As a result, a Calibration Chart target (when printed through an RGB driver) will not produce excessive ink on the paper, and none of the chart squares will be so heavily inked that they soak through.

However, when you print CMYK through some 3rd party CMYK RIPs, there is **no** internal ink limiting. ProfilerPRO itself performs this, as well as black generation, for you when it loads and separates a Calibration Chart target, based on the settings in the Adobe Photoshop CMYK controls.

This means that **you** have control over how much ink is put down, as well as how the black channel is generated. Changing the values in the Adobe Photoshop CMYK Controls as previously described, and then reloading a fresh copy of the Calibration Chart, will produce a different separated version of the target.

Before you proceed with the following steps (measuring, and then building a profile), make sure that your initial print of a Calibration Chart target, using the CMYK controls, is acceptable. There should be no excessive color bleed between patches, and if you turn the chart print over, you shouldn't see excessive ink coming through the back of the paper. If so, adjust the CMYK controls, reload the target and make another chart print.

(See the earlier Step 1 documentation for loading a Calibration Chart target for detailed descriptions of the CMYK Separation and Black Generation controls.)

Step 4 - Measure The Target Print

Once you're printed a Calibration Chart target, you need to measure the color patches with your colorimetric measuring device. There is no difference in the technique for measuring patches for a CMYK profile vs. an RGB profile. Refer to the detailed Step 3 instructions for measuring patches in the previous sections on RGB profiling.

Step 5 - Build A CMYK Profile

Before you can build a CMYK profile, you must select the text file containing measurements for your target print that you created previously in Step 3.

- Run ProfilerPRO. With **Create CMYK Profile** selected, choose **b. Select Measurement File…** from the pop-up menu. Use the file dialog to select the text file exported from your measuring device for the CMYK target you printed and measured previously.

The slider controls affect the way that the profile is built. The default settings of "High" precision and 0s for the six adjustment sliders are appropriate for building your first CMYK profile for a printer/paper/ink combination.

Note: Your CMYK settings in Adobe Photoshop should be configured **the same** as when you loaded and printed the calibration chart target. For this reason, you may want to write a note along the edge of your ProfilerPRO chart prints for CMYK profiling, listing the black generation settings used when the chart was loaded.

When you click "OK," ProfilerPRO will ask you to enter a name for the profile you are going to build, and to specify where that profile will be stored. It will take about 10 seconds, more or less, to build a profile after you've entered it's name and clicked "Save," and then you're done; the profile is built!

The general technique to build the best quality profiles is as follows:

- Make sure that you're starting with an acceptable print of the calibration chart. Some 3rd party CMYK RIPs do not have any internal ink limiting. You need to use the CMYK controls and your Calibration Chart target prints to decide how much ink to put down. Don't build a profile if your Calibration Chart target print has too much ink; adjust the CMYK controls, reload the target and print it again with a lower total ink value.

- Build an initial profile as a "reference" with the sliders set to 0, and print a sample photographic image through it as a test. Evaluate the print by looking at it under the lighting that you intend to view your final prints.

- If you want to adjust the color that the profile produces, you can change one or more of the sliders and subsequently rebuild different variations of the "reference" profile, based on your test prints. Go back into ProfilerPRO, reselect the measurement file, adjust the sliders, and build one or more new profiles. Make new test prints, evaluate and repeat, if needed.

- When building profile variations, change the sliders carefully after making test prints. Even with a calibrated monitor, the most accurate way to judge what the sliders will do is to look at an actual test print after you've built a new profile.

- You can use the Adobe Photoshop CMYK controls (described in more detail in the Step 1 documentation) to adjust the target and build even more profile variations.

Profile Editing Sliders

The description of the Brightness, Contrast, Saturation and Color Balance sliders is the same as in the previous description for RGB profiling.

Precision

The description of the Precision setting is the same as in the previous description for RGB profiling.

Step 6 - Saving The Profile

The description for Saving The Profile is the same as in the previous description for RGB profiling.

Step 7 - Printing CMYK from Adobe Photoshop

Here are three ways to print RGB images from Adobe Photoshop using a CMYK profile described below.

Method 1. Go into CMYK Setup and select your newly created CMYK profile.

Use **Image -> Mode -> CMYK** to convert an RGB image to CMYK using the profile that you selected in CMYK setup. This will also give you a live preview in Adobe Photoshop showing you how the image will print. Print with Adobe PressReady, using the same setup that you used when you printed the Calibration Chart target that you took measurements from, back in Steps 1 and 2.

Method 2. Convert your RGB image with **Image —> Mode —> Profile to Profile** to a color-corrected CMYK image, using the newly created ColorSync profile as the destination. Print with Adobe PressReady, using the same setup that you used when you printed the Calibration Chart target that you took measurements from, back in Steps 1 and 2.

Method 3. Load your CMYK profile in the appropriate locations in your RIP or Driver settings, and allow the RIP or Driver to convert the file for you. With some RIPs and Drivers this may require accurately configuring other settings, such as specifying what RGB space the files will be starting from, and whether or not you wish to emulate a press when printing your files.

Using ProfilerPRO With Adobe Photoshop Elements

ProfilerPRO is compatible with the new Adobe Photoshop Elements application. You will be able to load the Calibration Chart and build RGB profiles, but CMYK profiling and Preview are not functional and will not show up if you are running inside Adobe Photoshop Elements.

There are many references throughout this document to Adobe Photoshop in general and on occasion, Adobe Photoshop 5 and/or Adobe Photoshop 6 or later specifically. In most of these cases, you can substitute Adobe Photoshop Elements instead for RGB processes.

Note: The "method 3" descriptions for printing RGB images are not applicable in Adobe Photoshop Elements, which does not have a Profile To Profile command (as in Adobe Photoshop 5), or a Convert To Profile command (as in Adobe Photoshop 6 or later).

Note: Adobe Photoshop Elements does not offer control of RGB working spaces as full Adobe Photoshop does, so you will be limited in your ability to deal with color space issues.

Adjusting For Blues That Look Purple

In some situations, the most saturated "blues" that you print through a custom profile may have too much magenta in the final print, resulting in a color that looks more purple than blue.

One way of improving how the profile handles "blue" is to modify the ProfilerPRO target(s) that you print. To do so, open a target the usual way in Adobe Photoshop, using the "Load" command in ProfilerPRO. Then, use the Adobe Photoshop Image:Adjust:Hue/Saturation command. Set the Edit pop-up to "Blues," adjust the Hue slider to a value of +10, and click "OK". Save the modified target into a new file, using a **non-glossy** file format (such as PICT, with no JPG compression or TIFF). Name it whatever you like, as long as you know where the file is.

It is this **modified** target image that you would subsequently load (using the Adobe Photoshop File:Open command) and print, instead of using the ProfilerPRO plug-in to load the "standard" version of that target.

This technique adjusts the hue of the blue patches in the target without affecting the other colors, by shifting them towards purple. ProfilerPRO compensates for this by making the blues more cyan in the profile, and the result will be a more visually pleasing "blue" in your prints. If you need to, you can apply a stronger hue shift to the target, but if you go past +20 you may start to see some banding in transitions between blue and cyan in your prints.

Note: If you are using the two-page DTP41 or Eye One targets for profiling, make sure that you open each of them, apply the **same** hue/saturation adjustment, and save new copies of each of them. You would then use the Adobe Photoshop File: Open command to open each of the new two-page target files, instead of the originals, before printing and measuring them.