Kodak Polychrome Graphics

Color Fidelity System

ImageMapper

Version 1.0

USER'S GUIDE

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ImageMapper Quick Start

If you're familiar with installing and setting up software on Mac OS X, you can begin to use ImageMapper right away. If you need additional detail and help, consult the following chapters in this guide.

This Quick Start takes you through the steps for creating a new profile for your digital camera, and then using that profile to process a batch of pictures to a destination color space.

Shoot a batch of pictures, making sure to include the 24-patch GRETAGMACBETH ColorChecker target (or the new Mini ColorChecker) in one of your shots, photographed with the same setup, lighting and exposure as the other photos you wish to process. Note that the ColorChecker need not be perfectly square and level in your picture.

1. Launch ImageMapper and check or adjust the Preferences, if necessary. In particular, check that the **Base input** pop-up menu in the Preferences reflects the type of color your camera produces natively, such as sRGB or (in some cases) Adobe RGB (1998). Click **OK**.
2. Select **File → New Camera Profile...**
3. The Input Profile Assistant will display a Welcome screen. Click **Next**.
4. On the next screen, click **Browse...**, and navigate to a folder of pictures which also includes the shot containing the ColorChecker target. Select that picture and draw a loose box (marquee) around the target. Click **Next**.
5. The Input Profile Assistant will automatically locate the target and the patches that it uses to calculate the new input profile. Click **Next**.

6 The Input Profile Assistant displays a progress bar as it calculates the new profile. Click **Next**.

7 On the final screen the Assistant will show you what the picture will look like with the new profile applied. Enter a meaningful description for your profile in the **New profile description** field (or accept the default description that ImageMapper provides).

8 To save the profile to disk, make sure the **Save profile to disk** option is checked. To also apply the profile to a batch of pictures, check the box labeled **Process the other pictures in the input folder to:**, and make sure the correct destination profile is selected in the pop-up menu.

9 Click **Finish**.

10 In the **Save the New Profile** dialog box, enter a name and location for storing for the new profile. Click **Save**.

11 In the **Create a New Folder and Process Images** dialog box, enter a name and location for the folder that will contain your processed pictures. Click **Create**.

A progress bar will appear, indicating that your pictures are being processed.

Introduction to KPG ImageMapper

This chapter gives you an overview of KODAK POLYCHROME GRAPHICS ImageMapper software, version 1.0, and the components included in the package.

What does ImageMapper software do?

KODAK POLYCHROME GRAPHICS (KPG) ImageMapper software is one component of a collection of color publishing tools called the KPG Color Fidelity System.

ImageMapper software is a powerful but simple-to-use software application that can be used by photographers, creatives, publishers and others to do the following tasks:

- Characterize (make an ICC profile for) a digital camera
- Include a desired "look" in your camera characterization
- Convert a digital camera picture – or a batch of pictures – from the camera's native RGB to a working color space or an output color space such as CMYK, or any other color spaces used in publishing production work
- Simply embed a profile in a picture without converting, for further unambiguous processing at a later workflow stage

Understanding ICC Profiles

An ICC profile is simply a file on your computer that contains data that describes the way a color device – like your digital cam-

era – captures or reproduces color. ICC profiles follow a standardized format defined by the International Color Consortium (ICC), assuring that they can be used among the many different color management systems, computer operating systems and computer platforms.

Each device in a color workflow may have very different responses to color and may reproduce color differently. This causes problems with communicating color and translating color predictably from device to device in the workflow chain. ICC profiles provide valuable information on the color capabilities of each device to the color management system. This assures that color will be "mapped" as accurately as possible from device to device, given the limits and constraints of each device.

ImageMapper characterizes your camera using the industry-standard GRETAGMACBETH ColorChecker. When you include this target in a captured scene, ImageMapper can compare the known values of the target to the values that your camera produces, and then it creates a camera profile that can be used to accurately map your camera's color to a chosen destination color space, such as a working color space, or an output color space such as SWOP for publication work.

How ImageMapper works

You don't need to be an expert in color management or image conversion to use ImageMapper – the software application is very simple to use.

You begin by including a 24-patch GRETAGMACBETH ColorChecker color target (or a Mini ColorChecker target) in the first shot of a sequence of pictures that you will be shooting under the same exposure and lighting conditions. After launching ImageMapper, you then display that picture and draw a box to roughly define where the ColorChecker target is located in the

picture. ImageMapper then automatically locates each patch of the ColorChecker target, analyzes the color values, and computes an ICC profile that custom-characterizes the color capabilities of your camera.

You then have the option of saving the profile to your computer's disk and/or processing the remaining images in the folder. All images in the folder are converted from the color space described by the custom profile that you made to a destination color space (such as SWOP) that you designate.

You can also use ImageMapper to

- Simply make a camera profile and save it to disk for later use
- Embed a profile in the image without actually processing the image
- Apply a standard profile, such as sRGB or Adobe RGB (1998) or a previously-made custom profile to a batch of pictures in a folder

Supported file types

KPG ImageMapper can process JPEG images and *uncompressed* TIFF images produced by your camera and software.

Uncompressed TIFFs that are "byte encoded" for either Macintosh or PC may be used.

Here are some examples of TIFF images with compression that are *not* supported:

- LZW-compressed TIFFs
- ZIP-compressed TIFFs
- JPEG-compressed TIFFs; (note that JPEG-compressed TIFFs are not the same as standard JPEG files, which are supported)
- RLE-compressed TIFFs

KPG ImageMapper does not support black and white images.

Installing and Setting Up ImageMapper

This section contains the basic information you will need to install and set up KODAK POLYCHROME GRAPHICS ImageMapper software.

System Requirements

ImageMapper 1.0 may be installed on an APPLE Macintosh system with a G4 processor or later. It requires:

- Mac OS X 10.3 ("Panther") or later
- 200 MB or more of free hard disk space
- 256 MB of RAM (512 MB or higher is recommended)
- A color monitor capable of displaying millions of colors

Installing the software

Installation of KPG ImageMapper software happens in two parts:

- First, the ImageMapper software is installed
- Then, a second installer automatically launches to install the KPG Color Fidelity Module (CFM) on your computer

A note about the CFM

Color management systems are based upon a software module called a CMM, or Color Management Module. A CMM is the color management "engine" that is required to build transforms and process images within a color managed system.

The Color Fidelity Module (CFM) is a CMM created by Kodak Polychrome Graphics; it is used for building transforms within ImageMapper, and for processing images with the software. In particular, the CFM is required when using ImageMapper to process images to a CMYK color space.

You may also select the CFM for more general system use in the Macintosh operating system by selecting it as the preferred CMM in the Macintosh OS X ColorSync Utility. You can also select it as the CMM to be used in software applications like Adobe Photoshop.

Note: *While the CFM may be selected for general system use as described above, it is not necessary for you to do so in order to use ImageMapper. ImageMapper automatically selects the proper CMM to use based on the operation you are performing (irrespective of the CMM selected in the Mac's ColorSync Utility). Specifically, ImageMapper uses the Apple CMM when you convert an image to RGB, and it uses the KPG CFM when you convert an image to CMYK.*

An application called "KPG CFM Preferences" can make adjustments to the way that images are converted to CMYK, and is installed along with ImageMapper. **Note that for normal ImageMapper use, the CFM should not require any adjustment** It is useful to be aware of this application, however, if you later install other components of KPG's Color Fidelity System which also depend on the CFM for making color transformations. Further detail is provided, for reference only, in the *Kodak Polychrome Graphics Color Fidelity Module (CFM) for Macintosh OS X Systems User Guide*. This PDF file is installed with the ImageMapper software on your system.

To install the software

1. Double click on the **Install KPG ImageMapper** icon.
2. You will need Mac OS X Administrator rights to install the application. Enter your Administrator logon (Name) and password, and then click **OK**.
3. A splash screen appears. Click **Continue**.
4. Read the licence agreement and click **Agree**.
5. Make sure **Easy Install** is selected from the pop-up menu. By default, the installer will place ImageMapper in the Applications folder, generally considered the best choice; however, you also have an option to select another location for the program.

   Click **Install**.
6. A progress bar is displayed while the ImageMapper program is installed. When this part of the installation is done, a second installer automatically is launched for installing the KPG CFM.
7. After all installations have finished, you will see a message indicating that the software was successfully installed. Click **Quit**.

Important:*The installer creates a folder called "KPG ImageMapper" in your Mac OS X Applications folder. This folder contains the ImageMapper software application, as well as another folder called "KPG ImageMapper Profiles," which contains default profiles that are used by the application. That folder, and the default profiles inside of it, should not be moved or deleted. If you should inadvertently move or delete the folder, or any of the default profiles inside it, you can correct the situation by simply reinstalling the*

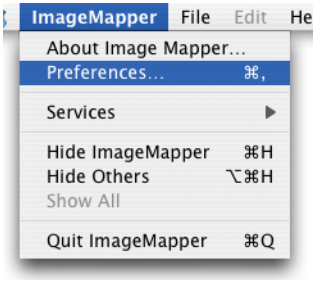
ImageMapper software. See Chapter 5, Tips, Techniques and Troubleshooting, *for more details.*

Setting ImageMapper Preferences

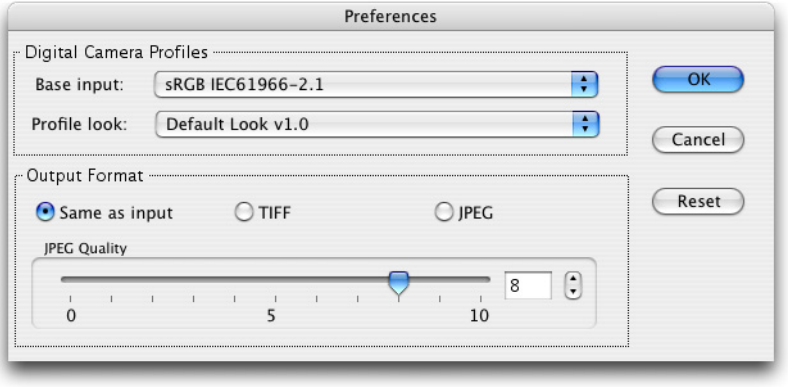
The default ImageMapper Preference settings will work well for many users. You may wish to check and adjust these settings before your first use, and whenever you have a significant change in the way you want to process your files, but in general, the Preferences do not need to be changed often.

The Preferences menu is divided into two sections: Digital Camera Profiles and Output Format. The Digital Camera Profiles Preferences control aspects of how your camera's color will be mapped to the color space for a given output process (when you select that output process later in the workflow). The Output Format Preferences control the file format and quality of the final files.

1 Select **ImageMapper → Preferences...**



The ImageMapper Preferences window appears.



2 Select a profile from the **Base input** pop-up menu.

In general, you should pick a Base input profile that corresponds to the type of color that your camera produces natively.

For example, many digital cameras produce an image file in the sRGB color space. In some cases, there may also be options to produce a file in another color space, such as Adobe RGB (1998). Your Base input profile should be the same as your camera's default color space.

3 Select a **Profile look** from the pop-up menu. Note that selecting a Look profile only affects workflows where you are generating a new custom input profile. It does not have any effect if you are simply processing images using the "Remap Pictures..." function.

Tip: *A "Look" is a special profile that is used during image conversion to allow additional modification in mapping colors appropriately for your subject matter, or to impart a particular effect to the rendered image. For example, if you are shooting products, select the Kodak DCS Product Look to maintain good image contrast and bright, saturated product colors. If you are shooting portraiture, select the Kodak DCS Portrait Look to achieve pleasing, less saturated fleshtones, and good fleshtone-to-neutral balance. Look profiles are also included that help achieve a look similar to popular color negative/paper*

combinations used in portrait labs, as well as certain favorite color reversal films ("chrome" looks).

4 In the **Output Format** section of the menu, select **Same as input** if you want to keep the output file format the same as the original camera file that you started with. With this setting, the output file will be a TIFF if the original camera file was a TIFF, and the output file will be a JPEG if the camera file was a JPEG.

If you want your output files to be TIFF, regardless of what the original file was, click **TIFF**; if you want your output files to be JPEG regardless of the original file, click **JPEG**.

Note: *ImageMapper supports the use of standard JPEG images and uncompressed TIFF images. It does not support TIFF images that are compressed. Unsupported file types include TIFFs with LZW, ZIP, JPEG and RLE compression. Black and white images are also unsupported.*

5 If your output files will be JPEG, you can adjust JPEG quality versus file size by using the **JPEG Quality** slider at the bottom of the menu.

Tip: *If you will be submitting your image files for publication, check with the publisher to see if your images should conform to the DISC (Digital Image Submission Criteria) specifications (http://www.disc-info.org/). The DISC requirements specify JPEG Quality 8, sometimes called "JPEG Fine." This is the default setting in the ImageMapper Preferences menu.*

6 Click **OK**.

If you make changes in the Preferences and later find that you want to revert to the Preference settings that were in place when the software was first installed, simply click the **Reset** button, and then click **OK**.

Using KPG ImageMapper

This chapter shows you how to use KODAK POLYCHROME GRAPHICS ImageMapper to

- Build and save a custom input profile for your digital camera
- Apply the custom profile to a folder of pictures and process the pictures to a "working space" or other specified output
- Apply a standard supplied profile or previously-made custom profile to a folder of pictures and process the pictures for a specified output
- Embed a profile in a batch of pictures without processing

Note on picture processing and embedded profiles

In a color managed workflow, profiles are used to convert a picture from a source color space – for example, the color space represented by the profile that characterizes your camera – to a destination color space, which might be a "working color space," or an "output color space" which is representative of a particular printer or printing press. ImageMapper provides an easy-to-use means for making these conversions.

Whenever ImageMapper processes images, it also *embeds* into the image the last profile that was used in the processing chain. With embedding, the profile information is actually added to the image information and is carried in the image file as metadata. The embedded profile provides valuable and unambiguous information to anyone who may receive and further manipulate the image

file, since they will know the correct color space to be used as the source for any further processing.

The first sequence of workflows described in this chapter involves actual processing of of your camera image's pixels via source and destination profiles. In these cases, the pixel data is altered to be optimized for the destination color space to which you are converting – and, the final profile used in that conversion is embedded in the image file. Thus, if further processing is needed in a later workflow step, the recipient of the image will know the correct profile to use as the source.

If you are a photographer whose workflow involves simply forwarding unmodified pictures to a publisher or prepress house for further processing, you may wish to simply embed the custom profile that you make in ImageMapper into your pictures without processing or modifying the pictures. In that case, the final workflow describes a simple method for simply embedding a profile without processing the picture.

Making a new camera profile, saving it, and processing a batch of pictures

All ImageMapper workflows that include the creation of a custom camera profile will allow you to simply save the profile to disk for later use. If desired, you may also immediately process a picture, or batch of pictures, with the newly-made profile.

Before you begin

Refer to the section "Preparing to build an input profile" in Chapter 5, *Tips, Techniques and Troubleshooting*, for an in-depth discussion of how to set up, use and evaluate the GRETAGMACBETH ColorChecker target to make an input profile.

Make sure your batch of pictures includes a shot that contains the ColorChecker target. You may use the standard-size 24-patch ColorChecker target, or the more recent small-size (3.25 x 2.25 inch) "Mini ColorChecker." The scene containing the target should be shot using the same camera settings, exposure and lighting conditions as the rest of the pictures in the batch.

Note:*It's not necessary to place the ColorChecker target perfectly square in the scene. The Input Profile Assistant will autolocate the patches of the ColorChecker, and can compensate for some degree of horizoning error or out-of-square placement. It is best, though, to locate the ColorChecker under the main lighting of the scene and roughly in the same plane as the important subject matter of the picture.*

Options for launching ImageMapper

You can launch and begin to use ImageMapper in two ways:

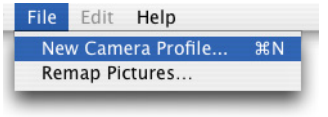
- Open the ImageMapper application by double-clicking on the application icon and select **File → New Camera Profile...**
- Drag-and-drop a picture file, or a folder full of picture files onto the ImageMapper application icon

ImageMapper uses a guided, "Input Profile Assistant" to take you through the steps needed to create a new camera profile, save it, and apply it to pictures.

Depending on which method you use to begin, the sequence of Input Profile Assistant screens will vary slightly to reflect choices and functions that you choose for your particular workflow.

Here are the two options for launching ImageMapper:

Open the ImageMapper application and choose **File → New Camera Profile...**



or,

Drop a picture file or a folder of picture files on the ImageMapper application icon.

The beginning screen will differ depending on which method you chose to begin the process. If you chose **File → New Camera Profile...** from the ImageMapper menu, you will see this screen:

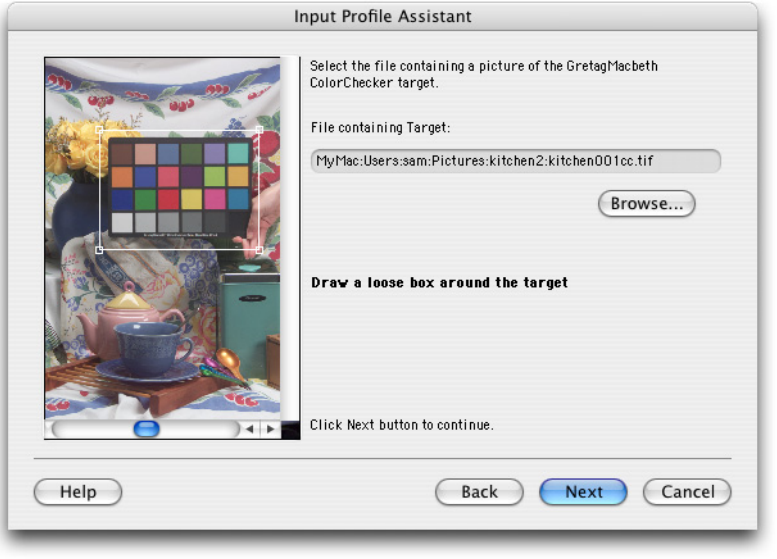
If you began by dropping a folder of pictures onto the ImageMapper application icon, you will see this screen:

In this case, make sure to select **Create a new input profile from a target. You will be prompted to select the input file.**

Click **Next**. From this point, the screens are identical.

Creating the profile

1 On the next screen, click the **Browse...** button to navigate to a folder of pictures which also includes a picture containing the GRETAGMACBETH ColorChecker target, shot under the same exposure and lighting conditions as the rest of the pictures.

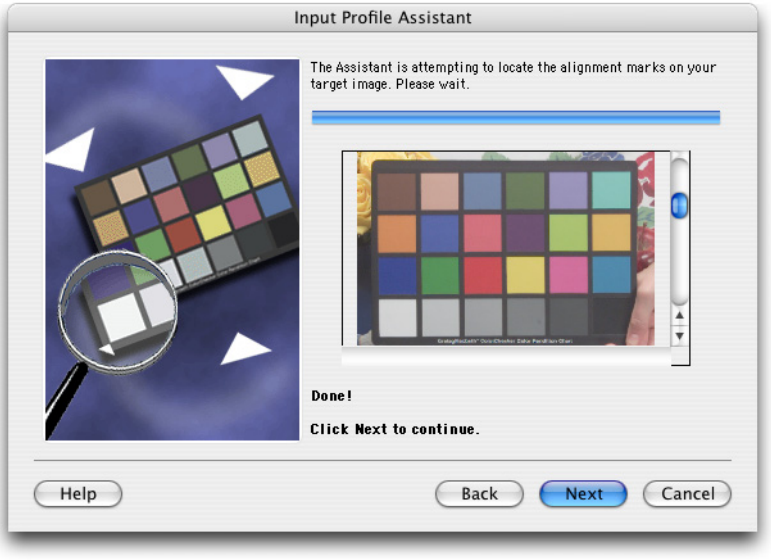


After you have selected the picture containing the target, use the mouse and cursor to draw a loose box around the area of the picture where the target is located.

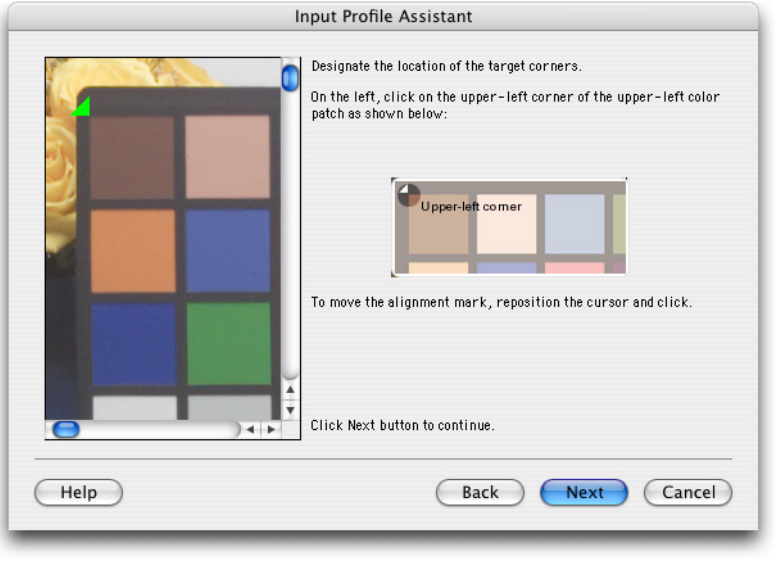
Note:*Do not draw the box too tightly around the image of the ColorChecker target.*

Click **Next**.

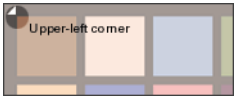
2 The Input Profile Assistant will automatically locate the patches of the ColorChecker.

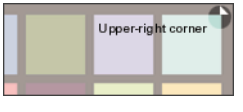


If, for some reason, the Input Profile Assistant is not able to locate the target, you will be asked to click on three corners of the target: the upper left corner, the upper right corner and the lower right corner. The panel shows you how to define the corners.

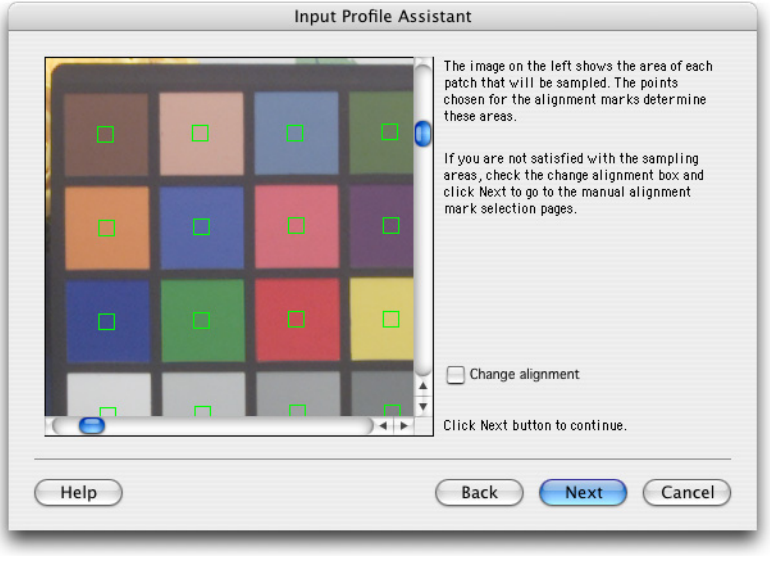


After you define each corner, click **Next** until you have defined all three corners.





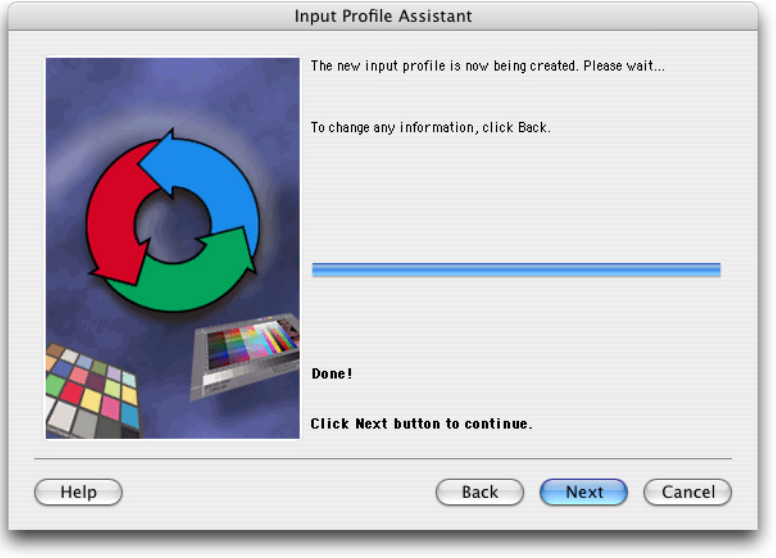
3 ImageMapper creates your input profile by sampling each patch of the GRETAGMACBETH ColorChecker and comparing the values you captured to known values. The green boxes on the next screen indicate the alignment of the points for sampling the ColorChecker target.



Click **Next**.

Note:*If you are not satisfied with the alignment of the points, you may click the "Change alignment" check box and click "Next." You will be asked to manually locate the three corners as described earlier.*

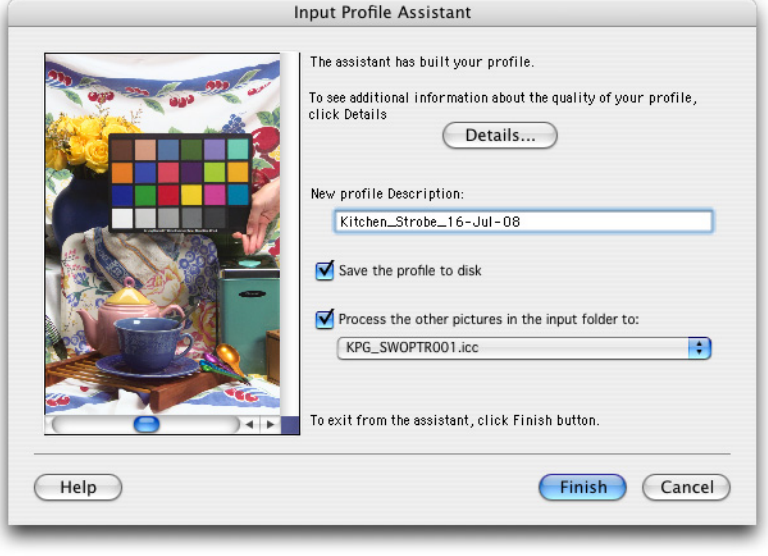
4 This screen tells you that the Input Profile Assistant is creating the new profile.



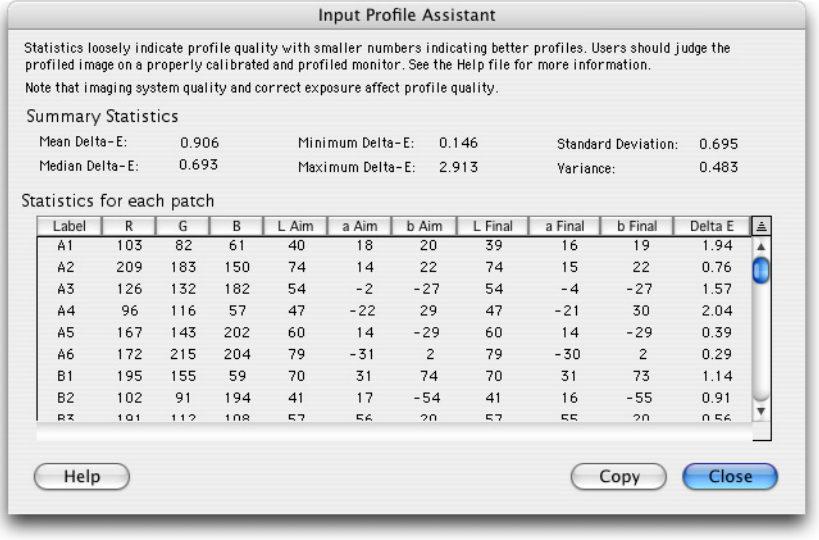
Click **Next**.

5 Once the profile has been built, you may do any combination of the following:

- View details about the quality of the new profile
- Enter a description for the new profile
- Save the profile to disk for future use
- Apply the new profile to a folder of pictures and process for a desired output color space.



If you want to see details about the quality of the profile, click **Details...**. A screen similar to the following will appear.



For a discussion on how to interpret the statistics, see Chapter 5, *Tips, Techniques and Troubleshooting*.

Saving the profile to disk and applying it to pictures

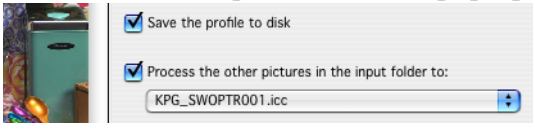
1 To continue with saving the profile, enter a meaningful description in the **New profile Description** text field. The Input Profile Assistant will enter a default description of the profile, based upon the name of the image containing the ColorChecker target that you used to create the profile. You can either accept the default description, or enter a description of your own.

Note: *When ImageMapper assigns a default name to the new profile, it uses the folder name and file name of the original picture that contained the GretagMacbeth ColorChecker, and it also appends the file extension ".icc". The format is: foldername_filename.icc. Example: if you create a profile from a picture containing a ColorChecker called kitchen001cc.tif, and the picture was originally located in a folder named kitchen2, the resulting profile will be*

called kitchen2_kitchen001cc.icc. (Note that the ".tif" extension that was part of the original picture file name is not used).

Tip: *In some circumstances, applications such as Adobe Photoshop display the profile's description string, rather than the file name, when you select a profile. This is a good reason for making sure that the profile description is useful and meaningful. Further, many users prefer to keep the profile description and profile file name similar or identical to avoid confusion. As you will see, ImageMapper creates a default profile file name that is identical to the description that you enter in this step.*

2 To save the profile to disk, make sure the **Save the profile to disk** check box is selected. If you also want to immediately apply the new profile to process a batch of pictures, select the **Process the other pictures in the input folder to:** check box, and select a destination profile from the pop-up menu.



If you are processing pictures, your new profile will be used as the source, and your selected profile from the pop-up menu will be used as the destination.

To convert the pictures to your publisher's or prepress house's working color space

Select a working space from the pop-up menu. For example, if your publisher or prepress house uses Adobe RGB (1998) as a working space, select that and click **Finish**. Your images will be converted to that working space, and the Adobe RGB (1998) profile will also be embedded in the pictures.

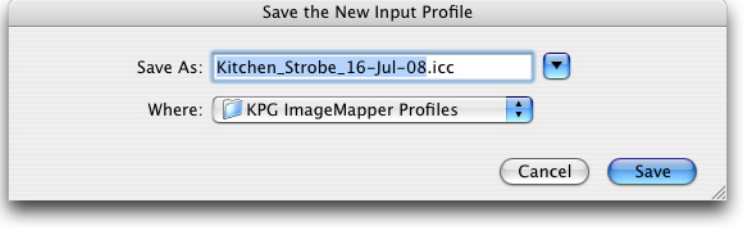
To convert the pictures to an output color space

Select an output color space from the pop-up menu and click **Finish**. This might be a profile that you have for an in-house printer, or it might be a profile that represents an offset printing standard such as SWOP. In the example illustrated above, KPG_SWOPTR001.icc has been selected.

Important: *If you are processing to an output color space in order to forward finished images to a print provider, make sure that you fully understand the requirements of that print provider. The provider may have specific requirements that must be followed, possibly including a specific profile to be used for a given printing press. If you are unsure, you may prefer to simply forward the image converted to the provider's specified RGB working space, or simply forward the unmodified image with the source profile embedded.*

After you have selected your processing options on the previous screen, complete the final steps.

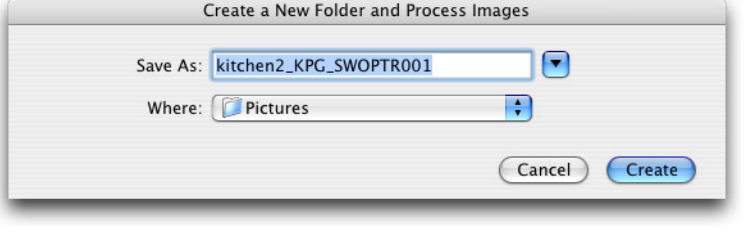
3 If you elected to save the profile to disk, you will see this screen:



Note that the default file name is the same as the profile description that you entered earlier, except that the extension ".icc" is added. You can keep this the same or elect to change it.

Navigate to a location on your computer where you wish to save the new profile and click **Save**.

4 If you chose to process the other pictures in the folder to a destination color space, you will see a screen that lets you create a new folder for the processed pictures and place that folder in a selected location on your computer.



By default, ImageMapper will create a new folder for the processed pictures, which is named the same as the folder from which the unprocessed pictures came. The folder name will also have the name of the destination profile appended to the end. You can accept the default folder name or change it.

Use the pop-up menu to indicate where you wish to save the final processed pictures and click **Create**.

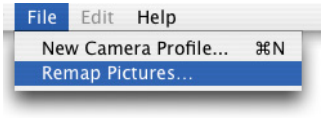
A progress bar appears, indicating that your pictures are being processed.

Processing a batch of pictures using a standard supplied or previously-made profile

This workflow can be used to simply process a batch of pictures in cases where you do not need to create a new custom profile. In this workflow, you can apply source and destination profiles of your choosing.

Options for launching ImageMapper

In this workflow, if you have already opened the ImageMapper application, select **File → Remap Pictures...**



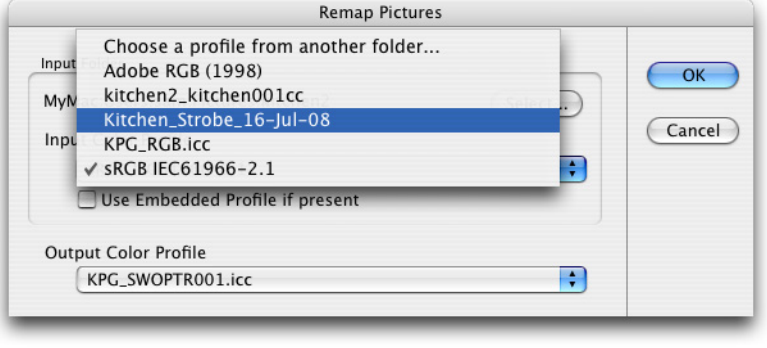
If you began by dropping a folder of pictures onto the application icon, you will see this Welcome screen. Select **Do not create a new profile. Apply the default input profile** and then click **Finish**.

From this point, the screens you see will be identical.

Processing the pictures

1 You will see the **Remap Pictures** screen. Click **Select...** to navigate to and select a folder of pictures to be processed.

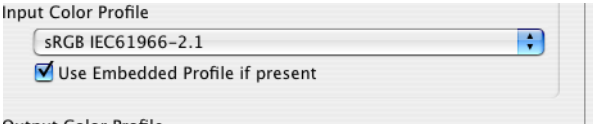
2 Click on the the **Input Color Profile** pop-up menu to select that profile that you wish to use as the source profile.



If that profile is not in the list, select **Choose a profile from another folder...** and navigate to the location of the profile to select it.

Note: *Some images that you process may have embedded profiles in them. Click the "Use Embedded Profile if present" check box if you want ImageMapper to use embedded profiles as the source for the conversion. When this is checked, ImageMapper will override any other source profile you may*

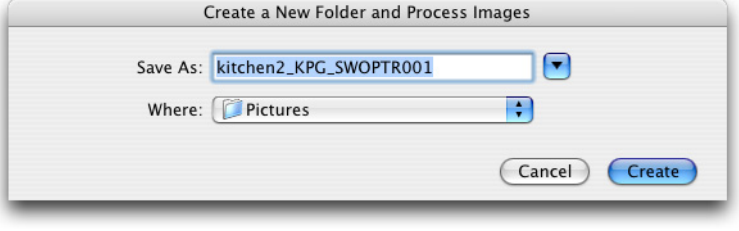
designate, using the image's embedded profile instead, if an embedded profile is detected.



3 Use the **Output Color Profile** pop-up to select an appropriate destination profile for processing the pictures.

Click **OK**.

4 In the next dialog box, enter the name that you wish to assign to the new folder of processed pictures (or accept the default name). Then, use the pop-up menu to navigate to the location on your computer where you want the new folder to be.



Click **Create**.

A progress bar will appear, indicating that the pictures are being processed.

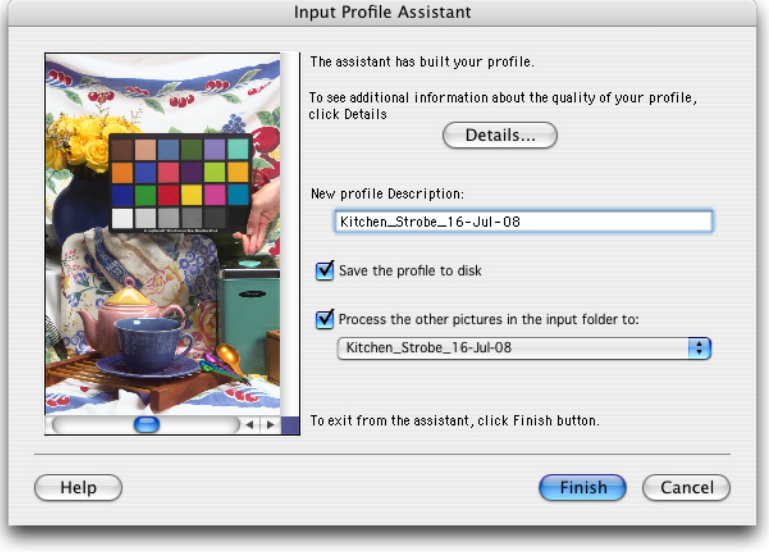
Embedding a profile in a picture without processing the picture

The secret to embedding a profile in a picture without processing the picture (that is, without converting from a source to a destination profile) is to simply specify the same profile as both the source and the destination.

Example

Follow the steps for the first workflow described in this chapter (**Making a new camera profile, saving it, and processing a batch of pictures**).

When you arrive at this screen, your new profile is created and ready to be used as the source; you will see the profile description in the **New profile Description** text field.



Now, select the *same* profile as the destination profile in the pop-up menu, as shown above.

When you click **Finish**, the subsequent picture processing will effectively leave the image data untouched, but will cause your new profile to be embedded in the picture file. At a later workflow stage, publisher or prepress personnel may elect to use your embedded profile as the source profile for any downstream conversions they may wish to make.

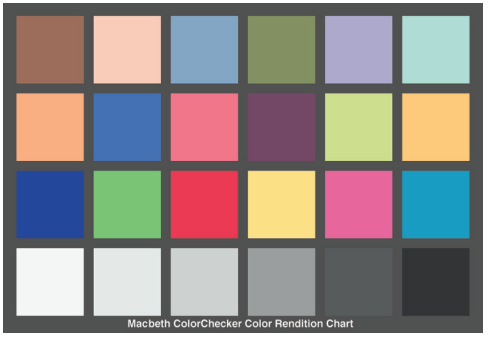
Tips, Techniques and Troubleshooting

This chapter provides important background information, special techniques and troubleshooting details.

Preparing to build a digital camera profile

Preparing to build a profile for a digital camera involves creating a digital target from a hardcopy GRETAGMACBETH ColorChecker Color Rendition Chart that you can purchase from your favorite camera store or photo dealer. The standard-size 24-patch ColorChecker or the smaller, 24-patch "Mini ColorChecker" may be used.

The standard 24-patch ColorChecker Color Rendition Chart looks like this:



You use the photographed target with ImageMapper. The ImageMapper software application includes colorimetric information about the ColorChecker chart that it uses to analyze your capture and apply corrective modifications to your capture in the form of an ICC profile.

You begin the process by shooting a scene in which you've placed the target.

Subsequent shots (without the ColorChecker) should use the same exposure and lighting setup.

You then open the image in the ImageMapper program and simply draw a loose box (marquee) around the area in the photo where the target resides. ImageMapper automatically locates the target and computes a profile for your camera consistent with the lighting and exposure used for that scene.

Important: *A digital camera profile addresses the qualities of the lighting and exposure of the scene, as well as the properties of the digital camera. If you*

significantly change the exposure or lighting, you will need to shoot another image containing the ColorChecker target and make a new profile.

Capturing the GRETAGMACBETH ColorChecker

To set up and shoot a scene with the GRETAGMACBETH ColorChecker:

1. Turn off all automatic adjustments in the camera, if your camera has them.
2. Place the ColorChecker in a scene so you can see all parts of the chart. Make sure the chart is somewhat parallel to the image plane so the perimeter is reasonably square.
3. Use Daylight or Strobe (D5000) as the main lighting source to light the ColorChecker. Be sure that the light falls evenly over the chart.
4. Shoot the scene with the same camera exposure and ISO rating you'll use for production.

Evaluating the image

You're looking for a balanced image with as much of the color information and highlight/shadow detail as possible. If you wish to make a detailed examination of the image:

1. Open the image with the ColorChecker target in an image-editing application such as Photoshop,
2. Examine the image and make sure:
   - Highlights are under 250. (Check the white square or a white object, but not a specular highlight).
   - Shadow areas have detail.

- You can distinguish among the gray patches of the ColorChecker.
- Colors are not overly saturated. For best results, make sure the values are under 250.
- The values of the darkest neutral patch are 5 or higher in all three channels.
- Red, green, and blue values are not 0 or 255 in any of the patches.
- Each of the RGB values for the colored patches is higher than the values for the darkest neutral patch.
- No objectionable color cast is present.

If the image doesn't meet these requirements, you may wish to change the exposure or lighting and shoot the scene again.

Making sure the image is gray-balanced

Unless you intend your capture to be casted for a special effect, or some other reason, you want to make sure the neutral parts of the image are truly neutral. When you make the image neutral, you are removing color cast.

> **Tip:** *Neutrality of the image is the second most important image quality aspect after correct exposure. Many digital cameras include features for assuring neutral grays in the captured image, either in-camera, or as part of the capture software. Your camera manufacturer probably includes a feature with a name like Click Balance, Click White or Set White that allow you to easily designate an area of the picture to be neutral.*

To examine the neutrality of a captured image:

1. Find a spot on the Neutral 6.5 gray patch (patch number 21) of the ColorChecker chart where the color value for green is between 165 and 175.
   (A significantly higher value for green may indicate over-

exposure. A significantly lower value may indicate under-exposure.) If you can find a spot where the green value is between 165 and 175, go to step 2 of this procedure. Otherwise, shoot the scene again with a different exposure or lighting and take readings again.

2. Check the RGB values in the Neutral 6.5 gray patch (patch number 21). If the red, green and blue values are far apart, try to bring them closer; the optimum is to have red green and blue within five to ten points of one another.

3. Check the RGB values in the rest of the neutral patches in the ColorChecker. Their values also should be within five to ten points of one another.

4. Examine the image again as you did in step 2 of "Evaluating the image" in the previous section.

Interpreting ImageMapper statistics

The statistical report you see after you build a profile is an advanced feature you may not need to use if you are satisfied with the profile you've made.

The statistics are intended to reflect how well the measurements taken from target patches match a mathematical model. The numbers are a loose indication of the quality of the profile and can vary according to the type and quality of the device for which you made the profile. In general, the numbers should be small and close together.

The statistics are calculated on the Delta-E value, which is a measurement of the difference between the value of a patch measurement and the mathematical model used to create the profile.

What do the statistics mean?

Here is a summary of the statistics:

Statistic	What the values signify
Mean Delta-E	The average of all the Delta-E values.
Median Delta-E	The Delta-E value at which half of all the values fall above or below this value.
Minimum Delta-E	The smallest Delta-E value.
Maximum Delta-E	The largest Delta-E values.
Standard Deviation	The square root of the variance. (Measurement is in the same unit as the Delta-E values.)
Variance	A measure of spread of the Delta-E values.

Viewing the original data

To see the original data from which the statistics are generated, click **Details...**. This table summarizes the details:

Column name	What the values signify
Label	The name of the patch in the target
RGB	Each channel in the device color space
L Aim a Aim b Aim	The values of the colors that are printed on the hardcopy target (after the tonal rendering is applied)
L Final a Final b Final	The values of the colors the input device reads, converted to CIE L*a*b*
Delta-E	The difference between the Aim and the Final value of a patch

Sorting the report

To sort the report, click on a column heading. The values are sorted in order of magnitude. Clicking again on the column heading reverses the order.

Copying and saving the statistics report

To copy and save the detailed report:

1 In the Statistics menu click **Copy**.

2 Open the document into which you want to copy the rows.

3 Click the cursor in the application window, and select **Edit → Paste**.

4 Save the document.

What do I do if ImageMapper reports a lower-quality profile?

Depending on many factors, ImageMapper's Input Profile Assistant may occasionally report that "The profile has been built but may not have the highest quality."

The causes of this message can usually be corrected by simple means. Here are some things to consider:

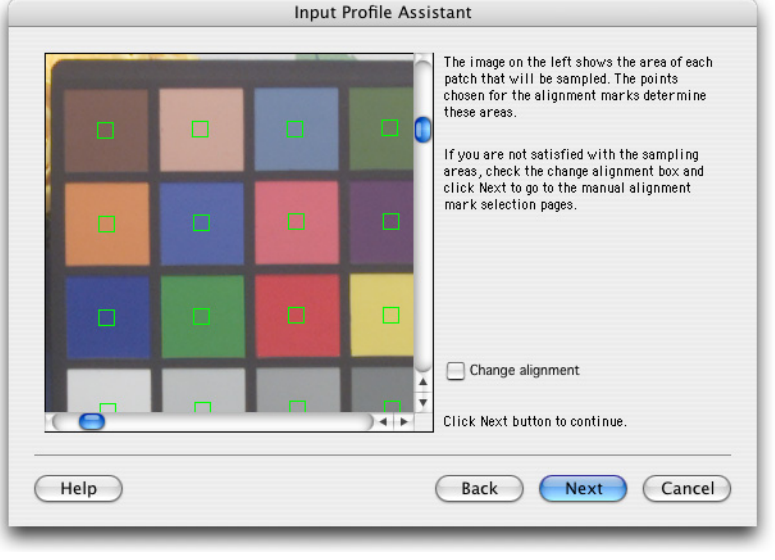
- This message often simply means that the tolerances that are built into the program that define a "statistically good" profile have been exceeded. This does not necessarily mean that you have built a "bad-looking" profile. Profiles that are slightly outside the tolerances for the program may look fine to the human eye – only you can be the judge.
- Note that once the profile has been built, it is automatically applied to the picture containing the GRETAGMACBETH ColorChecker that was used to compute the profile. Look at

the image and judge for yourself whether the color is acceptable.

If you judge that the quality of the profile is adversely affecting the color, try to eliminate the possible causes of bad profiles. These may include:

- Accidentally drawing the box to exclude the ColorChecker target
- Drawing the box so as to cut out part of the target (or not drawing a box at all)
- An object in the picture that inadvertently covers a part of the target
- Overexposure of the picture; if the red, green or blue values of the lightest patch in the target exceed 250, your image may be overexposed
- Underexposure of the picture; if the red, green or blue values of the darkest patch in the target are less than 5, your image may be underexposed
- Making the target too small in the picture; the photographed target should be approximately 200 pixels wide or greater

In general, ImageMapper is quite tolerant if the target is slightly out-of-square or rotated in the picture. If you suspect that the Input Profile Assistant is incorrectly locating or sampling the target patches, you can visually inspect the accuracy by using the Input Profile Assistant screen that shows you where the samples are being taken.



Use the scroll bars to look at the location of the green boxes relative to each patch in the target. If you are unsatisfied with the location of the sample points, select **Change alignment** and manually enter the upper left, upper right and lower right corners as described in Chapter 3.

Target placement for best exposure of the scene

While the need to photograph the GRETAGMACBETH ColorChecker under the same lighting and exposure conditions as the rest of the photo shoot may seem self-evident, there are situations where placement of the target may undermine the photographer's best intentions.

Consider this example: a subject photographed with an on-camera flash holds the Mini ColorChecker out towards the camera. While the subject would have received reasonable exposure under normal circumstances, the ColorChecker, being closer to the on-camera flash, is actually overexposed relative to the subject.

The resulting profile made from this capture attempts to normalize the scene based on the inadvertently overexposed ColorChecker. The result is a profile that corrects the target, but seriously darkens the subject's face.

The main point is to realize that to create a profile that will do justice to the scene, the ColorChecker target in the initial shot should be located under the main lighting for the scene, and ideally in roughly the same plane as the primary picture subject. For example, in the single person portrait mentioned above (or in a small group photo) the ColorChecker should be should be either under the subject's chin, or directly in front of the subject's face – that is, in, or close to, the same plane as the subject.

Troubleshooting profile locations on your computer

When you install ImageMapper on your computer, a folder is created inside of the **KPG ImageMapper** folder that contains important default profiles that are used by the software program. This folder is called **KPG ImageMapper Profiles**, and it con-

tains essential profiles, including sRGB, Adobe RGB (1998), and several Look profiles.

While you can always select profiles from anywhere on your computer's file system, the **KPG ImageMapper Profiles** folder provides a convenient location for storing profiles. Even when you are navigating to other locations to locate profiles on your computer, the relative location of the **KPG ImageMapper Profiles** folder is important for the software to be able to navigate to your chosen location.

The default profiles that are installed by the software into the **KPG ImageMapper Profiles** folder are the basis for many operations, including new profile building and profile conversions.

You should not move or delete either the **KPG ImageMapper Profiles** folder or the default profiles, once they are installed. When the program starts, it performs a check to see if the folder and profiles are in the expected location. If they are not, here is what you might encounter:

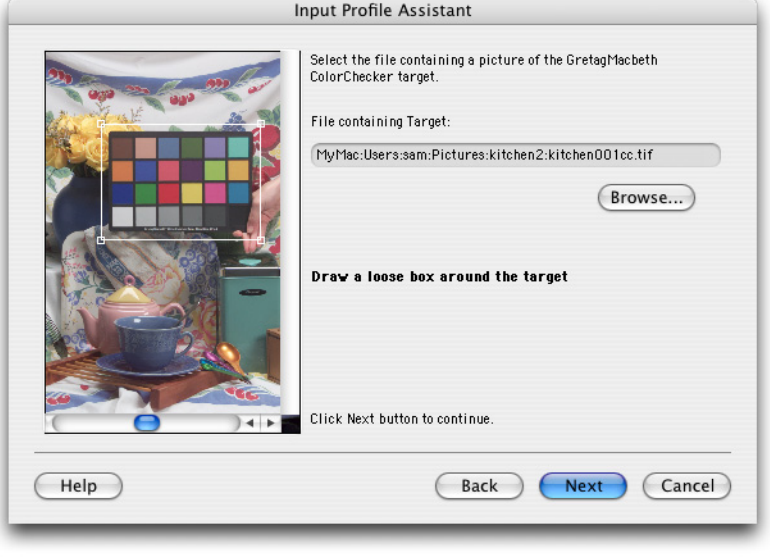
- If the **KPG ImageMapper Profiles** folder is not found in the expected location, the software will ask you to navigate to locate the folder.
- If the folder cannot be located, you will see an alert telling you that the folder was not found, and that the program will exit.
- If, on startup, ImageMapper detects that any of the default profiles are missing, you will get an alert telling you that the profiles were not found, and that the program will exit.

Note that any of these cases can be easily solved by simply running the ImageMapper installer again, which will reinstall the missing components.

Forgetting to draw a box around the ColorChecker

Given a loosely-drawn box, the Input Profile Assistant will nearly always autolocate the GRETAGMACBETH ColorChecker in the picture. If you should encounter a case where it does not, it is an easy matter to simply click the upper left, upper right and lower right corners of the target to help locate the target patches.

If you inadvertently forget to draw a box around the target, and the target is located in the lower section of the image, you may encounter problems if you try to remedy the situation by entering the three target corners manually. If this happens to you, simply click the **Back** button in the Input Profile Assistant until you arrive at the screen where you are instructed to draw a box around the target.



Draw the box around the target, and then proceed as usual by clicking **Next**.

Copying and pasting between images in Photoshop

If an image has an ImageMapper-built input profile, and you cut (or copy) and paste from that image to another image in Photoshop, you may observe a visual discrepancy once the image section has been pasted. This discrepancy is only in the visual appearance of the pasted area; the actual numerical color values of the pasted image are correctly preserved.

To avoid this visual discrepancy, it is best (and general good practice) to make sure that both images are converted to the same color space before pasting between them. For example: if both images are first converted to a common Photoshop "working space" like Adobe RGB (1998) before the pasting operation takes place, both the numerical values *and* the display will be accurate.

A note on IPTC metadata

IPTC (International Press Telecommunications Council) metadata is additional informational data such as title, author, caption, copyright information, keywords, etc., that may be embedded in an image file. While this informational data is distinct from the image data in the file, it is carried along with the image data within the same file. IPTC data is often used in photojournalism workflows.

Some software, for example Adobe Photoshop, allows you to view and modify IPTC metadata (**File → File Info...**). Your camera's capture software may also have IPTC capabilities, too.

When ImageMapper processes a picture, it preserves any IPTC metadata that was placed into the file with a prior application.

KPG ImageMapper customer support

KPG provides a web site URL for general ImageMapper support issues, as well as an email address for email-based support for registered users.

To view the KPG ImageMapper support web site, go to this URL:

http://tag.kpgraphics.com/color/imagemapper

For first-level email support, send an email to:

ColorCFSsupport@kpgraphics.com

Appendix: Color Management Basics

When you photograph the ColorChecker target and use it with ImageMapper software as described in this manual, you are practicing color management.

For many users, this is all you will need to know. For those who would like to gain a more detailed understanding of the color management process, this appendix is provided to explain the basics of how color management works to provide consistency and predictability in a color production workflow.

Devices in a color workflow

Input Devices

Input and capture devices, such as scanners and digital cameras, capture the original image or scene and store the image information as RGB (red, green and blue) values. Red, green and blue are referred to as additive primary colors, and RGB is sometimes called the additive color model. The additive color model is used when devices record or emit light.

Monitors

When a captured image is viewed on a color computer monitor, it is also displayed as RGB (additive) values. However, due to differences in the optical and mechanical characteristics between a capture device and a monitor, the RGB displayed by a monitor may look very different than what was captured.

Put another way, the capture device and the color monitor may require different RGB values to render the same perceived color; and conversely, the same numerical RGB values may produce very different color results on the capture device vs. the monitor display.

Output Devices

Once the image is captured and displayed, it must be transformed for printing, creating yet another opportunity for ambiguity in the process.

Again, the printer, press or other output device may have its own "recipe" for creating the same perceived color. Complicating this issue is the fact that printing devices do not use the additive color space. Image data must be converted to the "subtractive" model for printing. The subtractive primary colors are cyan, magenta and yellow (CMY), with black (K) often added to enhance contrast and neutrality.

Depending on the pigments or other colorants used by the CMY(K) printing device, this necessary conversion between color spaces is complicated by the fact that subtractive colorants are often simply incapable of creating the full gamut of colors that were originally captured or viewed on the monitor screen.

The problem of device-dependent color

The issues listed above illustrate the problems of device-dependent color. Images entering a printing or publications workflow potentially come from a variety of capture devices, and may be destined for reproduction on a wide variety of output media. In a non-color managed digital workflow, there is the potential for added complexity, inconsistency and compromise of color data as

it is manually adjusted to optimize the quality of both image capture and image reproduction.

Achieving consistency of color from image capture, to color monitor preview, to output is an issue facing many high-volume imaging enterprises, since each device in the imaging chain has its own recipe for reproducing colors, and the color data must be optimally translated to suit each device in the imaging chain. Each device's recipe is dependent upon that device's color space and its color gamut capabilities.

Maintaining acceptable color quality under these circumstances is challenging, and may result in a great deal of miscommunication, unproductive time and material waste, due to

- Rescans
- Reshooting of digital camera shots
- Re-editing of the image in software programs
- Re-printing of the image to the output media

Adjustment and storage of digital color files in a device dependent color space can also significantly limit the ability to "repurpose" the image. Editing an image such that it will reproduce well on a given device means that you have adjusted the color to conform as best possible to the limited color gamut of that device. Once data is lost due to "gamut clipping," it becomes difficult to repurpose that image for output on a larger-gamut device, while maintaining the color quality that is inherent in that larger gamut device.

Color management

Using device profiles with a device-independent color space

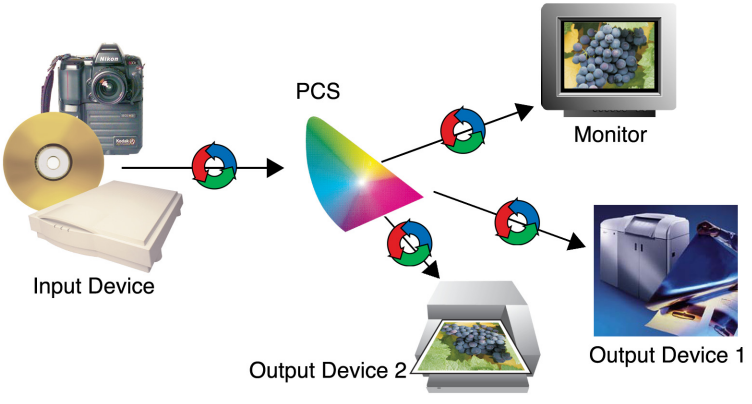
Color management aims to correct the problems of device-dependent color by providing a common language by which all these devices communicate. It does this through the use of device profiles and a device-*independent* color space.

A device profile is a file used in a color management system to describe how a specific device reads and renders color. When you shoot the GRETAGMACBETH ColorChecker target and use it with ImageMapper's Input Profile Assistant, you are creating a device profile for your digital camera that tells the color management system of the specific strengths and limitations in how your device captures color.

Color management systems also use a Profile Connection Space, or PCS, as the intermediate translator between devices. PCS is neither RGB nor CMYK and is not based on the characteristics of any physical device. colorant or process. PCS stores color values mathematically, but is based on extensive studies of human color perception and the "standard observer." Thus, it can be described as device-independent. Common PCS spaces are CIELab and CIEXYZ.

When you make a device profile for your camera, the profile is used to correctly "map" the color captured by your camera into the PCS. In later workflow steps, such as when the image is displayed on a monitor for editorial corrections, and when it is proofed or printed, device profiles for the monitor and proofing/printing device may be used to accurately translate the color val-

ues stored in the PCS to color values that are appropriate for display or printing.



Whenever color is mapped from the color space of one device to another, through the PCS by way of device profiles, a *source* and a *destination* is defined. For example, when you use **Remap Pictures...** in ImageMapper (or when you process a batch of pictures after making a new profile with the Input Profile Assistant), you are selecting device profiles for processing from a source color space – your camera's – to a destination color space, such as the Adobe RGB (1998) working space, or SWOP for offset presses.

The International Color Consortium

In the early days of color management, several major companies developed proprietary systems for color management. These systems generally adopted the model of using something similar to device profiles and a device-independent PCS, and many of them produced good results. However, due to their proprietary nature, the color management technology was not interchangeable between the various systems and software applications that were color-managed.

In the early 1990s, the International Color Consortium (ICC) was founded, with several major vendors as founding members. The

vendors agreed upon a common specification for the structure of a color management system, as well as a common format for profiles, ensuring that profiles and color managed images would be compatible across vendors' imaging software as well as computer operating systems and hardware platforms.

An ICC-compliant profile conforms to the standards of the International Color Consortium (ICC).

Note:*Input profiles created by ImageMapper are compliant with the version 4.0 ICC specification.*

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