



Fiery® Color Server

Fiery Color Reference



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INTRODUCTION

This document provides a reference for information about optimizing color printing with the Color Server and improving color quality and performance for all Color Server models. Specific features and options may vary, depending on the Color Server model at your site.

NOTE: The term “printer” is used throughout this document to denote a supported printer or copier. The term “toner” refers to toner or ink.

About this document

This document provides an overview of general color concepts, with a specific focus on color management for print output. It describes multiple scenarios (called workflows) during which color information can be specified. It also provides application notes that explain how to print to the Color Server from popular Microsoft Windows and Apple Mac OS applications.

Color terms and concepts, such as “**color space**,” “**spot color**,” “**gamut**,” and “**source profile**” appear in bold throughout this document. If you are new to desktop color, or if any terms are unfamiliar, see the “[Glossary](#)” on page 77.

For additional information

This document is one in a set of documentation that includes documents for both users and system administrators. For a description of all of the available documentation, see [Welcome](#). All other documents should be available at your site. For more information, see the following documents as directed.

For additional information about the topics discussed in this document, see:

- [Color Printing](#): For detailed information about the color printing options and settings available with your Color Server, as well as the ColorWise color management system built into your Color Server.
- [Printing](#): For information about how to set the ColorWise print options.



For information about performing color management tasks and using Command WorkStation, see Command WorkStation Help.

For general information about printing in color, see “[Desktop Color Primer](#)” on page 60 and the sources in the “[Bibliography](#)” on page 75.

OVERVIEW OF COLOR MANAGEMENT CONCEPTS

To create successful color documents and presentations, you can take advantage of the features of color management software as they are implemented by the Color Server and on your desktop computer. This chapter is devoted to various elements of color management that contribute to predictable color results.

Understanding color management systems

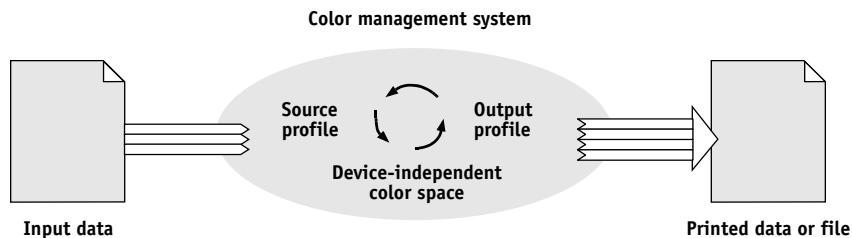
A **color management system (CMS)** is a “translator” between the **color space** of the source device (for example, a monitor or scanner) and the color space of the destination device (for example, the printer). It compares the color space in which the source object is created to the color space in which the job is output, and adjusts the colors in the document to maintain consistency across different devices. A CMS typically uses a device-independent color space, such as CIELAB, as its intermediate color space. To perform its translation, a CMS needs information about the color space of the source object and the **gamut** of the printer. This information is provided through **profiles**, often created by the manufacturers of the computer monitor or printer. The end product of a CMS conversion is a printed document or object file in the gamut of a particular printer.

Progress is being made toward standardization in the field of digital color management systems. Windows and Mac OS operating systems support an industry standard format developed by the International Color Consortium (ICC). This ICC format is implemented on Windows and Mac OS computers. Other software developers are also incorporating CMSs into high-end applications. The Color Server CMS, **ColorWise**, supports this standard profile format.

You can use the EFI Color Profiler Suite (an optional software package) to create color profiles that are fully compliant with ICC standards, evaluate the profiles, edit them, and test them. EFI Color Profiler Suite includes a spectrophotometer that you can use to create profiles.

How color management works

Before you can print a color document, the color data in it must be converted to the gamut of the printer. Whether performed by the Color Server or a host-based CMS, the process of converting color data for a printer is the same: the CMS interprets **RGB** object data according to a specified **source profile** and adjusts both RGB and CMYK data according to a specified **output profile**, also called a destination profile by some color management systems.



The source profile defines the RGB color space of the object's source: characteristics such as the **white point**, **gamma**, and type of **phosphor** used. The output profile defines the gamut of an output device, such as a printer. The Color Server (or host-based CMS) uses a device-independent color space to translate between the **source color space** and the color space of the output device.

The Color Server allows you to specify default and override settings for the source color space information and the output profile information (see [Color Printing](#)). When you use these settings, you do not need to use the features of other color management systems. Your Color Server software includes **ICC profile** for use with other color management systems, although conflicts may arise when the Color Server CMS is used in conjunction with a host CMS.

You can also use color management systems to adjust color data to the gamut of an output device other than the one to which you are printing. This process of simulating another output device is commonly used for proofing jobs that are printed on an offset press. For more information about the Color Server simulation feature, see [Color Printing](#).

The type of print job and the final output device, Color Server or offset press, determines the workflow that provides the best results. For information about choosing workflows, see ["Using Color Management Workflows"](#) on page 12.

Using ColorWise and application color management

The Color Server CMS, ColorWise, is designed to provide casual and expert users the best color output for a variety of purposes. Several applications also provide their own CMS. This document describes how to optimize print output using ColorWise color management and application color management.

The Color Server intelligently manages the printed appearance of **RGB**, **CMYK**, and **spot colors**. You can allow the Color Server to manage color for most color printing jobs without adjusting any settings.

A desktop (host-based) CMS uses ICC profiles to convert colors from one device gamut to another (see “[Desktop Color Primer](#)” on page 60). The color data is converted when it passes from one application to another or when the job is sent to the printer; thus, the processing occurs on your computer, as opposed to the Color Server.

Conventional color management systems typically address only color conversions, and they occupy your computer processor. When you use ColorWise, jobs leave your computer and are processed faster on the Color Server.

The advantages to ColorWise color management versus desktop (application) color management include the following:

- Relieving your computer from performing additional processing. Delaying color conversions until the color data reaches the Color Server frees your computer so that you can continue working. Color conversions on the Color Server are, in most cases, much faster than similar conversions on a host computer.
- Eliminating the potential for undesirable color management-related conflicts, such as iterative color conversions and inconsistent color between applications. The Color Server applies global corrections to specific groups of RGB, CMYK, and spot colors to avoid such conflicts.
- Accepting RGB files in addition to larger CMYK files from applications, which minimizes network traffic and enables jobs to print faster.

ColorWise uses ICC profiles to convert colors to the device gamut or simulate other devices, such as an offset printing press. ColorWise manages color conversions for all users printing to the Color Server from Windows and Mac OS computers. It allows users to follow a simple workflow with minimal intervention using robust default settings, while giving advanced users the control and precision that they need.

Using ColorWise color management tools

Your Color Server user software includes several types of color reference pages that allow you to see the range of colors that can be printed on your printer. For predictable color, use the color reference pages when defining the colors in your document.

The available resources are as follows:

RGB Color Reference: A Microsoft Word file and a Microsoft PowerPoint file that allow you to view the colors available in the standard palettes of office applications and see how those colors print on the Color Server (see [“Color matching with office applications”](#) on page 20).

CMYK Color Reference: An 11-page, downloadable PostScript file of CMYK color patches (see [“Using the CMYK Color Reference”](#) on page 24).

Process Simulation of PANTONE Solid Coated Colors: A 19-page, downloadable PostScript file of color patches showing the CMYK equivalents of PANTONE Coated colors. This file prints differently, depending on the setting of the Spot Color Matching option (see [“Using the PANTONE reference”](#) on page 25).

In addition, you can print RGB, CMYK, and PANTONE color charts from the Color Server.

USING COLOR MANAGEMENT WORKFLOWS

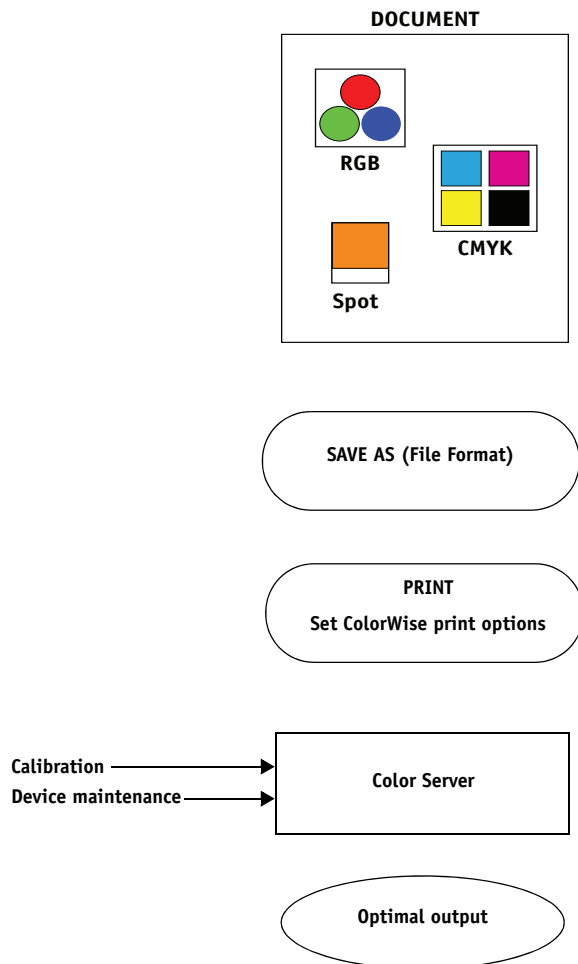
A workflow is the path a print job follows from creation to destination. The workflow of any job includes points at which decisions are made about how to define, use, and translate color. The choices made, and the point at which they are made, impact the color output produced.

This chapter introduces issues with color management in specific desktop applications and discusses the interaction between those applications and ColorWise color management.

Understanding workflows

The term “workflow” is used to describe the path a job follows from its creation in a desktop application to final printed output. The Color Server supports a variety of workflows with different levels of complexity. There are several points at which color management can be performed on a job (see the illustration on [page 13](#)). The information provided at each step (for example, the type of color used) impacts the workflow of the job.

Always consider the complexity of the workflow. Every time colors are converted, performance and color accuracy are affected. A workflow with a minimum number of steps minimizes the risk of error.



Application and operating system color management:
Turn off

Disable any CMS provided by the application or operating system to ensure that the Color Server receives color data properly and prints it accurately. For information, see the documentation that accompanies your application.

NOTE: Color management between the display device and the application cannot be disabled.

Select colors based on the desired output (see [“Choosing colors”](#) on page 15).

Select file format based on the desired output. EPS data is not manipulated. Other formats can be used if the file is saved with the appropriate settings.

Use the ColorWise CMS as described in this document and [Color Printing](#).

Operating system color options: Disabled

Disable any CMS provided by the operating system.

Calibrate as described in [Color Printing](#). Perform regular maintenance as recommended by the printer manufacturer. Use the paper stock, toner, and other materials recommended by the printer manufacturer.

Standard recommended workflow

The Color Server is highly optimized for the specific printer it supports. ColorWise addresses issues unique to your printer, including halftones, individual toner response, interactions among toners, natural smoothness of blends, and the capability to render spot and custom colors. The Color Server distinguishes text and graphics from image elements, so that black channel information can be preserved while parameters used for CMYK [color separations](#) are maintained.

The recommended standard color workflow uses ColorWise calibration and color management. The Color Server comes into play near the end of the color workflow.

For this workflow:

- Bypass any color management of printed output in the application and operating system.

This ensures that the colors you select reach the Color Server and ColorWise in a usable form. Consider, however, that ColorWise fully supports color management from applications and printer drivers (see [“Using ColorWise and application color management”](#) on page 10).

- Set the CMYK/Grayscale Source option in ColorWise to match the CMYK color space used in the application to select the colors. Any CMYK/Grayscale Source setting (except ColorWise Off, if available) applies calibration, so the response of the printer appears stable.

Some examples of CMYK/Grayscale Source settings are [SWOP](#) or ISO Coated in the U.S., [Euroscale](#) in Europe, and [DIC](#) or Japan Color in Japan. If colors have been selected specifically for your calibrated Color Server, set CMYK/Grayscale Source to None.

- Set other ColorWise print options as appropriate. For a list and descriptions of ColorWise print options that affect CMYK, RGB, spot, and other colors, see [Color Printing](#).

Choosing colors

When working with color materials, whether they are presentations, illustrations, or complicated page designs, you make aesthetic decisions about the colors you use. After you set a goal, you must make the best use of the capabilities of your Color Server to realize your design in print. Your color printing system becomes an ally in this creative process to the extent that results are predictable:

- If you designed a poster to print on the Color Server, you want the printed colors to match the design specification.
- If you are printing presentations on the Color Server, you want to preserve the vivid colors that you see on the monitor.
- If you are working with color that is to be printed on an offset press, you want the Color Server output to match other [prepress proofs](#) or PANTONE color swatch books.

The colors that you define when creating a file in an application, and the color management tools within the application that you use, impact how the file is processed (workflow) and the final output that you can expect.

Use color management to control color output by performing the following tasks:

- Select a color model: Different types of applications use different color models. The color model you select, and whether or when data is converted from one color model to another, influences the final color output.
- Optimize for output type: The type of final output influences your color and application choices.
- Use color matching tools: The Color Server provides several tools to preview colors available on a device and define them within an application.

Understanding color models

You can define colors in several different color models, most commonly RGB, CMYK, and a spot color matching system (such as PANTONE). Depending on the application you use, you may or may not have a choice of the color model.

RGB colors are used when you take output from an RGB device such as a digital camera or scanner. Another use of the RGB color model is for displaying colors on a monitor.

CMYK colors are what most printers use.

spot colors, such as PANTONE, are special inks manufactured to run on an offset printing press. Spot colors can be simulated using CMYK toners (also known as **process colors**). With the Spot Color Matching print option, you can determine how spot colors are printed at the Color Server:

- **Spot Color Matching On** uses color tables built into the Color Server to simulate the spot color with the closest equivalent available using the CMYK toners of the copier/printer connected to the Color Server.

If your Color Server supports the Spot-On application in Command WorkStation, you can customize the spot color definitions used by ColorWise.

- **Spot Color Matching Off** instructs the Color Server to simulate the spot color using CMYK equivalents defined by the spot color manufacturer. These are the same CMYK values used by applications that include spot color libraries. This CMYK combination is then printed with the CMYK/Grayscale Source setting that you choose, such as SWOP or DIC.

The color model used by your application determines the methods available for choosing colors, as well as the way color data is transmitted to the Color Server:

- Office applications, such as word processing, spreadsheet, and presentation graphics applications, use the RGB color model. They typically transmit only RGB data to the Color Server.
- Illustration applications use both the RGB and CMYK color models, but typically transmit only CMYK data to the Color Server.
- Pixel-editing applications use both the RGB and CMYK color models. They transmit RGB or CMYK data to the Color Server.

Optimizing for output type

You can use the Color Server for on-demand color printing and color proofing. On-demand color printing refers to those jobs for which the Color Server is the final print device. Printing jobs to the Color Server in preparation for printing on an offset press is referred to as color proofing. Both types of Color Server print jobs can use RGB, CMYK, and spot colors.

Characteristics of on-demand jobs

Bright, saturated colors are often desirable.

Colors are achieved using the full range of colors available, referred to as the full gamut of the printer or, more simply, device CMYK.

Characteristics of offset proofs

Require the printed colors to match those from another set of CMYK printing conditions.

Colors that are specified for an offset press require CMYK simulation that is optimized for proofing on the printer.

NOTE: The term “on-demand” applies to producing printed output when it is needed. You may be familiar with the term “short-run,” which usually applies to the volume of a printing task. Although these terms do not mean exactly the same thing, “on-demand” in this document applies also to short-run printing scenarios. Because you can print as many pages as you need and reprint jobs quickly, the Color Server performs equally well in either environment.

The type of printing you plan for a document, on-demand color printing on the Color Server versus color proofing for eventual printing on an offset press, determines the way you define colors, as well as the print option settings you choose.

- For on-demand color printing on the Color Server, use any application and define colors in RGB or CMYK. If your application supports it, you can also choose colors from the PANTONE color library. Choose the appropriate settings for print options affecting color output (for descriptions of the print options, see [Color Printing](#)).
- For color proofing, use a PostScript-defined color in CMYK or choose colors from color libraries, such as the PANTONE color library. Placed objects can also be defined in RGB or CMYK. Choose the appropriate settings for print options affecting color output (see [Color Printing](#)).

NOTE: The Color Server allows you to use RGB or CMYK data when printing proofs for an offset press run. However, sending data to an [imagesetter](#) usually requires CMYK data.

Maintaining color accuracy

For the colors you see on your monitor to match those on your printed output, they must go through color management, including precise [calibration](#) of your monitor and Color Server. If viewing colors on the monitor is critical, consider using a professional profiling software package and instrument, such as the EFI Color Profiler Suite, to create a monitor profile. A monitor profile enables the application to compensate for the color behavior of the monitor when displaying colors. As a result, colors previewed on the monitor more closely match the colors in your printed output.

If you are not equipped or inclined to maintain accurate monitor color management, you can opt for an easier approach. Determine which is more important to you: printed colors or on-screen colors.

- If printed colors are your priority, choose colors from printed samples. By using sample colors, you ensure that your printed output remains consistent, regardless of how the colors appear on different monitors. Print the palette of available colors from business applications and select colors from the printed samples. Color reference files are included on the User Software CD or DVD. (For more information, see [“Color matching with office applications”](#) on page 20 and [“Color matching with PostScript applications”](#) on page 24.) You can also print color charts from the Color Server and select colors by name or number from the printed samples. Advanced applications allow you to define colors in the easier-to-control spot and CMYK color spaces. For more information about color selection, see [“Choosing colors”](#) on page 15.
- If on-screen (displayed) colors are more important, trust your eyes and your monitor. Visually select colors on your monitor, but be aware that colors are optimized only for your monitor. When the document is opened on other monitors, the colors may look different. Even though printed colors may not match those on your monitor, they still print to the Color Server with good results.

MANAGING COLOR IN OFFICE APPLICATIONS

The ColorWise color management system provides complete color management for jobs printed from office applications and other applications that do not generate PostScript. This chapter provides instructions for printing color documents from applications such as word processing, spreadsheet, and presentation graphics applications. Use these instructions with the Microsoft Office applications.

Using office applications

The Color Server must receive PostScript instructions to print a document. Many applications do not create these PostScript instructions, relying on the printer driver to create them. Included in this category are most word processing, spreadsheet, and presentation graphics applications. These applications use operating system features to render images for display or printing. The term “**office applications**” is used in this document to refer to these types of applications.

All office applications handle color similarly, using the same RGB color model used for the color monitor. Most office applications allow you to choose colors from a palette of preselected colors. Some allow you to add new colors to the palette using a color picker. Although some applications allow you to specify color using the CMYK, HSL, and HSV color models, these applications always send RGB color data to the Color Server. (An exception to this is a CMYK EPS format file placed in a document, which is sent as CMYK data.)

When working with color in office applications, consider the following:

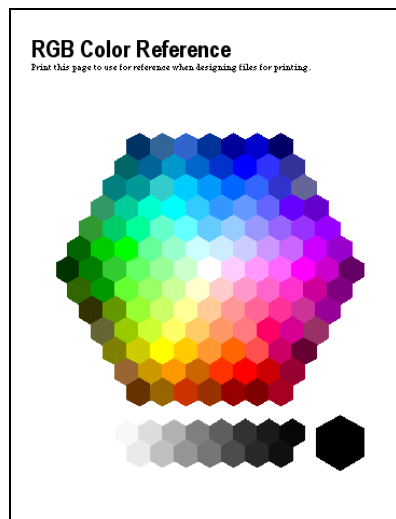
- The range of colors that can be displayed in RGB on your monitor is much larger than the range of colors that can be printed on your printer. When you print the document, out-of-gamut RGB colors are mapped to the colors your printer can produce.
- Office applications send only RGB data to the Color Server. You control the rendering style of the color conversion with your selection of a **rendering intent**.

Each rendering intent uses a different color rendering style and has a different way of mapping unprintable colors to the color gamut of your printer. For more information about color rendering intents, see *Color Printing*.

Color matching with office applications

Your Color Server user software includes two RGB color reference pages, a Microsoft Word file and a Microsoft PowerPoint file. You can print these files using different RGB print options to see how the colors appear when printed to the Color Server. For best results, print the color reference page using the same print options you plan to use for your final document. Select the colors that you want to use from the printed version of the RGB color reference page and use those colors in your document.

RGB Color Reference
(Microsoft PowerPoint)



Working with office applications

Before printing from these applications, make sure that the appropriate printer driver and the Color Server [PPD \(PostScript Printer Description\)](#) are installed on your computer, as described in [Printing](#).

Defining colors

Office applications use the RGB color model. The only way to use CMYK or PANTONE colors is to define them in [Encapsulated PostScript \(EPS\)](#) format files with an illustration or page layout application, and then place these files in Microsoft Office documents. Colors in EPS files are preserved until they reach the Color Server (assuming no PostScript color management information was included).

Office applications display EPS files at low resolution, but the EPS objects are printed at full resolution. In general, use EPS files only when RGB colors are impractical in your specific workflow. EPS files are useful when large or complex objects must be printed at full [resolution](#) or exceed the memory allocation of some office applications.

Working with imported files

Your application may allow you to import a variety of file formats. If you encounter printing problems when using other imported file formats, such as TIFF and PICT, EPS files are recommended.

NOTE: If you cannot import EPS elements, it may be necessary to perform a “custom install” of your office applications.

Even when there are no user-defined color management options within office applications, color conversions occur when you import objects or page elements that were not defined in RGB. To avoid such conversions with imported files, use the EPS file format for non-RGB artwork that is to be imported into office applications.

All RGB objects placed in a document are affected by the settings you choose for the RGB print options.

Mixing imported object types (Advanced color management)

If you place multiple RGB objects, mixed non-photographic and photographic, into an office application file, a single rendering intent may not optimize output for all the objects. In this case, you can have the photographic objects bypass the rendering intent altogether. To accomplish this, open the photographic object in CMYK mode with a pixel-editing application, such as Adobe Photoshop, save the object in an EPS format file, and then import it into the document.

Selecting options when printing

With regard to Color Server printing, all office applications behave in the same manner. To specify print options and color management settings, follow the instructions in [Color Printing](#). To specify these options, you must use a PostScript Level 2 (or later) printer driver, such as an Adobe PostScript printer driver.

Because office applications send RGB data to the Color Server, your choice of RGB print option settings is important. Specify the appropriate RGB print options for the desired color effect (see [Color Printing](#)).

Output profiles

All color data in a job is affected by the output profile on the Color Server. This profile may be the one designed for your device and shipped with the Color Server, or it may be a custom profile created at your site (see [Color Printing](#)). If necessary, print the Test Page to see which profile is the active default on the Color Server.

Ensuring color accuracy when you save a file

To ensure color accuracy, take the following steps:

- When saving CMYK EPS files, do not include PostScript color management information. This minimizes the risk of conflicting data and multiple color conversions. PostScript color management causes your CMYK colors to be interpreted by the Color Server as though they were supplied in the Lab color space and, as a result, processed by RGB print options, rather than your CMYK Source and CMYK Processing Method settings.
- Include ICC color information in files. ColorWise does not conflict with this information, and such data is useful for identifying the specific color space used by your files.
- Do not include halftone and transfer functions.
- Turn off color management in the printer driver.

On Windows computers, on the Color Management tab of the printer's Properties, make sure that no color profiles are associated with the printer.

On Mac OS computers, in the ColorSync settings of the printer driver, set the Color Conversion option to In Printer and the Quartz Filter option to None.

MANAGING COLOR IN POSTSCRIPT APPLICATIONS

This chapter provides guidelines for using applications that can write their own **PostScript**, such as some illustration, **pixel** editing, and page layout applications. For information about using specific applications, see “[Managing Color in Adobe Photoshop](#)” on page 28, “[Managing Color in Page Layout Applications](#)” on page 38, or “[Managing Color in Illustration Applications](#)” on page 47.

Working with PostScript applications

Most applications used for illustration, pixel editing, and page layout can create the PostScript information they send to a PostScript printer or save in PostScript files. Adobe Illustrator, Photoshop, Adobe InDesign, and QuarkXPress are all PostScript applications.

PostScript applications work with color in many different ways. Most allow you to choose process colors (by entering percentages for cyan, magenta, yellow, and black), as well as **named colors** from a spot color system, such as PANTONE. When you print composites, these applications send process-color equivalents for named spot colors to the Color Server. In some applications, you can also choose colors using the **RGB**, **HSB**, **HSL**, or other color models.

Generally, PostScript applications send color information to the Color Server as CMYK data. An exception to this is an RGB object placed in a document, which is sent directly to the Color Server (unless you specify special color management settings in the application). In addition, some PostScript applications that allow you to define colors in RGB or other color models also send data to the Color Server in those color spaces.

NOTE: If your Color Server supports the Postflight application, you can use PostFlight to analyze the color spaces used in a particular job.

Color controls in PostScript applications are typically designed for printing on an offset press. Some adjustments may be required for printing to the Color Server. Displayed versions of colors you choose in these applications may not match Color Server output exactly, and named colors may not print accurately on the Color Server, since these colors typically require custom inks.

Color matching with PostScript applications

All PostScript applications support CMYK. Some also support RGB and other color models based on monitor display values. PostScript applications also allow you to choose named colors using one or more color libraries, such as PANTONE (see [page 25](#)).

We highly recommend that you use printed color reference pages to ensure predictable color printing results with the Color Server or match your Color Server output to colors produced by other printers.

Using color reference pages to match color

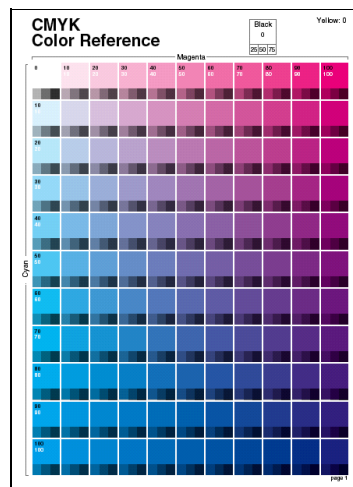
Your Color Server user software includes several color reference pages. By choosing colors for your documents from these printed reference pages and specifying the corresponding CMYK values, you ensure that you print the same color from your device.

NOTE: For best results, calibrate the Color Server before printing the reference pages.

NOTE: Using the reference pages does not match monitor colors to printed colors. For this, you must use a color management system and calibrate your monitor.

Using the CMYK Color Reference

Use the CMYK Color Reference included with your Color Server user software to see how various cyan, magenta, yellow, and black combinations look when printed on your printer.



To print the CMYK Color Reference, download the file to a recently calibrated Color Server. The printed pages display groups of color patches in graduated combinations of yellow, magenta, and cyan, and smaller patches that include 25%, 50%, and 75% black. Use these pages to pick colors and specify process color values in your application. The file is included on the User Software CD or DVD.

Using the PANTONE reference

Use the PANTONE reference (Process Simulation of PANTONE Solid Coated Colors) included with your Color Server user software to help ensure predictable results with colors chosen from the PANTONE color library.

The information printed by this reference varies depending on the Spot Color Matching setting.

- **Spot Color Matching On** prints patches that simulate the spot color with the closest equivalent available using the CMYK toners of the copier/printer connected to the Color Server. The CMYK values used to produce the color, as well as the PANTONE color name/number, are printed below each patch.
- **Spot Color Matching Off** prints patches of the CMYK equivalents of PANTONE colors as defined by PANTONE. (These are the same CMYK values defined in applications that include PANTONE libraries.) The CMYK values used to produce the color, as well as the PANTONE color name/number, are printed below each patch.

To print the reference, download the file to the Color Server. The file is included on the User Software CD or DVD. If the default Spot Color Matching setting on the Color Server is not the setting that you want to use for printing the PANTONE colors, download the file to the Hold queue, and then override the Spot Color Matching setting using Command WorkStation.



For more information about using Command WorkStation, see Command WorkStation Help.

Working with imported objects

You can import objects into documents created in illustration applications (such as Illustrator) and page layout applications (such as QuarkXPress). The recommended formats for objects imported into page layout documents are EPS (also known as EPSF) and **TIFF (Tag Image File Format)**. If you encounter a problem using a TIFF format object, use the EPS file format. Support for importing other file formats may be provided by individual applications.

All RGB objects placed in a document are affected by the RGB print options. The ColorWise CMS applies the specified RGB/Lab Source setting to all RGB data, and then uses the specified rendering intent to perform a color conversion. An exception to this occurs if you assign ICC profiles to RGB objects using the application's color management tools (see the following section). In this case, the application performs the color conversion of the object and sends CMYK data to the Color Server.

Mixing object types (Advanced color management)

If you place multiple RGB objects, mixed non-photographic and photographic, in a file, a single rendering intent may not optimize output for all the objects. In this case, you can have the photographic objects bypass the rendering intent altogether. To accomplish this, separate the object into CMYK data with a pixel-editing application, such as Photoshop, and perform color correction. Save the file as an EPS or TIFF format file, and then import it into the document.

You can save the RGB object in TIFF format and assign it an ICC profile and rendering intent when you import it into the document, if your application supports this feature.

Using CMYK source profiles

You can specify a CMYK source profile and a CMYK processing method for a job (see [Color Printing](#)). The CMYK print options affect all CMYK color data sent by the page layout or illustration application, and can also affect RGB data in a page layout application if the Separate RGB/Lab to CMYK Source option is enabled.

- If the document contains CMYK objects that were separated for an offset press standard, apply the corresponding CMYK source profile. For example, for objects separated for SWOP, choose SWOP as the CMYK source profile.

NOTE: If you print separations to the Color Server and choose to use the Combine Separations feature in conjunction with the Full (Source GCR) or Full (Output GCR) CMYK processing methods, the result may not match that of the same page printed as composite.

- If the document contains CMYK objects that were separated according to the color characteristics of a custom ICC profile (not a press standard profile), specify the corresponding profile as the CMYK source profile on the Color Server.

For more information about copying CMYK source profiles to the Color Server with Command WorkStation, see Command WorkStation Help.

Using application-defined halftones

If your site has installed the Graphic Arts Package (not available for all Color Server models), you can define halftones from several PostScript applications and use them when printing. The results may vary, depending on the application.

To define a halftone, use the application to adjust the Frequency and Angle values of the halftone. When you print the job, choose Application Defined for the halftone screen print option.

The Frequency and Angle settings in the Application Defined halftone are used regardless of whether the setting for Combine Separations is set to On or Off. For special instructions on printing separations with Photoshop, see [“Selecting options when printing”](#) on page 34.

NOTE: In general, using halftones is not recommended, because the printed output will have visible dots of toner, rather than smooth blends. Use halftones only when necessary to achieve a specific style of printed output.

Ensuring color accuracy when you save a file

To ensure color accuracy, take the following steps:

- When saving CMYK EPS files, do not include PostScript color management information. This minimizes the risk of conflicting data and multiple color conversions. PostScript color management causes your CMYK colors to be interpreted by the Color Server as though they were supplied in the Lab color space and, as a result, processed by RGB print options, rather than your CMYK Source and CMYK Processing Method settings.
- Include ICC color information in files. ColorWise does not conflict with this information, and such data is useful for identifying the specific color space used by your files.
- Do not include halftone and transfer functions.
- Turn off color management in the printer driver.

On Windows computers, on the Color Management tab of the printer's Properties, make sure that no color profiles are associated with the printer.

On Mac OS computers, in the ColorSync settings of the printer driver, set the Color Conversion option to In Printer and the Quartz Filter option to None.

MANAGING COLOR IN ADOBE PHOTOSHOP

This chapter covers features of Adobe Photoshop CS3 for Windows and Mac OS. The illustrations show the Windows user interface, but the information and instructions apply equally to the Mac OS version of Photoshop, unless otherwise specified.

Before using Photoshop, install the RGB source profile and CMYK source profile or output profile that you will use when printing to the Color Server. For more information about transferring profiles to or from the Color Server, see Command WorkStation Help.

Before printing from Photoshop, make sure that the appropriate printer driver and Color Server [PPD \(PostScript Printer Description\)](#) are installed on your computer, as described in [Printing](#).

Specifying color settings

The following sections outline the recommended color settings for Photoshop in a Color Server workflow. These color settings include:

Working Spaces: Default color spaces used when working with RGB, CMYK, grayscale, and spot colors. ICC color profiles describe the gamut and color characteristics of these working spaces.

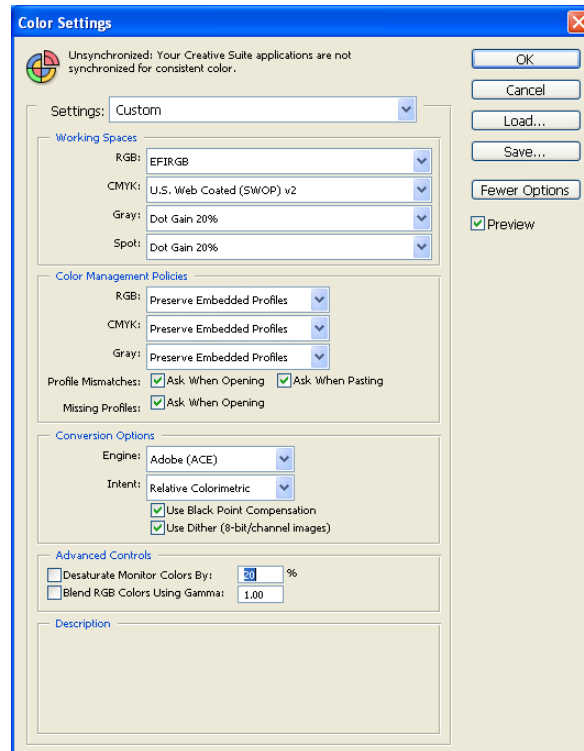
Color Management Policies: Instructions that tell Photoshop what to do when it encounters color data from a color space other than the specified working space.

Configuring Photoshop color settings

Photoshop uses a sophisticated CMS that handles document colors for a variety of color-managed workflows. By customizing color settings, you specify the amount of color management that you want to use while working in Photoshop.

TO SPECIFY COLOR SETTINGS FOR PHOTOSHOP**1 Choose Color Settings from the Edit menu.**

The Color Settings dialog box appears.



NOTE: If More Options appears (rather than Fewer Options), click More Options.

2 Choose the desired working space profile for each color mode in the Working Spaces area.

A working space specifies the color profile for documents that have no color profile associations or documents that are newly created. It also defines the color space of a document converted to RGB, CMYK, or Grayscale color modes, and the spot colors in a document.

Choose an appropriate ICC profile to embed when saving a file for each color space. Use the following guidelines for specifying working spaces:

- For RGB, choose the profile for the default RGB color space used by the Color Server, for example, Fiery RGB or EFIRGB. New RGB documents you create in Photoshop will use this working space.
- For CMYK, choose a profile that describes your target press (such as SWOP, DIC, or Japan Color) if you are a prepress user. If you are a user who prints final output, choose an output profile that describes the device connected to the Color Server. To use a device-specific output profile, you must copy the profile from the Color Server to your computer (see Command WorkStation Help). New CMYK documents you create in Photoshop will use the specified working space.
- For guidelines on specifying the Gray working space, see the documentation that accompanies Photoshop.

3 In the Color Management Policies area, choose Preserve Embedded Profiles from the RGB, CMYK, and Gray menus.

4 Select the following options:

Profile Mismatches: Ask When Opening, Ask When Pasting

Missing Profiles: Ask When Opening

These options allow you to override the color management policies when opening documents or importing color data.

We recommend that you use these settings so that you are notified before any application color management is applied.

5 In the Conversion Options area, choose settings for converting between color spaces.

Choose Adobe (ACE) from the Engine menu to use the built-in color management engine for Photoshop.

Choose a rendering intent from the Intent menu that optimizes the color quality of the conversion. For information about choosing the rendering intent, see the documentation that accompanies Photoshop.

Select the Use Black Point Compensation and Use Dither (8-bit/channel images) options to optimize the quality of color conversions.

- 6 **Clear the Desaturate Monitor Colors By and Blend RGB Colors Using Gamma options in the Advanced Controls area.**

Clearing these options helps to ensure a match between your monitor display and the printed output.

- 7 **Click Save to save the current group of color settings.**

The Save dialog box appears.

- 8 **Name the settings file, accept the default saved location, and then click Save.**

Switch to your saved settings at any time by choosing the group name from the Settings menu at the top of the Color Settings dialog box.

NOTE: You can apply the saved color settings in other Adobe Creative Suite applications. You can also apply the saved color settings to all Adobe Creative Suite applications at once using Adobe Bridge.

- 9 **Click OK to apply the settings and close the Color Settings dialog box.**

Saving files from Photoshop

Before saving a file from Photoshop, perform any necessary rotating, cropping, and resizing. This speeds processing when printing from the application in which the object is placed.

When saving a document, you have the option to embed a color profile in the document. If you will send the document to the Color Server, we recommend that you disable this option.

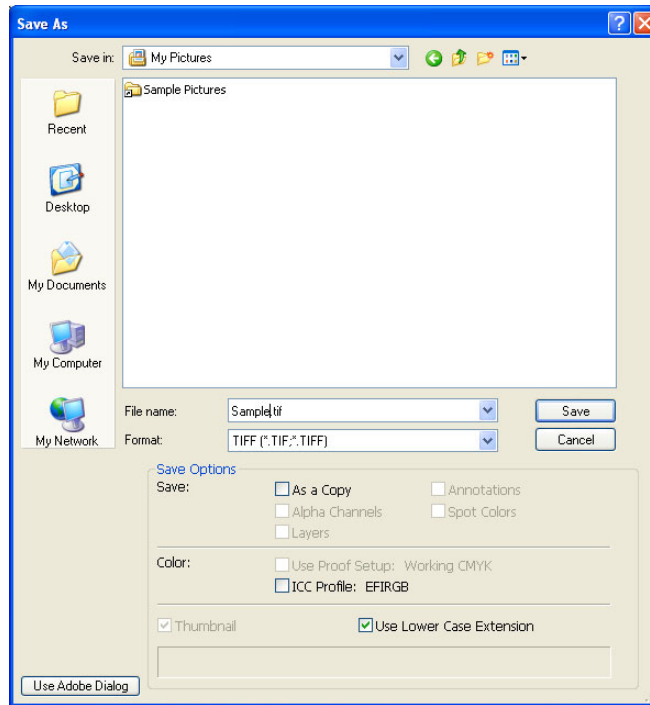
Choosing a file format

We recommend that you use EPS or TIFF file formats to save RGB objects that will be imported into other documents and printed to the Color Server. You can import EPS and TIFF files into virtually all page layout applications.

NOTE: Although TIFF files generally display better when imported into other applications, their color and resolution characteristics may be altered by the application into which they are imported. EPS files are not modified by the applications into which they are imported.

TO SAVE A DOCUMENT FROM PHOTOSHOP**1 Choose Save As from the File menu.**

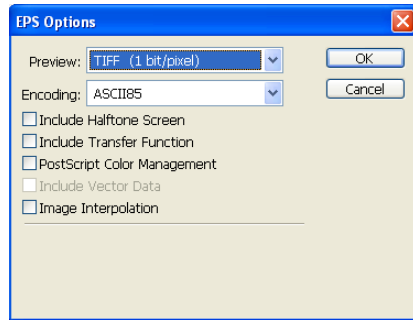
The Save As dialog box appears.

**2 Specify settings in the Save As dialog box.**

- Browse to a location for the document.
- Specify a file name and format.
- Clear the ICC Profile option (Windows) or Embed Color Profile option (Mac OS).

3 Click Save.

If you chose Photoshop EPS as the format, the EPS Options dialog box appears.



4 Specify EPS options, and then click OK.

- Choose a TIFF preview option. A TIFF preview is compatible with Windows and Mac OS computers.
- Do *not* select the PostScript Color Management option. For more information about PostScript color management, see the following section.
- Do *not* select Include Transfer Function or Include Halftone Screen.

NOTE: If you choose **JPEG** encoding, save a backup of the original object with Binary encoding until you see the printed results of the JPEG file. Occasionally, the compression used for JPEG encoding produces unwanted **artifacts**. If you see unexpected results in the printed output of a JPEG file, revert to Binary encoding.

If you experience problems printing the document in which you placed the object, substitute an ASCII version of the same object and reprint the document. Binary encoding is much more compact than ASCII encoding, but occasionally causes printing problems with some system configurations.

Selecting options when printing

You can print RGB or CMYK objects from Photoshop.

- When you print an RGB object, you choose whether the conversion to CMYK is performed by the Color Server (using ColorWise RGB print options), PostScript (using the PostScript Color Management option), or Photoshop built-in color management.
- When you print a CMYK object, you can print composites or color separations.

NOTE: Make sure that the Color Server Combine Separations print option is set to Off. To print separations, use the Separation option in the Photoshop pane of the print dialog box. For instructions, see the documentation that accompanies Photoshop.

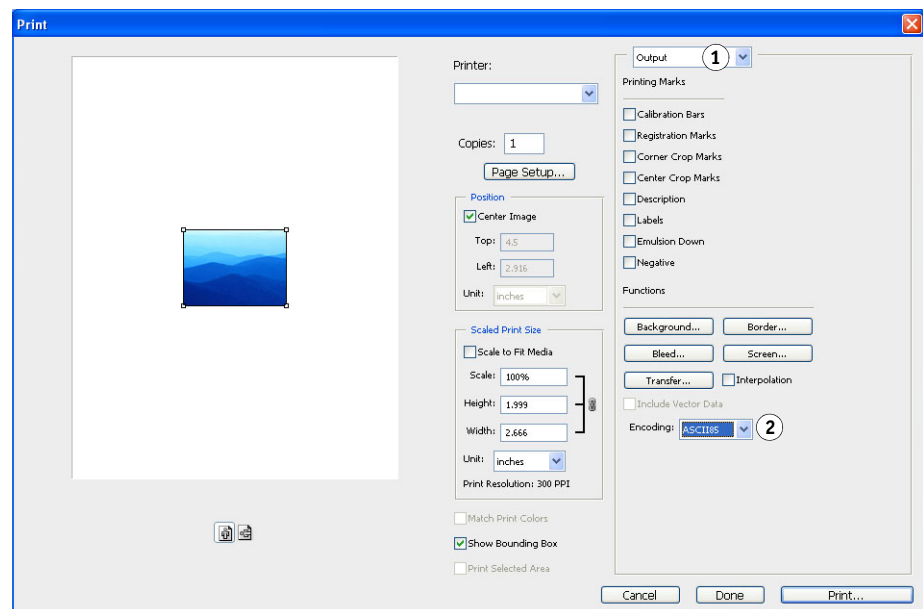
TO PRINT OBJECTS FROM PHOTOSHOP

1 Choose Print (or Print with Preview in Photoshop CS2) from the File menu.

The Print dialog box appears.

2 Choose Output.

- 1 Choose Output
- 2 Choose Encoding method

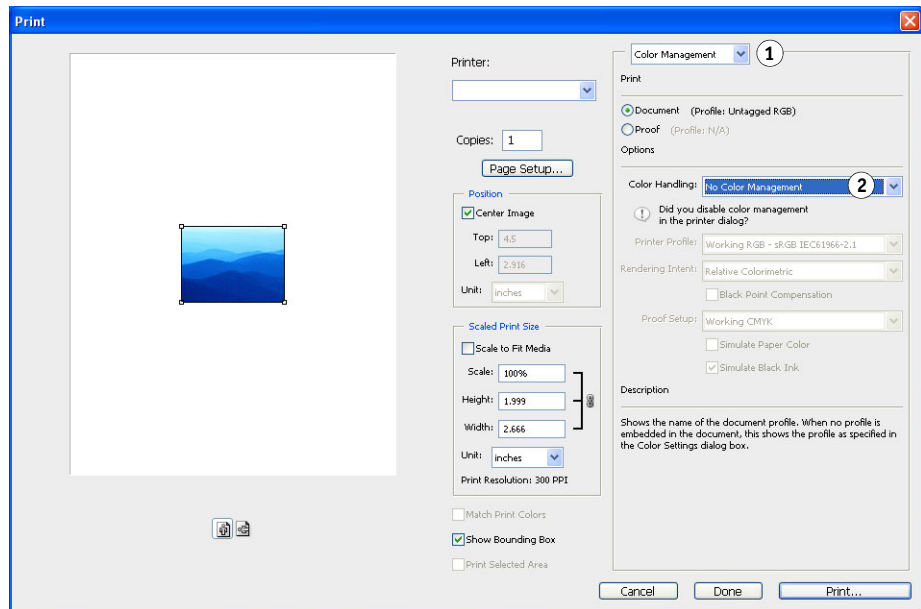


3 Choose an Encoding method.

NOTE: If you choose JPEG encoding, save a backup of the original object with Binary encoding until you see the printed results of the JPEG file. Occasionally, the compression used for JPEG encoding produces unwanted artifacts. If you see unexpected results in the printed output of a JPEG file, revert to Binary encoding.

4 Choose Color Management.

- 1 Choose Color Management
- 2 Choose Color Handling



5 Choose No Color Management from the Color Handling menu to specify the color space for printing the object.

Photoshop does not convert object data to another color space before sending it to the Color Server.

6 Click Print.

The operating system Print dialog box appears.

7 Windows: Click Preferences, and then click the Fiery Printing tab in the dialog box that appears.

8 Select the desired print options.

For information about setting ColorWise print options, see [Color Printing](#).

9 Windows: Click OK.

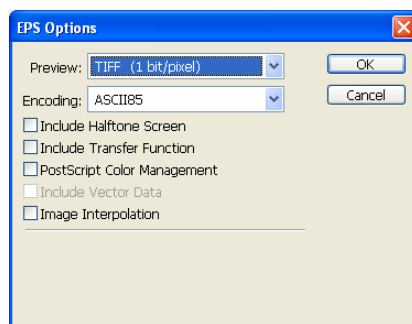
10 Click Print.

Advanced tips for using PostScript color management

Use the following information to implement alternative, more complex, color workflows with Photoshop.

Saving EPS documents with PostScript color management

If you select the PostScript Color Management option (in the EPS Options dialog box) when you save a CMYK or RGB EPS file, Photoshop embeds PostScript color information, which is independent of ICC profiles, in the resulting document. This information is intended for PostScript devices like the Color Server.



Printing RGB EPS files saved with PostScript color management

When you print an RGB EPS file that contains an embedded profile to the Color Server, you can use the working space information from the embedded RGB profile as an RGB source definition for Color Server rendering intents. To use this source color space information from the embedded profile with Color Server rendering intents, choose None as the ColorWise RGB/Lab Source when you print. This applies when you print directly from Photoshop or when the same RGB EPS file is output from another application.

To *override* the embedded profile in an EPS file using an RGB source profile on the Color Server, choose anything except None as the Color Server RGB source profile.

Printing RGB objects with Photoshop PostScript color management

If you select an RGB color space and decide to use PostScript color management, Photoshop sends RGB data to the Color Server along with the PostScript color information defining this RGB color space. When you select the PostScript Color Management option, a rendering intent is used to perform color conversions to CMYK.

NOTE: The included RGB source color space information is overridden by the ColorWise RGB/Lab Source setting, unless it is set to None. The ColorWise Rendering Intent option specified takes effect if the ColorWise RGB/Lab Source option is set to None.

For fastest print times, choose JPEG encoding, but inspect printed output carefully for unwanted artifacts that may appear as a result of JPEG compression. If you see unexpected results in the printed output, reprint the job using Binary or ASCII encoding.

Printing CMYK EPS files saved with PostScript color management

If you select the Photoshop PostScript Color Management option when you save a CMYK EPS object, Photoshop embeds PostScript color information that defines the CMYK source color space of the object. When you print a CMYK EPS file that contains PostScript color information to the Color Server, RGB print options are used instead of ColorWise CMYK source profile and processing method options. Choose the appropriate setting for the Rendering Intent option.

Printing CMYK objects with Photoshop PostScript color management

If you select a CMYK color space and decide to use PostScript color management, Photoshop sends CMYK data to the Color Server along with the PostScript color information defining this CMYK color space. When you select the PostScript Color Management option, a rendering intent is used to perform color conversions to the CMYK color space of the Color Server.

The destination color space for the rendering intents is determined by the Separate RGB/Lab to CMYK Source print option. If the Separate RGB/Lab to CMYK Source option is enabled, the CMYK object is printed according to all specified CMYK/Grayscale Source and CMYK Processing Method settings. If the Separate RGB/Lab to CMYK Source option is not enabled, the CMYK object is converted to the CMYK color space of the selected output profile.

Setting the Color Server print option Spot Color Matching to On has an effect only if you use the Photoshop Multi-Channel feature to define spot channels, and then save the object in EPS format and open it in another application. For more information, see the documentation that accompanies Photoshop.

Photoshop converts spot colors to CMYK values when you work in CMYK mode.

- If the object was separated for an offset press standard, apply the corresponding CMYK/Grayscale Source setting. For example, if the object is separated for SWOP, choose SWOP as the CMYK/Grayscale Source setting.
- If Photoshop is configured for a custom separation using an ICC profile, choose the corresponding profile for the ColorWise CMYK/Grayscale Source option.

The previous custom CMYK setting requires that the same profile used for separation in Photoshop also reside on the Color Server. For more information about downloading CMYK Source profiles to the Color Server with Command WorkStation, see Command WorkStation Help.

MANAGING COLOR IN PAGE LAYOUT APPLICATIONS

This chapter provides instructions for printing color documents from Adobe InDesign CS3 and QuarkXPress 7 for Windows and Mac OS. The illustrations show the Windows user interface, but the information and instructions apply equally to the Mac OS version of each application, unless otherwise specified.

Before using these applications, install the RGB source profile and the CMYK source profile or output profile that you will use when printing to the Color Server. For more information about transferring profiles to or from the Color Server, see Command WorkStation Help.

Before printing from these applications, make sure that the appropriate printer driver and Color Server **PPD (PostScript Printer Description)** are installed on your computer, as described in *Printing*.

Adobe InDesign

The following sections outline the recommended settings for using Adobe InDesign CS3 with the Color Server.

InDesign color settings

When using ColorWise color management, turn off the InDesign color management features.

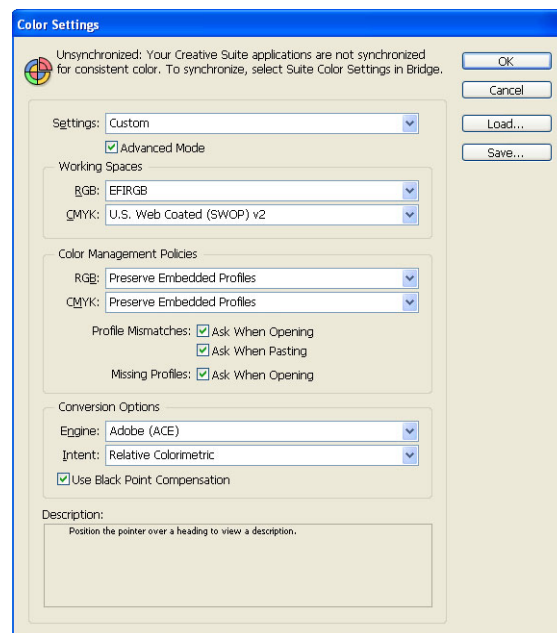
TO DISABLE INDESIGN COLOR MANAGEMENT

1 Choose Color Settings from the Edit menu.

The Color Settings dialog box appears.

2 Select Advanced Mode.

In Advanced Mode, a more extensive list of options is displayed.



3 Choose the desired working space profile for each mode in the Working Spaces area.

Use the following guidelines for specifying working spaces:

- For RGB, choose the profile for the default RGB color space used by the Color Server, for example, Fiery RGB or EFIRGB.
- For CMYK, choose a profile that describes your target press (such as SWOP, DIC, or Japan Color) if you are a prepress user. If you are a user who prints final output, choose an output profile that describes the device connected to the Color Server. To use a device-specific output profile, you must copy the profile from the Color Server to your computer (see Command WorkStation Help).

4 In the Color Management Policies area, choose Preserve Embedded Profiles from the RGB and CMYK menus.**5 Select the following options:**

Profile Mismatches: Ask When Opening, Ask When Pasting

Missing Profiles: Ask When Opening

These options allow you to override the color management policies when opening documents or importing color data.

We recommend that you use these settings so that you are notified before any application color management is applied.

6 In the Conversion Options area, choose settings for converting between color spaces.

Choose Adobe (ACE) from the Engine menu to use the built-in color management engine for InDesign.

Choose a rendering intent from the Intent menu that will optimize the color quality of the conversion. For information about choosing the rendering intent, see the documentation that accompanies InDesign.

Select the Use Black Point Compensation option to optimize the quality of color conversions.

7 Click Save to save the current group of color settings.

The Save dialog box appears.

8 Name the settings file, accept the default saved location, and click Save.

Switch to your saved settings at any time by choosing the group name from the Settings menu at the top of the Color Settings dialog box.

NOTE: You can apply the saved color settings in other Adobe Creative Suite applications. You can also apply the saved color settings to all Adobe Creative Suite applications at once using Adobe Bridge.

9 Click OK to apply the settings and close the Color settings dialog box.

Importing objects

All RGB objects placed in a document, except for RGB TIFF objects, are affected by your RGB print settings. For best results with placed objects, follow the instructions in [“Working with imported objects”](#) on page 25.

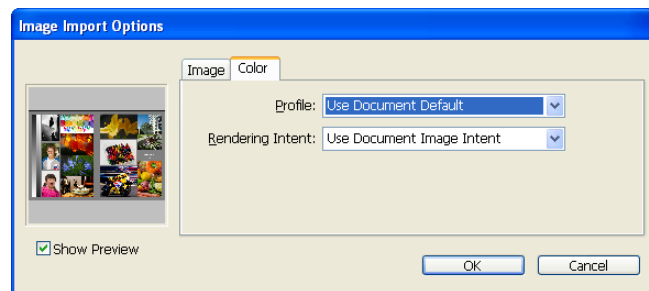
Disable InDesign color management when placing objects in a document.

TO DISABLE INDESIGN COLOR MANAGEMENT WHEN IMPORTING OBJECTS

- 1 Choose **Place** from the **File** menu.

The Place dialog box appears.

- 2 Select the **Show Import Options** option.
- 3 Select the file that you want to import and click **Open**.
- 4 Click the **Color** tab.



- 5 Choose **Use Document Default** from the **Profile** menu.
- 6 Choose **Use Document Image Intent** from the **Rendering Intent** menu.
- 7 Click **OK**.

Selecting options when printing

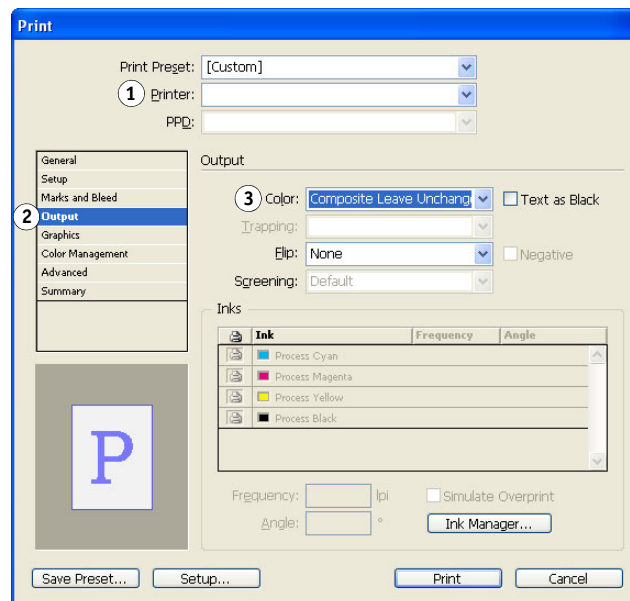
Use the standard Color Server printer driver interface to select print options from InDesign.

TO SET PRINT OPTIONS FROM INDESIGN

- 1 Choose Print from the File menu.
- 2 Choose the Color Server device name from the Printer menu.
- 3 Select Output.

Output options appear.

- 1 Choose the device name
- 2 Select Output
- 3 Choose Color setting

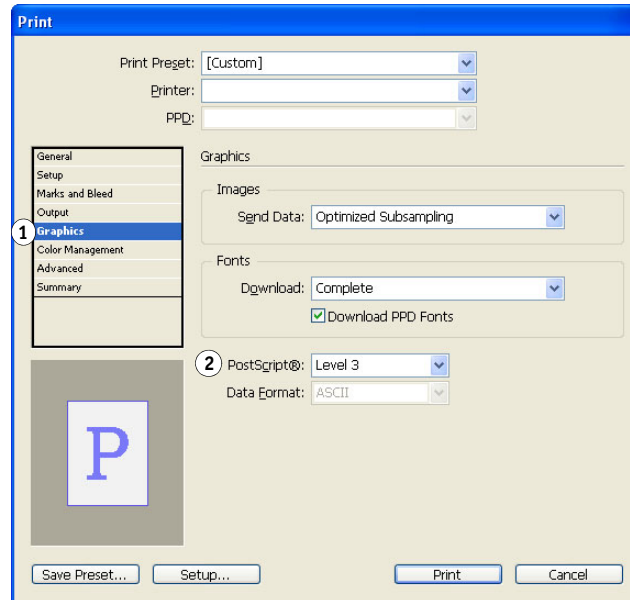


- 4 Choose Composite Leave Unchanged from the Color menu.

5 Select Graphics.

Graphics options appear.

- 1 Select Graphics
- 2 Choose PostScript setting

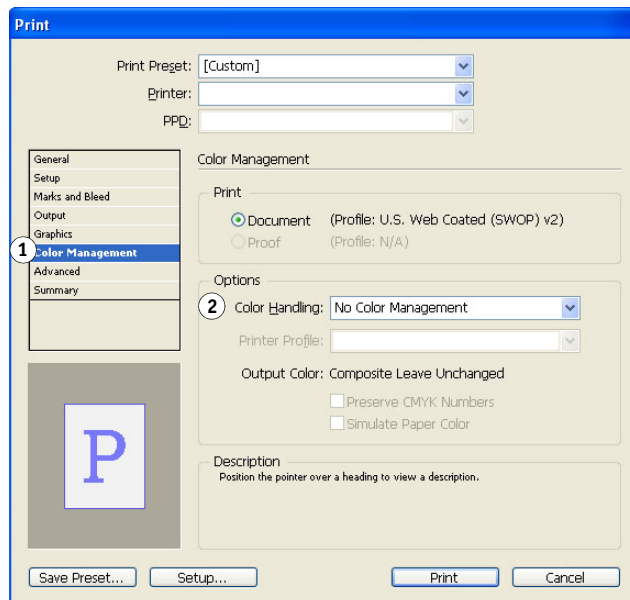


- 6 Choose Level 3 from the PostScript menu. If you encounter problems, you can also use Level 2.

7 Select Color Management.

Color management options appear.

- 1 Select Color Management
- 2 Choose Color Handling setting



- 8 Confirm that Color Handling is set to No Color Management.
- 9 Click Setup (Windows) or Printer (Mac OS) at the bottom of the dialog box.

The operating system Print dialog box appears.

- 10 Windows: Click Preferences, and then click the Fiery Printing tab in the dialog box that appears.
- 11 Select the desired print options.

For information about setting ColorWise print options, see [Color Printing](#).

- 12 Windows: Click OK.
- 13 Click Print, and then click Print again.

QuarkXPress

Importing objects

Only RGB objects saved in EPS format are affected by RGB print options. For best results with placed objects, follow the instructions in [“Working with imported objects”](#) on page 25.

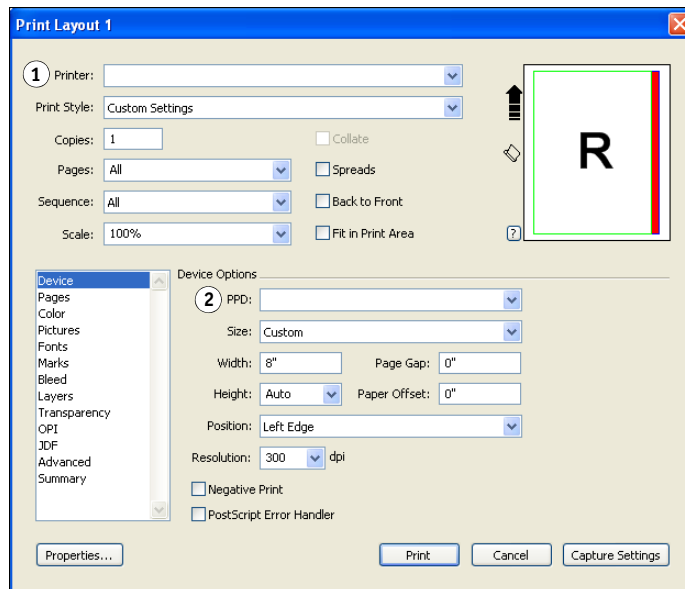
Selecting options when printing

The following procedure provides instructions on printing files to the Color Server.

TO SET PRINT OPTIONS IN QUARKXPRESS

- 1 Choose Print from the File menu.
- 2 Choose the Color Server device from the Printer menu.
- 3 Choose the Color Server PPD from the PPD menu.

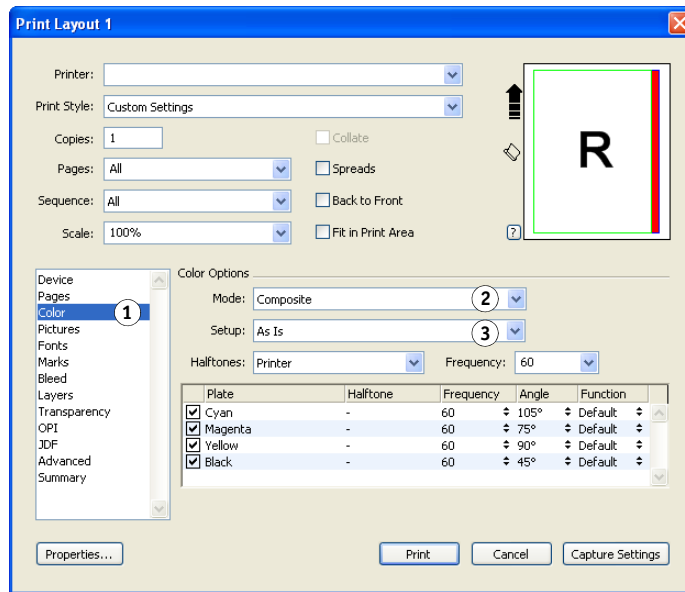
- 1 Choose the Color Server
- 2 Choose PPD for the Color Server



4 Select Color.

Color management options appear.

- 1 Select Color
- 2 Choose Mode setting
- 3 Choose Setup setting



5 Choose Composite from the Mode menu.

6 Choose As Is from the Setup menu.

Use this setting if you want the color managed by the Color Server. This means that each color in the document should be described in the space from which the color was created.

7 Click Properties.

8 Click the Fiery Printing tab in the dialog box that appears.

The standard printer driver interface for the Color Server appears.

9 If the document contains spot colors, choose the appropriate Spot Color Matching setting.

10 Select the desired print options, and then click OK.

For information about setting ColorWise print options, see [Color Printing](#).

11 Click Print.

Optional color management from QuarkXPress

If you have color management requirements that are not offered by ColorWise, such as managing color on devices not controlled by the Color Server, consider using the QuarkXPress color management features. For more information, see the documentation that accompanies QuarkXPress.

MANAGING COLOR IN ILLUSTRATION APPLICATIONS

This chapter provides instructions for using Illustrator for Windows and Mac OS and CorelDRAW for Windows. The illustrations show the Windows user interface, but the information and instructions apply equally to the Mac OS version of Illustrator, unless otherwise specified.

You can print directly from an illustration application or use it to create and save files that will be imported into a page layout document. To print from an illustration application, use the printer driver and print settings recommended in [Color Printing](#). As a general rule, use the EPS file format when saving files with an illustration application. When an EPS file is imported into another application, the color information in the imported object is not changed by the application.

Before using these applications, install the RGB source profile and CMYK source profile or output profile that you will use when printing to the Color Server. For more information about transferring profiles to or from the Color Server, see Command WorkStation Help.

Before printing from these applications, make sure that the appropriate printer driver and Color Server [PPD \(PostScript Printer Description\)](#) are installed on your computer, as described in [Printing](#).

NOTE: This document provides instructions for printing composites only. For information about printing color separations, see the documentation that accompanies the application.

Adobe Illustrator

The following sections provide guidelines for working with Adobe Illustrator CS3.

Note about color models in Illustrator

In Illustrator, you can set the Document Color Mode to RGB color or CMYK color. All elements in a file are created in the selected color model. When you print the file, the data is sent to the Color Server in the color model that you specified.

Illustrator color settings

Illustrator uses a sophisticated color management system that can handle both RGB and CMYK colors for a variety of color-managed workflows. By customizing color settings, you specify the amount of color management that you want to use while working in Illustrator.

Illustrator color settings include the following:

Working spaces: Default color spaces to use when working with RGB and CMYK documents. ICC color profiles describe the gamut and color characteristics of these working spaces.

Color management policies: Instructions that tell Illustrator what to do when it encounters color data from a color space other than the specified working space.

The following procedure outlines the recommended color settings for Illustrator in a Color Server workflow.

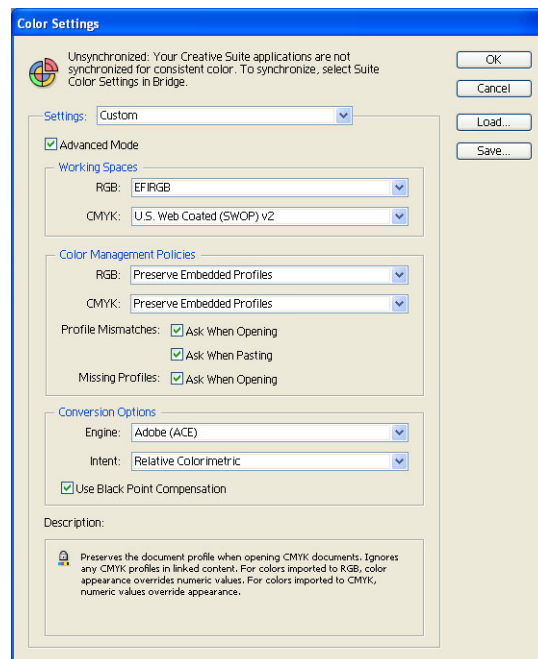
TO SPECIFY COLOR SETTINGS

1 Choose Color Settings from the Edit menu.

The Color Settings dialog box appears.

2 Select Advanced Mode.

In Advanced Mode, a more extensive list of options is displayed.



3 Choose the appropriate working space profile for each mode in the Working Spaces area.

- For RGB, choose the profile for the default RGB color space used by the Color Server, for example, Fiery RGB or EFIRGB. New RGB documents you create in Illustrator will use this working space.
- For CMYK, choose a profile that describes your target press (such as SWOP, DIC, or Japan Color) if you are a prepress user. If you are a user who prints final output, choose an output profile that describes the device connected to the Color Server. To use a device-specific output profile, you must copy the profile from the Color Server to your computer (see Command WorkStation Help). New CMYK documents you create in Illustrator will use the specified working space.

4 In the Color Management Policies area, choose Preserve Embedded Profiles from the RGB and CMYK menus.**5 Select the following options:**

Profile Mismatches: Ask When Opening, Ask When Pasting

Missing Profiles: Ask When Opening

These options allow you to override the color management policies when opening documents or importing color data.

We recommend that you use these settings so that you are notified before any application color management is applied.

6 In the Conversion Options area, choose settings for converting between color spaces.

Choose Adobe (ACE) from the Engine menu to use the built-in color management engine for Illustrator.

Choose a rendering intent from the Intent menu that optimizes the color quality of the conversion. For information about choosing the rendering intent, see the documentation that accompanies Illustrator.

Select the Use Black Point Compensation option to optimize the quality of color conversions.

7 Click Save to save the current group of color settings.

The Save dialog box appears.

8 Name the settings file, accept the default saved location, and then click Save.

Switch to your saved settings at any time by choosing the group name from the Settings menu at the top of the Color Settings dialog box.

NOTE: You can apply the saved color settings in other Adobe Creative Suite applications. You can also apply the saved color settings to all Adobe Creative Suite applications at once using Adobe Bridge.

9 Click OK to apply the settings and close the Color settings dialog box.

Saving files for importing into other documents

When saving files in Illustrator for importing into other types of documents, use the EPS file format. Illustrator can save color information in both RGB and CMYK. The ColorWise RGB print options affect color output of RGB artwork saved in Illustrator EPS and imported into other kinds of documents (even when both RGB and CMYK artwork exist in the same file). In the case of Illustrator files imported into Photoshop, however, vector data from the Illustrator file is rasterized into **bitmap (or raster)** format in Photoshop, and the final color space of the bitmap data is determined by the color mode that you set in Photoshop.

Specifying print options

The following procedure explains how to set print options when printing a document from Illustrator to the Color Server.

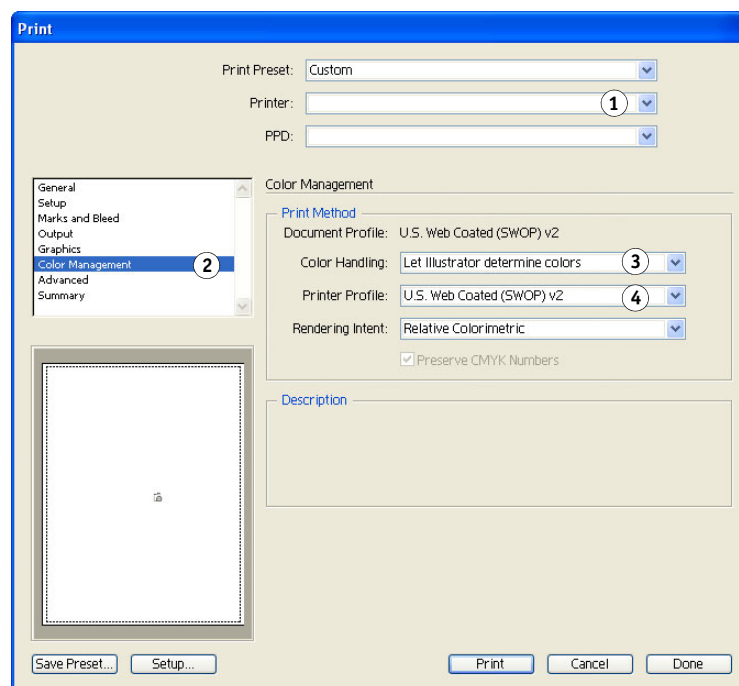
TO SET PRINT OPTIONS IN ILLUSTRATOR

1 Choose Print from the File menu.

The Print dialog box appears.

2 Choose the Color Server device from the Printer menu.

- 1 Choose the device name
- 2 Select Color Management
- 3 Choose Color Handling setting
- 4 Choose Printer Profile



3 Select Color Management.

Color management options appear.

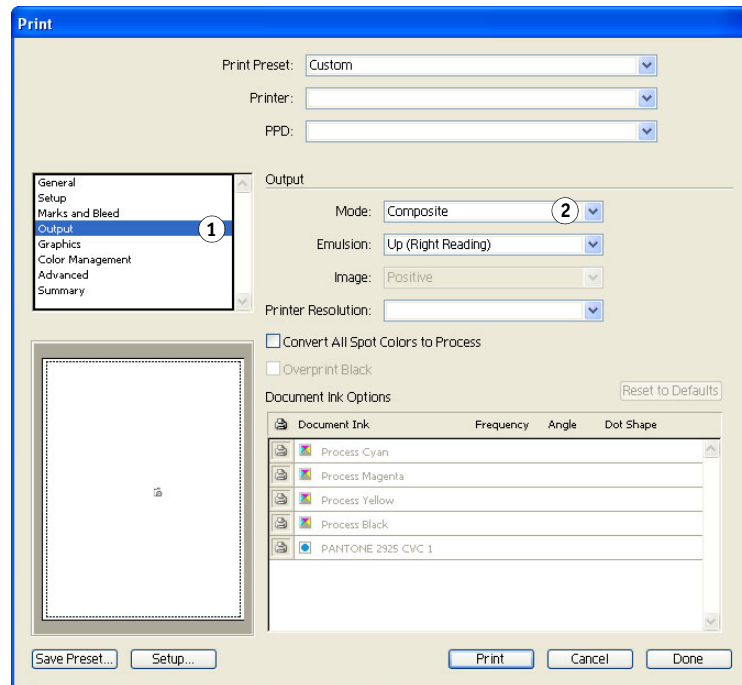
4 Choose Let Illustrator determine colors from the Color Handling menu.

5 Make sure that the Printer Profile setting matches the displayed Document Profile setting.

6 Select Output.

Output options appear.

- 1 Select Output
- 2 Choose Mode setting

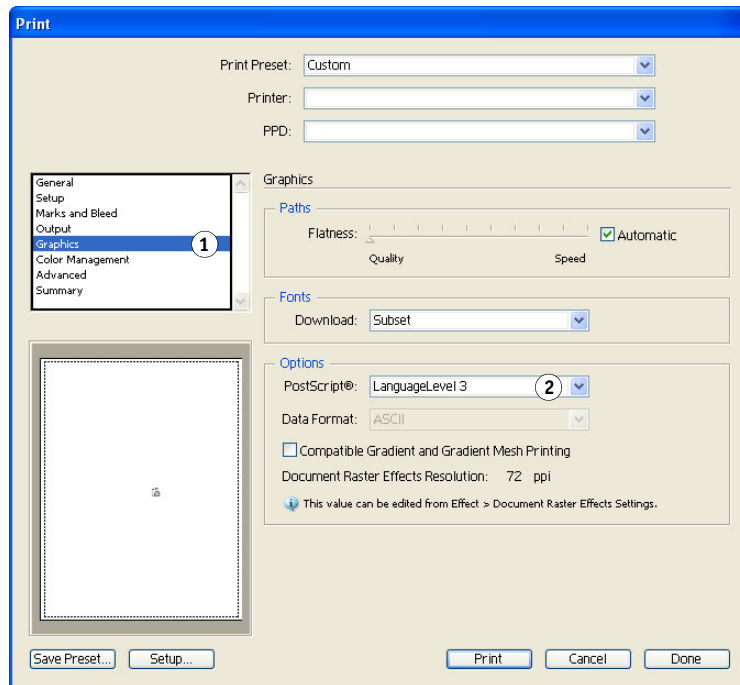


7 Choose Composite from the Mode menu.

8 Select Graphics.

Graphics options appear.

- 1 Select Graphics
- 2 Choose PostScript setting



- 9 Choose Language Level 3 from the PostScript menu. If you encounter problems, you can also use Level 2.

- 10 Click Setup (Windows) or Printer (Mac OS) at the bottom of the dialog box.

The operating system Print dialog box appears.

- 11 Windows: Click Preferences, and then click the Fiery Printing tab in the dialog box that appears.
- 12 If necessary, click ColorWise and select RGB print settings.

Specify these settings only if your CMYK document contains placed RGB objects. In all other cases, colors remain unaffected by the settings.

- 13 If the document contains spot colors, choose the appropriate Spot Color Matching setting.
- 14 Select the desired print options.

For information about setting ColorWise print options, see [Color Printing](#).

- 15 Windows: Click OK.
- 16 Click Print, and then click Print again.

Using Illustrator color management

If you have color management requirements that are not offered by ColorWise, such as managing color on devices not controlled by the Color Server, consider using the Illustrator color management features. For more information, see the documentation that accompanies Illustrator.

CorelDRAW

The following sections describe the recommended color settings for CorelDRAW X3 for Windows.

Defining colors

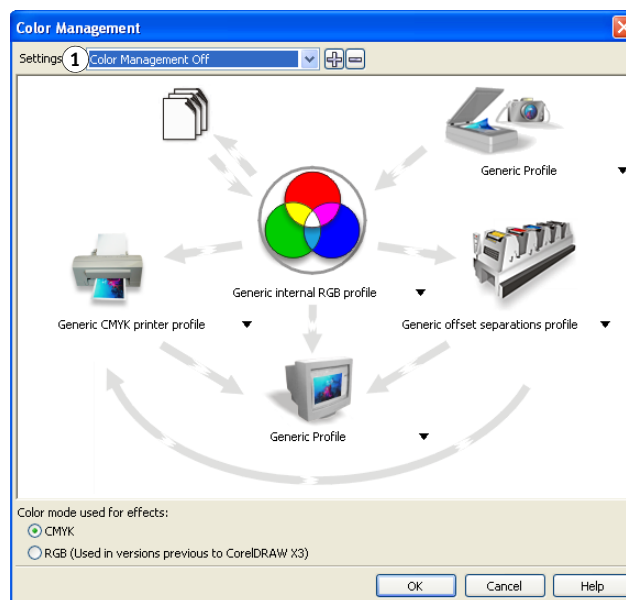
Any colors defined in CorelDRAW X3 are sent to the device in CMYK, even those colors defined using other color models. For best results, use the color definition methods described in [“Color matching with PostScript applications”](#) on page 24.

You can control the conversion of RGB colors defined in CorelDRAW by specifying settings in the Color Management dialog box. To display the Color Management dialog box, choose Color Management from the Tools menu in the CorelDRAW main window.

TO DISABLE COLOR MANAGEMENT IN CORELDRAW

- 1 Choose Color Management from the Tools menu.
- 2 Choose Color Management Off from the Settings list and click OK.

1 Color Management Off



Importing objects

All RGB objects placed in a document are affected by the RGB print settings. For best results with placed objects, follow the instructions in [“Working with imported objects”](#) on page 25.

Saving files for importing into other documents

When saving files in CorelDRAW for importing into other types of documents, use the EPS file format. CorelDRAW saves all color information in CMYK, so RGB print options have no effect on color output of artwork saved with CorelDRAW and imported into other kinds of documents. In the case of CorelDRAW files imported into Photoshop, however, vector data from the CorelDRAW file is rasterized into bitmaps in Photoshop, and the final color space of the bitmap data is determined by the color mode that you set in Photoshop.

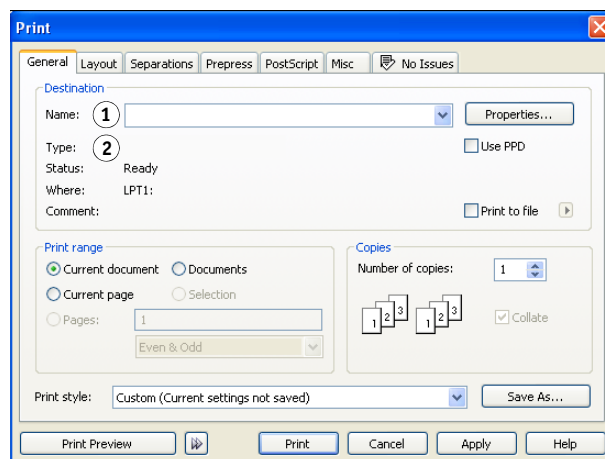
Specifying print options

This section explains how to set print options when printing from CorelDRAW to the Color Server.

TO SET PRINT OPTIONS IN CORELDRAW

- 1 Choose Print from the File menu.
- 2 On the General tab, select the correct print device from the Name list.

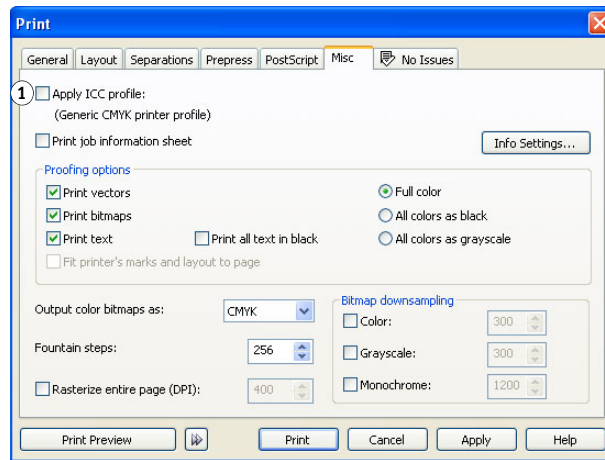
- 1 Print device name appears here
- 2 Printer driver/PPD name appears here



3 On the Misc tab, clear the Apply ICC profile option.

If this option is selected, CorelDRAW color management settings are used to convert RGB colors and objects to CMYK.

1 Clear this option to use ColorWise color management



4 On the General tab, click Properties.

The Properties window appears.

5 Click the ColorWise icon, and then click Expert Settings to specify ColorWise print options.

6 If a document contains placed RGB objects, choose RGB print settings for your device.

With the exception of placed RGB objects, these settings have no effect on colors printed with CorelDRAW.

7 If the document contains spot colors, choose the appropriate Spot Color Matching setting.

8 Click OK, and then click Print to print the document.

Optional color management in CorelDRAW

If you have color management requirements that are not offered by ColorWise, such as managing color on devices not controlled by the Color Server, consider using the CorelDRAW color management features. For more information, see the documentation that accompanies CorelDRAW.

MANAGING COLOR IN ADOBE ACROBAT

This chapter covers features of Adobe Acrobat 7.0 Professional for Windows and Mac OS. The illustrations show the Windows user interface, but the information and instructions apply equally to the Mac OS version of Acrobat, unless otherwise specified.

Before using Acrobat, install the RGB source profile and CMYK source profile or output profile that you will use when printing to the Color Server. For more information about transferring profiles to or from the Color Server, see Command WorkStation Help.

Before printing from Acrobat, make sure that the appropriate printer driver and the Color Server PostScript printer description file (PPD) are installed on your computer, as described in [Printing](#).

Specifying color settings

When using ColorWise color management, turn off the Acrobat color management features.

To Specify Color Settings for Acrobat

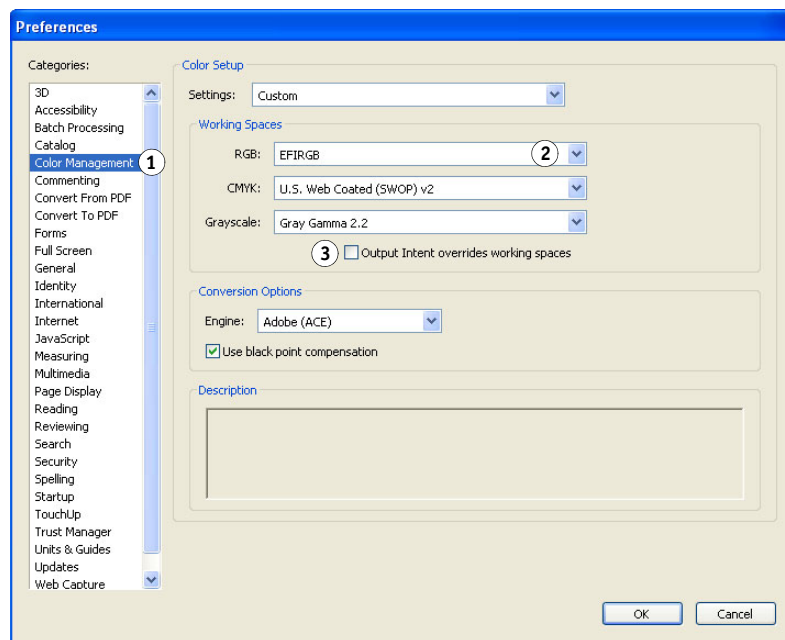
- 1 Choose Preferences from the Edit menu (Windows) or Acrobat menu (Mac OS).**

NOTE: If Enfocus Pitstop is installed, choose Preferences > General from the Edit menu.

- ## 2 Select Color Management.

Color management preferences appear.

- 1 Select Color Management
- 2 Choose profiles
- 3 Clear Output Intent overrides working spaces



- 3 Choose the desired working space profile for each color mode in the Working Spaces area.**

- For RGB, choose the profile for the default RGB color space used by the Color Server, for example, Fiery RGB or EFIRGB.
- For CMYK, choose a profile that describes your target press (such as SWOP, DIC, or Japan Color) if you are a prepress user. If you are a user who prints final output, choose an output profile that describes the device connected to the Color Server. To use a device-specific output profile, you must copy the profile from the Color Server to your computer (see Command WorkStation Help).
- For guidelines on specifying the Grayscale working space, see the documentation that accompanies Acrobat.

- 4 Clear the Output Intent overrides working spaces option.**

- 5 Click OK.**

Selecting options when printing

You can use the standard Color Server printer driver interface to select print options from Acrobat.

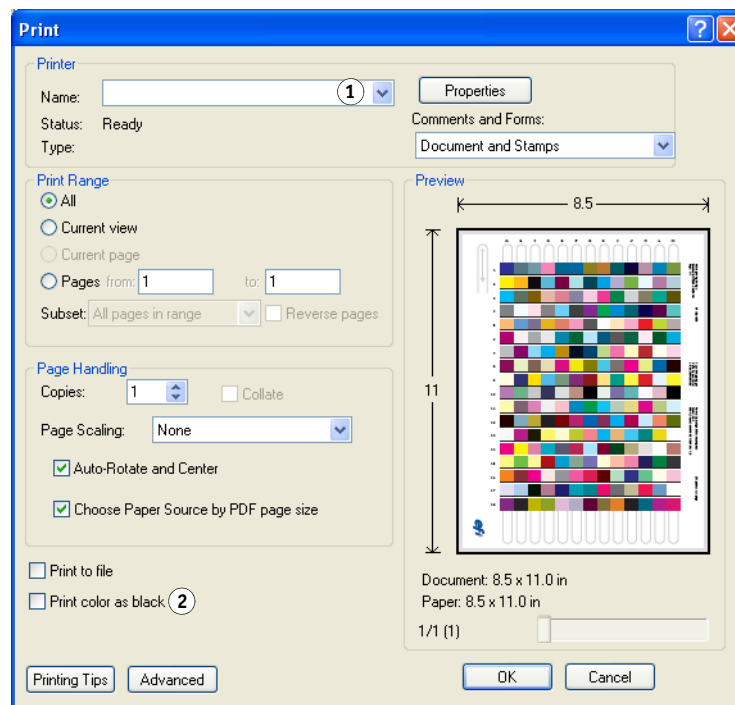
TO PRINT A PDF DOCUMENT FROM ADOBE ACROBAT

- 1 Choose Print from the File menu.**

The Print dialog box appears.

- 2 Choose the Color Server device from the Name menu (Windows) or Printer menu (Mac OS).**

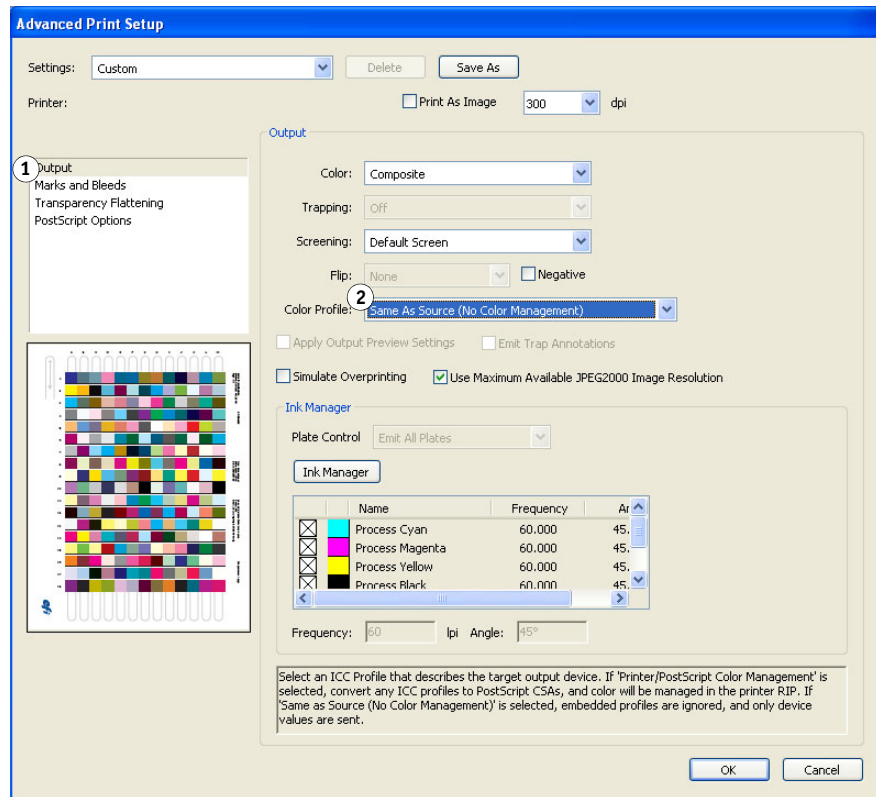
- 1 Select Color Server
- 2 Clear Print color as black



- 3 **Windows:** Clear the Print color as black option.
- 4 **Click Advanced.**

5 Select Output.

- 1 Select Output
- 2 Choose Color Profile



6 Choose Same as Source (No Color Management) from the Color Profile list.

Acrobat does not convert object data to another color space before sending it to the Color Server.

7 Click OK, and then click OK again (Windows) or click Print (Mac OS).

DESKTOP COLOR PRIMER

This chapter covers concepts that are basic to printing in color, including:

- Properties of color
- Printing techniques
- Effective use of color
- Raster images and vector graphics
- File optimization for processing and printing

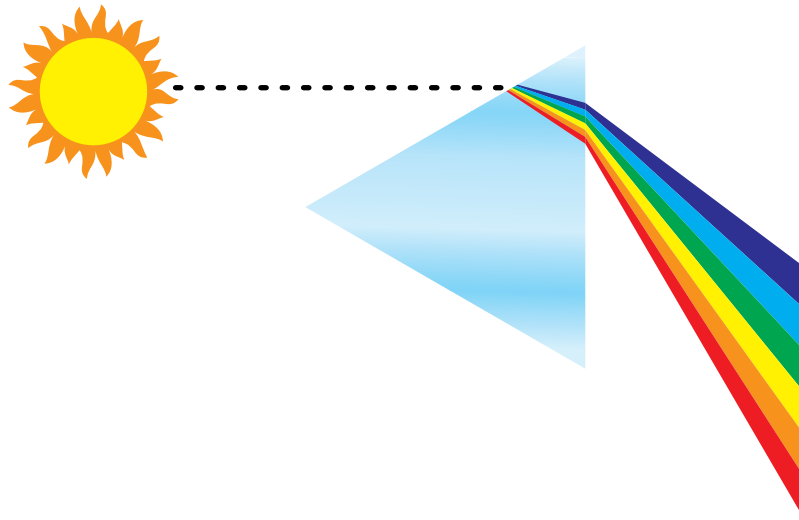
If you are already familiar with color theory and digital color printing, proceed to [“Optimizing files for processing and printing”](#) on page 73 for information about optimizing files for printing.

The properties of color

This section introduces concepts that are basic to color theory. You will encounter some of these concepts (such as hue, saturation, and brightness) when you work with color in applications; others provide useful background information. Color is a complex topic, so consider this a starting point for experimentation and further research.

The physics of color

The human eye can see electromagnetic radiation at wavelengths between 400 nanometers (purplish blue) and 700 nanometers (red). This range is called the visible spectrum of light. We see pure **spectral light** as intensely saturated or pure colors. Sunlight at midday, which we perceive as white or neutral light, is composed of light from across the visible spectrum in more or less equal proportions. Shining sunlight through a prism separates it into its spectral components, resulting in the familiar rainbow of colors illustrated in the following figure.

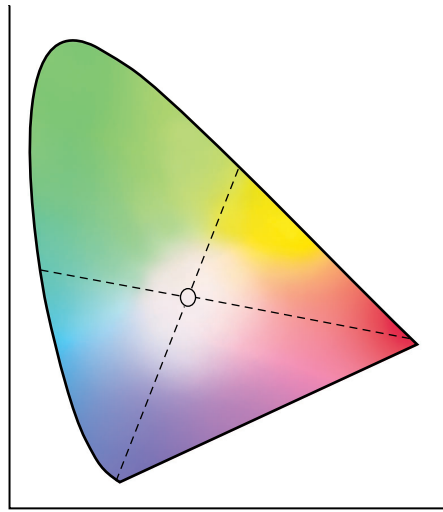


Like the sun, most light sources we encounter in our daily environment emit a mixture of light wavelengths, although the particular distribution of wavelengths can vary considerably. Light from a tungsten light bulb, for example, contains much less blue light than sunlight. Tungsten light appears white to the human eye, which, up to a point, can adjust to the different light sources. However, color objects appear different under tungsten light than they do in sunlight because of the different spectral makeup of the two light sources.

The mixture of light wavelengths emitted by a light source is reflected selectively by different objects. Different mixtures of reflected light appear as different colors. Some of these mixtures appear as relatively saturated colors, but most appear as grays or impure hues of a color.

CIE color model

In the 1930s, the Commission Internationale de l'Eclairage (CIE) defined a standard **color space**, a way of defining colors in mathematical terms, to help in the communication of color information. This color space is based on research on the nature of color perception. The following CIE chromaticity diagram is a two-dimensional model of color vision. The arc around the top of the horseshoe encompasses the pure, or spectral, colors from blue-violet to red. Although the CIE chromaticity diagram is not perceptually uniform, some areas of the diagram seem to compress color differences relative to others, it is a good tool for illustrating some interesting aspects of color vision.



By mixing any two spectral colors in different proportions, we can create all the colors found on the straight line drawn between them in the diagram. It is possible to create the same gray by mixing blue-green and red light or by mixing yellow-green and blue-violet light. This is possible because of a phenomenon peculiar to color vision called **metamerism**. The eye does not distinguish individual wavelengths of light. Therefore, different combinations of spectral light can produce the same perceived color.

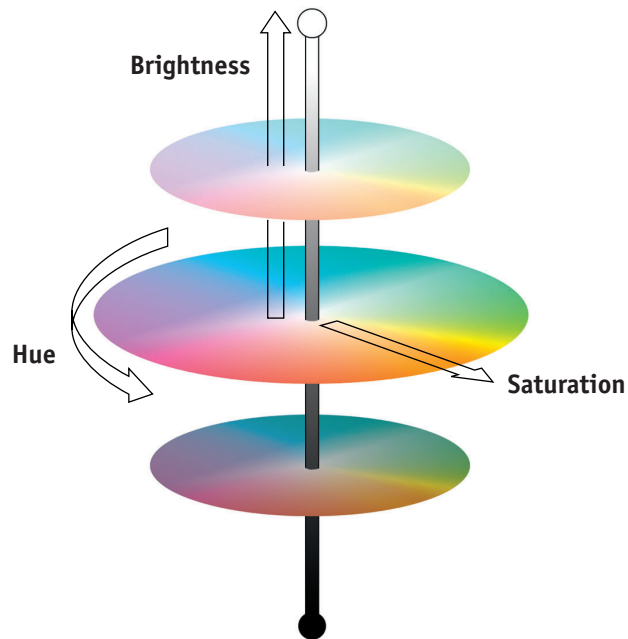
Purple colors, which do not exist in the spectrum of pure light, are found at the bottom of the diagram. Purples are mixtures of red and blue light—the opposite ends of the spectrum.

Hue, saturation, and brightness

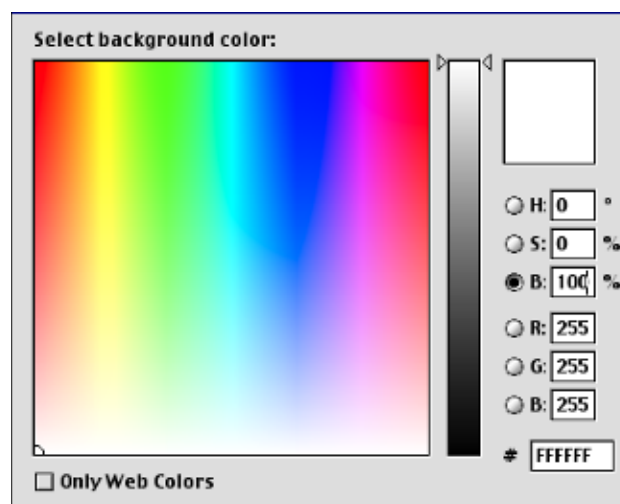
A color can be described in terms of three varying characteristics, called the **HSB** color model:

- Hue: Tint (the qualitative aspect of a color—red, green, or orange)
- Saturation: The purity of the color
- Brightness: Relative position between white and black

While the CIE chromaticity diagram illustrated earlier conveys hue and saturation, a three-dimensional color model is required to add the brightness component, as illustrated in the following figure.



Many computer applications include dialog boxes in which you choose colors by manipulating hue, saturation, and brightness. For example, some applications use a color picker that can be reconfigured according to your preference (as illustrated in the following figure).

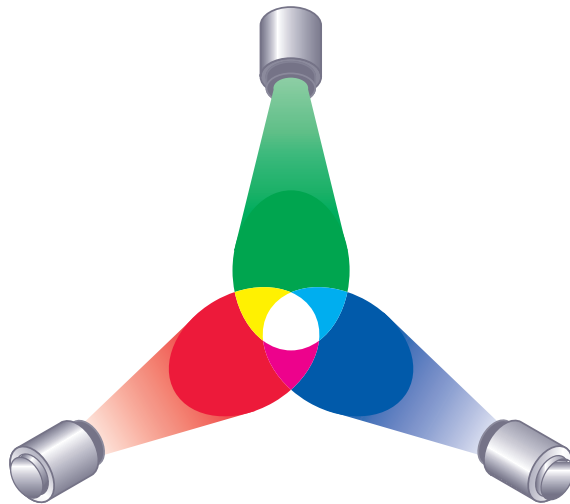


Additive and subtractive color systems

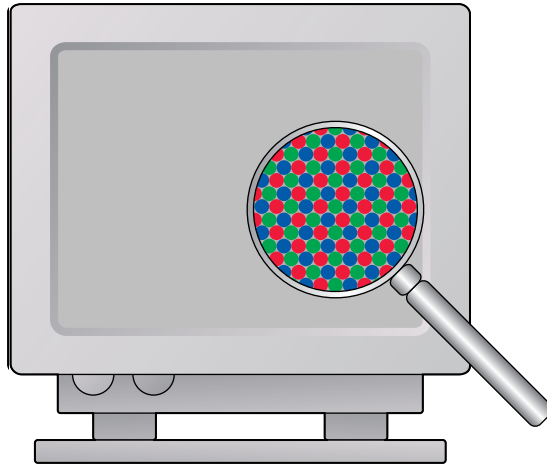
Color devices used in desktop publishing and printing *simulate* the range of visible colors using a set of primary colors that are combined to create other colors. There are two methods for creating a range of colors from a set of primary colors. Computer monitors and scanners are based on the [additive color model](#). Printing technologies, including the Color Server and offset presses, are based on the [subtractive color model](#).

Additive (RGB) color

Color devices that use the additive color model create a range of colors by combining varying amounts of red, green, and blue light. These colors are called the [additive primaries](#) (illustrated in the following figure). White is created by adding the maximum amount of red, green, and blue light available. Black occurs wherever all three colors are absent. Grays are created by adding equal amounts of all three color together. Combining varying amounts of any two of the additive primaries creates a third, saturated hue.



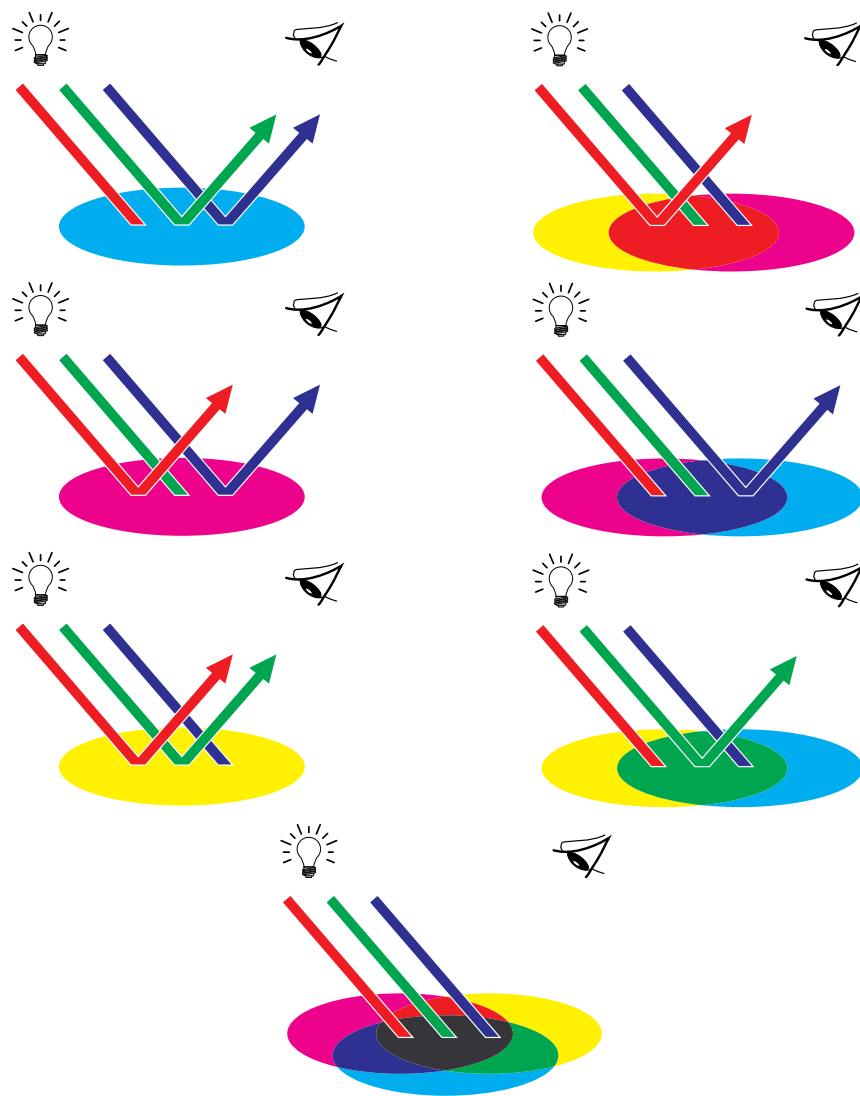
A familiar device that is based on this color model is the computer monitor, illustrated in the following figure. Monitors have red, green, and blue **phosphors** that emit varying amounts of light to display a given color. Scanners create digital representations of colors by measuring their red, green, and blue components through colored filters.



Subtractive (CMY and CMYK) color

The subtractive color model is the basis for color printing, color photographic prints, and transparencies. While the additive color model simulates the visible spectrum of color by adding light of three primary hues, the subtractive color model starts with a “white” or neutral light source containing light of many wavelengths. Inks, toners, or other **colorants** are used to selectively absorb (subtract) certain wavelengths of light that otherwise would be reflected or transmitted by the media in use.

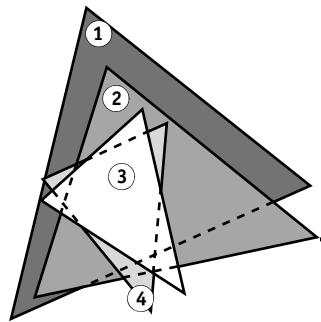
The **subtractive primaries** are cyan, magenta, and yellow; they absorb red, green, and blue light, respectively (as illustrated in the following figure). Combining any two subtractive primaries creates a new color that is relatively pure or saturated. For example, you can make red by combining magenta and yellow, which absorb green and blue light, respectively. White occurs when no colorant is applied. In theory, combining all three subtractive primaries yields black, but due to deficiencies of cyan, magenta, and yellow colorants, combining these three primaries actually yields a muddy brown. Black colorant is added to compensate for the deficiencies of cyan, magenta, and yellow colorants. Consequently, color printing uses four **process colors**: Cyan, Magenta, Yellow, and black (CMYK). The use of black toner produces neutral solid blacks and allows for improved rendering of black text.



Understanding color gamut

Different color reproduction techniques have different color capabilities, or **gamuts**. Color transparency films have comparatively large gamuts, as do color monitors. The color gamut that can be produced using process inks or CMYK toners on paper is smaller. This is why some colors that can be displayed on a color monitor, especially bright saturated colors, cannot be reproduced exactly by your Color Server, nor can they be reproduced on a press using **process colors**. Moreover, different printers have different gamuts. Some colors your printer can produce cannot be reproduced on an offset press, and vice versa. The following figure illustrates this concept of differing gamuts.

- 1 Color transparency film
- 2 RGB monitor
- 3 Offset press (white)
- 4 Other print device



You must account for the gamut of your printer when designing on a color monitor. When printed, colors that fall outside the printer gamut are “mapped” to printable colors. This process, referred to as **gamut mapping**, takes place when color data is converted or adjusted to meet the gamut requirements of a printer.

The Color Server is specially designed to perform gamut mapping at high speed with high-quality results. It provides these color management features automatically, using either built-in default settings or settings you select for a particular print job. For added flexibility, you can also use the Color Server color management system in combination with the color management systems on Windows and Mac OS computers.

Printing techniques

Until recently, most color printing was done on printing presses using one of several printing techniques, such as **offset lithography**, **flexography**, or **gravure**. All traditional printing techniques require lengthy preparation before a press run can take place. Short-run color printing, including Color Server printing, eliminates most of this preparation. By streamlining the process of color printing, the Color Server makes short print runs economically feasible.

In contemporary offset lithographic printing, digital files from desktop computers are output to an imagesetter, which creates film separations. The film is used to make a **prepress proof**, which is an accurate predictor of the final print job and allows you to make corrections before going to press. Once the proof is approved, the printer makes plates from the film and runs the print job on the press.

With the Color Server, you simply print the file. The Color Server processes the PostScript information in the file and sends four bitmaps (one each for cyan, magenta, yellow, and black) to the printer. The ease of Color Server printing makes possible experimentation that would be too costly on a press, allowing unlimited fine-tuning of color and design elements.

Halftone and continuous tone devices

Halftoning is used in offset printing to print each process color at a different intensity, allowing millions of different colors to be reproduced using only the four process colors. Depending on the required intensity of a given color, toner is placed on paper in dots of different size. The grid of dots used for each toner color is called a screen. Halftone screens are aligned to unique angles designed to eliminate interference patterns called **moiré** that can arise with halftoning.

Some color printers are commonly referred to as **continuous tone (contone)** devices. They do not use traditional halftone patterns and angles. Contone devices are capable of varying the intensity of individual dots.

Even if your color printing is done exclusively on the Color Server, you will encounter concepts from offset printing if you use high-end graphics applications. For example, color controls in illustration applications, such as Adobe Illustrator, are geared toward specifying color for offset printing using process and spot colors. Many applications allow you to specify the halftone used for each printing plate.

Using color effectively

The ability to print in color can greatly increase the effectiveness of your message, whether you are printing a presentation or newsletter (short-run printing), or proofing an ad concept that will later be printed on a press (color proofing). Some potential benefits of using color include:

- Conveying information rapidly by using color cues
- Making use of the emotive aspects of different colors
- Increasing impact and message retention

Color can also be a source of distraction and discord if it is used poorly. This section outlines some guidelines and concepts to consider as you approach designing color materials.

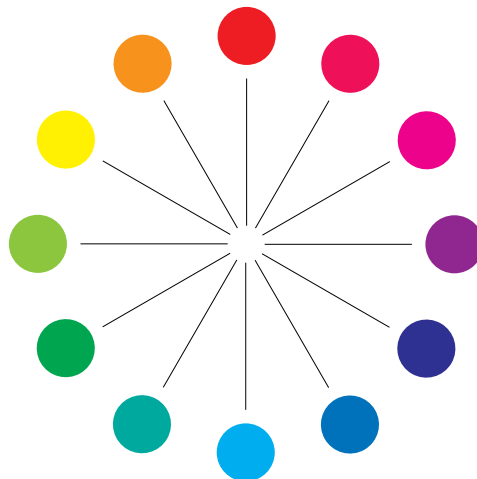
General guidelines

To create successful color materials, consider the following:

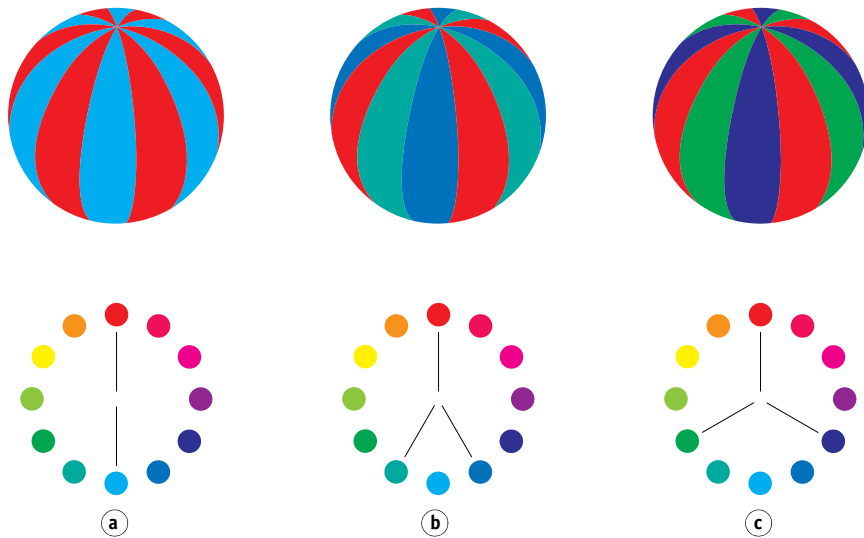
- Use color to aid comprehension, rather than applying colors indiscriminately. In presentations, graphs, and charts, use color to highlight patterns and emphasize differences.
- Use color sparingly. In general, fewer colors work better than many colors.
- Use red as an accent color. Red is particularly effective when used in otherwise monochromatic materials.
- Consider the tastes of your target audience when choosing colors.
- Keep a file of printed color pieces that appeal to you or strike you as effective. Refer to it for ideas when designing your own documents.

Color wheel

A color wheel like the one in the following figure is a helpful tool for understanding the interrelation of colors. The colors on one side of the color wheel, from magenta to yellow, appear to most people to be warm colors, while those on the other side, from green to blue, appear to be cool. The distance between two colors on the color wheel can help predict how they will appear when seen side by side.



Colors opposite one another on the color wheel are called complements (see example a in the following figure), and create a striking contrast side by side. This can be the basis for a bold graphical design, but it is an effect you should use with discretion, since it can be visually fatiguing. Other bold combinations to consider are split complements—a color and the two colors adjacent to its complement (example b)—and triads (three colors evenly spaced on the color wheel (example c). Colors adjacent to one another on the color wheel result in subtle harmonies.



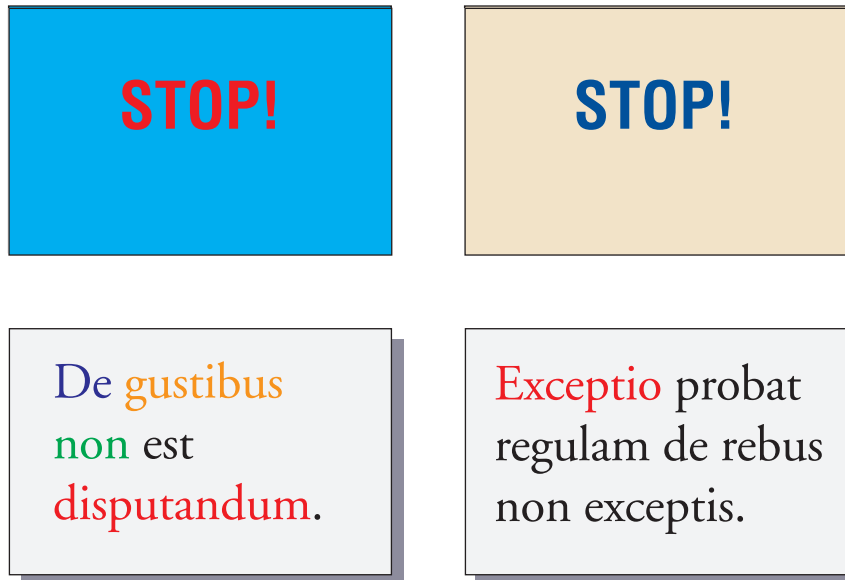
The color wheel simplifies color relationships for the purpose of clarity, showing only saturated or pure colors. Adding the myriad variations of each hue to the palette (more or less saturated, darker, or lighter) creates a wealth of possibilities. Taking a pair of complements from the color wheel and varying the saturation and brightness of one or both colors produces a very different result from the pure complements. Combining a light tint of a warm color with a darker shade of its cooler complement often gives pleasing results. Combining a darker shade of a warm color with a light tint of its cooler complement produces an unusual effect that may appeal to you.

Once you have mastered the concept of the color wheel, you have a good framework for experimenting with color combinations. Many books targeted at graphic designers show groups of preselected color combinations. Some are organized by themes or moods, and some are based on a [custom color system](#), such as PANTONE. The more you develop a critical facility for judging color combinations, the more you will trust your own eye for color. For a selection of books about design, see the “[Bibliography](#)” on page 75.

Color and text

It is not a coincidence that the overwhelming majority of text you see is printed in black on white paper. Text in black on white is highly legible and is not fatiguing to read for extended periods. For many color materials, using black text on a white background and confining color to graphic elements and headings is a good choice.

When used skillfully, color text can add flair to documents printed on paper. This technique is widely used in presentations. When using color text, avoid dazzling text and background combinations created from primary complements, especially red and cyan or red and blue. They are visually fatiguing and hard to read. Color text is more legible when distinguished from its background by a difference in lightness, for example, dark blue text on a light beige background. In addition, using many different colors in a string of text makes for a confused appearance and is hard to read. However, using a single highlight color is an effective way to draw the reader's eye to selected words. For color text samples, see the following figure.



When using color text, keep in mind that small font sizes typically do not print in color with the same sharpness as in black. In most applications, black text prints exclusively in black toner, while color text usually prints with two or more toners. Any misregistration between the different toners on paper causes color text to lose definition. You can make test prints to find the smallest point size at which color text prints clearly. When using high-end graphics applications that allow you to specify color as percentages of cyan, magenta, yellow, black, you can create pure cyan or pure magenta text that prints with the same sharpness as black text. (Pure yellow text is extremely hard to read on anything but a dark or complementary background.)

Raster images and vector graphics

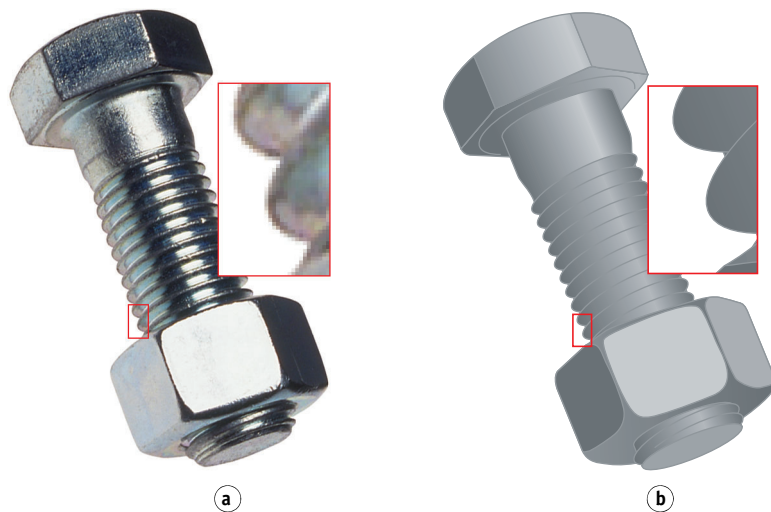
Two broad categories of artwork can be printed from a personal computer to a color printer: **raster images** and **vector graphics**.

A raster image, also referred to as a bitmap, is composed of a grid of **pixels**, each assigned a particular color value (as illustrated in example a in the following figure). The grid, when sufficiently enlarged, resembles a mosaic made from square tiles. Examples of raster images include scans and images created in painting or pixel-editing applications, such as Photoshop and Corel Painter.

The amount of data found in a raster image depends on its **resolution** and **bit depth**. The resolution of a raster describes the compactness of the pixels and is specified in pixels per inch (ppi). The bit depth is the number of bits of information assigned to each pixel. Black and white raster images require only one bit of information per pixel. Grayscale images require 8 bits per pixel. For photographic quality color, 24 bits of RGB color information are required per pixel, yielding 256 levels of red, green, and blue. For CMYK images, 32 bits per pixel are required.

When printing raster artwork, the quality of the output depends on the resolution of the source raster. If the raster resolution is too low, individual pixels become visible in the printed output as small squares. This effect is sometimes called “pixelation.”

In **vector graphics**, picture objects are defined mathematically as lines or curves between points—hence the term “vector” (see example b). Picture elements can have solid, **gradient**, or patterned color fills. Vector artwork is created in illustration and drawing applications, such as Illustrator and CorelDRAW. Page layout applications, such as QuarkXPress, also allow you to create simple vector artwork with their drawing tools. PostScript fonts are vector-based, as well.



Vector artwork is resolution-independent. You can scale it to any size and resolution without danger of pixels becoming visible in printed output.

Optimizing files for processing and printing

The following sections provide information about how to create image files that produce the highest possible print quality while minimizing the processing time and disk space they require.

Resolution of raster images

While a 72-ppi raster image appears sharp on a monitor, the same image would likely appear pixelated when printed to the Color Server. Color printers are capable of much greater detail than computer monitors, and require correspondingly higher resolution image files. However, high-resolution files can be large and, therefore, cumbersome to transmit over a network, process for printing, store on disk, and edit.

Beyond a certain threshold, a higher image resolution greatly increases file size while having a minimal effect on output quality. The optimal image resolution depends on the resolution of the final print device. Aim for the resolution that optimizes both file size and output quality.

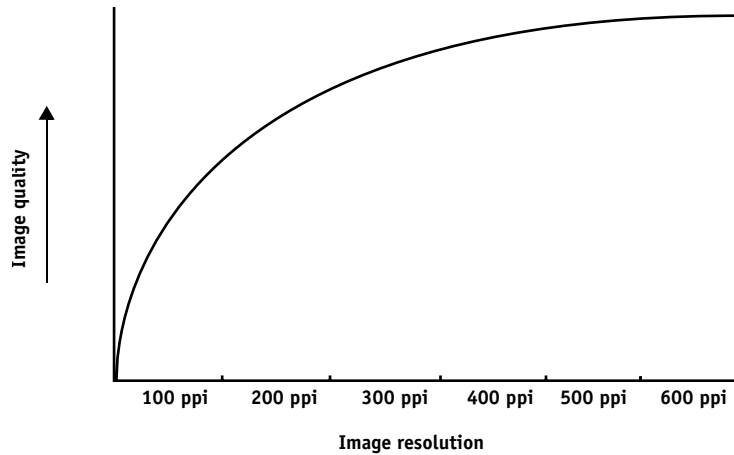
The resolution of a raster image, along with its bit depth and physical dimensions, determine its file size. The following table shows the file sizes of color raster images at different dimensions and resolutions.

Image size	File size at				
	100 ppi	150 ppi	200 ppi	400 ppi	600 ppi
	RGB/CMYK	RGB/CMYK	RGB/CMYK	RGB/CMYK	RGB/CMYK
3" x 4"	0.4/0.5 MB	0.8/1.0 MB	1.4/1.8 MB	5.5/7.3 MB	12.4/16.5 MB
5" x 7"	1.0/1.3 MB	2.3/3.0 MB	4.0/5.3 MB	16.0/21.4 MB	36.1/48.1 MB
8.5" x 11"	2.7/3.6 MB	6.0/8.0 MB	10.7/14.3 MB	42.8/57.1 MB	96.4/128.5 MB
11" x 17"	5.4/7.1 MB	12.0/16.1 MB	21.4/28.5 MB	85.6/114.1 MB	192.7/256.9 MB

In this table, the shaded areas indicate that 200 ppi is typically the best trade-off between image quality and file size. However, higher resolutions (for example, 250 to 300 ppi) may be necessary for offset printing, when quality is of the utmost importance, or for images containing sharp diagonal lines.

To find the best image resolution for your purposes, make test prints of some raster artwork at different resolutions. Start with a high-resolution image (400 ppi) and save versions at progressively lower resolutions, down to 100 ppi, using a pixel-editing application, such as Photoshop. Always save a copy of the original high-resolution version, in case you must revert to it. The high-resolution data cannot be recreated from a lower resolution version.

Print the files and examine the output. You will likely begin to see a marked deterioration in output quality at resolutions below 200 ppi, while above 200 ppi the improvement may be very subtle.



Raster images prepared for offset printing may need to be at higher resolutions than necessary for proofing on your Color Server.

Scaling

Ideally, each raster image should be saved at the actual size, and it will be placed in the document at the optimal resolution for the printer. If the image resolution is correct for the printer, there is no quality advantage to be gained by scaling an image to a percentage of its actual size. If you scale a large image to a percentage of its actual size, you incur unnecessary file transfer time, because the image data for the entire large image is sent to the printer. If an image is placed multiple times at markedly different sizes in a document, save a separate version of the image at the correct size for each placement.

If you must place an image at greater than 100% in a document, remember that the output image resolution is affected. For example, if you scale a 200 ppi image to 200%, the image is printed at 100 ppi.

BIBLIOGRAPHY

Books

Bruno, Michael H., ed. *Pocket Pal: A Graphic Arts Production Handbook*. Nineteenth Edition. International Paper, 2004.

Fraser, Bruce and Blatner, David. *Real World Adobe Photoshop CS2*. Berkeley: Peachpit Press, 2006.

Hunt, R.W.G. *The Reproduction of Colour*. Sixth Edition. Wiley, 2004.

Kieran, Michael. *The Color Scanning Success Handbook*. Toronto: DPA Communications Corp., 1997. (Out of print)

Kieran, Michael. *Understanding Desktop Color*. Second Edition. Berkeley: Peachpit Press, 1994.

Lawler, Brian P. *Adobe Print Publishing Guide*. Second Edition. Adobe Press, 2006.

Margulis, Dan. *Professional Photoshop: The Classic Guide to Color Correction*. Fifth Edition. Berkeley: Peachpit Press, 2006.

Miller, Marc D. and Zaucha, Randy. *The Color Mac*. Second Edition. Hayden Books, 1995. (Out of print)

The Color Guide and Glossary: Communication, measurement, and control for Digital Imaging and Graphic Arts. X-Rite Incorporated, 2004. (Available from X-Rite dealers or via the X-Rite web site, www.xrite.com.)

World Wide Web sites

International Color Consortium: www.color.org

Graphic Arts Information Network: www.gain.net

Seybold Seminars Online: www.seyboldseminars.com

Adobe Systems Incorporated: www.adobe.com

GLOSSARY

This Glossary contains some terms that are industry concepts and may not be explicitly referenced in the documentation set.

A

additive color model

A system in which colors are produced by combining red, green, and blue light (the additive primaries). An RGB video monitor is based on an additive color model.

additive primaries

Red, green, and blue light used in additive color systems. When blended together in proper amounts, these colors of light produce white.

artifact

A visible defect in an image, usually caused by limitations in the input or output process (hardware or software); a blemish or error.

B

banding

Visible steps between shades in a color gradient.

bit depth

Amount of information used for each pixel in a raster image. Black-and-white images require only one bit per pixel. Grayscale images with 256 shades of gray require 8 bits (or 1 byte) per pixel. Photographic quality color images can require 24 bits per pixel (RGB images) or 32 bits per pixel (CMYK images).

Bitmap (BMP)

A graphics file format established by Microsoft; native to the Windows operating system.

bitmap (or raster)

An image made up of small squares arranged in a grid. Each square in the grid is a pixel. The number of pixels per inch defines the resolution of a bitmap.

blasting

An undesirable effect that occurs when excess amounts of toner, possibly combined with certain types of paper stock, cause objects in an image to spread beyond the boundaries defined in the file.

brightness

Both the saturation and lightness of product color.

C**calibration**

The process of adjusting the basic setting of a monitor, printer, or other device to standard values in order to ensure uniform and consistent results over time. Calibration helps assure predictable and consistent printing results.

calibration target (or calibration set)

A set of measurements that describe the expected density response of a printing device. Calibration targets are associated with the output profile of the device.

CIE

The International Commission on Illumination, abbreviated as CIE from its French title Commission Internationale de l'Eclairage, is an organization devoted to international cooperation and exchange of information among its member countries on all matters relating to the science and art of lighting. The CIE developed mathematical models to quantify light sources, objects and observers as a function of wavelength, which led to the development of a basic color space for plotting colors.

CIEbased colors (A, ABC, DEF, DEFG)

Device-independent color spaces that are produced by color management outside of the Color Server, such as application software, operating systems, or printer drivers, and are applied at the user's computer.

CMS

See color management system.

CMYK

A subtractive color model that uses cyan, magenta, yellow, and black (process colors), and is used in color printing; a color model used in the printing of colors in four-color process printing.

coated media

Media that is coated to enhance print quality. The coating allows the media to be printed without allowing significant toner or ink absorption, thereby preventing blurriness or lack of contrast.

color channel

A single-color image that can be edited separately from the other color channels in a color space; for example, the red channel of an RGB image.

color gamut

See gamut.

color management system (CMS)

System used to match color across different input, display, and output devices.

color rendering dictionary

See CRD (Color Rendering Dictionary).

color separation

The process of separating a color image into the color components for printing: cyan, magenta, yellow, and black. Also refers to the four sheets of film that result from the process of separating a color image.

color space

A model for representing color in terms of measurable values, such as the amount of red, green, and blue in an image. RGB and CMYK color spaces correspond to color devices (monitors and printers, respectively). Other color spaces, such as CIE Lab, are based on mathematical models and are device-independent (that is, not based on the color response of a particular device). *See* gamut.

colorant

An ink, dye, toner, paint, or other pigment that modifies the color of media to which it is applied.

ColorWise

See ColorWise color management.

ColorWise color management

An ICC-open color management solution, which is an easy-to-use system that addresses the needs of both casual and experienced color management users.

component

In variable data printing, an element such as text, a graphic, or a photograph that is printed on a page.

composite printer

Any output device that can print directly in color without first creating color separations. A composite print can be used as an early proof of an offset print job.

consumable

Material such as ink, toner, paper, or lubricants that must be replenished regularly in order for the print device to function properly.

continuous tone (contone)

A photographic image that contains gradient tones from black to white (such as a 35mm transparency or a photograph). Continuous tones cannot be reproduced in that form for printing, but must be screened to translate the image into dots.

CRD (Color Rendering Dictionary)

A feature that maintains the best possible translation of color from one color device to another. A CRD is used by the color management system or the PostScript interpreter of the Color Server when converting data between color spaces. The Color Server includes several CRDs, each of which provides a different color rendering intent.

custom color system

A system of named color swatches that can be matched on press using spot colors or approximated using process colors. PANTONE and TruMatch are examples of custom color systems.

D**DCS (Desktop Color Separation)**

A data file standard that assists in making color separations with desktop publishing systems. Five files are created: four color files (one each for C, M, Y, and K) and a composite color preview file of the color image. DCS allows an image-editing application to perform color separation and pass it through to final output with its integrity intact.

densitometer

An instrument commonly used in the graphic arts industry to measure density according to a specified standard.

density

A measurement of the light-absorbing quality of a photographic or printed image.

desktop color separation

See DCS.

device-dependent colors

Colors directly related to their representation on an output device. Color values map directly or via simple conversions to the application of device colorants, such as quantities of ink or intensities of display phosphors. Device-dependent colors are controlled precisely for a particular device, but the results may not be consistent between different devices. Examples of device-dependent color spaces are DeviceRGB, DeviceCMYK, and DeviceGray.

device-independent colors

Colors described using a model based on human visual perception instead of being device-specific.

DIC

A Japanese standard of specifications for separations, proofs, and color printing.

E**Encapsulated PostScript (EPS)**

A PostScript file format designed to be embedded in another PostScript stream.

Euroscale

A European standard of specifications for separations, proofs, and color printing.

F**flexography**

A printing technology that uses flexible raised-image plates. Flexography can be used to print on non-flat materials such as cans.

four-color printer

A printing device that uses cyan, magenta, yellow, and black ink or toner.

G**gamma**

A numeric value representing the relationship (gamma curve) between the input and output values of a color device. If gamma equals 1, input values are mapped exactly to output values.

gamut

A range of colors. A device gamut is the range of colors that a print device can produce. An image gamut is the range of colors in a particular image.

gamut mapping

The conversion of color coordinates from one device's gamut to another, usually accomplished with algorithms or look-up tables.

GCR

See gray component replacement.

GDI (Graphics Device Interface)

Graphics and display technology used by Windows computers. GDI applications rely on GDI (rather than the PostScript language) to send text and pictures to a print device.

GIF (Graphics Interchange Format)

A standard for bitmap graphics of up to 256 colors used for posting photographic images on Internet or intranet pages; rarely used for professional printing.

gradient

A smooth transition between two different colors or two shades of a color.

Graphics Device Interface

See GDI.

Graphics Interchange Format

See GIF.

gravure

A printing technology that uses an etched cylinder that has been immersed in ink. The ink that remains in the etched areas is applied to the paper. The non-etched surfaces of the cylinder are non-printing areas.

gray component replacement (GCR)

A method for improving wet ink trapping and reducing ink costs in process color printing. In shadow, midtone, and quarter-tone areas where all three process colors (C, M, Y) overprint, the gray components of those colors are reduced and replaced by black.

H**halftoning**

A method for representing an original continuous tone image using a pattern of dots, lines, or other patterns.

HSB

A color model where each color is represented by its hue, saturation, and brightness components; supported by most color applications.

HSL

A color model in which each color is represented by its hue, saturation, and lightness components.

I**ICC profile**

An industry standard color profile format developed by the International Color Consortium (ICC) that describes the color capabilities, including the gamut, of a color device based on the differences between an ideal and the current device. The ideal is often provided by the manufacturer as a color reference file. ICC profiles are implemented on Mac OS computers in ColorSync and on Windows computers in Image Color Matching (ICM). The Color Server color management system, ColorWise, supports ICC profiles.

imagesetter

Raster-based film output device; a high-resolution laser output device that writes bitmapped data onto photosensitive paper or film.

J**JPEG**

A graphics file format defined by the Joint Photographic Experts Group committee of International Standards Organization (ISO); a standard for digital compression of still image graphic data.

L**Lab**

A uniform device-independent color space in which colors are located within a three-dimensional rectangular coordinate system. The three dimensions are lightness (L), redness/greenness (a) and yellowness/blueness (b). (Also referred to as $L^*a^*b^*$ and CIELab.)

M**metamerism**

Phenomenon in which two colors composed of different combinations of light wavelengths appear identical under a specific light source, but may look different under other light sources. The colors are called “metamers.”

moiré

An undesirable pattern in images made using halftone screens. Moiré can be caused by the improper line frequency of the screens, improper screen angles, improper alignment of halftone screens, or by the combination of a halftone screen with patterns in the image.

N**named color**

A color that is defined according to a custom color system. For example, PANTONE 107 C is a named color; also referred to as a spot color.

O**office applications**

Software applications commonly used for business purposes, including presentation, spreadsheet, and word processing applications.

offset lithography

Printing in which ink is transferred from printing plates to a rubber blanket, and then from the blanket to paper.

output

See output profile.

output profile

A file that describes the color characteristics of a printing device. The output profile is associated with a calibration target that defines the expected density response of the print device.

P**PANTONE System**

One of the best known color specification systems used by designers and printers to communicate color. Available in Coated, Uncoated, and Matte, each swatch book contains a series of colors that can be referenced based on the assigned PANTONE notation.

PDF (Portable Document Format)

An open file format specification that describes text and graphics in documents.

phosphor

Material used in making computer monitors; phosphors glow and emit red, green, and blue light when struck by an electron beam, thus creating an image.

photographic rendering

A color rendering intent that preserves tonal relationships in images. Unprintable colors are mapped to printable colors in a way that retains differences in lightness, sacrificing color accuracy as necessary.

pixel

The smallest distinct element of a raster image. The term is a combination of the words “picture” and “element.”

PostScript

A device-independent page description language that is used to print and display pictures and text. PostScript 3 includes many enhancements to older versions of PostScript, including improved image quality and color.

PPD (PostScript Printer Description)

A file containing information about particular PostScript capabilities of the print device. The information in the PPD is presented via the printer driver.

prepress proof

A print made from a set of film separations or other file to simulate the results of printing. A prepress proof is the last opportunity to catch problems before the print job goes to press.

presentation graphics rendering

A color rendering intent that creates saturated colors but does not match printed colors precisely to displayed colors. It is appropriate for bright saturated colors used in illustrations and graphs.

process colors

The colors used in printing to simulate full-spectrum color images: Cyan, Magenta, Yellow, black (CMYK).

profile

Systematically describes how a color maps to a particular space. By identifying a source profile and an output profile, you initiate the appropriate workflow to maintain consistent color values.

R**raster image**

Electronic representation of a page or image using a grid of points called pixels.

rendering intent

The style of color rendering, or gamut mapping, designed for a particular type of color job. An example of a rendering intent is Photographic rendering (also referred to as Image rendering or Contrast rendering), which is designed for photographic images.

resolution

The number of pixels per inch (ppi) in a bitmap image or the number of dots per inch (dpi) that a device can render.

RGB

An additive color model that makes a range of colors by combining red, green, and blue light, called the additive primaries. Commonly used to refer to the color space, mixing system, or monitor in color computer graphics.

S**solid color rendering**

A color rendering intent intended for use when color accuracy is crucial. Unprintable colors are mapped to the closest printable colors. Solid color rendering does the best job of preserving the saturation of displayed colors.

source color space

The color environment of the originating source of a colored element, including scanners and color monitors.

source profile

A file used by a color management system to determine the characteristics of the color values specified in a source digital image.

spectral light

The wavelengths of electromagnetic radiation emitted by a given light source that can be seen by the human eye.

spectrophotometer

An instrument commonly used in the graphic arts industry to measure spectral light according to a specified standard.

spot color

A color that is printed on its own separation plate when separations are specified. A spot color is printed using a custom ink for that color, in contrast to process colors, which are printed using combinations of cyan, magenta, yellow, and black. (Also referred to as a named color.)

Status T

A spectral response for graphic arts reflection densitometers defined by ANSI (American National Standards Institute).

substrate

The material upon which a job is printed.

subtractive color model

A system in which color is produced by combining colorants such as paint, inks, or dyes on media such as paper, acetate, or transparent film. All printing devices use the subtractive color model.

subtractive primaries

Cyan, magenta, and yellow colorants used in subtractive color systems for color printing. Combining the subtractive primaries produces darker colors. Black is added to the subtractive primaries to compensate for deficiencies of the toners or inks, and for more efficient black printing.

SWOP

The abbreviation for Specifications for Web Offset Publications. A standard of specifications for separations, proofs, and color printing on a web offset press (*not* a sheet-fed press).

T**TIFF (Tag Image File Format)**

A common format for exchanging raster graphics (bitmap) images between applications.

trapping

Printing technique in which some objects are printed slightly larger or smaller than you have specified in an application in order to prevent white edges around these objects.

U**undercolor removal (UCR)**

A method for improving wet ink trapping and reducing ink costs in process color printing. In shadow areas where all three process colors (C, M, Y) overprint, the amounts of those colors are reduced and replaced by black.

V**vector graphic**

Graphic illustration created on computers where picture objects are defined mathematically as lines or curves between points. These mathematical definitions are interpreted by an image language such as PostScript. Vector images include artwork created with illustration applications (such as Adobe Illustrator or Macromedia FreeHand) and page layout applications (such as Adobe PageMaker).

W**white point**

The color temperature of any white light source, typically expressed in degrees Kelvin (for example, 6500 K, typical for the white of a monitor).

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