

Color Management in the

CorelDRAW Graphics Suite for Professionals, Small Office and Home Office

David Milisock



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About the Author

David Milisock has been in professional graphics since 1975, and supporting professional output from CorelDRAW since version 4 as Custom Printers. The support for CorelDRAW as well as other graphic applications started as output only but quickly evolved into support for Postscript-compliant file creation for established clients only. As word of mouth spread, training services were offered to new customers and another company was formed, Custom Graphic Technologies Inc. This company offered software support which quickly evolved into the building of custom-configured graphic workstations, and then into network support. As the companies' evolution continued, Custom Printers was absorbed into Custom Graphic Technologies Inc.

Today Custom Graphic Technologies Inc., while still offering training for graphic applications, workstation and network support, has evolved to offer state-of-the-art Color Management Support, Technical Systems Development, Management Consultation and Print Production. It is located in Washington Boro, PA. David can be reached by email at davidmilisock@comcast.net.

FOREWORD

While watching a biography on one of my favorite film directors, John Huston, I recall a story told by Ossie Morris, his cinematographer on the 1950 production of *Moulin Rouge*. Morris explained how the management staff members for Technicolor in England, who were concerned about the integrity of their color system, had come to the set in Paris to observe the rushes.

Huston and Morris wanted a feel to the film that would reflect as if the painter Toulouse-Lautrec had directed the film. So Morris added filters to the cameras to reduce saturation and smoke in the air to obtain their goal, a *painted look*. The Technicolor staff was so displeased that they told Huston he was desecrating their color system.

Huston, in prime form, asked Morris his opinion. Morris said, "I believe we have achieved the feel we wanted for this film." Huston replied, "So do I," and to the Technicolor staff he said f^%* you!

That was 1950, and even to this day, nearly 58 years later, a similar color struggle is still present in our artistic productions. Both Huston and Technicolor were correct. Huston was certainly not using the color system in a manner to reflect correct color. However that was not his goal. His goal was to deliver his artistic vision and he was passionate about it! Technicolor failed to recognize that their system was validated by the fact that it produced such a stable color platform that Morris could consistently and easily achieve the director's vision for the film.

Color management is concerned with creating an artistic, technical and manufacturing environment that allows the artist's mental vision of his or her project to be viewed by others as closely as possible to how the artist intended it to be viewed!

This publication is designed for the two types of individuals that will use CorelDRAW color management -- the color professional and the file creator. Neither require this publication to be a regurgitation of detailed color theory, so it certainly will not be such. However, both types of users require a detailed explanation of how the CorelDRAW Graphics Suite color management interface reacts with the graphic environment today -- and that will be covered within these pages.

The novice user requires some layman's explanations of core color management terms and this is where the publication will start. However, we will not only give you a definition, but when it is relevant, you will also see a screen capture of an example and instructions where you may use the feature in the CorelDRAW Graphics Suite. This may come off as a bit redundant. However, I feel it will be a big help for those new to CorelDRAW and color management to not have to page back and forth through the book looking for captures while viewing the definitions. (This is also one advantage of a PDF publication).

We will then proceed to cover the color management dialogs, what they do, and how to make educated choices. Then we will cover Postscript and non-Postscript printing with driver-based and RIP-driven devices for home, office, and professionals. We will end with coordinating CorelDRAW's color management with Adobe applications. All of the instructions in this publication will be enhanced with ample application-friendly screen captures.

CorelDRAW has provided us with a stable color platform for our creations. The goal of the publication is to provide the user with enough information to make educated choices on how to configure the settings of that platform.



INTRODUCTION

This book is designed to be viewed in the sRGB color space. My goal for this book is to have it be the definitive work on color management in the CorelDRAW Graphics Suite. I have not worried as much about perfect uniform page structure as I have about finishing a thought process while all the screen captures are still in front of the reader.

Please note this publication concerns itself with color management in the CorelDRAW Graphics Suite. Future use of the term Corel color management only applies to applications within the CorelDRAW Graphics Suite. Use of the name Corel may refer to the company name depending on the context of the copy. Corel, CorelDRAW, and Corel PHOTO-PAINT are registered trade marks of the Corel Corporation, in which the author and publisher are not affiliated.

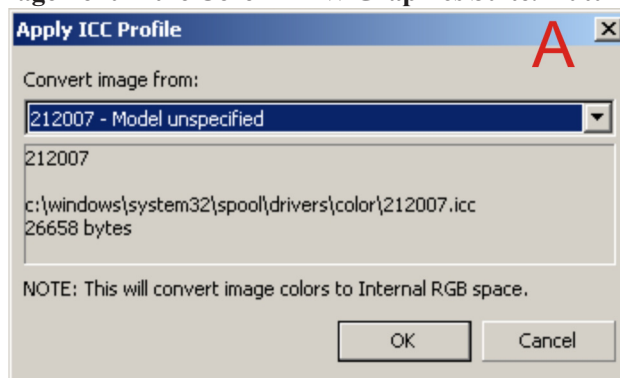
CorelDRAW Graphics Suite color management and the documentation supplied for it by Corel can best be described as a mostly functional conglomerate of incomplete processes, exemplified by **capture A** from Corel PHOTO-PAINT X4. Here the Apply ICC Profile dialog found under the image menu fails to identify the image's resident color space and can only convert to the Internal RGB color space. Most likely, if not handled by someone who understands the processes, it will result in an incorrect color conversion. However, if one understands the processes, this can be a functional feature. What you need to know about this process is in the Definitions and Workflow sections of this publication.

The color management interface of the CorelDRAW Graphics Suite will be discussed in detail within these pages. I'm positive that you will find that CorelDRAW can and does provide a stable platform for color production for images as well as composite files (using CorelDRAW for page layout).

Professional color reproduction for a printing press or a RIP-driven composite digital print engine is excellent -- in fact, second to none. This and driver-based Postscript printers, calibration, and suggested workflows are addressed in the printer calibration and workflow sections. For the home user and the SOHO (small office home office) user, an assumed RGB color space workflow seems best and the printer calibration and workflow sections address these situations.

A partial list of issues with CorelDRAW color management dealt with in this publication are:

1. identifying a file's resident color space
2. embedding profiles in CMYK images
3. inability to convert to a color space that is not the internal or separation printer profile
4. the RGB or CMYK mode in CorelDRAW
5. non-Postscript printer color coordination
6. driver-based Postscript printer color coordination
7. identifying the color space of untagged images
8. extracting and loading an ICC profile
9. a proper monitor display
10. opening a file in its resident color space for proper display
11. workflow organization for professional, home, and SOHO users
12. expanded gamut printing
13. Postscript color management
14. RIP-driven output device color coordination
15. RAW LAB color coordination
16. complete explanation of the CorelDRAW Graphics Suite color management interface
17. device simulation for soft and hard proofing
18. maintaining color integrity during file transfer
19. remote soft and hard proofing
20. coordination of CorelDRAW color management with Adobe



CHAPTER 1:

Definitions & Overviews

Definitions and Overviews

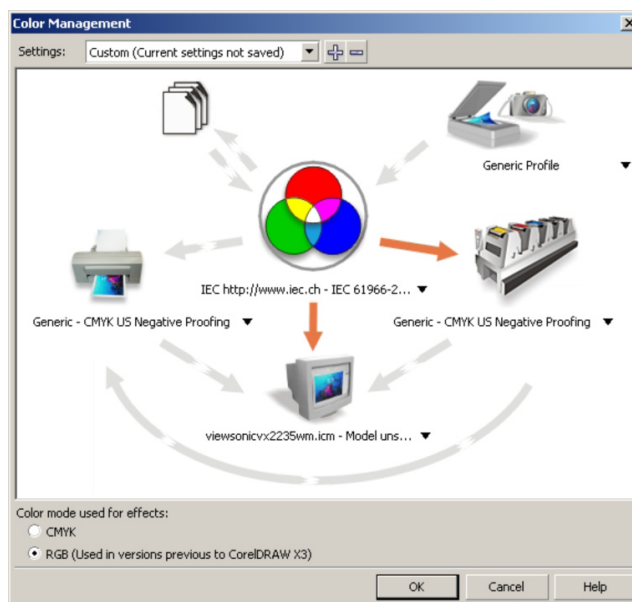
You do not need to know how to color calibrate a multi-million dollar output system. However you do need to know a few basic terms and what they mean so that you can make an educated choice when the software requires you to select a setting. These are layman definitions for the general user.

CMYK

Cyan, Magenta, Yellow and Black. The four base colors used in process printing. It is an absolute color space with a color limit of 100 for each color, a total limit of 400, with identical meaning in all CMYK color spaces.

COLOR CALIBRATION

In terms of the CorelDRAW Graphics Suite, color calibration is using the features of the Suite to print and/or display specific target files in an un-color managed manner, reading the results with a spectrophotometer, creating device specific profiles, loading those profiles, and maintaining a working environment that is conducive to utilizing the calibrated system. The main color management dialog in Corel is seen to the right. It is found under the Tools menu/ Color Management.



MORE ON CALIBRATION

Calibration for displaying Web, Presentation and Office work is

- A white point of 6,500 Kelvin

- Gamma of 2.2

- Internal RGB color space of sRGB (standard red, green and blue)

Calibration for Printing Press work is

- A white point of 5,000 kelvin

- Gamma of 1.8

- No standard RGB color space but Adobe RGB 1998 is most often used; consult your output provider

Calibration for expanded gamut inkjet reproduction has no standard at this time; consult your output provider

A Color Calibrated work environment requires attention to details, ambient lighting temperature, the decor of the environment, regular monitor calibrations. It also requires the user to adhere to some specific work habits, such as opening a file in its residing color space, and proper conversion and file export methods.

Color calibration is like a mosaic; it is only complete when you have all the pieces in place! Do not assume that your output provider will have much more than their output calibrated. For printing press work, this will mean a color-blind Postscript color-managed process -- which means CMYK color profiles for exported files only!

All image editing RGB and CMYK requires that the image's color profile be used during the editing process.

For all composite digital printer devices, you will need to inform the output provider of your RGB and/or CMYK profiles used during creation. It's best if you can supply them during file transfer.

Definitions and Overviews

COLOR MANAGEMENT MODULE

This is the software that allows the operating system, your graphics applications, and your output devices to communicate the color functions of your file to one another. You will find this in CorelDRAW and PHOTO-PAINT under the Tools menu/Color Management. Double click the Internal RGB icon and the Advanced Settings dialog (to the right) appears. Notice that the Kodak Digital Science CMM is selected. CorelDRAW 9 through 12 support both the Kodak and Microsoft Engines. X3 also supports the Adobe Color Engine (ACE) if you have it installed on your operating system, and X4 also supports the Windows Color System for Vista.

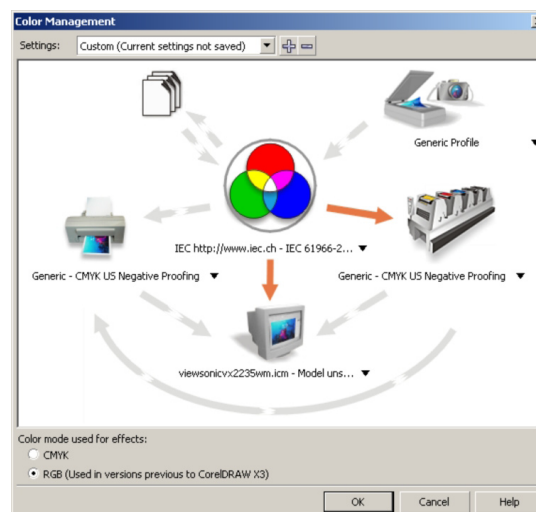
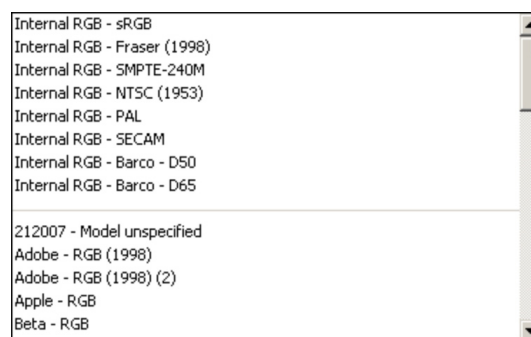
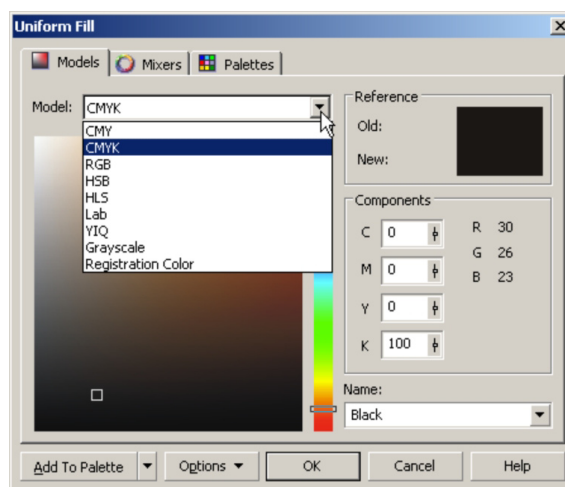
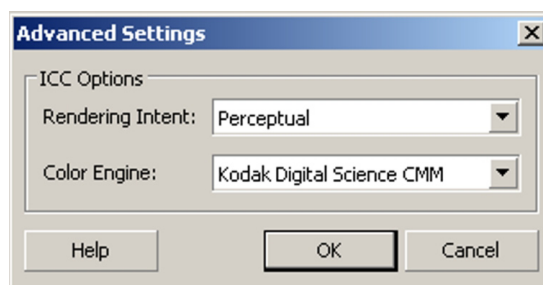
COLOR MODEL

This is a system that allows spaces and numbers to be assigned to the colors. Examples of color models are easily found in the **Uniform Fill Dialog** under the Models tab in CorelDRAW as seen to the right. These are many times less correctly referred to as color spaces. In either case, it is imperative that you control the color model and the color space of your images. **Remember color spaces exist inside color models.**

COLOR SPACE

A color space exists inside of a color model and is a theoretical 3D representation of all the colors that can exist in a color space within a color model. There is a profile file that is used to activate the color space inside an application so it can be used. However a color space is not always associated with a device. The capture to the right shows the drop-down list from the Internal RGB icon in the **Corel Color Management Dialog**. These color spaces do not represent any specific device unless noted. An example of a device color space is shown in the capture of the **Color Management Dialog at right where the monitor profile is listed. The monitor profile is a device specific profile** because it was created to correct errors in how this specific monitor displays color. Corel allows you to select device profiles such as camera and scanner profiles to use as your Internal RGB. This allows you to view scanned or camera images as the device created them.

The confusion with the numbers used in RGB color spaces arises because different RGB color spaces have different sizes. However the distances between dark to light are always assigned a maximum of 256 shades. **What results is that the RGB numbers of one RGB color space do not always translate directly to another RGB color space. This is why it is imperative that you communicate the model and color space of an image to another user or to a different device during file transfer or output.**



Definitions and Overviews

COLOR RENDERING DICTIONARY (CRD)

In Postscript Color Management, the CRD is equal to the destination profile in ICC Profile color management and is a part of all Postscript workflows. The CRD provides the destination color information for the final conversion from your file to the plate or film curve via the Postscript interpreter. (This takes place automatically in the background and you will need to understand this term later when we discuss CMYK press output and Postscript color management.)

COLOR SPACE ARRAY (CSA)

The CSA is incorrectly said to be equal to the source profile in ICC Profile color management. This is also part of all Postscript workflows. The CSA is the apparatus that transfers the color numbers, but not identify the color space, from the objects or images in your file to the Postscript interpreter which contains the CRD. (This takes place automatically in the background and you will need to understand this term later in the book when we discuss CMYK press output and Postscript color management.)

GAMMA

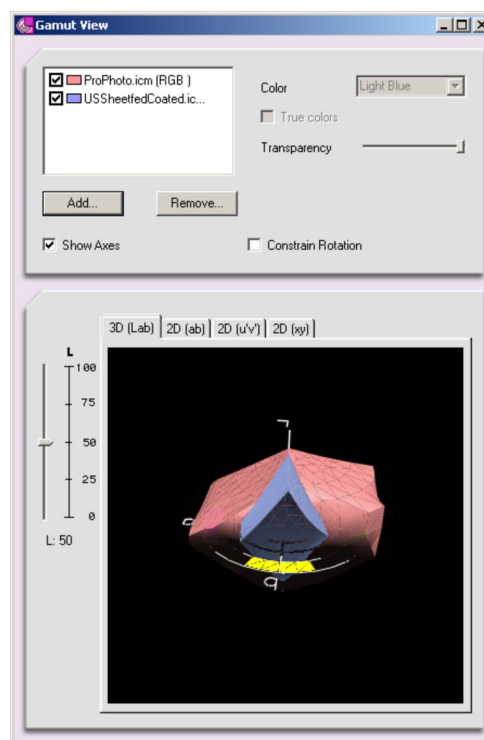
Gamma is the degree to which a color space is non-linear. This is chosen in the calibration software when one runs a calibration sequence, usually a gamma of 1.8 for press and 2.2 for web. CorelDRAW uses a standard grayscale profile with a gamma of 1.8.

GAMUT

Gamut is the range of colors of a color space. This can be seen in the range of colors and densities reproducible on an output device, **as shown in the screen capture from a profile editing application to the right.** The **pink** represents the range of colors reproducible in the Prophoto color space, and the **blue** represents the range of colors reproducible in the U.S. Coated Sheetfed CMYK profile.

GAMUT MAPPING

Gamut Mapping is the process of making the larger **Prophoto color space in pink** in the capture to the right fit into the smaller **U.S. Coated Sheetfed CMYK color space in blue** in the capture to the right.



Definitions and Overviews

HUE

Hue is the property of a light source from which we perceive its dominant wavelength.

It is always used in conjunction with **Saturation** and **Lightness**, so, for ease of use, we will discuss all three here. To the right, you will see a capture of the Hue/Saturation/Lightness dialog in Corel PHOTO-PAINT; it is found under the Adjust menu in PHOTO-PAINT.

SATURATION

The property of light from a light source from where we perceive the most pure (single wavelength) light.

LIGHTNESS

The brightness of a light source when compared to a calibration standard.

KELVIN

A scientific unit of measurement to describe temperature with the scale starting at absolute zero. Used as a measurement of the white point of a device profile as in a monitor calibration, 5,000 or 6,500 Kelvin.

LAB

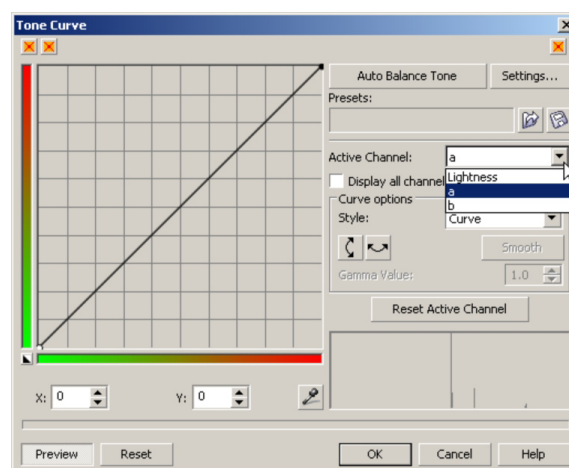
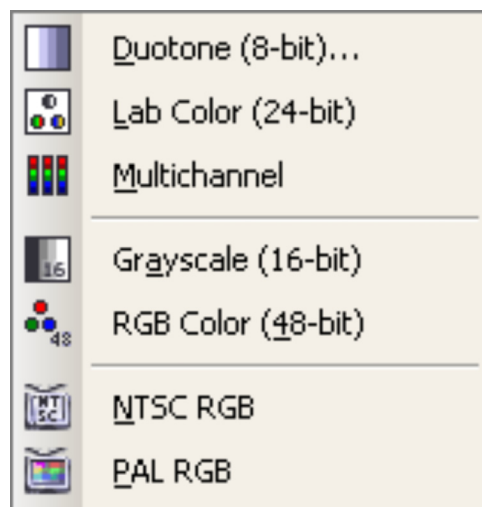
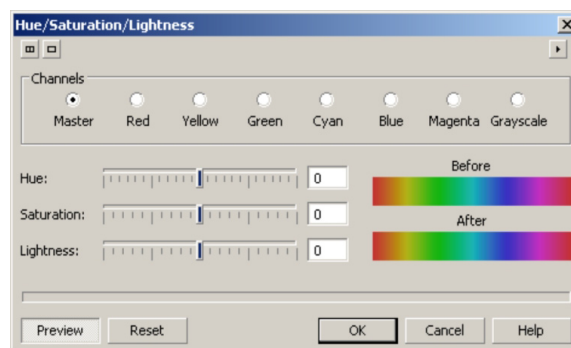
Also known as CIE LAB, it is a color space used as a profile connection space for conversions from one color space to another. It is also a device-independent space used for color correction. The space is comprised of the L channel, A channel, and the B channel. L refers to the lightness value, A refers to the red/green value and B refers to the blue/yellow value.

To the right, you see the Convert To menu that is accessed in PHOTO-PAINT under the Image menu/Convert To. Note that we can convert to Duotone or other color spaces here. Directly under the Convert To fly out, we see the **new tone curve** of PHOTO-PAINT X4 showing the **new eyedropper** and the channels for LAB. This is accessed in PHOTO-PAINT under the Adjust menu/Tone Curve.

It is important that you understand that LAB and another connection space, XYZ, are used anytime a color space conversion takes place. You will also read more about LAB when we discuss workflows which will include conversion methods to improve efficiency and quality.

LAB is the one color space we can convert our images to that will allow us to view them simultaneously and make critical color editing decisions before converting to a commercial color space.

LIGHTNESS, See Hue.



Definitions and Overviews

PROFILE

A properly prepared profile is a file that contains all the required information to allow a Color Management Module to convert colors into or out of any color space.

The capture right is the main color management and profile control in CorelDRAW. It is accessed under the Tools menu/Color Management. All the features of Corel color management revolve around understanding what the settings in this dialog and its sub dialogs do and what are the best choices for your needs. You load/unload or control the other functions of using profiles through here. **Understanding profiles is the first step!**

PROFILE: Independent

An independent profile is most commonly referred to just as a color space. Examples are Adobe RGB 1998, IEC sRGB, EIC RGB, and CIE RGB. These color spaces have no affiliation with any device. These color spaces are most commonly used as the Internal or working RGB for graphic applications. **The Internal RGB in CorelDRAW is called the Working RGB in Adobe.**

PROFILE: Device

As the name implies, these types of profiles contain color control information specific for a device. They can be RGB or CMYK depending on the type of device the profile was created for.

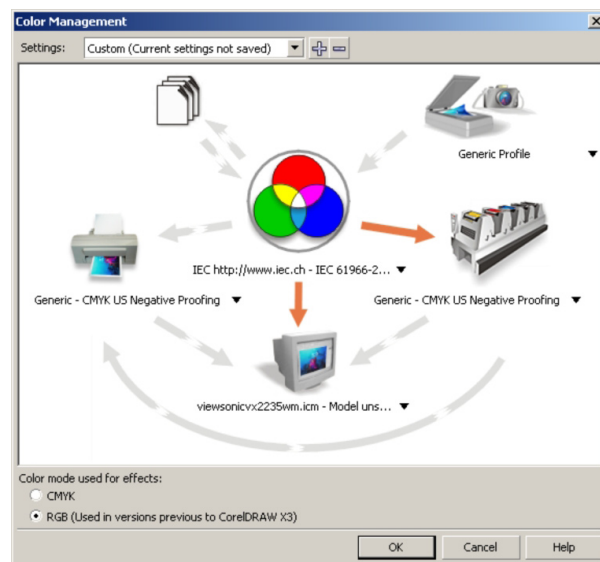
PROFILE: Source

The source profile is the color space of any file that you would open in CorelDRAW or PHOTO-PAINT. In most cases, it will be the color space of residence for the file. It is also the beginning profile of a color space in a conversion. For example, when your Adobe RGB image is being converted to CMYK, the source profile is Adobe RGB.

PROFILE: Destination

As the name implies, it is the profile that controls the color space to which you are converting a file. The destination can be RGB or CMYK depending on the type of device the profile was created for. For example, when your Adobe RGB image is being converted to CMYK, then CMYK is the destination color space.

A working understanding of profiles is so important to the CorelDRAW user that I will break with the alphabetized order of our definitions to provide an inclusive look at the profile information a user needs so you don't have to jump around the book. This will include entries for independent, device, source, destination, rendering intents, embedding and extracting of profiles.



Definitions and Overviews

PROFILE: Embedding a Profile

This is the concept of attaching a profile to a file. Embedding a profile is done so the color profile of the color space travels with the file. Thus color integrity can be maintained. Using the embedded profile for properly opening, editing or outputting a file is called **honoring the profile**. CorelDRAW **does not** support honoring an image's embedded profile through the import dialog when the image's color space **does not match** the Internal RGB or CMYK separations printer profile.

The capture to the right shows the color management dialog accessed in the Tools menu/Color Management. It shows the double arrows pointing to the upper left icon representing import/export. **By double clicking the icon you access the Advanced Import/Export Settings Dialog.** **You control embedding with these dialogs.**

CorelDRAW does not support embedding CMYK profiles but does support embedding of RGB profiles. One must embed a profile or inform another person of the color space in which an image resides.

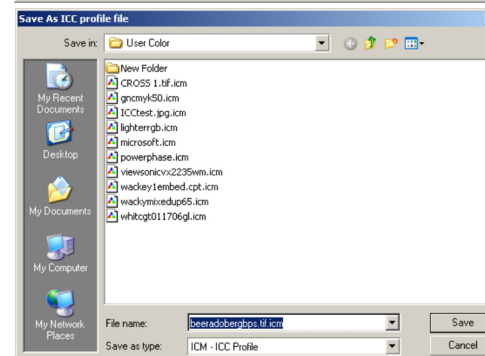
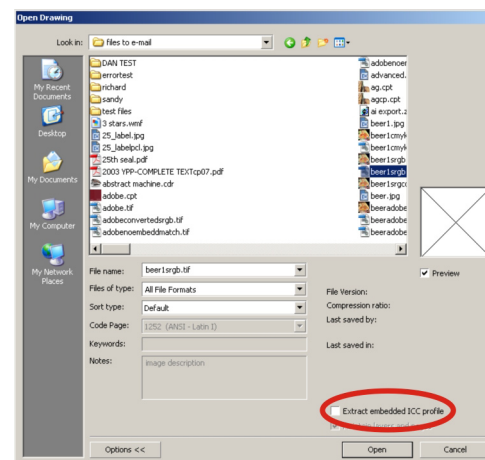
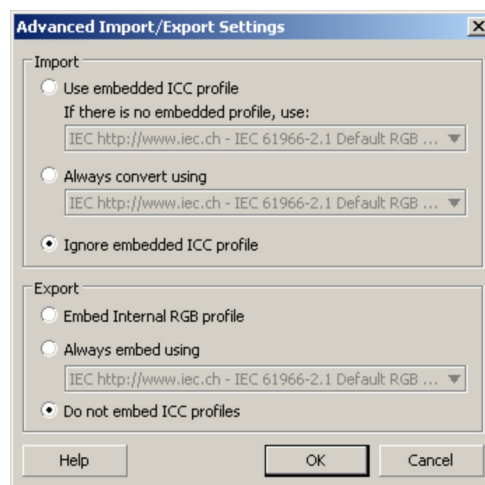
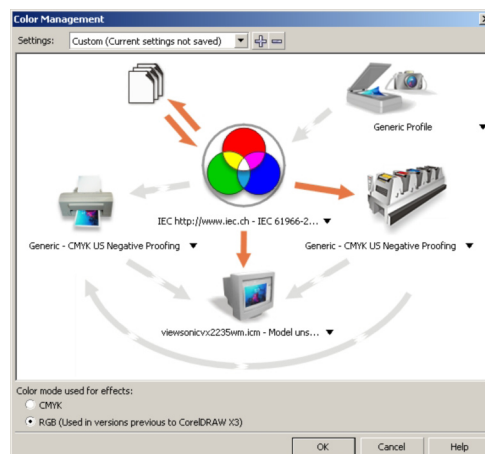
Detailed instructions to follow.

PROFILE: Extracting a Profile

Extracting, but not removing, a profile from an image is done so it can be loaded on your system. CorelDRAW is one of the few applications that supports profile extraction. You will need to do this for multiple reasons. The capture to the right shows the checkbox in the open drawing dialog that allows this process. When this is checked and you select Open, the **Save As ICC Profile File** dialog opens and allows you to save the profile.

In DRAW and or PHOTO-PAINT, the extracted profile **needs to be installed as the Internal RGB or as the separations printer profile**. Any non-commercial color space will need to be extracted and loaded so you can properly view your image. The extracted copy may be the only source of the profile. In Photoshop, your View Custom Proof dialogs will not function fully unless the image's profile is loaded in the Photoshop folders.

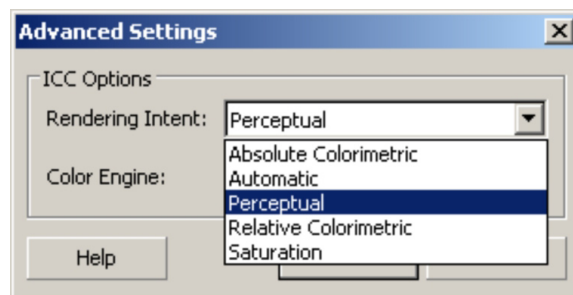
More information to follow.



Definitions and Overviews

PROFILE: Rendering Intents

The rendering intent is a pre-determined set of instructions telling the Color Management Module how to handle the conversion of color when converting from larger to smaller gamuts or vice versa. The rendering intents commercially specified are: perceptual, saturation, relative colorimetric and absolute colorimetric. The capture to the right shows the **Advanced Settings Dialog**. You will find this in CorelDRAW and PHOTO-PAINT under the Tools menu/ Color Management. Double click the Internal RGB Icon and it appears. DRAW has a default rendering setting of automatic which means a perceptual rendering for images and saturation for vectors. PHOTO-PAINT defaults to the perceptual rendering intent. In my opinion, **the automatic setting is a poor choice** as identical colors in vector and bitmap contained in a CorelDRAW file will reproduce (render) differently.



PROFILE: Rendering Intent Absolute Colorimetric

This is the conversion of color relative to (attempting to reproduce) the source color's white point with an exact match of the colors of the source that are within the destination profile's gamut. Colors from the source that are out of gamut for the destination are mapped to their nearest equivalent.

Many times this is used in proofing when trying to match the white point of a magazine or newsprint on a different proofing paper. It will produce a window pane effect on the proofing paper which is caused by the attempt to print what the intent sees as white.

PROFILE: Rendering Intent Relative Colorimetric

This is the conversion of color with a remapping of the source color's white point to the destination's white point, with an exact match of the colors of the source that are within the destination profile's gamut. Colors from the source that are out of gamut for the destination are mapped to their nearest equivalent. Most often this is used in proofing general commercial work and in basic RIP or driver set up.

PROFILE: Rendering Intent Perceptual

This is the conversion of color that tries to preserve the perceptual relationship of color. All colors in the source, both those that are in and out of gamut for the destination profile, are manipulated to maintain the perceptual relationship, (the feel), of the colors from one space to another.

Most often, this is used in images when converting RGB files that are significantly out of the CMYK gamut. It is my choice for all-around work.

PROFILE: Rendering Intent Saturation

The conversion of color that tries to preserve the saturation properties (color depth) of color, even at the expense of hue accuracy. Most often, it is used in signs or the reproduction of maps. It is the least accurate of the rendering intents but with significant value in some processes.

Definitions and Overviews

PROFILE: Connection Space

When a color space is converted it is done via a connection space. That connection space is a theoretical space and by design it is LAB or XYZ also known as CIE XYZ. What happens is that the source (original) color space is converted to the theoretical space, and then that space is converted to the destination color space. This is done to facilitate the process as it is only required to compute the changes from the source or to the destination in one space LAB.

PROFILE: Color Space of Residence

This is the intended color space of creation of an image. Example: If you create or capture an image in Adobe RGB, whether or not you embed a profile, the image is said to **reside in the Adobe RGB color space**. An image editor or output device that has its color controls for the source color space set to the image's color space of residence will have the correct source information required to view, display or output this file correctly.

As this publication will deal with workflows, it is important to understand this one important aspect of profiles.

PROFILE: False Profile

This is the process of assigning a profile to an image other than the profile that matches its color space of residence. This is usually done to cause a color shift in the output, and is not recommended.

RAW

This is a file format that is proprietary to the camera manufacturer. They are linear-gamma, grayscale images from digital color filter arrays. All these files require processing by a RAW converter to convert them to an RGB image. Corel PHOTO-PAINT X4 supports many RAW camera formats and converts your RAW file to the Internal RGB color space.

RIP

Raster Image Processor (RIP) is the software and/or hardware device that will rasterize (converts to image) the interpreted Postscript file.

SATURATION See **Hue**.

SOFT PROOF

Editing a file in one color space but viewing it in another.

sRGB

Standard RGB color space designed for default use (assumed color space) of computer systems and the internet.

TAGGING A DOCUMENT

The act of embedding a profile with an image or document; an image with no embedded profile is called untagged

TOTAL INK LIMIT

This is also known as total ink coverage, and is the total amount of all inks used at one time to reproduce a color. CMYK profiles can very efficiently be referred to by the total ink coverage. An example of this is a TIC 360 CMYK profile.

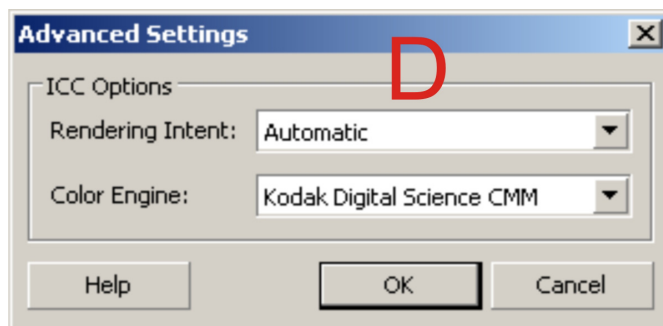
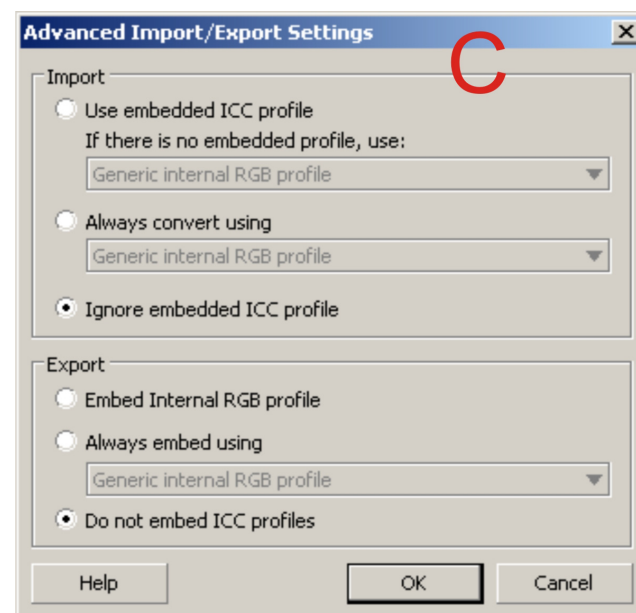
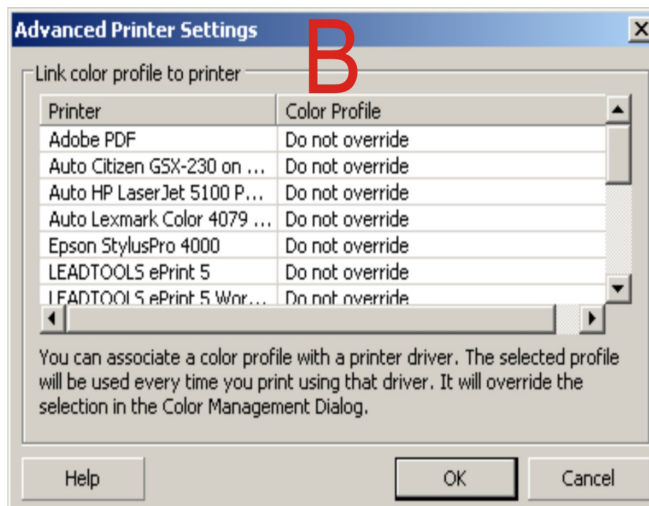
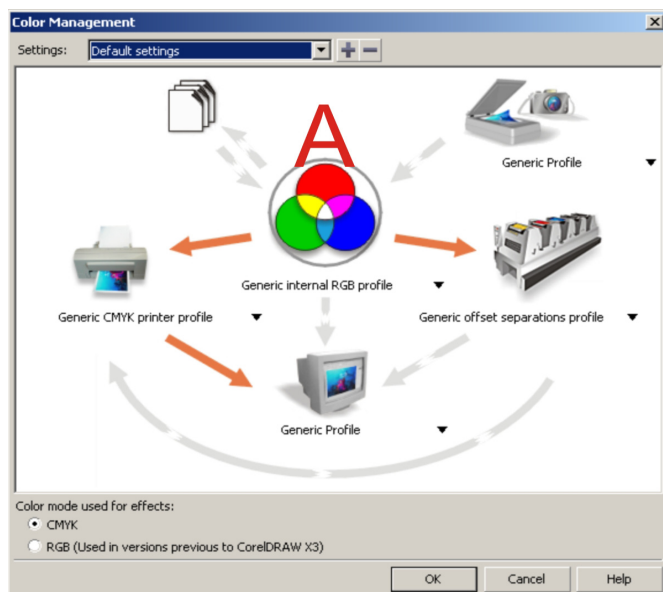
CHAPTER 2:

The CorelDRAW Graphics Suite Color Management Interface Controls

The Controls in CorelDRAW

Note: CorelDRAW operates in CMYK Mode or RGB Mode

The four main CorelDRAW Color Management Dialogs



These are the main four CorelDRAW color management dialogs.

Clockwise from the top left, we see **capture A**, the **Color Management Dialog** (access this in CorelDRAW under the Tools menu/Color Management).

To the right, we have **capture B**, the **Advanced Printer Setting Dialog** (access this by double clicking the icon for the offset separations to the right of the RGB (red-green-blue) icon or the composite printer icon to the left of the RGB icon).

Just below, we have **capture C**, the **Advanced Import/Export Settings Dialog** (access this by double clicking the page icons directly up and left of the central RGB icon).

The lower left, **capture D**, the **Advanced Setting Dialog** (access this by double clicking the RGB Icon in capture A which is the red, blue and green circles under the red A in capture A).

The Controls in CorelDRAW

Note: CorelDRAW operates in CMYK Mode or RGB Mode

To the right we see **capture A, the Color Management Dialog**, in CorelDRAW with its default settings (access this under the Tools menu/Color Management).

An easy way to start to understand how this dialog works is to explain what the icons represent and what the default settings mean. To facilitate this, I have marked capture A with the numbers 1 through 6. We will discuss each in detail in the following pages.

The drop-down dialogs in the color management dialog set the profiles. By default, the dialog will see profiles loaded in the c:\windows\system 32\spool\drivers\color folder, and also in the Corel user color folder, which is usually c:\documents and settings\user name\application data\CorelDRAW Graphics Suite X4 (version number)\user color. This folder may contain profiles but they need to be manually loaded.

Now follow the numbers of each icon in the dialog:

1. Sets the Internal RGB (in Adobe applications this is the Working RGB). You select this by using the drop-down arrow under the central RGB icon.

The long orange arrows indicate a feature has been activated. [To activate an arrow, you simply click on the gray arrow between the two icons and it will turn on.] Here is what they mean: 1-the Internal RGB color space being sent to 3-the separations and 5-the composite printer. This means that **RGB to CMYK conversions from the application menus will convert from the generic Internal RGB color space to the generic offset separations printer CMYK space**. This CMYK conversion includes LAB as well as grayscale to CMYK conversions. Conversions to RGB **will be converted to the generic internal RGB color space**. To the best of my knowledge, the default separations and composite printer profile are actually the same profile. The arrow from 5-the composite printer to the 4-the monitor **means that this user is viewing all their files (RGB and CMYK content) as being soft proofed in the generic CMYK printer profile**. RGB to CMYK conversions in the print stream may be controlled in another dialog.

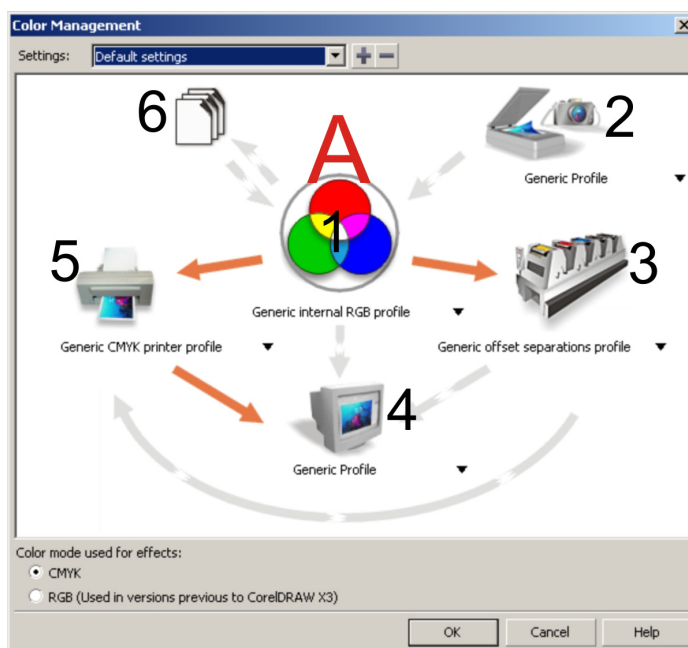
2. Sets the camera or the scanner profile. By activating the arrow from 2-the camera/scanner to 1-the Internal RGB, **a conversion from the camera or scanner color space to the internal RGB color space takes place when you acquire the image**. (To view your images as captured or scanned without a conversion, you must set 1-the internal RGB to your camera/scanner profile and activate the arrow from 1-the Internal RGB to 4-the monitor in PHOTO-PAINT; DRAW requires the same settings and selecting the RGB mode.)

3. Sets the separation printer profile (the CMYK working space in Adobe). Unless changed in the Advanced Printer Setting Dialog, capture B of the previous page, this profile controls the CMYK color space of residence for all conversions to the CMYK color space. The Corel Graphics Suite only applies CMYK conversions to non-CMYK objects or images; CMYK to CMYK conversions for hard proofing are not supported.

4. Sets your monitor profile. A custom-created profile is a requirement. I suggest a modest-priced calibration hardware/software device like Eye One. A factory profile will be useless and an adjust-by-eye method from the internet will be worse.

5. Sets the composite printer profile. The composite printer profile will be one of the most complex to understand, depending on if you have a Postscript or non-Postscript printer and we will cover this in detail in the workflow section.

6. Sets the import/export of files, honoring and embedding of profiles. When the arrow at 6 to 1 is activated the Corel graphics suite only honors RGB profiles that match the Internal RGB of the application. For all other profiles, a conversion takes place. CorelDRAW only supports embedding RGB profiles by activating the arrow from 1 to 6.



The Controls: The Internal RGB

Note: CorelDRAW operates in CMYK Mode or RGB Mode

In capture A, the number 1 represents the Internal RGB (in Adobe this is the Working RGB). This setting controls the residing color space of RGB images created in DRAW or PHOTO-PAINT. Any conversion to RGB is to the Internal RGB color space, as the Suite lacks the ability to do otherwise. You load a profile by using the drop-down arrow under the RGB icon 1. The drop-down, shown below the color management dialog, allows you to select the Get Profile from Disk selection (circled in red) that will bring up the Browse for Folder dialog.

The profile (color space) **must match any RGB image that you import into CorelDRAW or PHOTO-PAINT for proper display.** This is critical for expanded gamut printing and conversion in the print stream. We will discuss this in more detail in the workflow section. The Internal RGB needs to match the workflow for your project, whether it's web or print.

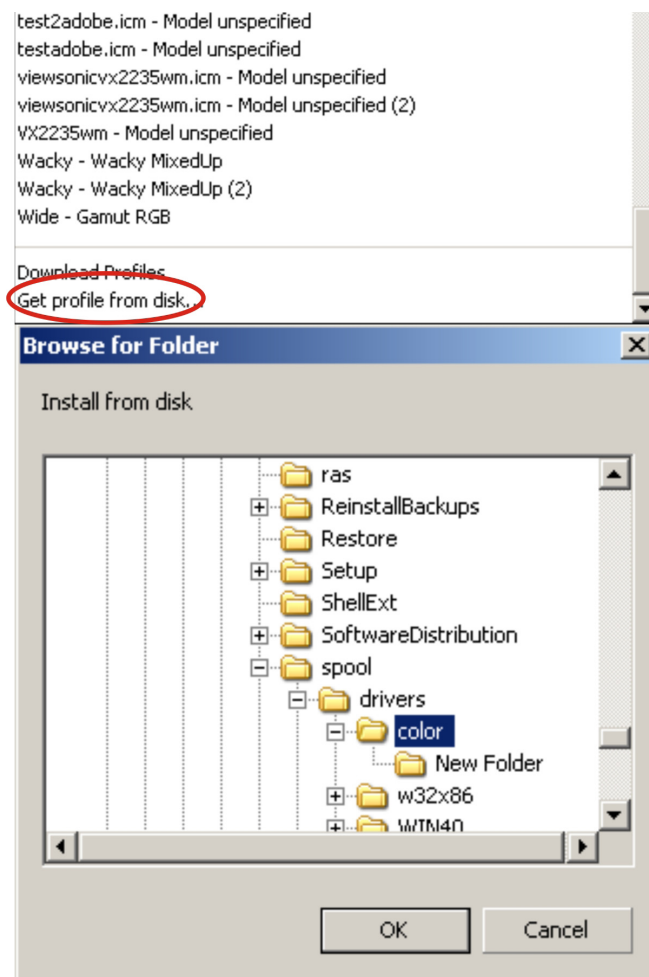
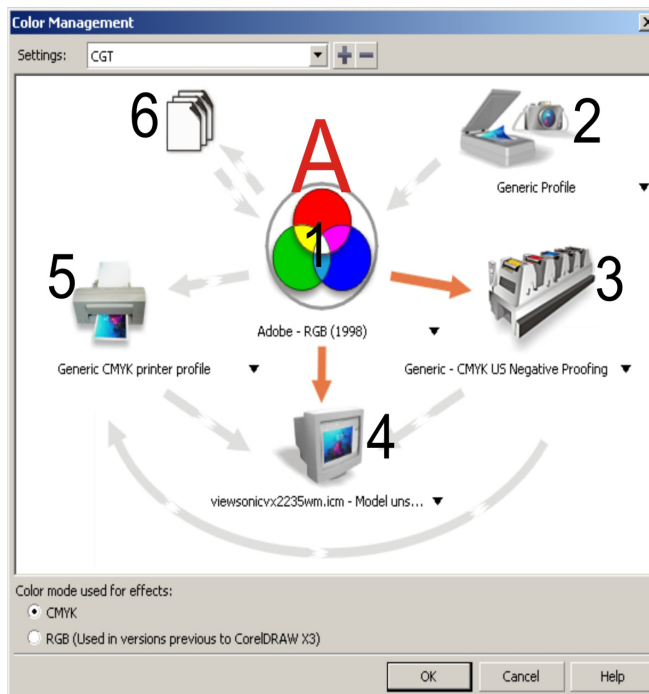
The profile selected as your Internal RGB **will affect all conversions from other color spaces.** For example, a PMS spot color converted to Prophoto RGB and used on the web will display improperly in the assumed sRGB of the internet. The same can be said for other commercial color palettes converted to RGB.

CorelDRAW X4 and X3 in CMYK mode, as shown in capture A, display all objects and images in the separations' CMYK color space -- unless you activate the arrow 5 to 4 to view your image for composite printing.

The RGB/CMYK mode is critical to understand, or all your work will display improperly. **Web work in X4 and X3 requires that you use RGB mode with proper calibration and color management settings!** In versions of CorelDRAW previous to X3, the default display was RGB. This, with proper color management settings and calibration, is duplicated in X4 and X3 when operating in RGB mode.

If no other soft proof is chosen (arrow from 5 or 3 to 4 activated), versions X3 and X4 in CMYK mode **require that the arrow from 1 (Internal RGB) to the monitor 4 be activated or a false display occurs.**

All other versions, as well as X3 and X4 in RGB mode, require that the arrow from 1 (Internal RGB) to the monitor (4) be activated for a proper RGB display. CMYK images display as the separations printer profile unless otherwise selected.



The Controls: Rendering Intent -- Color Engines

Note: CorelDRAW operates in CMYK Mode or RGB Mode

In capture A to the right, the number 1 represents the **Internal RGB**. By double clicking the RGB Icon you bring up the **Advanced Settings Dialog, capture D**. Here you choose the color engine and the rendering intent that will be used for color space conversions. DRAW sets default rendering intents to automatic, which is *perceptual* for images in PHOTO-PAINT and DRAW, and *saturation* for graphics in DRAW. Below is a repeat of definitions.

Rendering Intents Revisited

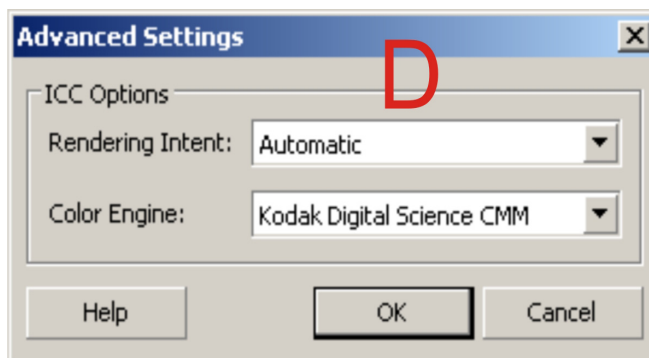
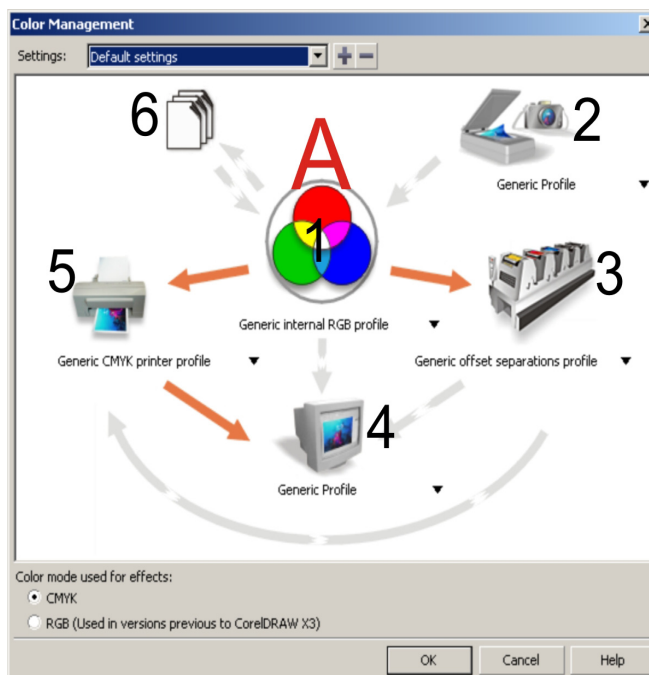
Absolute Colorimetric is the conversion of color relative to (attempting to reproduce) the source color's white point with an exact match of the colors of the source that are within the destination profile's gamut. Colors from the source that are out of gamut for the destination are mapped to their nearest equivalent.

Relative Colorimetric is the conversion of color with a remapping of the source color's white point to the destination's white point, with an exact match of the colors of the source that are within the destination profile's gamut. Colors from the source that are out of gamut for the destination are mapped to their nearest equivalent.

Perceptual is the conversion of color that tries to preserve the perceptual relationship of color. All colors in the source, both those that are in and out of gamut for the destination profile, are manipulated to maintain the perceptual relationship, (the feel), of the colors from one space to another.

Saturation is the conversion of color that tries to preserve the saturation properties (color depth) of color, even at the expense of hue accuracy. Most often used in signs or the reproduction of maps, the least accurate of the rendering intents but with significant value in some processes.

Capture G shows 3 images, the original out-of-CMYK gamut sRGB image on the left, the center image converted to CMYK with relative colorimetric rendering, and the right image converted to CMYK using perceptual rendering. There are subtle but definite differences in the conversion.



Key to this process of maintaining color integrity is **coordination of rendering intents and color engines**. This is an important step for cross application work, and is covered in detail in the workflow section of this publication. If the rendering intents and color engines in CorelDRAW and PHOTO-PAINT are not coordinated, then identical colors in PHOTO-PAINT and DRAW will convert and output differently. This is of particular interest for those using cross application, or cross platform workflows.

The Controls: Corel PHOTO-PAINT®

Note: CorelDRAW operates in CMYK Mode or RGB Mode

Capture **PP A** displays PHOTO-PAINT's equivalent Color Management Dialog. Note that there is no CMYK or RGB mode. This is the only real difference between the color management in the two applications. I will repeat the instructions for the PHOTO-PAINT user who ignores the DRAW section. The Internal RGB color space 1 controls the RGB color space of residence of any file created in PHOTO-PAINT. To display an RGB image properly, the color space in 1 must match the color space of residence on an opened image **and the arrow from 1 to 4 (the monitor) must be activated.**

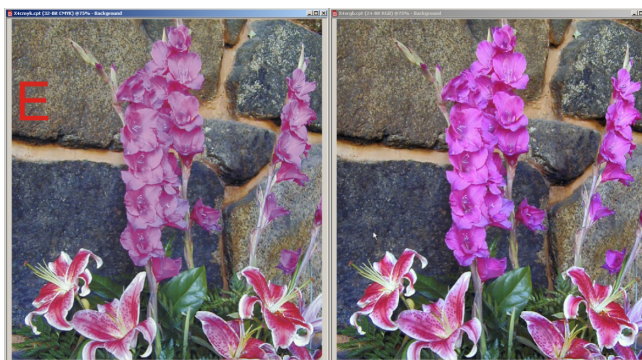
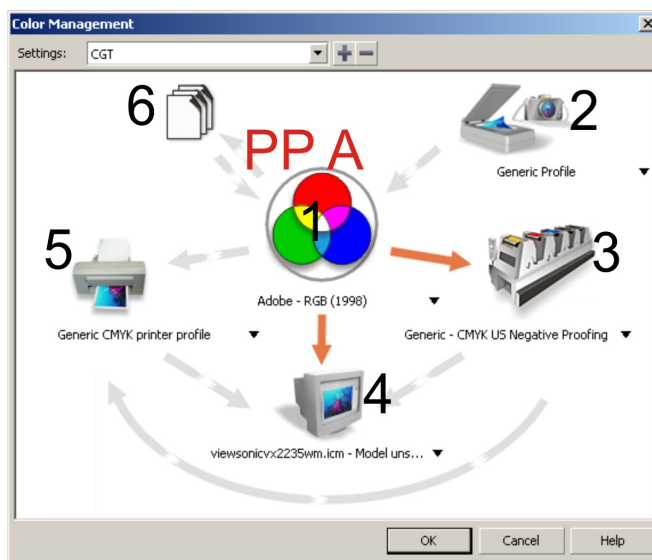
The profile selected as your Internal RGB **will affect all conversions from other color spaces.** For example, a PMS spot color converted to wide gamut RGB and used in a presentation will display improperly in the assumed sRGB of the PowerPoint or Corel Presentations. The same can be said for CMYK conversions as well as other commercial color palettes. **Your Internal RGB, as well as your separations printer profile, must match your workflows.** (How the Internal RGB affects imported images with embedded profile will be covered later in this section).

In **capture PP A** you can note that the Internal RGB 1 is being sent to the monitor 4 for proper display and to the separations printer 3. Sending the Internal RGB to the CMYK profile is important for proper RGB to CMYK conversions.

PHOTO-PAINT can display RGB and CMYK copies of an image simultaneously as shown in **capture E**, with the RGB image on the right and the CMYK on the left. I used this image as there is a serious out-of-gamut condition that existed with some of the flowers and this made it easy to show the difference between the two simultaneously displayed images. **Image editing tip: some RGB to CMYK conversions can be enhanced by color editing the CMYK copy of an RGB image to improve the conversion while having a simultaneous display of the RGB and CMYK to compare.**

Unless changed by activating the arrow from 5 to 4, PHOTO-PAINT by default displays CMYK images as if from the separations printer profile. To maintain color integrity, **the separations printer profile must match the color space of CMYK images you open for editing in PHOTO-PAINT.** If not, then an improper display and therefore incorrect color editing will result.

To maintain color integrity for a CorelDRAW Graphics Suite Project, it is imperative that you coordinate your color management setting between CorelDRAW and PHOTO-PAINT.



If working in a cross-application environment, color integrity requires that you have the color management setting of all your applications coordinated. This publication will address these settings with a description of how to achieve this.

The Controls: Camera & Scanner Profile

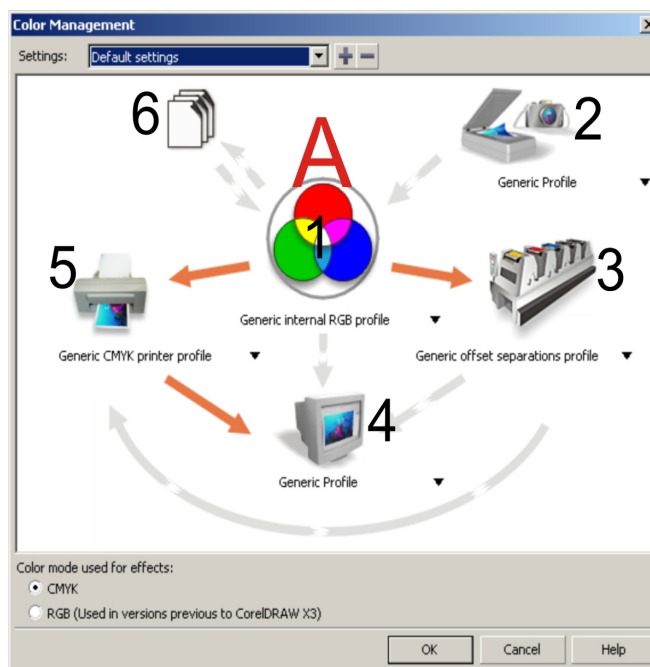
Note: CorelDRAW operates in CMYK Mode or RGB Mode

In capture A to the right, the number 2 represents the scanner and camera profile. You load a profile by using the drop-down arrow under the scanner icon 2. The procedure is the same as described for the Internal RGB. The results of the settings follow.

If you do not activate the arrow from 2-the scanner/camera to 1-the Internal RGB, the scan or capture imports into CorelDRAW or PHOTO-PAINT with the RGB numbers intact, but the display and output will be dependent upon your color management settings. By default, the display is the composite printer profile.

If you activate the arrow from 2-the scanner/camera to 1-the Internal RGB, then the scanner or camera color space is automatically converted to the Internal RGB of CorelDRAW or PHOTO-PAINT. Corel only honors the camera/scanner's profile for automatic conversion.

This setting may or may not provide you with the control you want, or inadvertently you may have your Internal RGB set to a narrow RGB and do an unsatisfactory conversion to your capture or scan. This is part of an automatic conversion workflow, so a serious warning needs to be issued here. As the quality of your scanner or camera increases, the less likely this setting is to be satisfactory for you.



[Note: To activate an arrow means to click on the gray arrow between the two icons you are connecting so the arrow turns color.]

The following settings are identical for CorelDRAW and PHOTO-PAINT all versions.

Depending on your standards for quality, this is where the complexity arises. In CorelDRAW X4 and X3 the default color management setting's CMYK mode has a color conversion and a soft proof standing between your scan/capture and you. **In my opinion, a scan or capture acquired from these CorelDRAW versions should only be done from RGB mode.**

For maximum control over quality, scans and camera captures should only be done in Corel PHOTO-PAINT, although one can use CorelDRAW. The procedure is to load the camera or scanner profile as the **Internal RGB color space (1)** and activate the arrow from 1-the Internal RGB to 4-the monitor and 3-the separations printer. **Make sure the arrow from 2-the scanner/camera to 1-the Internal RGB is disabled.** If needed, the scanner or camera profile may be extracted from a previous image or from the hardware manufacturer's disk or web site.

Acquire the scan or open the image capture. The image now displays as the scanner or camera captured the data. You may now color edit or convert to other color spaces with full control.

Color editing tip: Camera and scanner captures can be archived in their original color space. A copy can be converted to the LAB color space for convenient simultaneous display and editing, and then converted to the proper color space for final output.

The Controls: Separations Printer Profile

Note: CorelDRAW operates in CMYK Mode or RGB Mode

In capture A to the right, the number 3 represents the separations printer profile, (the working CMYK profile in Adobe). You load a profile by using the drop - down arrow under the printer icon number 3. The procedure is the same as described for the Internal RGB. The results of the settings follow.

The separations printer profile, number 3, is the color space that controls the CMYK color space of residence for CMYK objects and images in CorelDRAW and Corel PHOTO-PAINT. All conversions to CMYK in the application menus will be to this color space.

The CorelDRAW default settings that you see in capture A will have all RGB vectors and image RGB to CMYK conversions using the application menus converted using the separations printer profile, number 3.

In this case with the default settings, the image RGB to CMYK conversions that take place in the print stream, (the Apply ICC Profile check box in the print dialog misc tab) will be governed by the profile selected in 5-the composite printer, or by the choices in the **Advanced Printer Setting Dialog, capture B.**

The separations printer profile does not affect the PMS spot color to CMYK conversions as this is set by Pantone. It does affect the CMYK to RGB conversions.

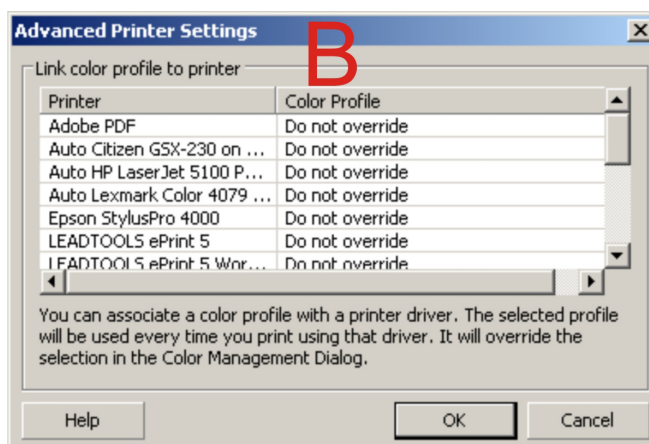
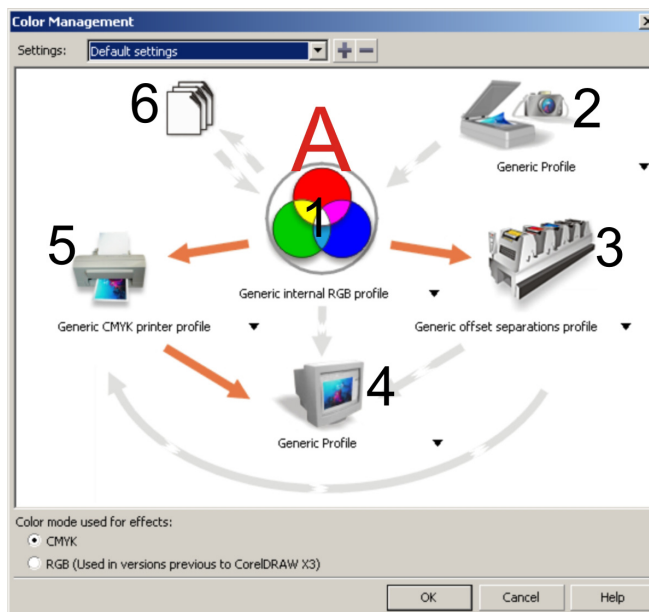
By double clicking 3 or 5 you can bring up the **Advanced Printer Dialog capture B.** This will allow you to set the ICC profile to use for specific printers. As CMYK to CMYK conversions are not supported, this function can only apply to RGB to CMYK conversions in the print stream.

Your options in the color profile column are: None, Do Not Override, and a dialog list of profiles from which to choose.

With the arrow from the RGB (1) to the separations printer (3) in (capture A) deactivated, all choices provide a rudimentary and very poor CMYK conversion.

With the arrow from the RGB (1) to the separations printer (3) in (capture A) activated, **None**, as your choice in the profile column, provides the same rudimentary conversion as no arrow activated. Do Not Override provides a conversion based on the profile settings provided in the main color management dialog capture A.

By selecting a profile in the Advanced Printer Setting Dialog, the profile settings in the main color management dialog will be circumvented and provide RGB to CMYK conversions based on the specific profile selected in the Advanced Printer Settings Dialog for that specific printer.



The Controls: The Monitor Profile

Note: CorelDRAW operates in CMYK Mode or RGB Mode

In capture A to the right, the number 4 represents the monitor profile. (Adobe automatically loads this from the operating system). You load a profile by using the drop-down arrow under 4-the monitor icon. The procedure is the same as described for the Internal RGB. The results of the settings follow.

A custom monitor profile is required for all quality work. A hardware/software calibration system is about US\$450 and without one you're guessing at your display!

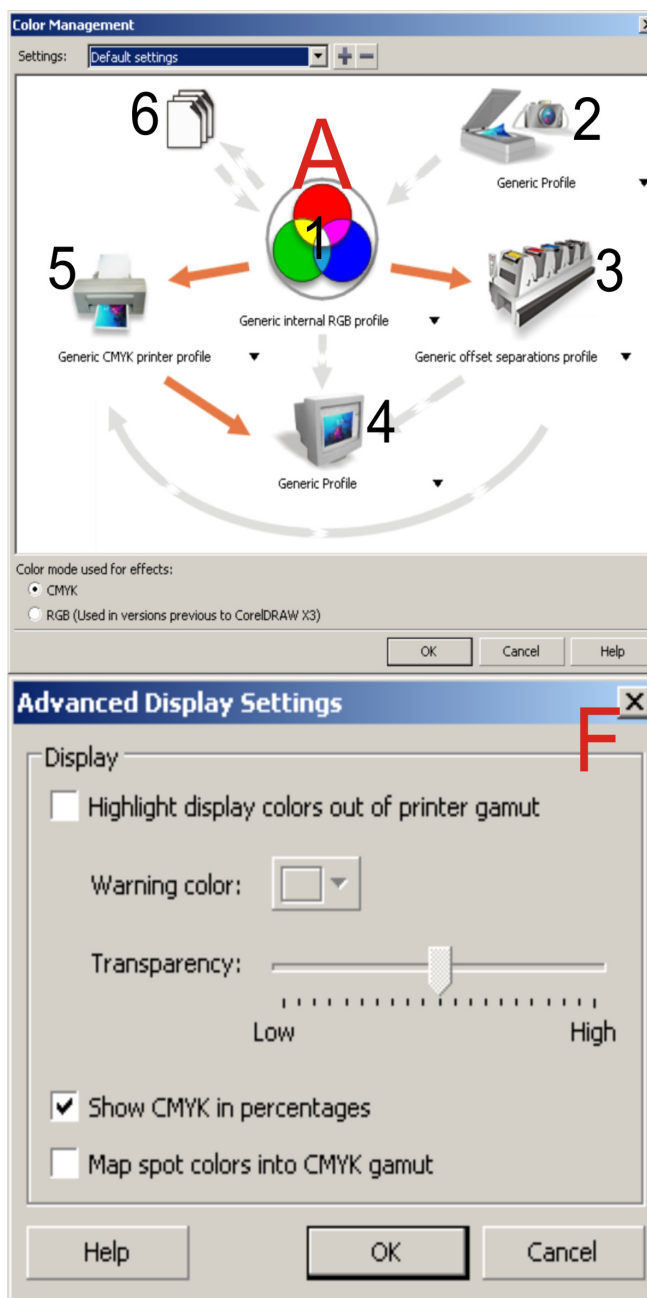
As each and every video card/monitor combination is different, a manufacturer's-supplied profile is next to useless.

Methods found on the internet and used for eyeballing the contrast, brightness and RGB colors, in most cases, do more harm than good. With that said, a link to find such services is provided in this publication.

By double clicking the monitor icon, the Advanced Display Setting dialog appears **capture F**. The check box "Highlight display colors out of printer gamut" has been called the out-of-gamut alarm. The purpose of this is to (supposedly) when you are displaying an RGB image and when you have soft proofing engaged, **(one of the arrows from the printers to the monitor activated)**, areas of color in the RGB image that are out-of-gamut for the printer, **(not reproducible)** will be highlighted with the alarm color. Unfortunately this feature, with all the changes in modern profiles, is quite a bit less functional then one would like. In the workflow section, we will demonstrate procedures without using the gamut alarm. This feature is not available if you do not choose to soft proof.

The "Show CMYK in percentages" box is checked by default. What this means is that the color reading throughout the application will be handled as the industry standard percentage of ink 1% to 100%. Un-checking this box displays the ink reading in a scale of 0 to 255.

The CMYK default display in X3 and X4, as well as the RGB mode display, attempts to display spot colors correctly as spot colors. If you check the box "Map spot colors into CMYK gamut," this will attempt to simulate your spot color in CMYK. **This will affect your spot color to RGB conversions.**



The Controls: Composite Printer Profile

Note: CorelDRAW operates in CMYK Mode or RGB Mode

In **capture A** to the right, number 5 represents the composite printer profile. (As Adobe handles this quite a bit differently, there is no real Adobe equivalent). You load a profile by using the drop-down arrow under 5-the printer icon. The procedure is the same as described for the Internal RGB. The results of the settings follow.

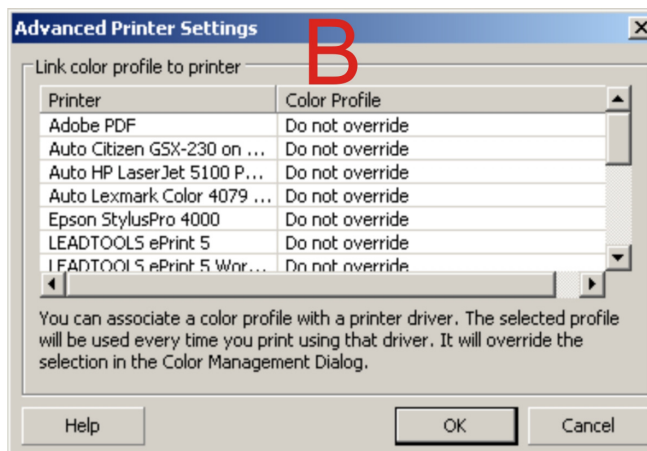
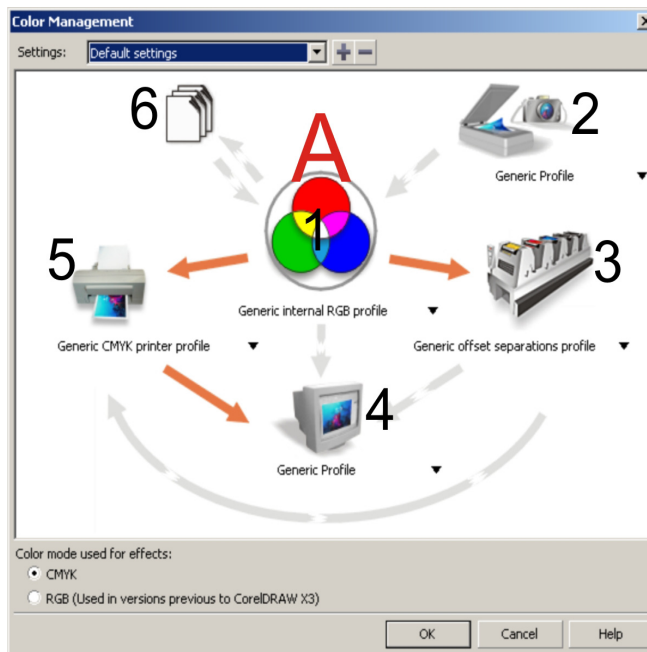
This is the most complicated area of the Suite's color management and will be covered in serious detail in the printer calibration section of this publication. What takes place is completely different for non-Postscript devices than it is for Postscript devices. Composite files (files containing RGB, SPOT color and CMYK elements) are handled differently than images or files of single color spaces.

The Postscript description of what happens with the composite printer setting shown in **capture A** (the default settings) follows. In CorelDRAW and PHOTO-PAINT all conversions from RGB to CMYK via the application menu commands will be handled by 3-the separations printer profile. All RGB to CMYK conversions that take place in the print stream will be handled by the profile selected for 5-the composite printer, **via the color management dialog or the Advanced printer Settings Dialog capture B.**

Device simulation hard proofing is not supported. As such, no CMYK to CMYK conversions take place in the print stream, meaning that any items in the file that were already CMYK have their CMYK numbers passed along unchanged. The print stream is converted to LAB and via LAB to the printer's media, ink limit curve.

Here is what happens with non-Postscript devices with the settings you see in **capture A** (Default Settings). In CorelDRAW and PHOTO-PAINT all conversions to CMYK via the menu commands are handled by 3-the separations printer. All CMYK conversions that take place in the print stream will be handled by the profile selected for 5-the composite printer, via the color management dialog or the Advanced printer Settings Dialog **capture B.** **Now here's some of the difference in non-Postscript devices.** All CMYK information in the file is converted to RGB, then to CMYK color space of the printer profile, and then rasterized to RGB for the device print stream. This has to be done this way as non-Postscript devices require an RGB raster in their print stream. That means additional conversions.

This non-Postscript print stream flow will be covered in the work flow section of this publication. Non-Postscript printers require RGB printer profiles and as such the process is complicated.



The Controls: Advanced Import / Export Dialog

Note: CorelDRAW operates in CMYK Mode or RGB Mode

In capture A to the right, number 6 represents the Import/Export Dialog. By activating the arrows from or to the Page Icon in capture A one turns on the embedding or profile honoring system. To control how the Suite handles this system, double click on the Page Icon and the Advanced Import/Export Dialog, capture C appears.

I admit that this is a confusing dialog so I will cut to the chase, explaining what I know works, how it works, and setting the known limitations.

For images with an embedded RGB profile, activating the arrow from 6 to 1 will automatically convert the image to the Internal RGB. For untagged RGB images and all CMYK images, the Suite will assume the Internal RGB color space, or respectively the separations printer profile.

Activating the arrow from 1 to 6 in **capture A** will embed an RGB profile into RGB files per your settings in **Capture C**. This includes the WIO (web image optimizer).

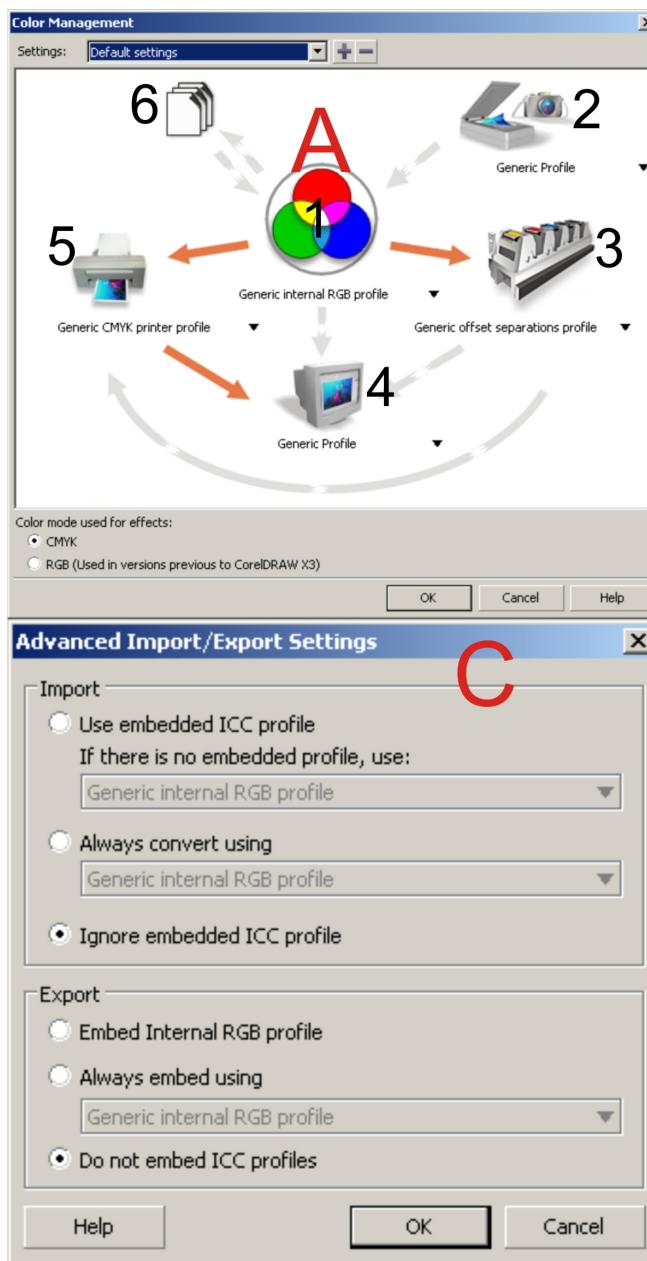
If you send out a CMYK image for editing or composite output, you must send along or at least notify the service provider of the CMYK profile used for conversion, period! For press output, this is not required.

If you open another person's CMYK image for viewing or editing, you must load their CMYK profile as 3- the separations printer profile **capture A**, period! If they've embedded it, you can extract and load it. Instructions to come in the workflow chapter.

In **capture C**, the default seen here is a Postscript color-managed process of opening and exporting files. What that means for those who use the default settings of **capture A** and **C** is that **an RGB image that is opened or imported will display as if it is a Corel sRGB image soft proofed to the Generic CMYK composite printer.** Any CMYK image that is opened or imported **will display as if it was converted to the Generic CMYK composite printer.**

However, with these default settings, the RGB image will only display or print accurately if it was created in the Corel proprietary sRGB color space, and the CMYK image will display properly if it was converted to the generic CMYK printer profile. However it will not print properly to composite printers but will print fine to a printing press. **OUCH!**

The Advanced Import/Export Setting Dialog **Capture C** really only easily supports an assumed color space workflow. That is a workflow where all the application's color management settings are preset and all RGB and CMYK images are assumed to be in those color spaces. The Suite easily supports a converted color space workflow, where all RGB images are automatically converted to the Internal RGB. However it is only supported in RGB.



The Controls: Advanced Import / Export Dialog (cont.)

Note: CorelDRAW operates in CMYK Mode or RGB Mode

The “Use the embedded ICC profile” radio button in capture C, when checked, will use the embedded profile to convert the RGB image to your Internal RGB via LAB, when the embedded profile does not match your internal RGB color space. If the embedded profile matches your Internal RGB, no conversion takes place. Corel only honors RGB profiles without a conversion that match the Internal RGB or separations printer profile. The Suite provides no automated conversion process for CMYK files and only honors CMYK images that match the profile selected for 3-the separations printer in capture A.

There is a drop-down dialog that allows you to choose a profile for converting the un-tagged image (an image without a profile attached) to. My experiments with Adobe and sRGB images show that an untagged Adobe RGB image opened into Corel PHOTO-PAINT set to use sRGB if there is no embedded profile (see drop-down in capture C), allows the image to open incorrectly with the Adobe numbers intact.

The radio button for “Always convert using” with the **drop-down dialog for choosing a profile** set to always use for converting, seems to provide the same result as the “If there is no embedded profile, use” drop down.

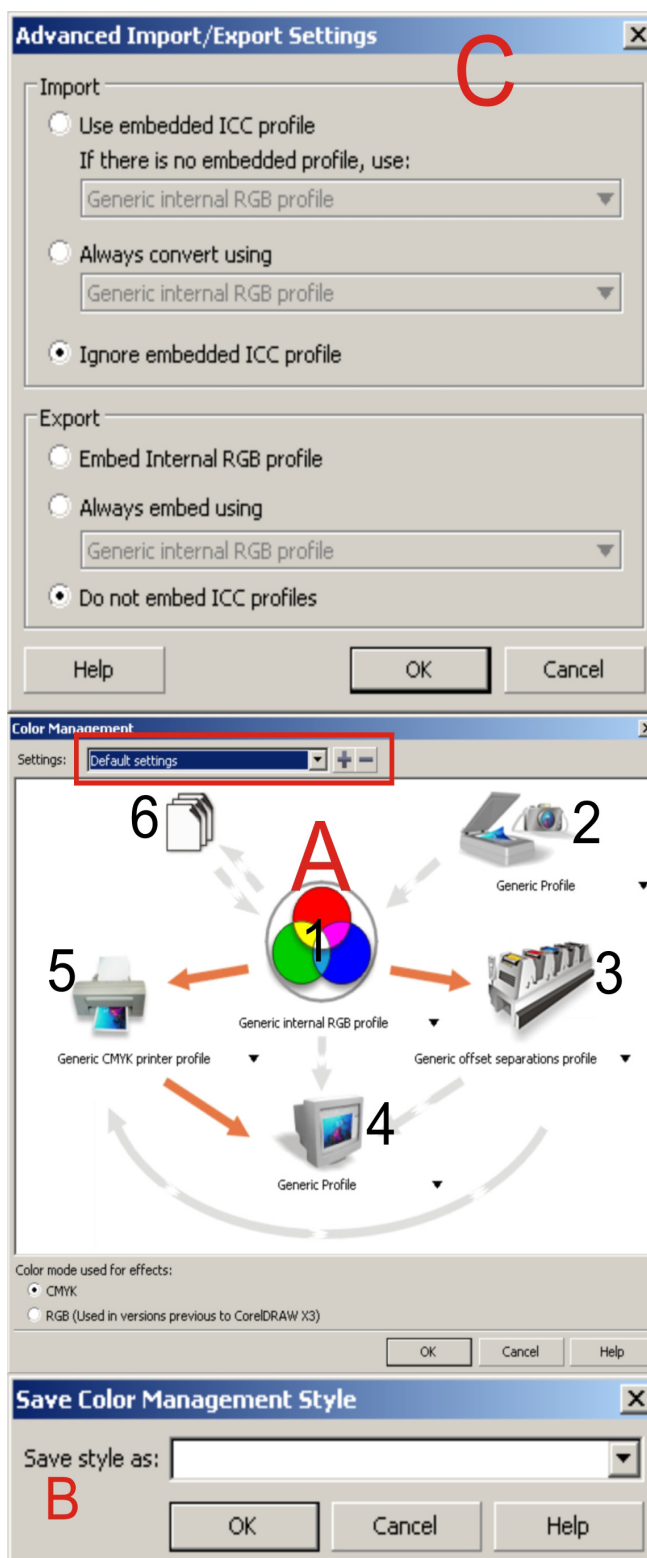
The “Ignore embedded ICC profile” radio button works as labeled.

For exportation the “Embed Internal RGB profile” radio button works as labeled.

The “Always embed using” radio button and the associated drop down has produced results with my test Adobe RGB images of embedding the profile properly as selected in the drop-down, ONLY when the embedded profile matches the internal RGB.

“Do not embed ICC profiles” works as labeled.

The Graphics Suite allows you to save color management styles and to use them independently in DRAW and PHOTO-PAINT, X3 and X4 only, as shown in **capture A** inside the red rectangle. Version 12 uses the same settings for CorelDRAW and Corel PHOTO-PAINT. Once you have made your color management choices, click the + sign and the Save Color Management Style dialog appears (**capture B**). If you are using a style and click the button, it will delete the style. Styles can be created and tailored to your needs.



The Controls: The Apply ICC Profile Dialogs

Note: CorelDRAW operates in CMYK Mode or RGB Mode

The Apply ICC Profile dialog (**capture A**) is found in the Image menu of Corel PHOTO-PAINT 11 thru X4 and the Bitmap mode menu of CorelDRAW 11 thru X4. You have to identify the resident color space of the image and it will then convert it to the Internal RGB color space. This is the only place outside the Import-Export dialog where the Suite allows RGB to RGB conversions via LAB.

The Apply ICC Profile check box is found in multiple places in the CorelDRAW Graphics Suite. **Capture B** shows the Apply ICC Profile Check Box in the Convert To Bitmap Dialog in CorelDRAW. **Capture C** is the Convert to Bitmap Dialog in Corel PHOTO-PAINT that you get when you open a CorelDRAW or other vector file and rasterize it.

The use of this checkbox is very simple. The object that is being converted to bitmap will be converted to either the Internal RGB for an RGB conversion or to the separations printer profile if you're converting to CMYK or other profile.

If the object is CMYK, Corel **assumes that it resides in the separations printer profile as the source** for the RGB or other conversions. If the object is RGB, **Corel assumes the Internal RGB as source** for the conversion to the separations printer or other profile.

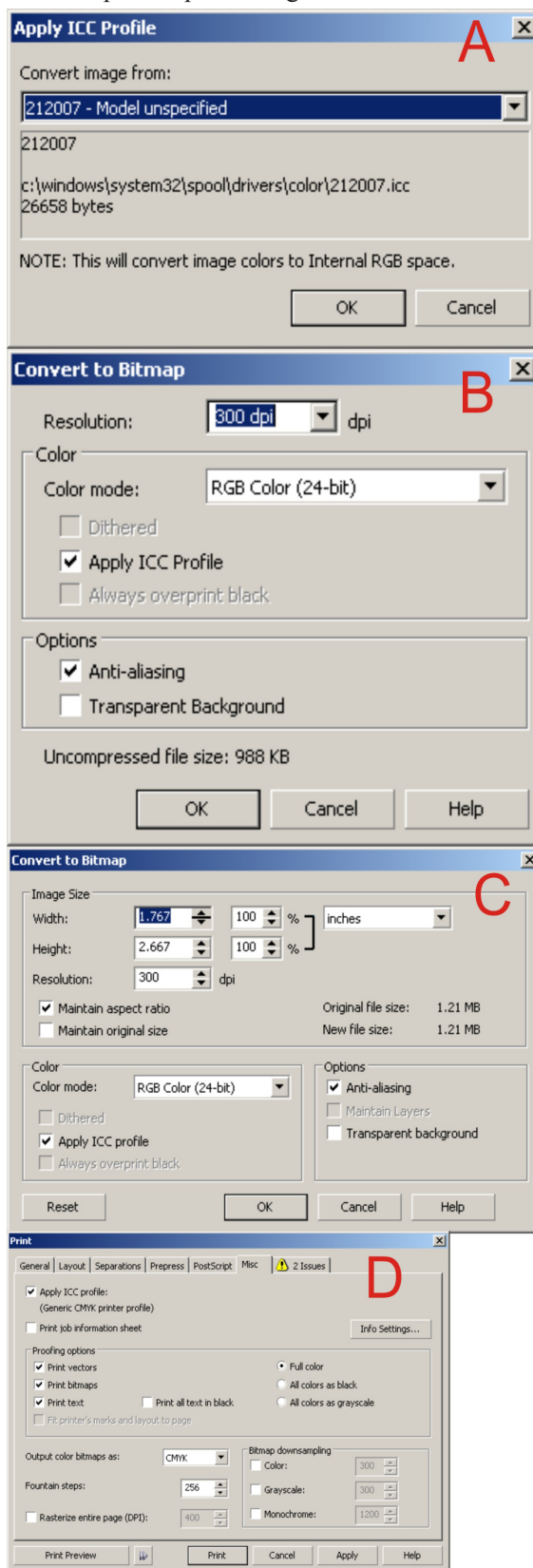
The Suite uses non-user accessible profiles for the conversions to black and white, 16 colors, grayscale and paletted images. If the image is from one of those spaces, then Corel assumes the Internal profiles as the source.

The key to the "Apply ICC profile" check box is that nothing happens unless a conversion takes place. That means RGB to gray scale or to CMYK; no RGB to RGB or CMYK to CMYK conversions take place via this check box.

CorelDRAW in the Convert to Bitmap or Print dialogs assumes that all images and objects in the file reside in the color spaces assigned in the color management dialog, and as such allows no RGB to RGB conversions. RGB to RGB conversion takes place through the "Apply ICC profil" dialog in (**capture A**) and the import dialog.

The only other place you find the "Apply ICC Profile" check box is in the Misc tab of the Print Dialog (**capture D**) and the Advanced tab of the Publish-to-PDF dialog (not shown). ONLY conversions will be applied as described above or as described in the workflow and calibration sections of this book.

When checked, the ICC profile chosen for the composite or separations printer in the main color management dialog is applied -- unless you have selected to override it and use the Advanced Printer Settings dialog to set specific profiles for specific printers in that dialog.



The Controls: Pre-Programmed Settings

CorelDRAW & PHOTO-PAINT

The “Optimized for desktop printing” setting shown in the Settings drop-down box in **capture A** is an automatic conversion workflow in CMYK mode. All tagged RGB images are converted to the Internal RGB color space upon opening. Untagged images are assumed to be in the Internal RGB or the separations printer profile, soft proofed via the composite printer. The Internal RGB is sent to the separations printer and to the composite printer. The composite printer is being soft proofed to the monitor. Scanned images are assumed to be in the Internal RGB color space.

To the best of my knowledge, the Internal RGB is not IEC sRGB, and the separations and composite printer profiles are identical and are CMYK profile.

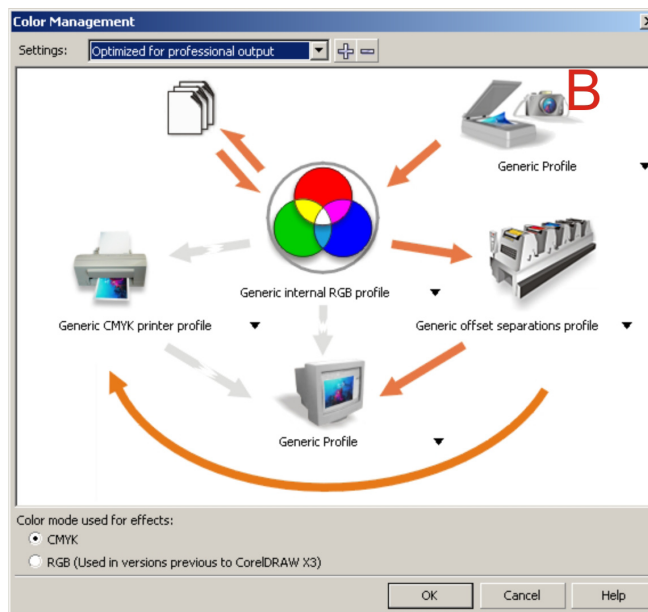
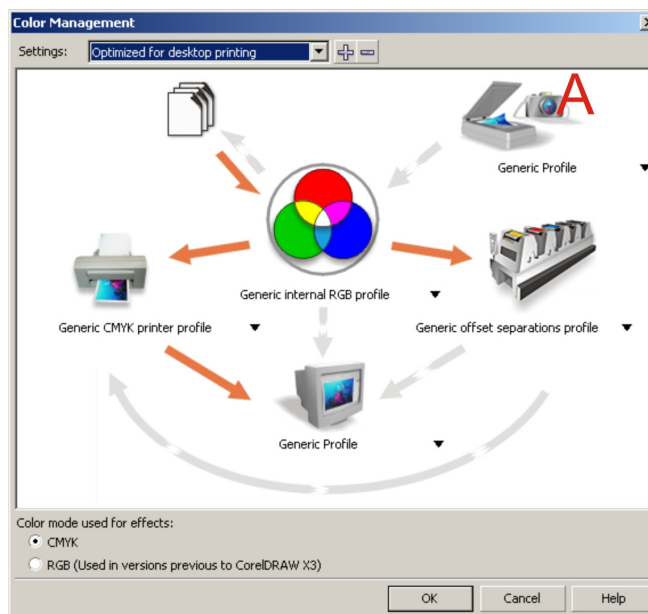
All RGB to CMYK conversions in the application menus are controlled by the separations printer, and RGB to CMYK conversions in the print stream are controlled by the composite printer profile.

“Optimized for professional output” is shown in **capture B** and this is also an automatic conversion workflow. The difference between the two is that in **capture B** an RGB profile can be attached when the file is saved. The arrow to the composite printer is deactivated and you’re soft proofing the separations printer. Scanned images are converted to the Internal RGB. The RGB to CMYK conversion in the application menus and the print stream are controlled by the separations printer.

Since the profiles used for the composite and separations printer are identical, the only real difference between the two workflows is the conversion of scanned images and the embedding of an RGB profile into the file.

Corel, for some reason, has designed their preset color management controls around the user working in RGB and converting to CMYK in the print stream. This is a bad idea. CMYK work should be converted manually and/or created in CMYK. The end result in quality is superior.

The other serious issue is that CorelDRAW has a bug with certain profiles with various color engines with soft proofing. This sometimes causes conversion errors. I suggest not using soft proofing. In CorelDRAW CMYK mode, simply deactivate any arrow from any printer to the monitor, and activate the arrow from the Internal RGB to the monitor.

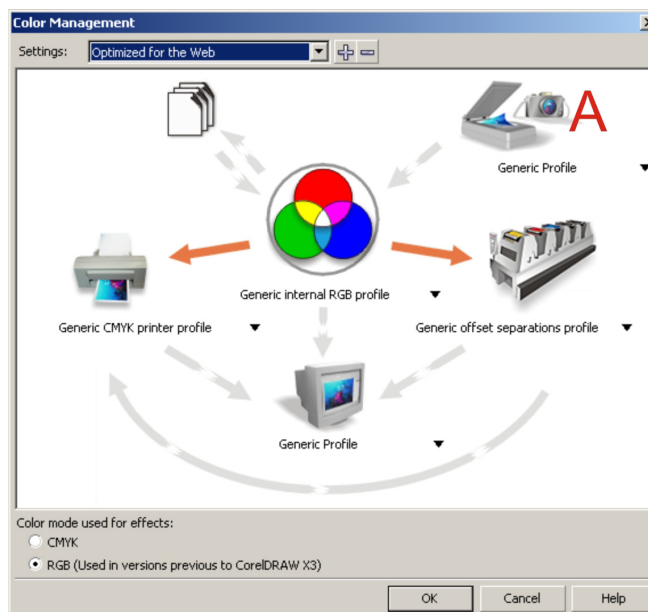


The Controls: Pre-Programmed Settings

CoreIDRAW & PHOTO-PAINT

The “Optimized for the web” setting (in the Settings drop-down box at the top of capture A) is an RGB mode of workflow and has the Internal RGB being sent to the separations and the composite printer.

To save my life, I could not figure out why one would use this setting. Your display source is not even the generic RGB profile as displayed by the color management dialog. To prove this to yourself, use these color management settings and create a red square in CMYK, then duplicate it and convert the duplicate to RGB. Now activate the arrow from the Internal RGB to the monitor and watch the display change. Settings that will utilize profiles for the web are contained in the workflow section of this publication.



CHAPTER 3:

Workflow Calibrations

Monitor Calibration

The concept of any workflow has to include the production of a final product and organization of the processes that guide the project to fruition. What that means for color management is injecting reliable controls into the process so the user can rely on those processes. When a question arises, a quick check of a few crucial points in the system and a quick resolution to the issue can be found. For those of us who are in graphics that means two things -- first monitor calibration, and then coordination of the color management settings across the processes, PERIOD!

Monitor calibration is the first step. Here is a link, <http://www.simtel.net/product.download.mirrors.php?id=61876>, for the Monitor Calibration Wizard 1.0. This is a software program I've seen home users use to **THEIR satisfaction**. This is **NOT PROFILING** software or hardware; it is software that relies on your visual reference and manual manipulation to make a tone curve adjustment to your video card. **This is not real calibration. Real calibration of a monitor or printer relies on standardized targets, reading results with instruments involving hundreds, if not thousands, of calculations handled by the equipment.**

Here are some web links I've found to help you evaluate your monitor:

Learn monitor calibration -- http://www.drycreekphoto.com/Learn/monitor_calibration.htm

A black point test -- http://www.drycreekphoto.com/Learn/Calibration/monitor_black.htm

A gamma check -- http://www.drycreekphoto.com/Learn/Calibration/monitor_gradient.htm

For the modest budget enthusiast, the Spyder Pro can be bought online in the United States for about \$169; the Pantone Huey Pro is about \$100. There are many reasonably-priced monitor calibration systems available. I strongly recommend that even the home user invest in a monitor calibration package. You will get your money back on what you save on ink jet or photo lab services rather quickly. **The professional will find the price range of the Gretag Macbeth Eye One Photo starts at about \$2,500 and the available packages go up to about \$17,000.**

I use the Eye-One Photo with an Eye-One Pro spectrophotometer and the ProfileMaker Professional software package. Please take these words of caution to heart. When I wanted to place a calibration package and a 22" x 17" ink jet proof printer at our design location, the first quotes were over \$16,000. After some research and shopping around, the total cost was \$8,000. I can recommend the Gretag Macbeth spectrophotometer, the Eye-One i1 Photo LT, as it will do emissive (monitors) and reflective (print) modes for about \$1,000, saving the professional in the small office or home office a great deal of money. The profile creation software is additional.

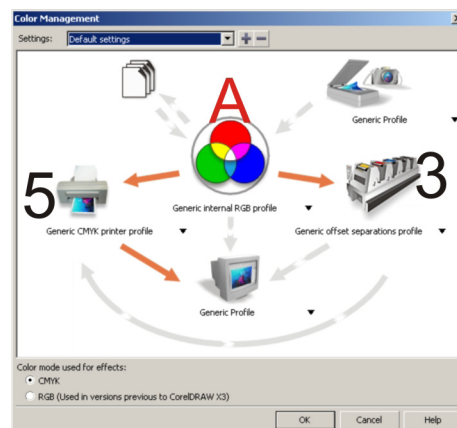
Once you follow the manufacturer's instructions and create your monitor profile, simply install it in CorelDRAW or PHOTO-PAINT through the color management dialog. All the profiling systems I've used, automatically allow you to set the created profile as the system profile, and the drop-down box under the monitor (4) in capture A will automatically see it when you expand the drop down.

Those who are starting to use proper color management understand that the technology comes at a cost. However the user needs to know when to be cautious. Watch out when a person, especially a sales person, says that your monitor will match your print or that your proof will match your print. I've been in professional graphics since 1975, managed large companies with multiple presses, calibrated multiple digital output devices and press systems. **I'VE NEVER** seen a monitor match a print; **I'VE NEVER** seen a proof match a print. When correct processes are followed, they are always CLOSE, but **NOT A PERFECT MATCH!**

Printer Calibration

The only other calibration a user might want to do is their printer. This is infinitely more complicated. The two main print systems are Postscript and non-Postscript, with pros and cons to each method. **Let's deal with Postscript calibration, driver-based printers first.**

The first thing that needs to be remembered is that **CMYK to CMYK conversions are not supported in the Suite**. What that means is that once an object or image resides in the CMYK color model, no matter what CMYK profile that is loaded as the composite printer profile (5), no changes to the CMYK numbers will occur. For a driver-based Postscript-calibrated ink jet output, **all RGB to CMYK conversions must be done to the profile that you create for the ink jet.**



Printer Calibration: Postscript Driver-Based Printers

In order to keep the calibration section of this publication in a mental order, I have placed printer calibration with monitor calibration. **It is imperative that you understand that manipulating a curve or other color controls in a print driver is NOT color calibration. If you do so, and then edit an image to print to what you consider as proper to your device, in almost all cases you image WILL NOT print properly on calibrated devices!**

Another fact is that the Suite DOES NOT support driver-based device simulation hard proofing in driver-based workflows of any kind. In plain words, you cannot simulate a different printer from your printer.

To make a test print for Postscript calibration, all you simply need do is to select color management settings that will negate any color handling of the file. The capture you see at right will do that for CMYK objects and images. The arrow to the composite printer is deactivated and so is the profile loaded there. All CMYK numbers will pass to the composite printer unchanged.

Key to the printing of a test target is the printer driver color settings. There are two schools of thought on this process. One suggests that all driver settings should be disengaged. The other is that the driver settings should be set as default for the media selected. I believe in the latter and I'll explain why.

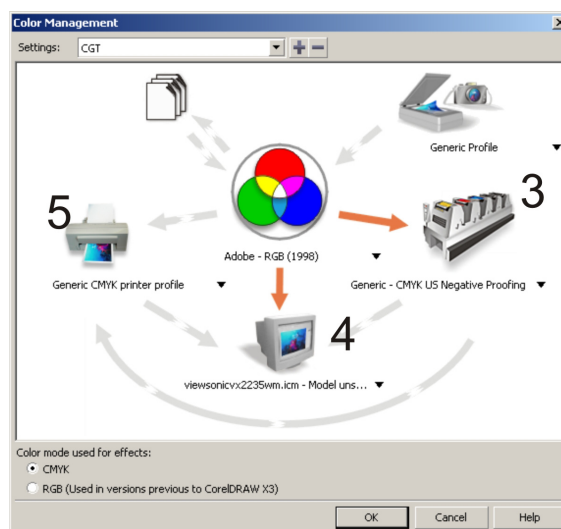
The driver settings on a composite printer, be it an ink jet or a laser printer, handle a critical function. They handle the media, ink/toner limit linearization curve. What this mean in layman's terms is that these curves make sure that the device, for the media (paper) selected, produces on paper an accurate (as possible) rendition of the CMYK percentages it was given in the print stream. In short, 5% looks like 5% and 50% looks like 50%. When a device does this, its output is said to be linear.

If you disengage these settings, your profile will have to handle this, and in the case of a seriously non-linear device-media combination, it may totally negate the soft proofing capabilities of Corel, as the soft proof display will reflect what the profile has had to do to linearize the device. In layman's terms, the soft proof may look really bad even though the print looks fine.

If you leave the driver settings engaged for your media, your profile will be making adjustments to an already factory-linearized device and the soft proof display will be much more consistent with the print. Yes, I know from a purest standpoint, this is not as accurate a profile because it relies on a factory-created ink/toner limit linearization curve. However, I believe users that are super critical about their color should resort to a RIP, not a driver-based work flow, where the equipment allows the creation of a custom, and the regular update of, the media linearization curve and much more.

Above, under the color management dialog, you will see a typical CMYK test target for printing. It has been converted to sRGB for the purpose of this publication.

Once you have completed the profile creation process you need to load the profile for use as described previously in this publication. On the next page, we will discuss using the newly created profile.



Printer Calibration: Postscript Driver-Based Printers (cont.)

So what do we do to utilize this new profile? Below are some scenarios for you to consider. To the right in **capture A** we see one CMYK mode method of handling the new profile. What happens here is that the Internal RGB (1) is sent to the separations printer (3) and the composite printer (5). The display (4) is from the composite printer.

A. Display of all objects in DRAW and PHOTO-PAINT is always CMYK

B. All conversions to CMYK either in the application menus or print driver are handled by the new profile loaded in both 3 & 5

In fact the arrow from Internal RGB (1) to the monitor (4) could be activated with the same display result in DRAW. PHOTO-PAINT would then display both RGB and CMYK images.

The RGB mode method is shown in **capture B**. Here the Internal RGB (1) is sent to the separations printer (3), the display (4), and the composite printer (5).

A. DRAW and PHOTO-PAINT can now display RGB and CMYK objects

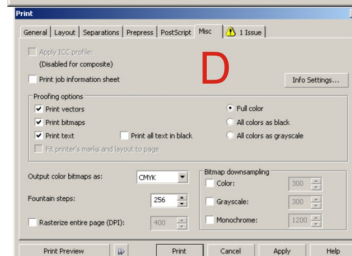
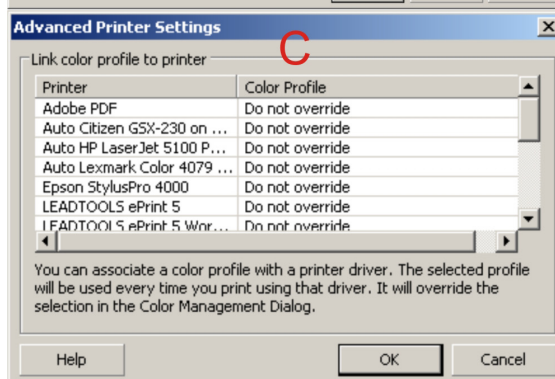
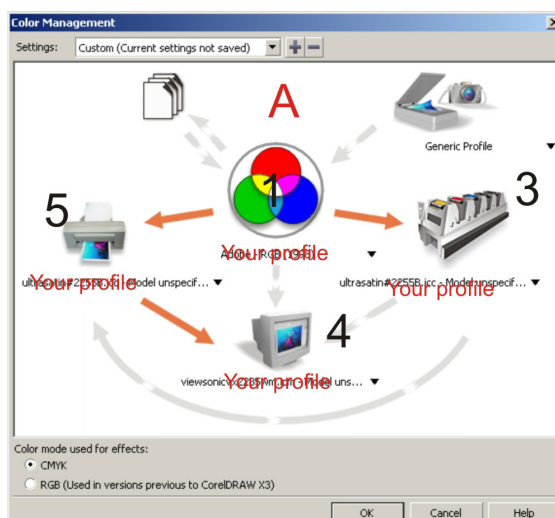
B. All conversions to CMYK either in the application menus or print driver are handled by the new profile loaded in both 3 & 5.

Both methods require that the color profile in the Advanced Printer Setting Dialog, **capture C**, be set to **Do Not Override**. This will send the CMYK profile selected in **capture A** or **B** to the printer.

Both methods have one drawback and that is the handling of imported CMYK images. CMYK images from outside sources that do not match the profile set in (3) or (5) need to be opened in their color space of residence and converted to LAB or RGB. Then either via the print stream or the applications menus converted to the CMYK profile set in 3 or 5.

Both methods will allow you to create files containing RGB and CMYK elements and to achieve a reasonably well-calibrated output because all CMYK elements created in CorelDRAW with these color settings will reside in the newly created CMYK profile space. All RGB elements will be converted in the print stream to the new CMYK color space as long as you use the default (Send images as CMYK setting) in the Misc tab of the Print dialog **capture D**.

Tip: Converting your image to this new CMYK color space is recommended for local printer output only, such as fliers or other material you output for yourself. It is better to use a commercial CMYK color space for professional print output. An example of such a workflow would be to create your file in RGB, and print locally using your profile. Then change your separation and composite printer profile to a commercial profile, and create a PDF using the commercial profile for professional output.



Printer Calibration: RIP-Based Printers

RIP-based color calibration for print output, from the CorelDRAW users perspective, is extremely easy. All the calibration processes take place in the RIP by simply using the RIP manufacturer's instructions. All the user has to do is create the file properly using properly coordinated profile settings. **First let's understand that this is what CorelDRAW was made to do and it does this as well as any application on the market.**

In the **captures A, B, and C** you will see my color management default settings for a press sheetfed TIC 360 (total ink coverage) CMYK, and an expanded gamut, digital output workflow for CorelDRAW and PHOTO-PAINT using the Adobe RGB 1998 color space and a Kodak CMYK profile.

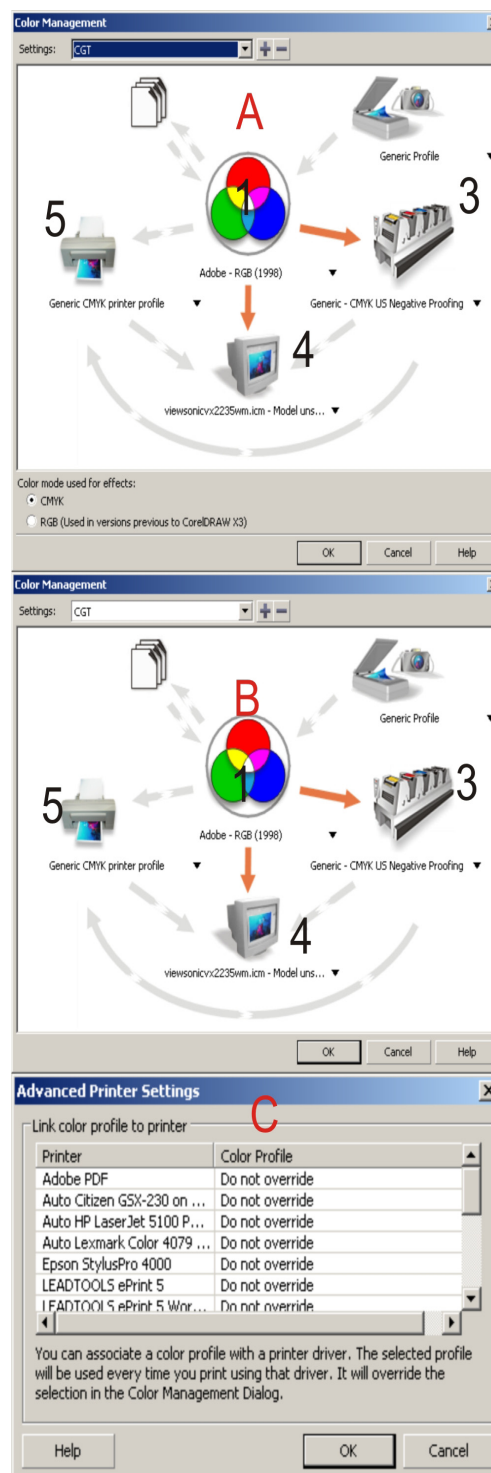
Please understand that I am located in the Northeastern United States so the profiles I have chosen reflect the sheetfed, coated paper, expanded gamut digital output, and the commercial RGB color spaces of my region and the United States in general. Your choices should reflect your region.

Note most importantly that PHOTO-PAINT and DRAW have exactly the same settings. All RGB is created in or properly converted to the Internal RGB, then if needed is converted to the separations printer profile CMYK. All CMYK is created in or properly converted to the separations printer CMYK profile.

In CorelDRAW and PHOTO-PAINT what happens for **press print work** is that **all objects and images** are created in or converted to our CMYK color space. **No profiles are embedded or applied.** All conversions are controlled in the application manually for the highest quality possible. As most pre-press work flows do not support CorelDRAW published PDF, for press work we print to an **un-color managed Acrobat Distiller setting using Postscript color management and create a commercial PDF.**

For expanded gamut digital output, all CMYK and spot color corporate identities are imported into DRAW in their native color space. All RGB corporate identities are opened in their color space of residence and converted to the Internal RGB of the Suite for import to the final file. All images and objects that have no corporate identity structure are properly imported into DRAW and converted to the Internal RGB, or separations printer CMYK color space as required. All corporate images are properly opened and converted to the color spaces selected in Corel color management. Images that have no corporate identity structure are created and/or edited to be in the Internal RGB color space. **We then create a CorelDRAW-published native color PDF. No profiles are embedded or applied; the RIP is set to assume as source profiles the Internal RGB color space and separations printer CMYK color space of CorelDRAW.** All conversions are controlled by the RIP for the widest gamut while honoring corporate identity color structure. You will need to make sure your RIP or output provider supports CorelDRAW-published PDF to use this feature.

It's just that simple, by using regional settings and creating the file correctly, I have had CorelDRAW files printed all over the world. Of course you must not make silly mistakes like sending un-flattened transparency.



Printer Calibration: RIP-Based Printers (cont.)

What I hear all the time is “**How is this possible?**” Every book I’ve ever read says that I have to embed the profiles, and these instructions for press and digital output use no profile embedding and an un-color managed Distiller published PDF!

It’s really very simple. The color integrity and therefore color-calibrated CorelDRAW output to professional level calibrated RIPs relies on four factors:

1. The linearization and commercial calibration of the RIPs to their media (plate or film setters included)
2. The file creator’s strict adherence to coordination of their RGB and CMYK color spaces during file creation and the communication to the digital output provider of what color spaces were used during creation
3. The ability of all graphic applications and RIPS to work in an assumed color space
4. Postscript Color Management

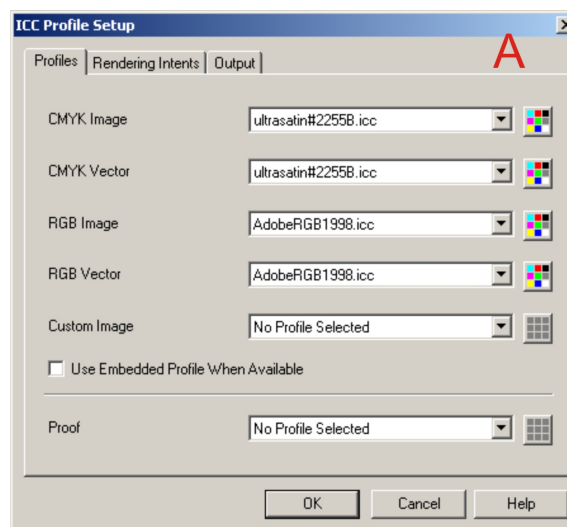
To understand how this works we first have to understand Postscript color management basics. This type of color management was the very first color management in use. **It relies on the fact that every file contains within itself the RGB and CMYK numbers of every item in the file. When a Postscript file is created, these numbers become the color space arrays (CSA) and are, in my opinion, incorrectly identified by many as an equivalent to the source profile.** I say “incorrectly identified as an equivalent” because color numbers without an identification of color space is useless for RGB color spaces and useless for editing (not output to plate) of CMYK color spaces. Please bear with me. This is complicated and I will simplify it as much as possible. However I have seen many people with doctorate degrees that couldn’t grasp Postscript color management when, in my opinion, it is very simple.

Ink Jet Composite Printer RIPs

These RIPs are different than press RIPs. They are truly ICC controlled; they actually do conversions from and to profiles. As shown by the screen capture from an Oynx RIP, **capture A**, the ICC Profile Setup dialog. **The key to these types of RIPs is that there is a progression of profiles used and to understand them we must understand the hidden final output profile -- the media (paper) profile. It is a profile that provides the ink limit, dot gain and linearization curve for the media. This profile is applied to all print streams for the specific media and it is a color profile.** As this is a profile, it requires that the input stream identify the color space from which it came.

This is where Postscript color management in conjunction with ICC color management works for us. As you can see from the source profiles tab, this RIP is complex. It has the ability to use separate source profiles for RGB and CMYK images and vectors. The files sent to the RIP will be interpreted and rasterized. As this happens, each object is identified as vector or image. **Because the source ICC profile information matches our color spaces used to create the file, the CSA color information (which is simply numbers passed along through the file) has its color spaces properly identified. This brings meaning to them, complying with the ICC specification.** Thus we have provided color integrity to the processes of this RIP.

These RIPs are far more complex than this. However their scope of capabilities are out of context for this publication.



Printer Calibration: The RIP for Film or Plate Setter

This is a different animal all together. To get an Adobe certification for Postscript Level 3, they must support ICC profiles. While they may support ICC profiles, few are set to use them in compliance with the ICC regulations. Some just do not support ICC profiles at all, foregoing a certification. **How the RIP manufacturers have decided to handle RGB files varies from one manufacturer to another, so when you send an RGB file to a Plate or Film Setter you do so at your own risk PERIOD!**

How these devices handle CMYK is different from ICC-controlled RIPs. The controlling factor is that it converts the source CMYK color space to a LAB color space. It uses a linearization media curve that is not an ICC profile and has a LAB equivalent for that CMYK space. The source LAB space is connected to linearization media curve LAB color space and then to the media curve.

In all my travels I have never seen an image or plate setter set up to use ICC profiles. They have all used Postscript color management totally and the CSA is assumed to be from CMYK. **Since that CMYK information is an absolute color space, it has an absolute LAB color space equivalent to which it can be converted.**

The **absolute color space** is a color space that means the same thing universally. Unlike RGB where the numbers mean nothing without color space identification because 256 shades from light to dark are used for gamuts of different sizes, CMYK uses 100 shades only, for one fixed-size gamut, total ink of 400. This creates an absolute color space for which to build the image setter platform.

The image setter is calibrated by printing a test grid of screens. These screened percentages are read and the RIP software allows manipulation so that the final output is linearized. A 5% value prints at 5%; the same for every value along the grid up to 100%. This is the linearization curve.

Plates are imaged with the same percentage screen grid and printed to the paper in which you want to design your output curve. Once the proper ink densities have been reached on press, the screen values are read from the paper. **This will establish the ink limit, dot gain curve for that paper.** For example if the 40% screen now reads 43% on the paper and so on, these readings establish a dot gain curve. The percentage where the ink becomes solid establishes the ink limit. The RIP software allows you to create a dot gain curve in which to apply to the linearization curve. This establishes the ink limit linearization dot gain curve for the paper. The RIP software can now establish a LAB value for the CMYK percentages possible for the media.

The CMYK color space communicated by the CSA in the Postscript file is converted to LAB and is connected and converted to the LAB of the ink limit media curve for the plates and the plate or film is imaged.

The only relevant aspect of a CMYK press workflow for a Corel user is the TIC (total ink coverage), or ink limit of the media curve. **However finding an individual in a print shop that can tell you what the ink limit is will not be easy. Most likely you will get a response that you should use the CMYK commercial profile for your region.** They come in web coated and un-coated as well as sheetfed coated and un-coated versions.

TIP: Some CMYK profiles are labeled as to their TIC; most are not. Create an Adobe RGB 1988 image, R0, G0 and B0 and convert it to multiple CMYK separation printer profiles, saving each version. Open each CMYK version in PHOTO-PAINT, then open the info docker, and set the secondary color to read total ink. You can then read and establish the TIC for all the CMYK profiles in your possession.

That's it! You know all you need to know about achieving calibrated output from the CorelDRAW Graphics Suite. **Just build the file right, adhering to strict color management principles, and Corel color management does all the work for you.**

Printer Calibration: The Non-Postscript Printer

The parameters for calibrating non-Postscript printers are different than a Postscript device in that you must be able to send the Internal RGB to the print device unaltered by any print profile in order to achieve printing of a proper RGB printer calibration target. This is because all non-Postscript devices convert the colors of a file to RGB in the print stream.

The unfortunate aspect of this is that the Suite is incapable of doing this for any Internal RGB color space except its own proprietary RGB. To make this worse, the RGB that the Suite uses is not sRGB or Adobe RGB; sRGB is standard for the web and Adobe RGB is very common for print. It is not the generic Internal RGB that is displayed as loaded when you choose the default color management of color management off setting.

You can prove this to yourself by creating swatches like those in Capture A using the color management off setting. Then, by activating the arrow from the Internal RGB to the monitor, this will cause a color shift in the display proving that the Internal RGB for the color management off setting is not the generic Internal RGB.

Capture A from an RGB mode CorelDRAW document demonstrates the conversions you get with the Internal RGB. The top row of swatches are RGB and the second row are the resulting CMYK conversions for that profile. The third row down is CMYK builds and the fourth row is the resulting RGB conversions. At first glance one might think this is great as the RGB and the CMYK look the same. **The problem is that the conversions are totally incorrect and that's what is being sent to the printer.** Our CMYK is being converted to something that is unrecognizable and un-printable. The good part of this observation is that the RGB numbers go unchanged.

Capture B shows the same swatches as **capture A** except this time Adobe RGB is used for the RGB and the arrow from the Internal RGB to the monitor is activated. The first row of swatches are RGB; the second row is the resulting CMYK conversions. **Notice the shift in color for the CMYK swatches; this is correct.** The third row of swatches is CMYK and the fourth row is the resulting RGB conversions. Note how the CMYK swatches in the third row display properly as CMYK and how the RGB display of the conversions match the CMYK versions even though they are now RGB. This is correct.

If the RGB versions of the CMYK swatches of Capture B could be sent to the print driver, the resulting print would have a greatly improved chance of printing correctly. Unfortunately, the entire Suite cannot send the Internal RGB of the application to the print stream without activating a profile. So we are stuck with a multi-stage calibration process.

So what do we do to try and calibrate a non-Postscript printer?

Warning: It is imperative that you understand that manipulating a curve or other color controls in a print driver is **NOT** color calibration. If you do so and then edit an image to print to what you consider as proper to your device, in almost all cases your image **WILL NOT** print properly on calibrated devices!

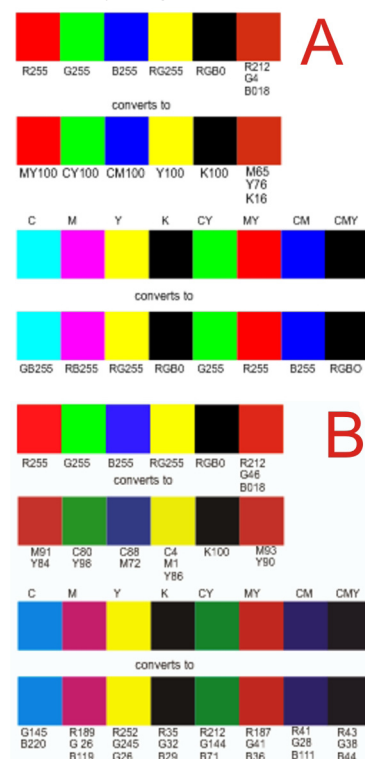
Second warning: Any profile created for a non-Postscript device will need to be edited to improve accuracy once you activate the arrow from the Internal RGB to the composite printer.

Third warning: The Suite will allow you to load CMYK profile for non-Postscript devices. I believe they have done this to contain some of the problems for those using non-Postscript devices as this changes the conversion pattern and with their default color management settings, the conversions all go to CMYK before going to RGB. Remember that all non-Postscript printer profiles need to be RGB printer profiles.

Fourth warning: After communicating with the technical departments of dozens of manufacturers of non-Postscript printers, ink jets, dye sublimation devices, and laser printers, I feel I must tell you as they have told me. **If matching corporate colors is important for your work, you must purchase a Postscript device.**

Now we're back to the first question: What do we do? First we need to work through the theory. By Microsoft standards, the driver will assume sRGB. Through our observations, we know that the non-RGB numbers are being changed in the print stream causing a conversion to the proprietary CorelDRAW Internal RGB, while RGB numbers are being passed along unchanged. What this means is that we can print an untagged RGB test target to our printer, which will assume sRGB by default allowing us to achieve a calibration for sRGB to the specific device.

I recommend that the media profile in the print driver be activated for the proper paper -- in this case, profiles. Any non-ICC profile color correction should be disabled.



Printer Calibration: The Non-Postscript Printer (cont.) Works Best With An RGB-Only Workflow

To the right is a typical RGB printer calibration target as an RGB TIF image. Directly below is a capture of the main color management dialog set to the color management Off default setting. Note: Circled in red, the arrow from the Internal RGB to the composite printer is disabled. We must print this target to our printer and then read the test print with our calibration software to create an RGB printer profile. **After that, we must load that profile into the composite printer profile drop-down box in the main color management dialog and activate the arrow from the Internal RGB to the composite printer.**

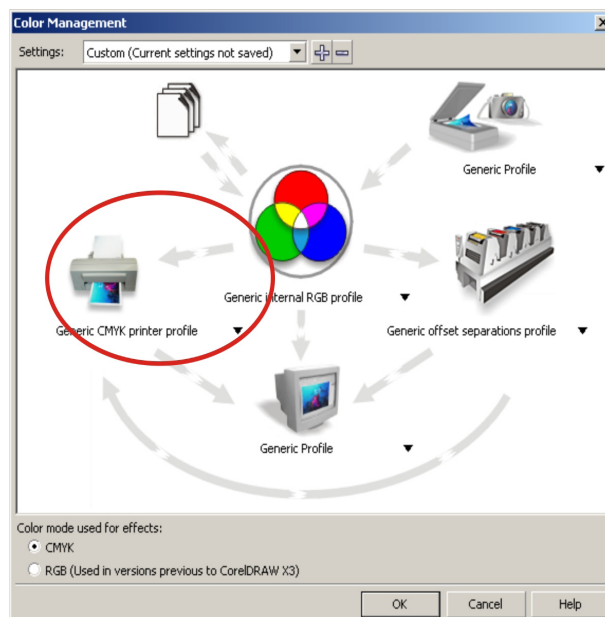
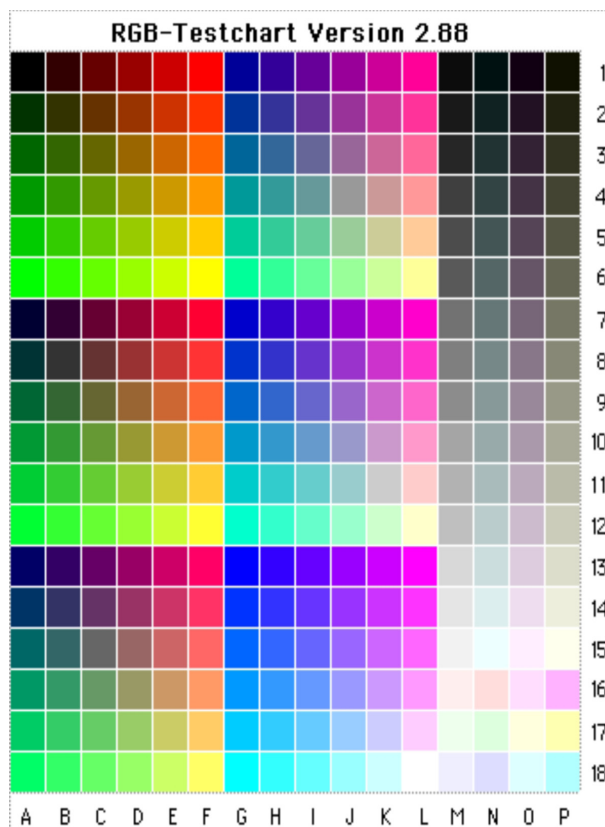
We can then print a few test images to see our results. Our calibration is limited to an assumed sRGB color space as we do not have the ability to send to the printer our Internal RGB color space of choice. However, for those who have advanced color profiling equipment, another RGB target could be printed this time using the Internal RGB of your choice and the activated profile. You would then have to append the previous profile.

The above instructions have been for those who have a non-Postscript device and will not only print single images as a photographer, but will also print composite files from CorelDRAW. The instructions will surely be more useful for an individual that has a printer in the US \$450 range and higher with the availability of some calibration equipment.

For those who have lower-cost non-Postscript devices, the choices become far more limited. First, many of these devices are not capable of being calibrated. **One should not consider the \$190 Bubble Jet as a production or proof unit.**

However for the home user of sRGB digital fixed lens cameras, many of these Bubble Jet units can be fun. I suggest that you deactivate the arrow from the Internal RGB to the composite printer to print single images from CorelDRAW and PHOTO-PAINT, but keep the media profiles in your print driver active. Then work in CorelDRAW in RGB mode using the sRGB Internal RGB profile. PHOTO-PAINT work should all be in the sRGB color space.

Activating the arrow from the Internal RGB to the composite printer and trying different CMYK profiles may also create some changes and improvements for you. However understand that this is not a commercially acceptable standard for color management. There are literally thousands of different printers for the consumer to use and instructions can only be very general.



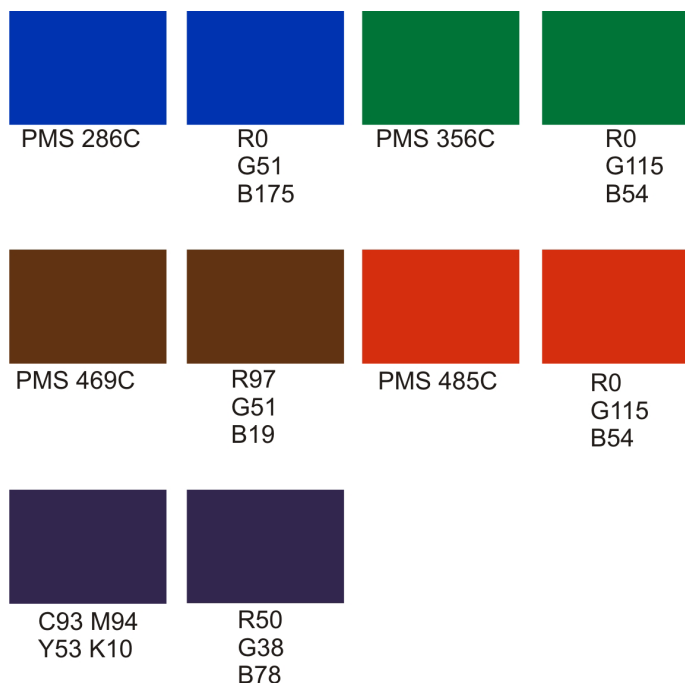
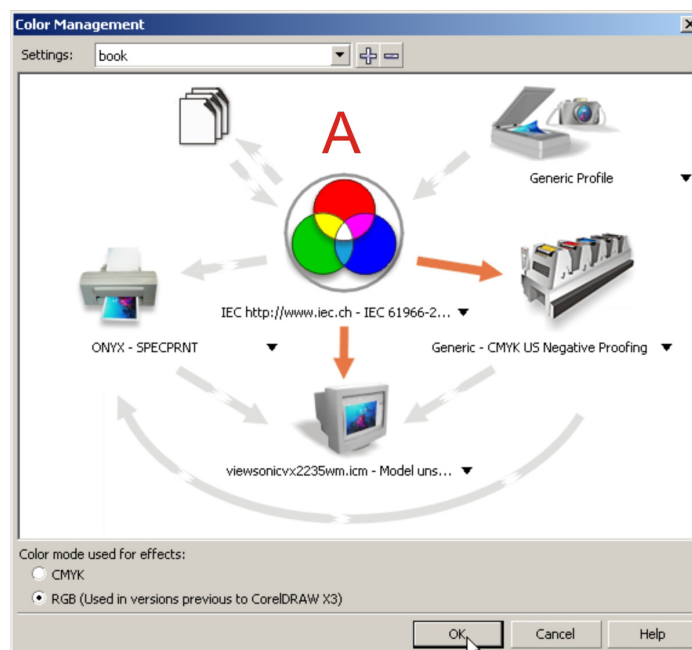
Printer Calibration: The Non-Postscript Printer (cont.) Works Best With An RGB-Only Workflow

For those of you who have dye sublimation printers or other non-Postscript devices, an RGB-only workflow demonstrated in **capture A** may benefit you. The CMYK and monitor profiles are, of course, your choice based on your workflow. Internal RGB will be best if limited to sRGB. After setting your color management settings, you can, if needed, build spot color and/or CMYK swatches and duplicate those swatches. Convert the duplicated swatches to RGB. (Note how the display of the RGB conversions match the spot color or CMYK originals.) Then print a test print only of the RGB conversions.

For example, a corporate client has a logo of PMS 356C and PMS 469C. You can create these swatches and print RGB-converted duplicates. Most likely the first test print will be close and may only require a tweak on the color. You can then build a table of swatches with their corresponding RGB conversions for your corporate clients and use those RGB color builds in the construction of your files.

The advantage of this color management setting is that the display in CorelDRAW is correct for the CMYK or spot color to RGB conversions, as are the actual RGB conversions. If you work in CMYK and convert to RGB in the application, the color being sent to the print stream with this setting has the best chance of not being subject to a significant color shift. **This allows the user to see what the conversions look like before wasting expensive material.**

The proper conversions will be reflected in the print stream, since the setting sends RGB numbers along unchanged. This creates an environment that is easier for the end user to build color swatches, and serve their corporate color needs -- without in some cases spending money on a RIP.



CorelDRAW & PHOTO-PAINT Color Space Conversions

General Workflow: Desktop Publishing

The workflow section of this book needs to start out with what I call my desktop publishing spiel. After 32 years in this business I've seen some changes take place and hopefully you'll benefit from what I've seen.

Thirty years ago a designer came to a professional with their concept, received galleys of type, and made art boards to help guide the graphic professional. That graphic professional had a team of other professionals (the strippers, color separators) that created color separations and proofs to guide the job's progress. After the approval process, the designer signed off on the proofs and, judging by the success of the companies in those days, in a very large percentage of the jobs the production was un-eventful.

In the mid 1980s this changed and within 15 years the group of professionals that guided these jobs were unemployed. For the most part, quality had taken a downward turn and, in many cases, even during a time when high quality should be easier then ever, has never recovered.

The evolution of this process included times where service bureaus flourished and have now nearly disappeared. At present, the dominating workflow seems to be (GIGO) garbage in garbage out. Most print shops make little to no effort to repair files and you get what you send them.

What this means is that it is **YOUR RESPONSIBILITY** as the file creator to create a file properly. You must determine the proper color models, color spaces, color palettes, image resolution, and ink densities. This is all based on where the file is intended to be used.

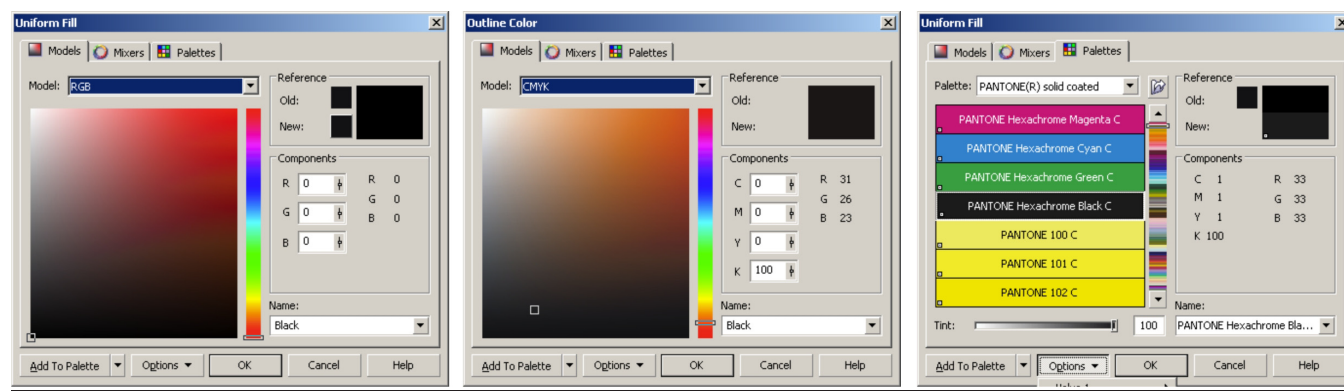
It is my opinion that this current situation has culminated in the anorexic profit margins that currently exist in graphics. Speciality printers have evolved, delivering printing at costs where the traditional printer can't even get the job to plate. The number of printing companies in the U.S. has been in a double-digit decline for almost two decades.

The good part to this is that if you're one of those who understands the needs of your output provider, you have available to you higher quality and lower cost printing than at any time in the history of the industry.

It really is simple;

1. Do not send out a file that contains transparency or complex fills without testing.
2. Use sRGB for the internet.
3. Determine what are the proper color spaces for your file in your region and who will provide for color space conversions, you or the service provider.
4. Create your file using the proper color palette.
5. Convert all your images to the proper color space.
6. Provide your file to the output provider in a manner that is conducive to their workflow.
7. Make sure a proper proof is part of the job's pricing structure.

Below are three screen captures, the uniform fill on the left, outline color in the center, and the uniform fill with the palettes tab activated on the right. This is where you can make the color choices for your file creation. These are not the only places but they are my favorite places. One may not consider this color management, but then one would be wrong!



CorelDRAW and PHOTO-PAINT

Color Space Conversions

On the previous page I stressed building the file correctly. A most important part of this is proper color space conversions. Files coming into you or created by you need to be in the proper color space or you have no hope of even remotely getting on paper or the display screen what you saw when you created the final file. In multiple sections of this book we have discussed specifications for certain workflows -- web and presentation work as sRGB, and expanded gamut and press work as being dependent upon the region of the world where your file will output. In Europe the European ECI profiles dominate and in the United States the SWOP specifications dominate. We are going to discuss doing the color space conversions, so please note that the color spaces I'm using will need be modified for the region where your file will output.

My process is what I like to call the Completion Backwards Principle. In short, I build the file base on its final use. Later in this section you will see some possible color management settings for work flows and previously you have seen definitions and the controls of CorelDRAW's color management dialogs. In this section, you will need to think about the end process before you can set the Suite's color management settings.

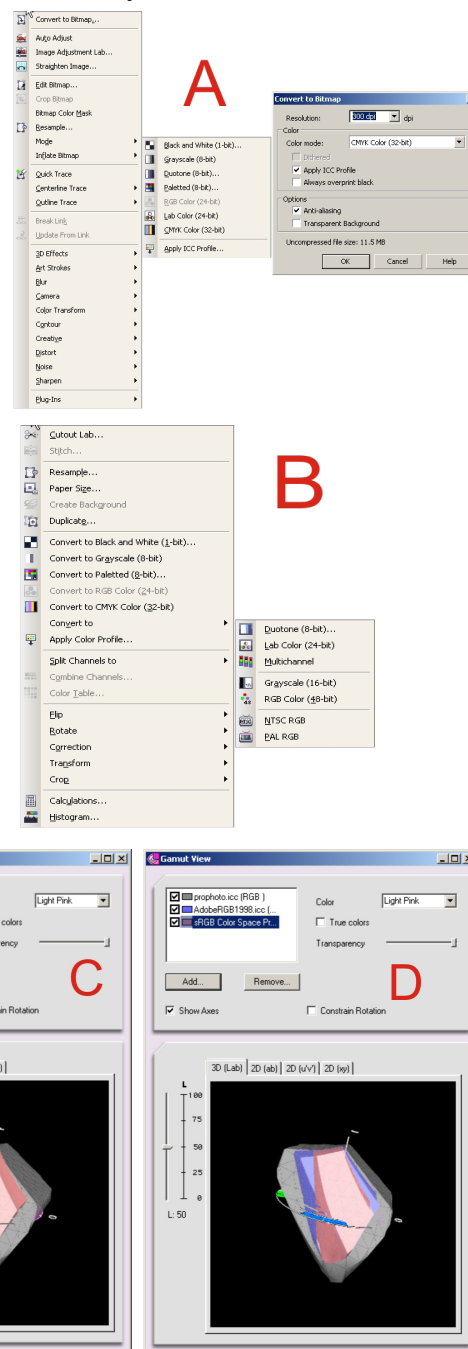
To the right we see **capture A**. This contains the Bitmap menu drop down, the bitmap mode fly out, and the Convert to Bitmap dialog from CorelDRAW X4. In CorelDRAW, outside of creating objects in the proper color space, this is where you control the color space of images. Objects created in CorelDRAW that you convert to images will use these menus and the choices that you have made in your color management dialogs will govern all the conversions. Grayscale, LAB, and black and white are governed by internal profiles as previously discussed.

In **capture B** we see the Image menu in Corel PHOTO-PAINT X4 and the Convert To fly out. In the Image menu, the Apply Color Profile and any selection using the word CONVERT in the command line affects the color space of the image you're working on. In the Convert To fly out, the multichannel command does not change the color space of the image. All the other commands do change the image's color space.

The reasoning behind this discussion is that there are, as always, right and wrong ways to convert images. Over the years I have done quite a bit of color correction for professional output of images that have an ultra-wide gamut RGB color space source, such as the Phase capture back, Heidelberg wide gamut, and Prophoto color spaces. In **capture C** we show the Prophoto color space with sRGB superimposed over top of it in a profile-editing application. The Prophoto color space in gray is significantly larger than sRGB color space in pink. In my opinion, an automated conversion process where you select to convert from Prophoto to sRGB can in some images provide a less than desirable result because there can be significant out-of-sRGB gamut mapping that may be getting processed.

As shown in **capture D** I have placed a display of Adobe RGB in blue between the Prophoto and sRGB. In this case, a conversion from Prophoto to Adobe RGB and then to sRGB would provide a progressive mapping of out-of-sRGB colors from the Prophoto image, and possibly provide a better conversion for the web or your presentation.

On the next page we will discuss some more practical processes of color space conversions.



CorelDRAW and PHOTO-PAINT

Color Space Conversions

To the right, meet Mickey. She is our Dachrussel Terrier. Note the satanic-colored eyes. This was done purposely as she earns them about ten minutes each day. This is a typical snap shot taken by the kids so we could e-mail a family member in California the image of our new family member. Please note that the image on the right is more saturated. You'll notice it more easily in the carpet and the brown on her face.

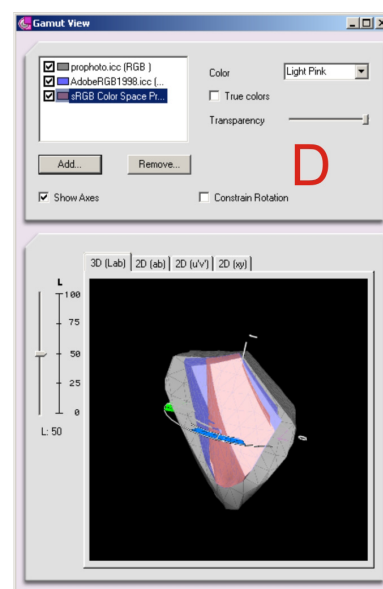
This is what happens when you open an sRGB image in Adobe RGB, convert it to LAB, and then convert it to Adobe. To the right is the proper conversion to Adobe.

The proper procedure for this image, because it did not have an embedded ICC profile, was to set the Internal RGB to sRGB in Corel PHOTO-PAINT X4 to match the image. Open the file, then under the Image menu convert the image to LAB and then set the Internal RGB of PHOTO-PAINT X4 to Adobe RGB. Then under the Image menu, convert the image to Adobe RGB. If the image would have had an embedded ICC profile we would have set the "Use embedded ICC profile" in the Advanced Import/Export settings dialog and activated the arrow to the Internal RGB.

An image such as this original sRGB image, when being converted to a larger RGB color space as was this case, **will experience a change in the RGB numbers. However it should not experience a display shift.** What that means is that the eyedropper readings from the exact same pixel from each image would have changed to reflect the different color space so the image will display the same on screen.

The orange squares below Mickey are an example of the reverse situation. On the right is a capture of a properly opened Adobe RGB image, and to the left is a capture of a proper conversion to sRGB of that image. Notice how the display color has made a serious color shift; this is correct. The issue is that R255 in Adobe RGB as shown in capture D is seriously out-of-gamut for sRGB. The G125 and the B10 also represent different colors. So the display of the Adobe RGB image in the sRGB gamut had to change.

This is also what will happen to you when you automatically convert large gamut RGB images to your smaller gamut Internal RGB. Of course, if you selected to use an automatic conversion you would have had no idea that it happened. My suggestion is to use the manual method of opening the image mentioned above. If required, use the ICC profile extraction and loading procedures in this publication, and test converting your wide gamut RGB images to smaller RGB spaces in steps. If you're picky about your quality, I'm betting you'll be pleased.



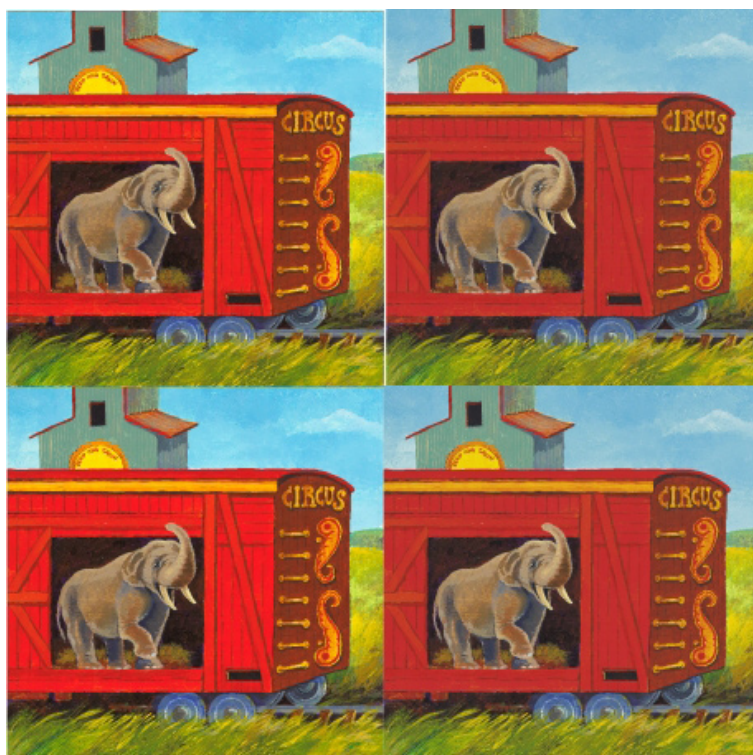
CorelDRAW and PHOTO-PAINT

Color Space Conversions

Conversion to the CMYK color space follows the same rules as for RGB images except that the CorelDRAW Graphics Suite does not allow automatic conversion when you open the file. We can extract and load CMYK profiles from images so if you need to, follow the instructions in this book and set the image's CMYK color space and your separations printer profile and open it in Corel PHOTO-PAINT. If the CMYK image has no embedded ICC profile, follow the instructions for attempting to identify a CMYK image's color space in this book. Set the main color management dialog in PHOTO-PAINT X4 to activate the Internal RGB to the monitor; PHOTO-PAINT will now display all CMYK images as if in the separations printer profile.

If you have an unknown CMYK image and you need to color correct it, you have no choice but to open it in the CMYK color space you deem as the best display; convert that image to LAB and then to RGB or to the proper CMYK color space.

To the right, there is a capture of four images -- the top left is a Phase Tungsten RGB, to the right of it is a CMYK conversion of that RGB image. The bottom left image is an Adobe RGB conversion of the Phase Tungsten image and to the right of the Adobe image a CMYK conversion to the same CMYK color space as the image above it. Notice how converting the ultra wide phase RGB to Adobe RGB and then to CMYK obtained a more open color separation for the final CMYK image.



When I convert RGB images to CMYK, I always save a copy of the corrected RGB image and have my corrected RGB copy open beside the one I'm converting to CMYK. Corel PHOTO-PAINT allows you to display both an RGB and CMYK copy of an image simultaneously. This allows me to manipulate the tone curves to my best advantage. Many times I undo the CMYK conversion and manipulate the RGB curves and then convert to CMYK again to achieve the best conversion.

Other critical conversions are from spot colors and/or CMYK to RGB. These are very simple as long as you set the color management dialogs properly. Spot colors and most CMYK colors are in gamut for RGB color spaces. As long as you have your arrows activated from the Internal RGB to the separations printer and from the Internal RGB to the monitor, CMYK and spot colors will convert to the Internal RGB with few color shifts. Just remember to make sure the advanced display setting has "Map spot colors to CMYK gamut" unchecked. Access this by double clicking the monitor icon in the main color management dialog.

Your fill color and outline color dialogs as well as bitmap conversions will function as required as long as you have met the above color management setting requirements.

CoreIDRAW and PHOTO-PAINT

Color Space Conversions

Grayscale conversion is where things can get sticky, especially for reproduction on newsprint. Many times those who print on newsprint will give you specifications of dot gain, maximum and minimum ink coverage. Of course, this means little to those who are creating the image, and in fact those handing out the specification rarely understand it. This comes about because typical conversion methods of grayscale images are not intended for press.

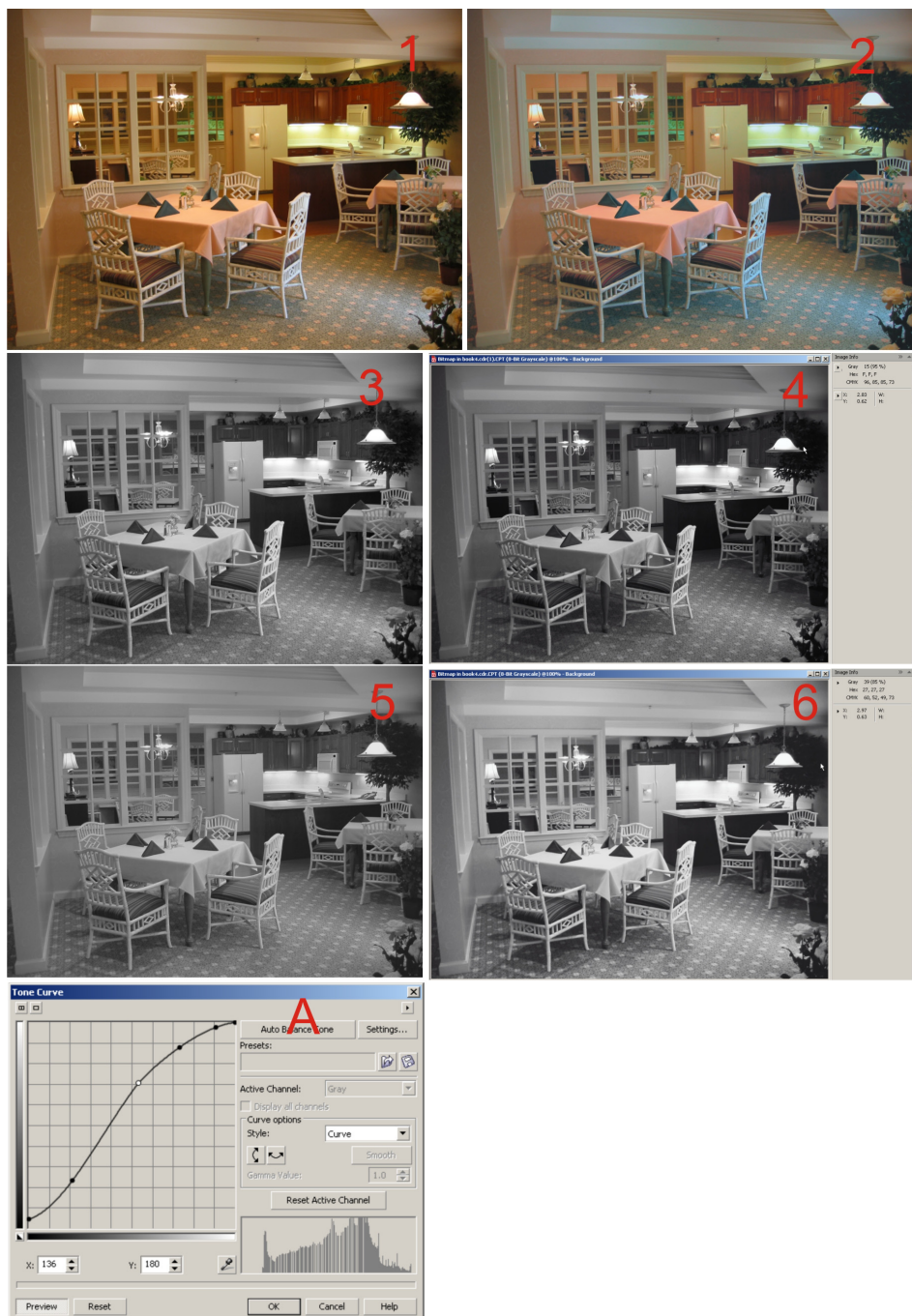
The images below are top left, 1-the original RGB, to the right, 2-a color-corrected CMYK using the U.S web un-coated profile. This was chosen because our final grayscale will be printed on an un-coated news print. The dot gain and ink limit characteristics of the profile are what we're looking for. This reduces the difficulty of correcting the grayscale in the tone curve.

The middle row left is 3-a grayscale conversion of image 1, and to the right is 4-the PHOTO-PAINT information docker reading showing 95% maximum ink reading, which is un-acceptable for newsprint.

The bottom row left is 5-the grayscale created from image 2. The maximum ink reading was 88%, still unacceptable but much closer. The image is however flat, lacking contrast. By applying the tone curve as shown in **capture A**, we can adjust the grayscale image as shown bottom row right, 6. It now has a maximum ink density of 85% and a minimum ink reading of 3%, acceptable for newsprint. Notice the curve in **capture A**. At the very bottom of the left corner I have lifted the curve off the bottom to limit the ink density.

The image is bright and allows for any dot gain that will occur on the newsprint. This image printed as a high quality CMYK on a matte stock and in newsprint with very good results.

Since most images start out as color nowadays, we took advantage of the dot gain and under-color removal of the U.S. Web un-coated SWOP CMYK profile. I then simply applied an adjustment tone curve, lifting the ink density and adjusting the curve for a pleasant display.



CorelDRAW and PHOTO-PAINT

Color Space Conversions

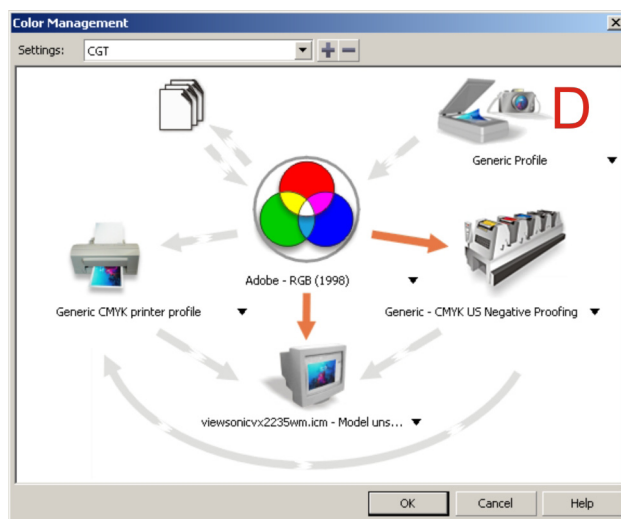
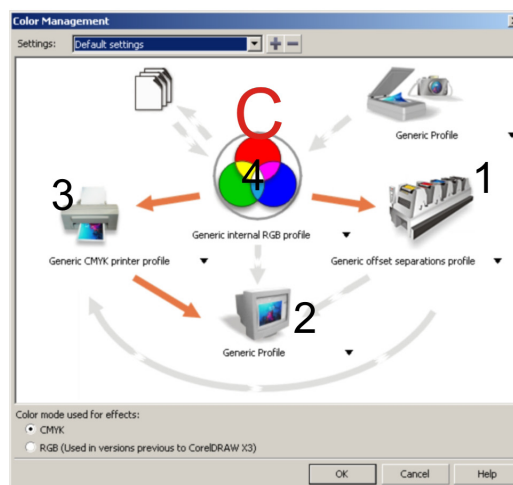
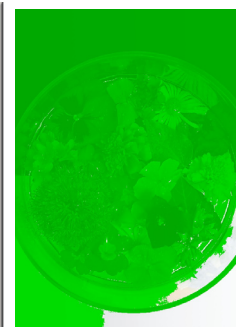
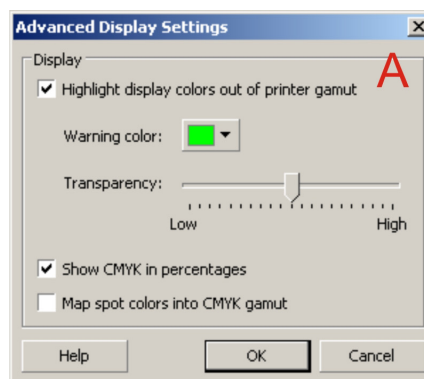
The out-of-gamut alarm which is accessed in the main color management dialog by double clicking the monitor icon in **capture C** is only functional when you have chosen to use soft proofing as shown in **capture C**. You must activate soft proofing before attempting to turn on the out-of-gamut alarm. You may also select to activate the arrow from 1 to 2 for soft proofing.

Capture A shows the Advanced Display Setting dialog that opens when you double click the monitor icon. To the right is an Adobe RGB image (green) as displayed through the out-of-gamut alarm.

Capture B shows two images, the left is the Adobe RGB image from **capture A** with no out-of-gamut alarm and the right is the CMYK conversion of that Adobe RGB image. As you can see, this is a difficult image to convert to CMYK, however the out-of-gamut alarm, in my opinion, only makes it harder. The alarm makes this and most RGB images look completely out of any CMYK gamut.

In my opinion, you are better off recognizing that any RGB image has to be first converted to CMYK for CMYK workflows, and to use the color management settings as displayed in **capture D** while editing the CMYK version of the RGB image while simultaneously displayed with the RGB image in PHOTO-PAINT.

Currently there is a known issue with soft proofing in the CorelDRAW Graphics Suite. Having the arrows from the composite or separations printer activated with some color engines and some profiles can cause an error in the conversion of the file from RGB to CMYK. It is one reason I only use the arrows activated as you see them in **capture D**.



CorelDRAW and PHOTO-PAINT

Color Space Conversions

The LAB color space in the conversion process is interesting because not only is LAB a profile connection space, it is a theoretical color space supported in the CorelDRAW Graphics Suite, and is available for us to use in color editing. I remember when LAB first started to be supported in image editors and it was a very big deal. The argument on LAB is that it is an 8-bit per channel 24-bit total color space. I understand that argument and agree that the LAB profile connection space can be 48-bit in some cases while the LAB supported in Corel PHOTO-PAINT and Photoshop is only 24-bit. I would give this argument a great deal more weight than I currently do if there was an output device that required 48-bit color. However there is not such a device, so I relegate it to the realm of future concerns. The reality is that ALL, and I mean ALL, RIPs use LAB as their final connection space before placing a dot on film/plate, or a spray of ink or toner on paper.

In **capture A** you will see tone curves representing the three channels of the LAB space, L, A and B. The advantage of LAB is that one can change L-luminous channel and therefore the brightness of the image without affecting the A-alpha and B-beta channels.

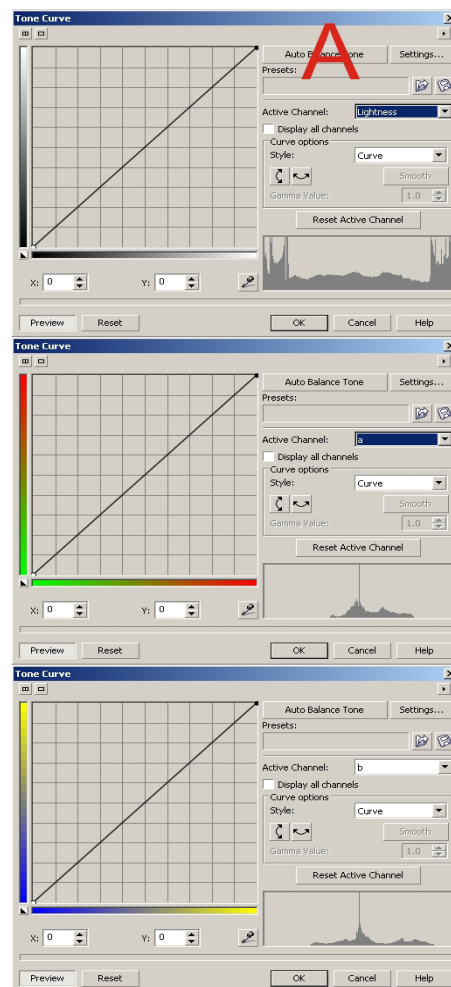
The alpha and beta channel allow you to make color changes to the image. With that said, LAB color is not the panacea for color correction that many writers would have you believe. It is one tool in a tool box, nothing more. I use multiple RGB, LAB, and CMYK color spaces to achieve my goal.

The advantage to LAB for the Corel PHOTO-PAINT image editor is, in my opinion, as a common color space for conversion. To understand this, I must stray off subject for a short time. Other image editors have much more complex view options which can get very confusing, especially when they can open an image and view it properly in its color space of residence. But after soft proofing the image into another color space, they are unable to return to the original view without closing and relaunching the file.

Corel PHOTO-PAINT has a more complicated color space identification process as you will read about later in this section. However Corel PHOTO-PAINT makes viewing your image simple; you can only view in the Internal RGB, the separations, or the composite printer's color space.

How this plays into using the LAB color space is that I communicate with my client and know what color space their files are in. For example, one newsletter client uses four-color space sources -- sRGB, Adobe RGB, Prophoto, and a proprietary RGB from one camera manufacturer. The disk comes in with the files in folders named for the photographers. I copy the files and open each file with the Internal RGB in PHOTO-PAINT set to match the RGB of the image with the arrow activated to the monitor. I then convert each image to LAB, rename each file, and save it as our editing version.

Color correcting is done from the LAB version, sometimes converting to RGB and back to LAB and then to Adobe RGB and then to CMYK when needed. We always have an Adobe RGB version so we can utilize expanded gamut output if needed.



CorelDRAW and PHOTO-PAINT General Workflow

Workflows in terms of color management in my experience fall into four categories -- 1) an assumed color space, 2) Postscript color management, 3) an automatically converted color space, and 4) a varied source color space workflow.

All workflows require color space conversion. The assumed color space work flow may or may not use automatic conversion. All work in conjunction with Postscript color management and the assumed color space workflow does.

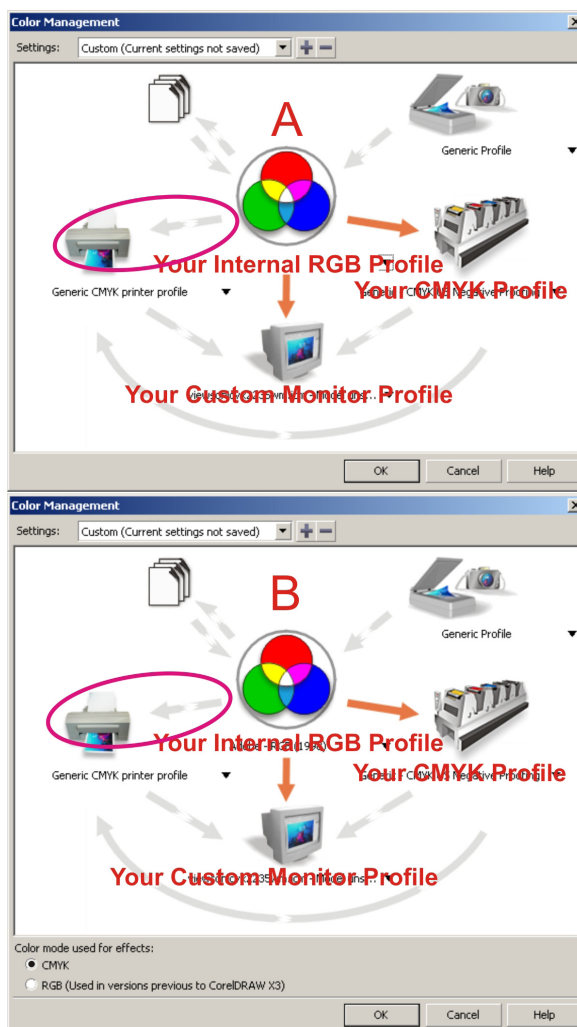
An assumed color space workflow is exactly what it says. Once positive control over any file's residing color space has been established, all applications and devices are set to assume specific RGB and CMYK color spaces as the source color space of the files. No profile embedding is required within that controlled environment, therefore file size and man hours are reduced. In general, you will also see an assumed color space workflow in the last editing application processes of a workflow.

All images have their color space of residence established, when **the file is properly opened by setting the Internal RGB or the separations printer profile to match the image's color space.** The file is converted either to LAB or directly to the assumed color space. No profiles are attached; however some file identification is required to keep the original customer files separated from the edited working files. All color corrections or editing is done in LAB or the assumed color space.

To use the assumed color space workflow, you need to decide if you're going to automatically or manually convert opened files into the assumed spaces. With creation if you're doing commercial work, coordinate your Internal RGB and separations printer profile to commercial color spaces for your region and create your files, as shown in **capture A&B.**

The next decision is what type of output you're going to use. Expanded gamut printing allows you to have RGB and CMYK elements in your file and use a CorelDRAW-published PDF for output. Driver-based printer output, Postscript and non-Postscript, also allows both RGB and CMYK elements in your CorelDRAW file. But it also forces you to activate a profile in the print dialog misc. tab and convert to a final color space in the print stream as discussed in the print calibration section. You will need to activate the arrow from the Internal RGB to the composite printer (circled in magenta) in **capture A&B** to use a composite printer profile. Your choice for your Internal RGB, composite printer profile, and separations printer profile should reflect the needs of your region and your devices.

The advantages of an assumed color space workflow is that at the beginning of the process it forces order and control. All color spaces are identified and converted to the assumed color spaces. Conversions to the final output are always from one of two color spaces, the assumed RGB or the assumed CMYK. This provides uniformity in the output. For example, if two images containing a corporate identity are converted to the final output directly from two different RGB color spaces, they will print differently. This can be alleviated by manually converting the two sources to reside in the same color space and from that color space convert to the final output.



CorelDRAW and PHOTO-PAINT

General Workflow

An **automatic conversion workflow** has all the same file and print parameters as an assumed color space workflow. The difference as shown in **capture A&B** is that the arrows (circled in green) from the scanner/camera and the import icon to the Internal RGB are activated. **What happens with these settings is that RGB files that have an embedded profile that does not match the Internal RGB color space will be converted to your Internal RGB.** (Per the rules discussed in the interface/controls section of the book). Files that have an embedded profile that matches the Internal RGB will be left unchanged.

The Suite does not support embedded profiles for CMYK files. Imported CMYK files that do not reside in your separations printer profile will print with a color shift to composite digital output devices. Also no automatic conversion can take place.

If an RGB file has no embedded profile, no conversion takes place (per the rules discussed in the interface/controls section of the book). This leaves you guessing! We will discuss this in more detail in the *Identifying an Image's Color Space and Properly Opening and Displaying the File* section of this book.

The automatic conversion workflow does not allow the precise control over color as other methods. This is because you do the conversions without actually seeing the original file.

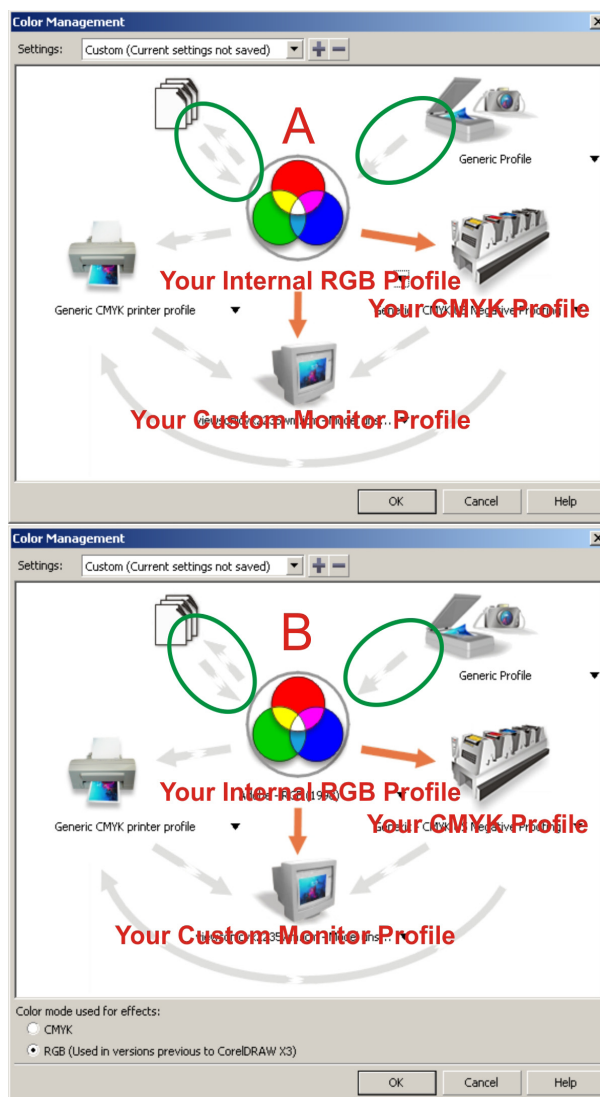
The varied source color space workflow requires some detailed explanation. What is meant by varied source workflow is that individual files contain an embedded profile and all output applications and devices honor the embedded profile for each file and each color space.

This is where technological concepts meet technological realities. CorelDRAW does not support a varied source workflow, and unfortunately, the fact is that I know of no applications that do support it 100%. No page layout application does for display, and I have not seen any RIPs when tested that support such a workflow.

What I have seen in the RIPs I've tested is that the RIP will see the first RGB color space in the PDF or Postscript stream and render the entire RGB content of the file using that color space; the same concept applies for the CMYK section of the RIP.

Postscript color-managed workflows are very simple to use -- once you have read and understood the RIP for film or plate setter area of the monitor printer calibration section. All you need remember is to use a coordinated assumed color space workflow. If you want to send RGB content, you must understand how the output device handles RGB and match that RGB setting in CorelDRAW (if possible). Many times it is not possible. If the RIP assumes Adobe RGB, you must assume Adobe RGB. **Be careful, the RIP may assume a nasty RGB source, (most press RIPs do),** and never provide any decent conversions.

The CMYK content is easy. All CMYK images need to be converted from RGB to a CMYK profile that has a TIC (total ink coverage) that matches as close as possible but does not exceed the TIC of the film or plate setter ink limit, linearization dot gain curve as previously explained.



Workflow General File Processing

Workflow General File Processing

Identifying an Image's Color Space and Properly Opening and Displaying the File

If color integrity is critical to your work, then you must be able to open and view a file as it was intended to be viewed, PERIOD! Identifying an image's color space, extracting, organizing and loading profiles is the discussion at hand.

When we access the open file dialog and a file has an embedded profile, we can select “Extract the file,” circled in green **capture A**. When we do that, the Save As ICC Profile dialog, **capture B**, appears and allows you to save the profile in the Corel user color folder. Unfortunately, the profile carries the name of the file, not the name of the profile, as seen circled in green **capture B**. This can be a significant issue if you have a large number of files.

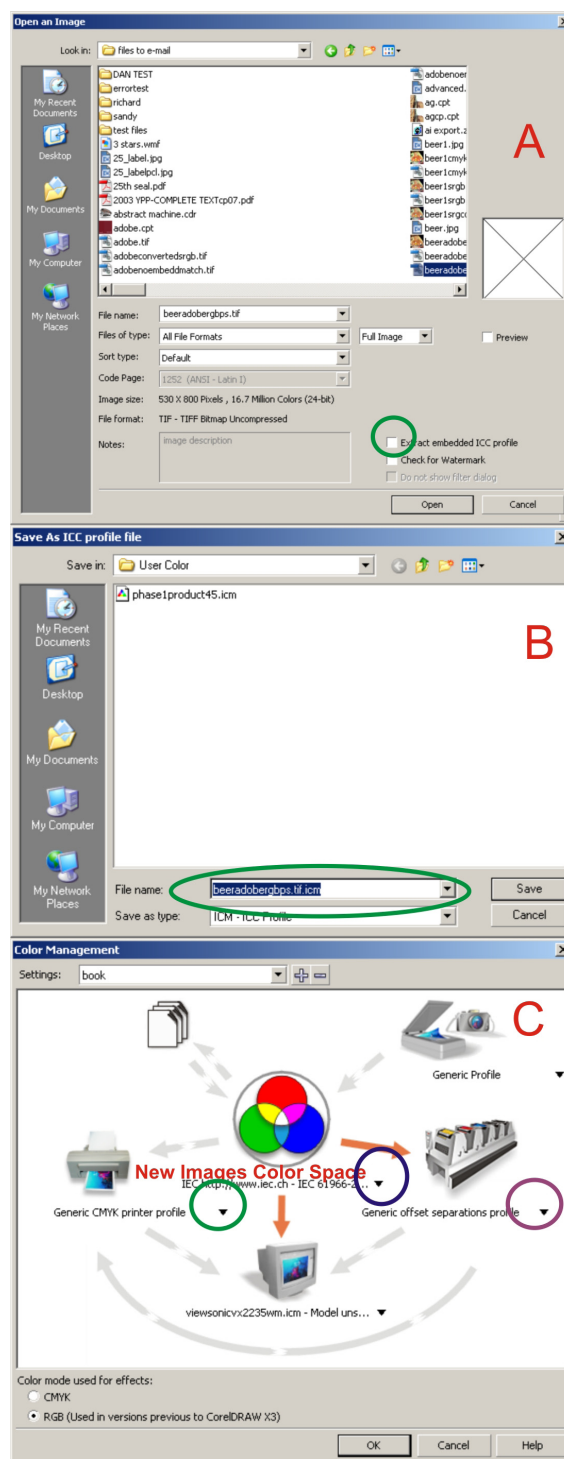
What happens when you select to save the profile is that the image opens and then you have to load the profile as the Internal RGB or separations printer color space, **capture C**, and activate the arrow from the Internal RGB to the monitor. When you go to load the profile, the dialogs that activate through **capture C** will identify the profile by a name which is non-standard to the industry, and also not the name it saved under in the Save As ICC Profile dialog **capture B**. This is another serious issue. If this is not your first extracted profile, **there may now be several profiles that show up in the install dialog. None are identified as being for this specific image!** Most applications use the internal reference name; CorelDRAW does not. What happens now is that you have no idea what profile of the many that are displayed is for your image. This can result in you having multiple copies of the same profile on your system, confusing you and clogging up your system.

A work around exists to organize the process and improve productivity.

1. Make and keep for reference a screen capture or a list of the ICC profiles as seen in your color management dialog, **capture C**, -- Internal RGB drop-down dialog (circled in blue), the separations printer dialog (circled in purple), and the composite printer (circled in green).

2. In the Corel user color folder (usually c:\\documents and settings\\ USER NAME\\application data\\Corel\\ VERSION NAME\\ user color folder), create a new folder. Name it Safe Profiles and **remove** all the profiles from the Corel user color folder to this Safe Profiles folder. This will remove any profiles from the drop-down dialogs that are not in the Windows System Color Folder (WSCF).

A. Read all the instructions before acting! If after step 2 you're missing profiles in the Corel drop-down dialogs, you can cut, (move) them one at a time from the Safe Profiles folder and paste them into the Windows System Color Folder, (WSCF -- c:\\windows\\system32\\spool\\drivers\\color). The Suite will automatically see them in the color management drop-down dialogs. **capture C.**



(continued on next page)

Workflow General File Processing

Identifying an Image's Color Space and Properly Opening and Displaying the File

B. Before cutting and pasting the profiles from your Safe Profiles folder into the WSCF, consider the benefits of some organization. When you hover your mouse over a profile name in the main color management dialog, capture C, the common name of the profile appears as shown in capture D. Only copy one profile at a time from the Safe Profiles folder to the WSCF; make a note of the file name. Now note which profile from your previously-made list is now available in the main color management dialog. (Once loaded into the WSCF, the Suite automatically sees the profiles in the drop down.) You can now, if needed, return to the WSCF and rename the file you placed there to reflect the profile name that displays in the drop-down dialog, making your profile file organization easier. (The Suite will still recognize the profile after renaming the file.) Continue this for all the profiles in the Safe Profiles folder; simply discard any file that produces a duplicate in the main color management drop-down dialogs.

3. Create a folder on your C drive and name it Color Profiles (Do not create the folder on your desktop as some of the Corel color dialogs cannot access the desktop). You can make a shortcut to it and place it on your desktop for your convenience if you desire.

Now we can use our improved procedures:

1. Open a file in PHOTO-PAINT and select "Extract the profile" as in capture A.

2. When the Save As ICC Profile dialog opens, capture B, choose to save the profile to your newly created color profiles folder. The file will open in PHOTO-PAINT

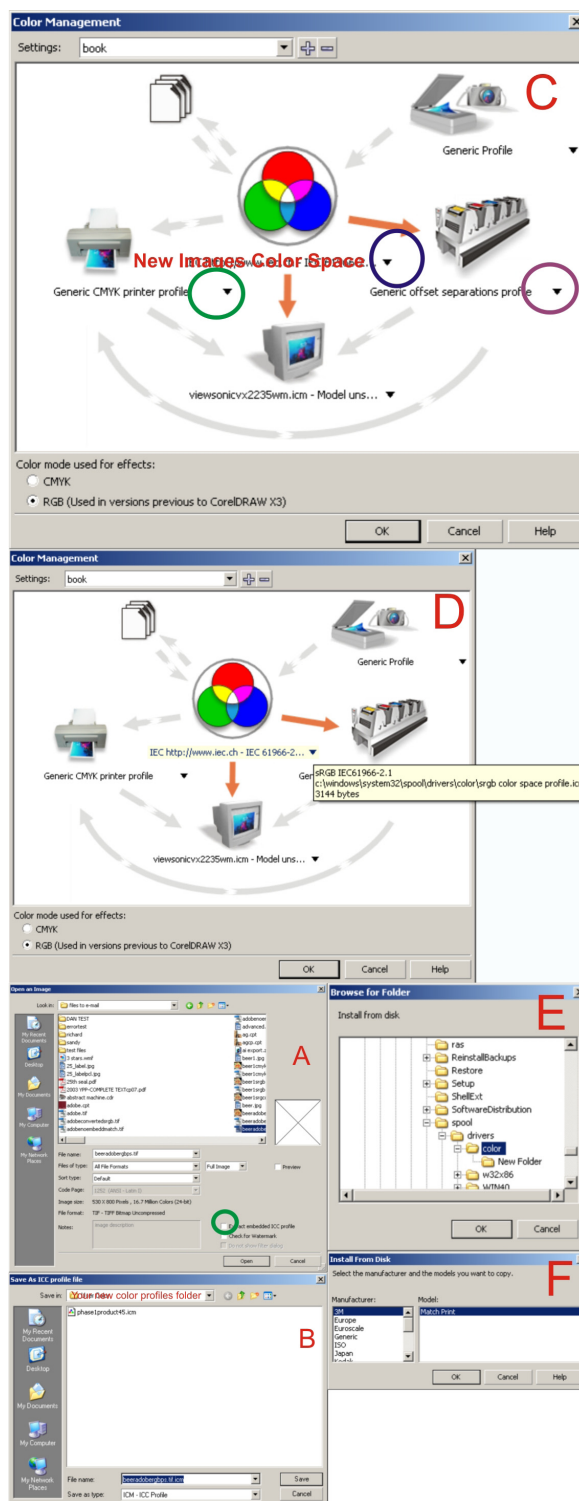
3. From the color management dialog, capture C, choose the drop down and select, "Get profiles from disk." This will bring up the Browse For Folder dialog, capture E.

4. In the Browse For Folder dialog, capture E, choose your color profiles folder and this will bring up the Install From Disk dialog, capture F.

5. In the Install From Disk dialog, you have now properly identified the image's embedded profile. If the profile listed in capture F is not on your list of installed profiles, you can select OK and it will install. However ...

My recommendation for improved profile organization is: If the profile matches one from your list, select cancel. Go to the Color Profiles folder and delete the file. If the profile is not already on your list, select cancel. Rename the file to match the profile name, then cut the profile from the Color Profiles folder and paste it into the WSCF.

To view the RGB file in Corel PHOTO-PAINT X4 properly, simply set the Internal RGB to match the image's color space and activate the arrow to the monitor. (continued on next page)



Workflow General File Processing

Identifying an Image's Color Space and Properly Opening and Displaying the File

In my opinion, it is best if you organize all your profiles in the Windows System Color Folder. The CorelDRAW Graphics Suite will automatically see them in the color management dialogs from there, and it allows you to keep the Corel user folders cleaned out and available for quick identification of unknown color spaces.

What happens for most users is that, after a short period of organization, most of the profiles from their sources get loaded and are readily available in the drop downs. Also through experience, you learn what color spaces your regular clients are using, making it simple to change the Internal RGB in Corel to match. The evolving situation is that some cameras are now using proprietary RGB color spaces and you must be able to identify, extract, and load them.

The Untagged RGB Image (an image with no embedded profile)

Another conundrum for the image editor is identifying the resident color space of untagged (images without an embedded profile) RGB images. This is an interesting aspect of technological analysis that reminds me of a story told by Joseph Rochefort about the breaking of the code for Japanese communications before the battle of the Coral Sea and Midway in 1942. When forcefully confronted by Matthew Garth about the real percentage of the Japanese code they could read, Rochefort replied 10%. Garth replied, "Hell, you're guessing." Rochefort replied, "**We like to call it analysis.**" History has shown that Rochefort's analysis named every Japanese ship at the battle of Coral Sea and paved the way for a surprise presence of the American fleet and an American victory at Midway. There's something positive to be said about analysis! So let's analyze what we know about RGB technology, how it is used, and how we can improve our chances of opening an untagged image properly.

There has been an attempt to standardize the RGB color space. Like peace treaties in various parts of the world, it has been a very limited success. The sRGB color space is the assumed color space for computer systems, the internet, all office suite applications, and the default color space for most digital cameras under US\$700.

Adobe RGB is very popular in the U.S. for an RGB space used to convert to CMYK for printing. In Europe ECI RGB is the standard RGB for the print industry. Many professional photographers deliver images in Adobe or ECI for conversion to CMYK for print in their respective regions.

Professional photographers tend to shoot in as wide a gamut as possible, so they have the most capability of being from unknown color spaces. Their equipment is also most likely to automatically embed a profile. However as noted, your analysis needs to take into consideration regional considerations. Australia may have a different dominant RGB color space than Europe or the U.S..

As we look at our untagged image, we need to consider the source. An image that comes from a user that has a fixed lens camera, or in general is not a dedicated full-time professional, has a very large chance of being in sRGB. There are literally hundreds of millions of devices that use sRGB. Therefore sRGB is a good starting point, especially if the person supplying the image fits the general profile.

The designer many times will have images that comply with a generally-accepted color space for their work, like Adobe RGB or the ECI RGB for press, sRGB for web, and Prophoto for archival purposes.

As we can see, according to our geographic region, most of our image sources will come from three to five color spaces, with the largest percentage likely coming from one or two, depending on our particular work. You may work mostly with print, so ECI, Adobe, and sRGB many times will be 95% of the images that come in. Also these types of color spaces have the highest possibility of not being embedded because the file generator many times is not a professional. A web designer would see similar percentages but would lean even heavily more toward sRGB.

Knowing this helps us because we can choose a space in which to open the image and make judgments based on how we know our calibrated display system will react.

Workflow General File Processing

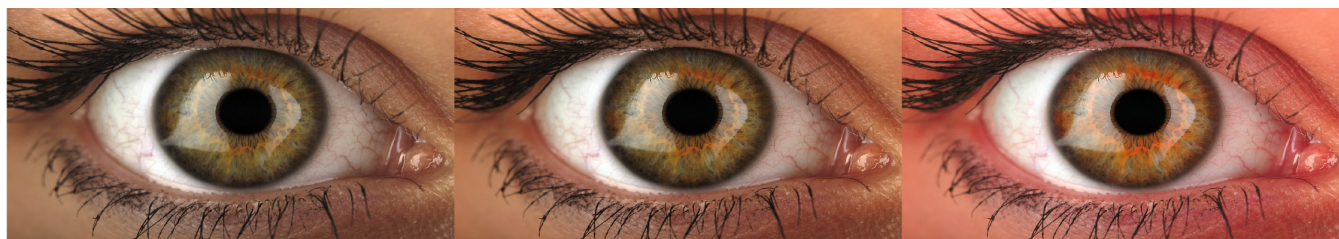
Identifying an Image's Color Space and Properly Opening and Displaying the File



Above, we see six screen captures of image displays, the top row shows, on the left, a capture of a correctly displayed sRGB image. The image in the middle shows the same sRGB image as displayed in Adobe RGB, and to the right the sRGB image as displayed in Prophoto RGB. Notice the increased saturation as each subsequent image is displayed in an increasing larger color space.

The second row of images starts out with a capture of a properly displayed Prophoto image. To the right, the same image displayed in Adobe RGB, and on the far right, the same Prophoto image displayed in sRGB. Notice how each subsequent image shows a reduction in the saturation.

Images of abstracts and floral scenes can be most difficult to determine if you've chosen the right profile, as it is certainly a judgment call whether the center image in either row was in the wrong color space or just a poorly captured image. I believe most people would have chosen the proper color space after a little time.



I believe the images above demonstrate our analysis system perfectly. Even though we can only see a small portion of this person, to most it is clear which color space is correct. The left image is flat and dull, lacking detail; the one to the far right is obviously too saturated with an unnatural white point. The center image has more natural flesh tones and white point. Besides needing some eye wash, the image looks normal. The left is sRGB, the right is Prophoto, and the center is correctly displayed in Adobe RGB 1998. As you see, we can estimate the color space of an RGB image with some reasonable success.

Workflow General File Processing

Identifying an Image's Color Space and Properly Opening and Displaying the File

The Untagged CMYK Image (a CMYK image with no embedded profile)

As CorelDRAW does not support embedding CMYK profiles, all CMYK images exported from the Suite are handled as untagged. For professional print to press this is of no consequence as press workflows use Postscript color management. Work that is to be sent to profile-controlled RIPS or for color editing is another story.

Corel does support extracting profiles from CMYK images, so you can use the previously noted methods to extract, identify and load the image's CMYK profile into Corel PHOTO-PAINT or DRAW in the separations printer profile.

Identifying the color space of an untagged CMYK image is more difficult than estimating the color space of an untagged RGB image. There are a multitude of reasons for this -- mostly the way the separations were designed to work by the person who created the profile (such as, features of color profile creation that are beyond the scope of this publication, like grey component replacement). In short, what may look poor on the monitor, may print fine and vice versa on a press.



Suffice to say that we have to use the tools we have at hand. **The eyedropper tool in Corel PHOTO-PAINT will read the CMYK numbers that are in the image as the image was created, regardless of the separations printer profile set in the color management dialog. So if we are fortunate, we can establish the maximum ink density for the image and that's it.** Read the darkest part of the image, with your info docker in PHOTO-PAINT set to have the secondary color read total ink, to establish the TIC. The image's display will change based on the CMYK profile loaded in the separations printer. Capture A shows this Onyx test image as displayed in a Kodak TIC 360 CMYK profile. You see it here as an sRGB capture. Capture B is the same image as displayed in U.S. Web un-coated. Note the difference. Capture C is U.S. sheetfed coated.

Our issue is that there is no way to know which one A, B, or C is correct. If we are going straight to press, we're ok as the proofing system built into modern pre-press applications use ROOM technology. The same RIPed file as the plate setter uses for plates is used for proofing, providing a proper hard proof. If we are going to use an ink jet or a digital print engine like a Kodak Next Press or even a Canon copier for our output, we have issues. **The types of shifts you see here in these captures will be what you get, if you're lucky!**

You can try to use a hard proof. If the hard proof is unsatisfactory, you can then try changing displays using profiles of regional preference until you find one you like and converting the image to LAB, and then convert all your images to a known CMYK profile. This in my opinion is the best choice. **When confronted with this scenario, I always choose to open each image and try different CMYK profiles until I find one that has the most appealing display. I then convert to LAB, and if needed, color correct and convert to CMYK.** This provides uniform conversions to plate or digital device, and restores some control to an out-of-control situation.

Workflow General File Processing

CorelDRAW Possible Color Management Settings

Versions of CorelDRAW 12 and older all work in RGB mode only. This means that all transparency is rendered in RGB. Conversion to CMYK will take place in the print engine and correctly, only if you have selected the proper profile in the Print dialog Misc tab. A PDF workflow will require that you break apart shadow groups, locate transparent effects, and convert to CMYK bitmaps before creating the PDF.

Version X3 and X4 work in RGB or CMYK mode; RGB mode is exactly like version 12 and older. The CMYK mode of operation is a new departure for CorelDRAW X3. In the CMYK mode, all shadows and transparency are rendered in CMYK. **There is an issue with RGB lens rendering in NATIVE COLOR CorelDRAW X3 Published and Distiller-based PDF. In RGB mode the lenses which you should be able to render in as RGB in native color, Corel-published PDF will render only in CMYK. This issue has been resolved in X4.**

The choices you make for your color management settings in CorelDRAW will reflect your understanding of the printer calibration and the color management interface sections of the publication. **With that said, it is imperative that the color management settings used in CorelDRAW and Corel PHOTO-PAINT be coordinated.** This means that all RGB and CMYK elements created in PHOTO-PAINT and imported into CorelDRAW have their respective resident color spaces set to match DRAW.

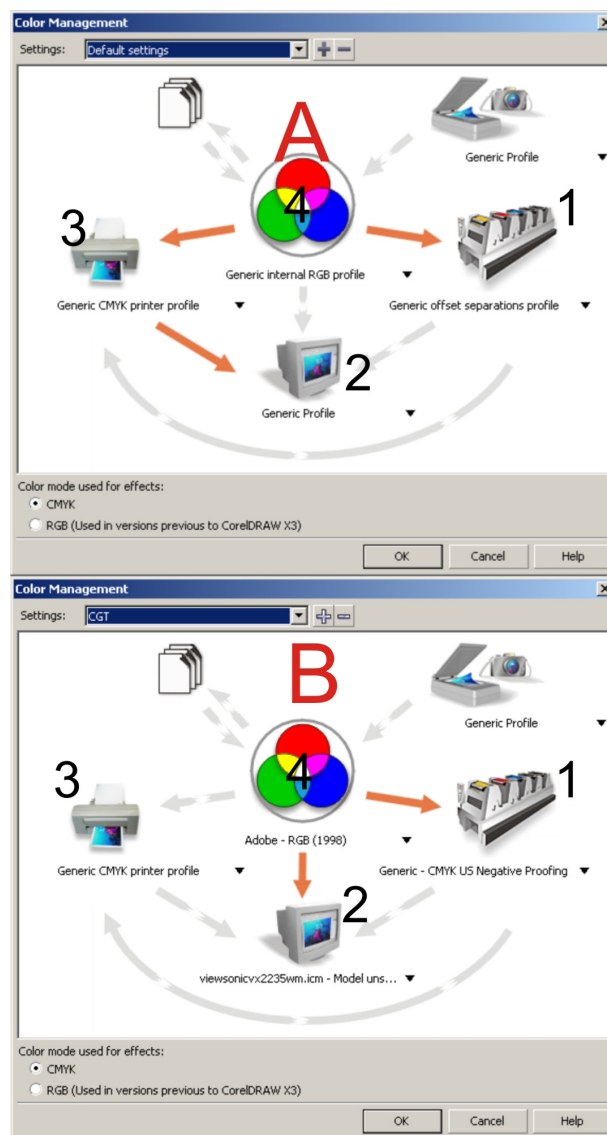
I am of the opinion that the default color management settings shown in **capture A** have been chosen to allow the user to generate output with as little shift from a generic CMYK display as possible, also with as little control. The display here is controlled by the composite printer 3.

Capture B displays the CMYK mode, sheetfed, expanded gamut output, color management setting of my choice. In CMYK mode, the display is controlled by 1, which also controls the resident CMYK color space of all CMYK conversions, and transparency. **The arrow from 4 to 2 must be activated or the display will be the default RGB by CorelDRAW.**

This choice of color-managed workflow functions properly with Postscript color-managed press work and expanded gamut Corel published native color PDF workflows. The RGB content will not display properly but prints fine in native color Corel-published PDF as long as the output RIP supports CorelDRAW-published PDF and assumes the RGB and CMYK color spaces set in CorelDRAW.

What happens here is that the CMYK numbers are controlled by 1 and passed along via Postscript color management for press work. Since there has been no choice made of a profile for 3, the RGB numbers will simply be passed along in a PDF workflow.

A driver-based workflow will require you to make a choice. Either your file will contain RGB or CMYK images, but not both. CorelDRAW supports only RGB images in non-Postscript drivers, and RGB or CMYK in Postscript drivers. In Postscript drivers, all RGB vectors will be converted to CMYK.



Workflow General File Processing

CorelDRAW Possible Color Management Settings

Capture C shows the RGB mode version of that shown in **capture B** on the previous page. With these settings, the display would properly show both RGB and CMYK elements correctly, **with transparency controlled by 4**.

All other aspects of printing and PDF publication are identical to those described for capture B for one exception. This RGB mode when used with RGB-only content can be used as a non-Postscript driver-based workflow with an improved display.

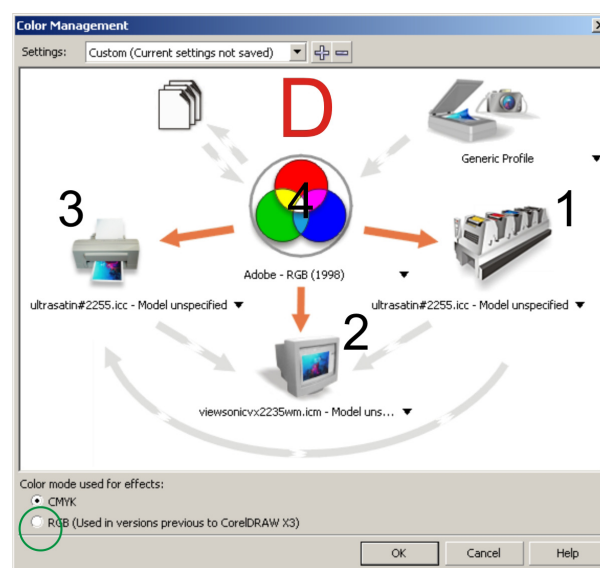
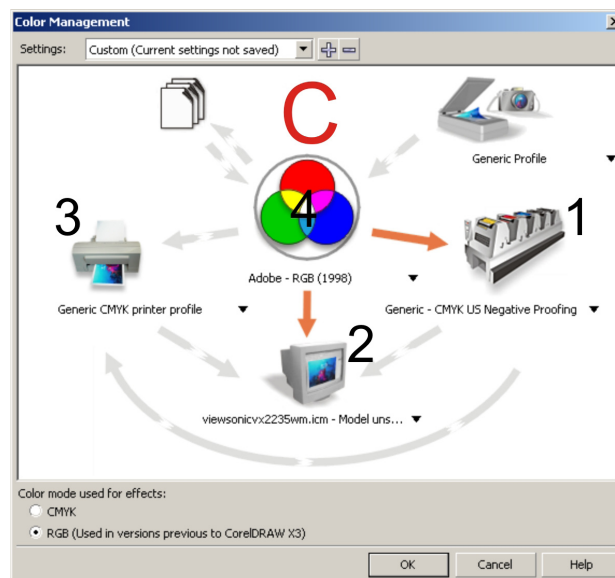
Capture D shows color management settings for a **Postscript only, digital composite device, driver-based workflow**. Note that the same custom printer profile is loaded in both 1 and 3. As Postscript output for objects from CorelDRAW are CMYK, your printer profile is CMYK. This allows you to load the CMYK profile in 1 and 3. These settings will work for CMYK or RGB mode. Simply select the radio button circled in green to activate the RGB mode. In the CMYK mode transparency is controlled by 1 in RGB mode by 4.

In CMYK mode, RGB and CMYK objects would display as soft proofed in the custom printer profile loaded in 1. All RGB to CMYK conversions from the applications dialogs would be converted to the profile in 1. During the print process, by selecting the Apply Profile in the Print dialog Misc tab, all RGB elements in the file would be converted to the profile in 3. Any CMYK objects would have their CMYK numbers passed along unchanged. As the profile loaded in 1 and 3 match, all conversions to CMYK are the same and you may work with all RGB elements if desired.

Note: if you select a different profile for #1, such as a commercial CMYK profile, elements in the file converted using the applications dialog will be converted to the profile in 1 and their CMYK numbers will pass unchanged to the composite printer. The RGB elements in the file will, if selected to do so, convert in the print stream to the profile in 3.

If you choose to use the RGB mode for this Postscript workflow by checking the radio button in **capture D** (circled in green), **transparency would be controlled by 4. The RGB elements in your file would display as displayed through the profile loaded in 4.** CMYK elements would display as the profile selected in 1. All other aspects of printing would be the same as in the CMYK mode above.

Both the CMYK and RGB mode described for **capture D** can be used for expanded gamut native color Corel-published PDF as long as the RIP supports CorelDRAW-published PDF and assumes the RGB and CMYK color spaces of the Suite.



Workflow General File Processing

CorelDRAW Possible Color Management Settings on a Non-Postscript Workflow

Capture E shows the color management off setting of the CorelDRAW color management dialog. The only use I have for this setting is to print the RGB calibration target. Even though the setting is called color management off, CorelDRAW has to have some color management operating. The Internal RGB being used for conversions is not the generic Internal RGB profile as displayed; your RGB to CMYK and vice versa conversions will be incorrect.

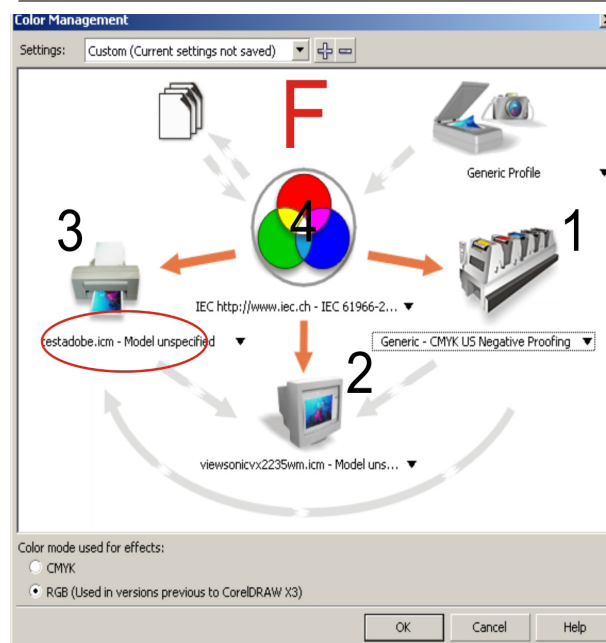
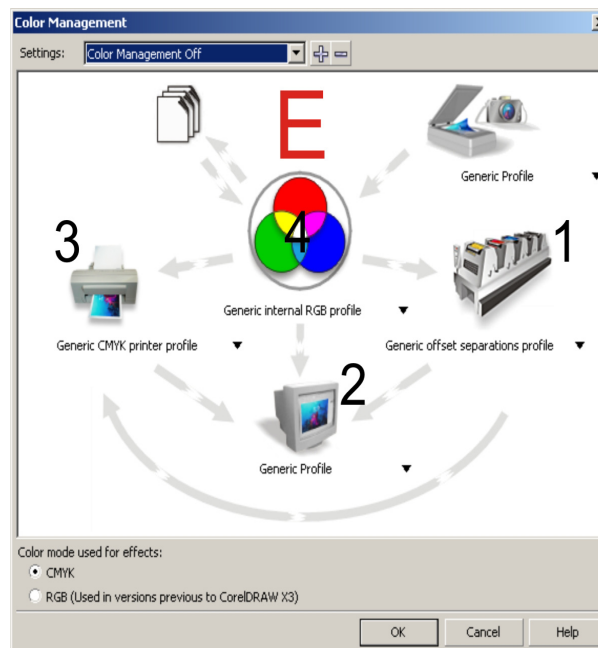
Below is **capture F** which is a capture of an RGB mode non-Postscript printer workflow. All content for a non-Postscript printer is converted to the Internal CorelDRAW RGB in the print stream. In my opinion, if you have chosen to use a non-Postscript device, you are then best served by working in the application only in RGB. By this I mean, manually converting all elements in the file to RGB which, in this case, is controlled by the profile loaded in 4. All of your transparency is controlled by the profile loaded in 4. The printer profile loaded in 3 must be an RGB printer profile.

If you choose to work in CMYK mode or with CMYK elements, those element will experience a conversion to RGB in the print process. In CMYK mode, your display will be governed by the profile loaded in 1.

If you use a CMYK profile for the non-Postscript device, according to my best sources, because it is a non-Postscript device, first all elements must convert to RGB, then to the CMYK space of the profile, and then to a different RGB in the print stream.

As explained in the printer calibration section, in a non-color-managed scenario, CorelDRAW can only send the CorelDRAW proprietary Internal RGB to the print stream. As such, we are forced to rely upon the assumed sRGB that the print device was designed to work with in the absence of a profile for calibration. After creating and activating an RGB printer profile, CorelDRAW can send the Internal RGB of your choice to the print stream. However if, in the future, we use anything other than sRGB as our internal RGB color space, we will need to adjust the printer profile, circled in red in **capture F**.

As explained, a user who chooses to use a non-Postscript printer, will find a much simpler path to repeatable calibrated work by keeping their work confined to an RGB workflow. Despite the pricing of the Graphics Suite, CorelDRAW is best suited as a professional graphic application for output to professional level RIP-controlled devices. With that said, non-Postscript printers can provide reasonable output, if you follow some basic rules and understand what is happening to the color of your files.



Workflow:

Digital Photography & Scanning

Workflow: Digital Photography and Scanning

A digital camera and a scanner are identical technologies in two different mechanical configurations. All color management instructions for a camera and scanner are the same. Any variations will be noted in the text.

Using the CorelDRAW Graphics Suite as your image editor and output application in these scenarios is very effective. **Capture A** shows an assumed color space method of viewing your digital camera/scanner file in PHOTO-PAINT. **If scans or captures are acquired or imported directly into CorelDRAW, you will need to use the RGB mode of operation as shown in capture B or you will not be able to properly view the image in its color space.**

The Internal RGB of the Graphics Suite is set to the color space of the camera/scanner and the arrow is activated to the monitor. This will allow you to view your files as the device captured them.

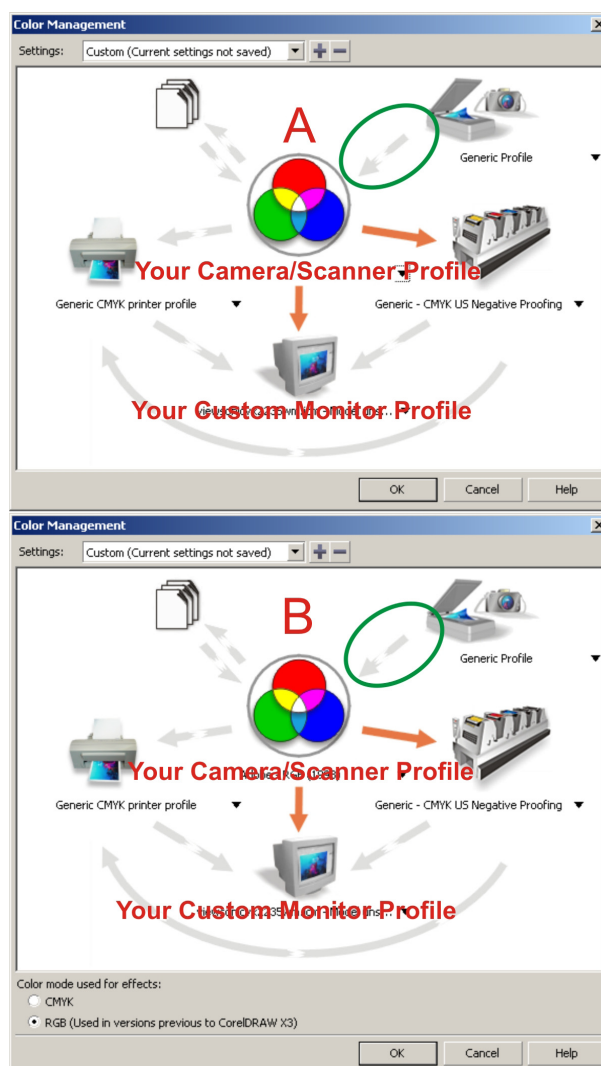
An automatic conversion method of acquiring the files is to load a scanner/camera profile in the drop down for the scanner/camera in the main color management dialog and to activate the arrow (circled in green) from the scanner/camera icon in **capture A & B**.

What happens if the arrow is activated in **capture A&B** is, if the Internal RGB matches the camera/scanner color space, the image is opened and displays properly with no conversion. If the scanner/camera profile does not match the Internal RGB, then automatically the image's color space is converted to the Internal RGB. If the scanner/camera image does not have an embedded profile, it may open and display improperly if its color space does not match the Internal RGB.

The only problem with the automatic conversion method is that you never view the file as originally created and therefore can make no attempt to gray balance the image before converting. This may not provide the best conversion possible.

The default color space of many fixed lens digital cameras is sRGB but, in many cases, it can manually be adjusted to other color spaces. The key to maximum control and quality for the Corel PHOTO-PAINT editing digital photography workflow is properly opening and displaying the digital files before attempting any color correction. Match your Corel PHOTO-PAINT Internal RGB color space to that of your camera, and use a custom monitor profile in a controlled editing environment.

Each scanner manufacturer has its own calibration process so the extent to which CorelDRAW color management comes into play is only as a non-conversion scan platform. The settings in **capture A&B** with the arrow from the scanner/camera icon deactivated will not affect the RGB numbers of the test scan. The display will be incorrect but the Internal RGB numbers of the test scan will remain valid. If you use a professional level scanner calibration application, the test scan will therefore be valid.



Workflow: Digital Photography and Scanning

A digital camera has some interesting aspects to the capture process that can have some validity for the scanning process. To the right, we see a capture target; they're available from many sources. Gretag Macbeth is one such source. The top row is a gray balance chart. That means each square has an RGB reading of equal R, G and B components.

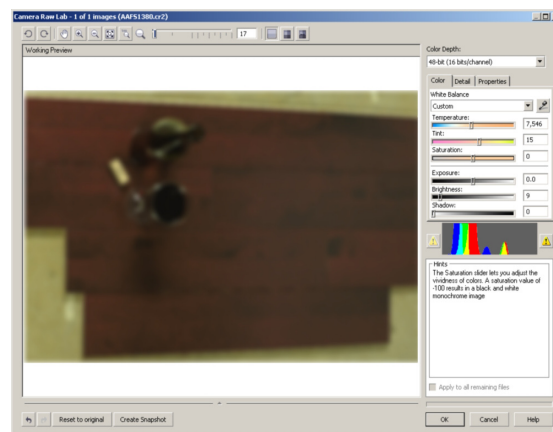
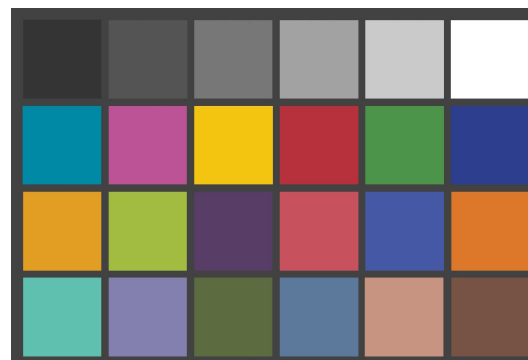
How this comes into play is that when a capture is taken with a camera, you slip this chart into the center area where it can be cropped out later. When you open the image, you can adjust the tone curve to obtain a neutral gray balance. The chart has designated RGB reading for each swatch, but I prefer to concentrate on the gray balance and the rest of the colors seem to fall into place. This will inject balance to the capture even in an un-calibrated display systems; you will not be able to see it but the balance will be there.

For studio conditions, using a capture color checker chart, many times you can create a tone curve that is applied to each shot to adjust for the lighting conditions and the nuances of the capture device to help automate your workflow. This works because the camera and the studio conditions are the same for each shot. Live shoots do not offer this level of automated control.

A user who has a scanner, but who does not have a calibration application, can apply similar methods to the scanner. Scan the color target and adjust the tone curve to obtain a neutral gray balance, then save the curve and apply it to each scan from that type of material.

The digital photographer using Corel PHOTO-PAINT X4 now has a RAW converter to help him or her control the processing of captures. The capture to the right shows the Camera RAW Lab of Corel PHOTO-PAINT X4.

The color management aspect of the Camera RAW Lab is that it will, after processing, convert your image into the Internal RGB color space of PHOTO-PAINT. I recommend that you set PHOTO-PAINT to as wide a gamut as possible to archive your converted images. I do not recommend that the RAW format be used as an archival format as it is not a standard file format. As such there is no guarantee that the current version of your files will be supported in the future.



As far as RAW converters go, this one is as good as I've seen. The problem with most RAW converters I've worked with is that they have a poor quality display. How you make critical adjustments with a poor display is beyond me. One weakness in that there is no way to measure and adjust the individual channel of the tone curve properly so one can achieve gray balanced color in the RAW converter. However the new tone curve in Corel PHOTO-PAINT X4 makes secondary adjustment easy.

Here are a few suggested uses for RGB color spaces; these are surely not the only available profiles or uses for these spaces or workflows. Prophoto (Kodak reference output medium metric), and Heidelberg wide-gamut RGB are two profiles wide enough for archival purposes. Adobe RGB, which is one of the standard RGB color spaces found on digital cameras (usually as an available setting in the camera's menu but not default), is excellent for use on product shots that will be used in print as Adobe RGB is wide enough to take advantage of all the gamut in a commercial CMYK color space. The sRGB color space is a standard color space as the assumed color space for the internet and computer systems. This sRGB color space is the perfect choice for presentations, the internet and e-mail image sharing as these systems are designed to assume sRGB by default. However sRGB is a poor choice for printing as it is insufficiently wide enough to take advantage of the entire gamut of CMYK color spaces or for archival purposes.

Workflow:

For the Internet and Presentation Work

Workflow: The Internet and General Presentations

The internet and office applications function on some very simple principles as far as CorelDRAW color management is concerned.

1. Set CorelDRAW to RGB mode.
2. Set your Internal RGB to sRGB, activate the arrows to the monitor and to the separations printer.
3. Open all files in their resident color space and convert to the sRGB color space. Make sure that "Map spot color into CMYK gamut" is NOT checked in the Advanced Display Setting dialog. You launch this dialog by double clicking the monitor icon in the main color management dialog.

4. **All non-web palette** colors need to be converted to sRGB for internet work. All colors need to be converted to sRGB for presentation work. **Capture D** shows two squares, one inside the other, both are PMS 539 converted to RGB, one to Adobe RGB and the other to sRGB. Notice how you can see the one square inside the other. If properly converted to the sRGB space for web or presentation use, you would see only one square. In this case sRGB converted to R0, G44, B70 and Adobe RGB converts to R27, G47, B71.

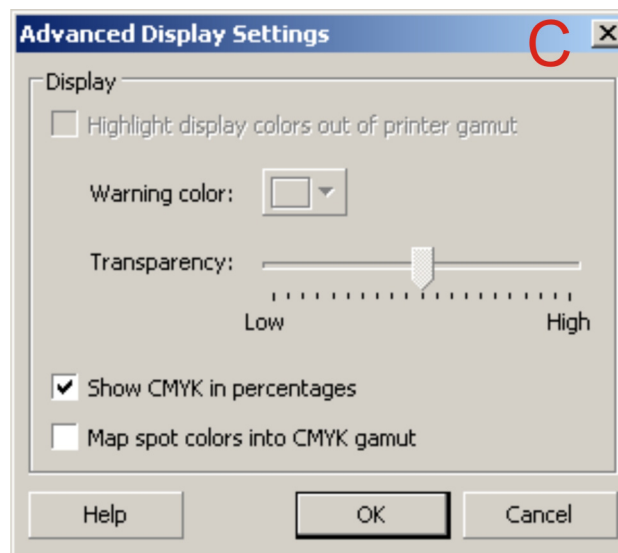
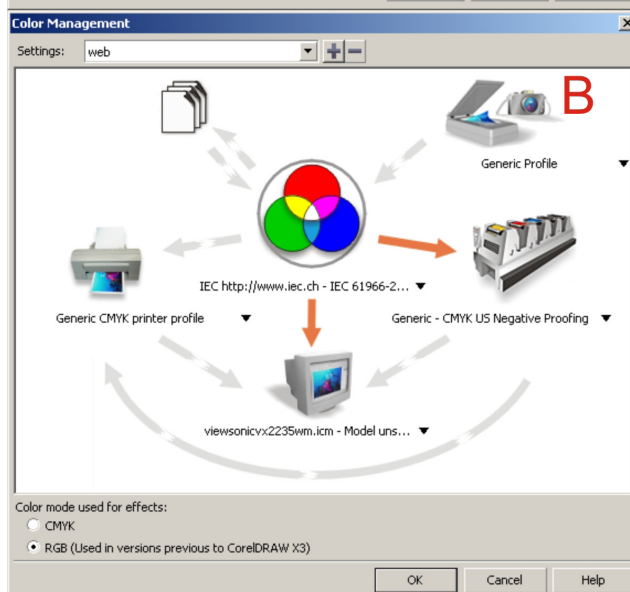
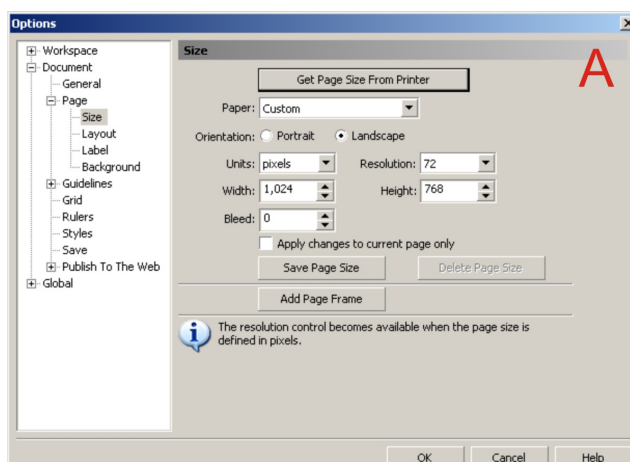
5. Match your CorelDRAW color management settings with Corel PHOTO-PAINT (PHOTO-PAINT has no RGB mode).

You see, here in **capture A**, the page options dialog found under the layout menu. I start by setting the units to pixels, the screen resolution to my web resolution, and the page size to that which is desired by my web site. Nothing to do with color but always best to put the first foot forward.

In **capture B**, I use my web color style. The IEC.ch-IEC61966-2 profile is the current sRGB color space. The separations printer is the same one I use for a large portion of my CMYK work. Your choice should match each file you open for proper conversion to RGB. **CorelDRAW is in RGB Mode!**

TIP: If you're designing work that will be used in print, the internet, and in a presentation, try designing your print work first. As presentation and the internet have a wider gamut, it is easier to make your print color match on the internet and in a presentation than it is to make your internet or presentation color match in print.

Today some presentation applications have the ability to load a profile for their display. This is handled in the presentation application and is based upon the assumption that you will create graphics to place into the presentation application in the sRGB color space.



Workflow:

Settings for Spot Colors

Workflow: Settings for Spot Colors

Spot colors and color management have one significant issue -- conversions for display and print! In **capture A** you see the uniform fill dialog and the Pantone solid coated palette selected. In **capture B** you see some of the fixed palettes supported by CorelDRAW. Then **capture C** shows the Advanced Display Settings dialog, launched by double clicking the monitor icon in the main color management dialog. Our particular interest is in the “Map spot colors into CMYK gamut” check box.

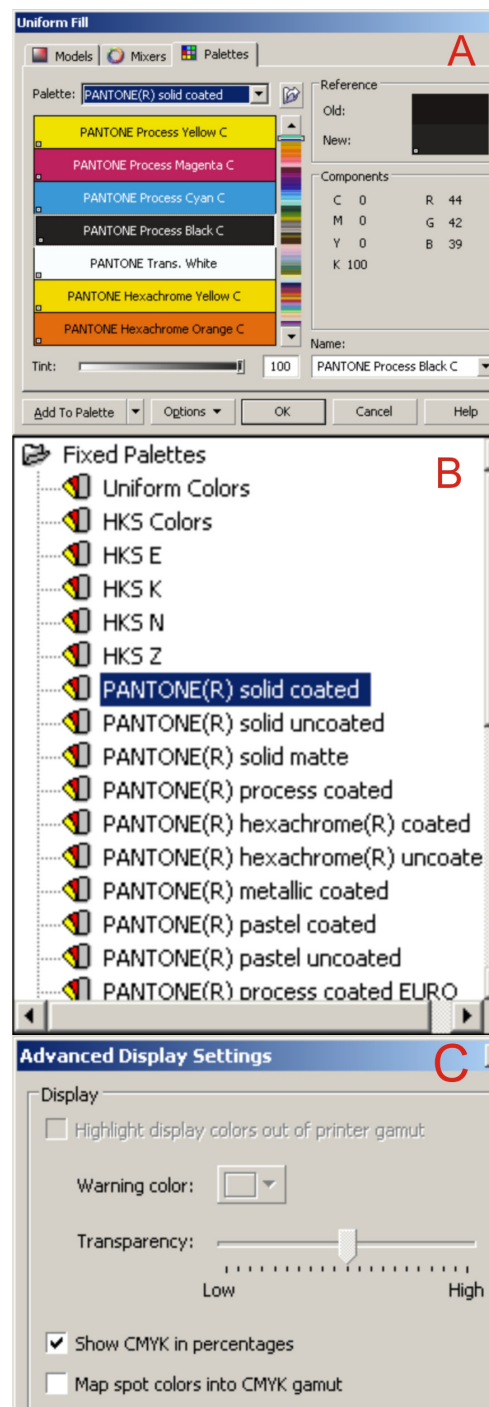
CorelDRAW (even in CMYK mode), by default, has the “Map spot colors into CMYK” unchecked and therefore attempts to properly display spot colors in both RGB and CMYK mode. If you check this box, Corel attempts to display the spot colors as soft proofed in the CMYK gamut. This will affect your spot color to RGB conversions.

Capture D illustrates this perfectly. The lower left square is a spot color PMS 539. The square directly above it is the RGB conversion with the “Map spot colors into CMYK gamut” turned off. Notice how the two squares match. Now to the right the darker square is the PMS 539 square converted to RGB with the “Map spot colors into CMYK gamut” turned on. While it looks like a proper spot color to CMYK conversion, the display does not match the spot color, when matching the spot color display is the intended goal.

Capture E illustrates another issue -- properly converting your spot colors to RGB. **Capture E** shows two squares, one inside the other; both are PMS 539 converted to RGB, one to Adobe RGB and the other to sRGB. Notice how you can see the one square inside the other. If properly converted to a coordinated RGB, such as required for proper display, you would see only one square. In this case, sRGB converted from PMS 539 to R0, G44, B70 and Adobe RGB converts to R27, G47, B71. Of course the color management setting also affects the RGB to spot color conversions. An R0, G44, B70 swatch created as sRGB as its resident color space opened in CorelDRAW, then, converted to spot color with Adobe RGB as the Internal RGB, converts to a different spot color, in this case to PMS 282 instead of PMS 539.

Spot Color to CMYK Conversions

The CorelDRAW Graphics Suite X3 was the first program released to use the new Pantone spot color to CMYK conversion tables. These are also supported in X4. If you're working in an environment where you have mixed versions of CorelDRAW, then you must coordinate all your spot color to CMYK conversions from one source -- X3 and newer, or version 12 and older. If not, there are a few hundred spot colors that could convert to CMYK differently between the different versions of this application. This is controlled by Pantone with X3 & X4 matching Quark 7 and the CS3 suite.



Workflow: Settings for Spot Colors

Capture F displays 3 squares: the bottom is PMS 470; directly above to the left is the automatic CMYK conversion per Pantone specifications; to the right is a manual conversion to CMYK. None of the CMYK conversions is perfect, however the top right is certainly closer. Many PMS colors simply cannot be printed as CMYK colors and are therefore out of the CMYK gamut. Pantone controls the spot color to CMYK conversions; however, in some cases, they have not done as well as they could have. **Capture F** shows this.

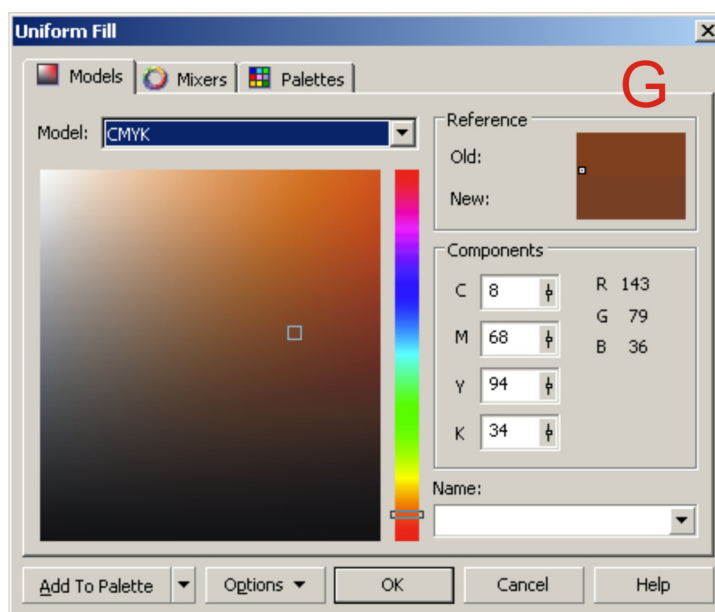


Capture G is the Uniform Fill dialog. Notice how the reference area showing the old and new conversion show a difference. I simply adjust the CMYK values until the old and new color are as close a match as possible. This, with some spot colors, gives you a better match.

Remember that your Internal RGB and your “Map spot colors into CMYK gamut” settings will affect the outcome. So you must coordinate the settings of all your workstations with the CorelDRAW Graphics Suite loaded.

Working with spot colors in PHOTO-PAINT is exactly the same as DRAW as far as color management is concerned. The issues with using spot colors in PHOTO-PAINT are entirely in the creation of the file and the file format in which the file is saved. Only CPT and EPS file formats support spot colors. Saving a PHOTO-PAINT file in EPS format and placing that EPS into DRAW then publishing a Corel-published PDF, may cause issues. Only a placard of the EPS file will show up in the pre-flight application before printing, and this may cause the technician to reject the file. The CPT file format works universally within the CorelDRAW Graphics Suite for CorelDRAW published PDF and will produce a proper display of the object in the PDF file.

The EPS and the PSD file formats from X4 work with InDesign as placed file formats for duotones or other spot color work from PHOTO-PAINT.



Workflow:

Remote Soft and Hard Proofing

Workflow:

Remote Soft and Hard Proofing

The CorelDRAW Graphics Suite supports remote soft proofing in the same manner as all other graphics applications. Remote SWOP or GRACOL certified proofing systems require the installation of specific monitors and printing proof devices for hard proofing. Once calibrated, you simply load these profiles into their appropriate locations in the main color management dialog.

Hard proofing, be it remote or local, is only supported in a RIP-based workflow; no driver-based device-simulated hard proofing is supported by the Graphics Suite.

CHAPTER 4:

Coordinating With Adobe

Coordinating with Adobe

Coordinating CorelDRAW and Adobe color management settings is not difficult at all. Understanding the nomenclature differences and then matching the rendering intents, color engines and color profiles is all it takes.

On the next page, I will post screen captures of Adobe Illustrator's, and CorelDRAW's color management dialogs. I will circle the pertinent areas in corresponding colors and sort through the differences in the names. The profiles you see listed in my screen captures are simply the ones I use. You may choose to use profiles that you prefer. However all color engines, rendering intents, RGB and CMYK profiles must be set to match across all the applications, or proper display, conversions, and print may not be possible. PCL output was not intended for critical calibrated color work. CorelDRAW X3 must be set to use RGB to match AI CS3 in RGB mode and to CMYK mode to match AI CS3 in CMYK mode. Then in both applications, in RGB mode, all objects and images must be RGB; in CMYK mode, all objects and images must be CMYK -- OR THE DISPLAYS WILL NOT MATCH.

Adobe uses a view menu to select the profiles you want to use for proofing each file. In Photoshop when you select to use the embedded ICC profile when opening a file, it will temporarily abandon the view menu settings. If in doubt if your Corel PHOTO-PAINT image matches in Photoshop, check the view menu proof setup setting.

Remember this -- you must choose and load a profile for your monitor in Corel; Adobe takes the monitor profile for the operating system.

Any effects that use transparency will be affected by the setting you have chosen in the main color management dialog.

CorelDRAW X3 and X4 allow composite color (files containing spot, RGB and CMYK colors). Files for expanded gamut output follow the instructions in the print calibration section of this book.

The screen captures I have placed for this section are from Adobe Illustrator; Photoshop uses the same dialogs as does InDesign. InDesign does not honor a placed image's color space for display use.

Coordinating with Adobe *(continued)*

You access Adobe's color setting under the Edit menu in CS3

Type color corresponds to circled objects

Adobe Working RGB = CorelDRAW Internal RGB

Adobe Conversion Options = CorelDRAW

Advanced Settings Dialog. Access this by double clicking the RGB icon.

The Advanced Display dialog in Corel has no Adobe equal. Access this by double clicking monitor icon. You see the setting I use. The highlight "Display colors out of printer gamut" is only available if you activate the arrow from the separations printer to the monitor. I never use this feature as the gamut alarm is dysfunctional and some CMYK profiles generate an error if an RGB image is converted to CMYK when this is activated. Displaying Pantone colors in CMYK, in my opinion, defeats the purpose of the display.

Adobe selects the monitor profile automatically through the operating system. In CorelDRAW, we must choose and load the monitor profile.

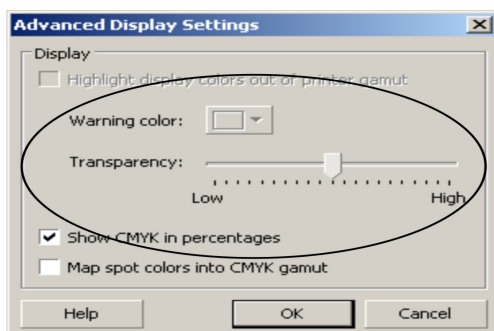
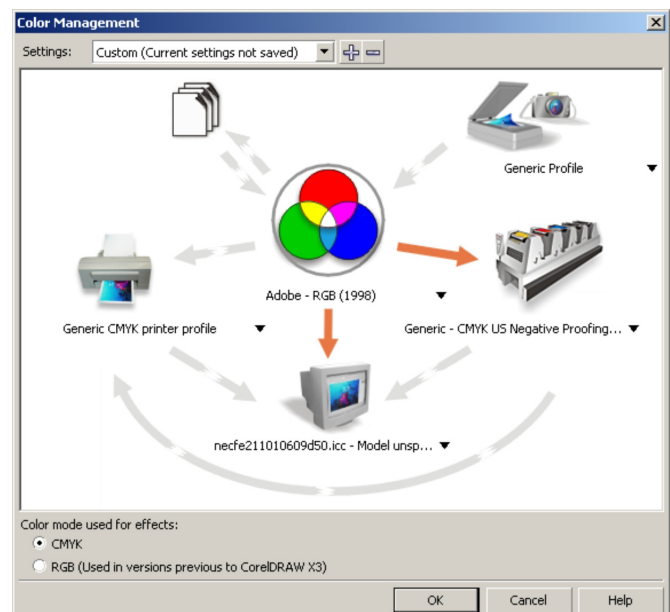
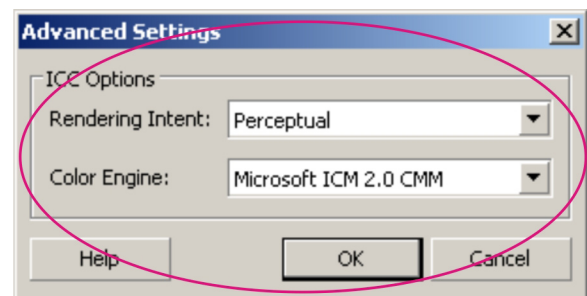
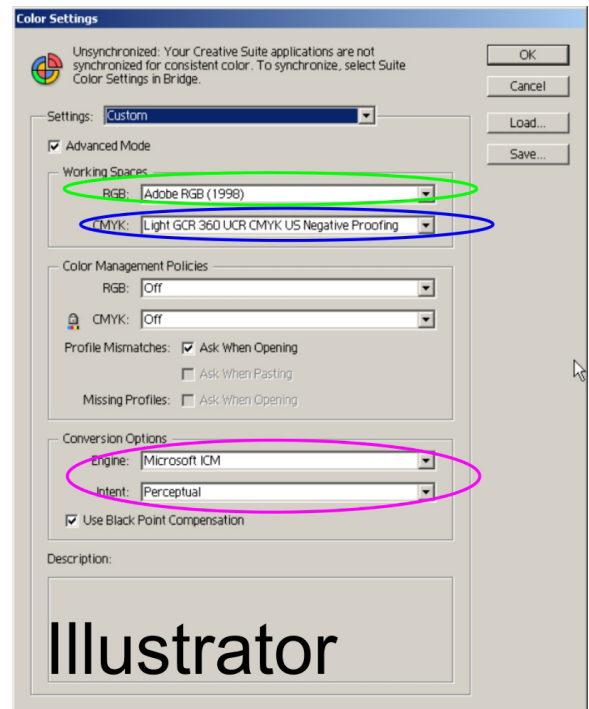
DRAW and Illustrator use different methods for Internal RGB color space so conversions from spot colors and CMYK to RGB will be different from DRAW to AI. The display may not show it, but the print will. Printers using the PCL printer language will be most affected by this, as all PCL printing requires that the colors from the application be converted to RGB automatically during the print process.

Don't worry, Indesign and Photoshop have the same issue -- not just with Corel but with their own counterparts.

Adobe Working CMYK = CorelDRAW Separations Printer

Corel uses a 1.8 GAMMA. By default, spot color dot gain is of no consequence that I have ever seen and the argument is still raging on black point compensation.

With coordinated settings, AI and Draw will display very similar RGB mode to RGB mode and CMYK to CMYK mode.



CHAPTER 5:

Publishing to PDF



Publishing to PDF for Print Pre-press

This tutorial is written to give the CorelDRAW X4 basic Publish-to-PDF settings from Acrobat Distiller and CorelDRAW X4. It is not intended to give an overview of every PDF setting and their variables. The settings used here have been tested to give the user PDF files that will output to the widest array of PDF workflow solutions as possible.

PDF files for pre-press are subject to the rules of Postscript compliance and what that means can be different for various devices. The first rule is to test your PDF files with items that may cause errors and send live jobs based on the operating parameters developed during those tests. Those items include transparent images, complex filled objects, Unicode fonts, and spot colors.

You will find on the following pages screen captures of Adobe Acrobat 7 dialogs and CorelDRAW X4 Publish-to-PDF dialogs, and instructions to publish to PDF through Distiller and CorelDRAW X4.

I have done this because all PDF pre-press applications I know of use Acrobat as their primary PDF application and also use one of several Acrobat Plug-In applications or a proprietary plug-in to edit the PDF files. These workflows usually contain PDF-based trapping and imposition tools that may or may not accept CorelDRAW-published PDF files. When in doubt, print to the Adobe PDF printer Distilling an Acrobat PDF and always test. I have used Acrobat 7 to gather my screen captures and I publish my PDFs to Acrobat 7 definitions, as many workflows are not capable of Acrobat 8 files yet.

The key to not only proper PDF output, but color management, is proper file construction. Building the file correctly using proper color palettes, image resolution, and color space are the foundation to a successful output experience.

You must always test your workflow and make sure that transparency, drop shadows, and any other special effects created in CorelDRAW will be supported. Always import flattened bitmaps into DRAW, which means no layered images in DRAW.

P.O. Box 77. Washington Boro, PA 17582-0077 . 717 509-3523 . 717 509-3525 Fax . davidmilisock@comcast.net
Shipping Address: 1390 Columbia Avenue #128, Lancaster, PA 17603

PDF Distiller Published: Setting Up Acrobat Distiller

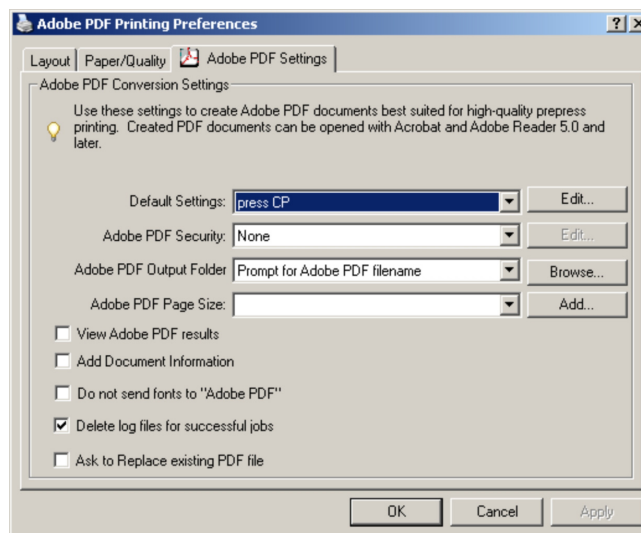
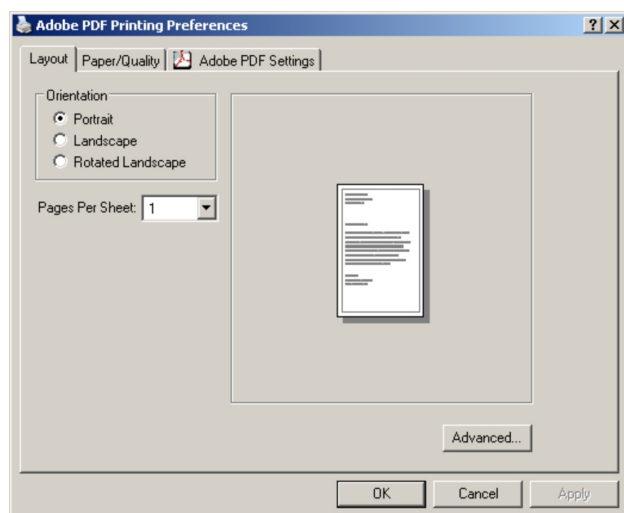
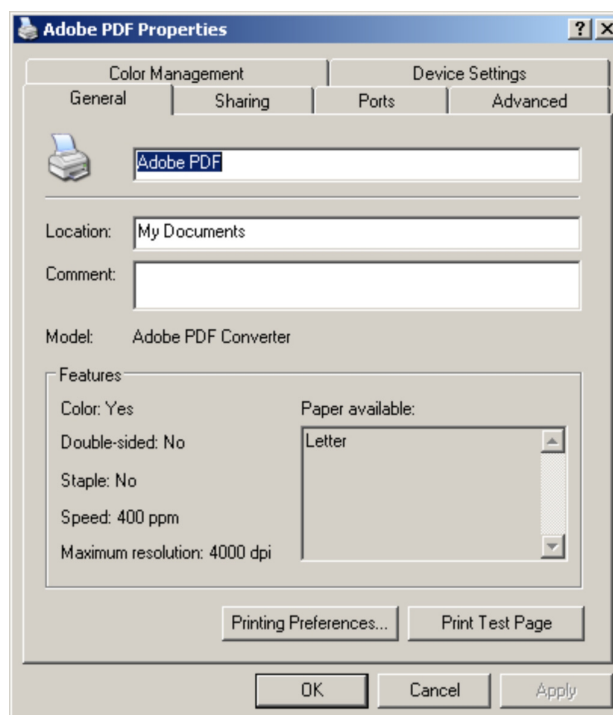
Setting up Acrobat Distiller is a two-part process; one must set up aspects of the Adobe PDF printer driver and Acrobat Distiller.

To the right, you see the Adobe PDF printer properties dialog. This allows you to begin the process of setting up the print driver part of your Acrobat Distilled PDF creation. You can access the driver through the Windows printer dialog: Start/Settings/Printers and faxes. Right click on the Adobe PDF printer and select properties.

Use the Printing Preference button to access the Adobe PDF Printing Preferences dialog box on the lower right of this page. Once there, duplicate the settings you see marked on the screen capture. Make sure that you uncheck “Do not send fonts to Adobe PDF.”

Make sure that you use the Printing Preferences button in the general tab, as the Printing defaults tab in the Advanced tab does not hold the settings as default. To my knowledge, this has been an issue with all Adobe drivers for a few years now.

We now want to select the Layout tab so that we can select the Advanced button and set our default settings for our PDF printer, as shown on the screen capture below. The screen capture top of the next page, shows the Advanced Settings dialog.



PDF Distiller Published: Setting Up Acrobat Distiller

To the top right, you see the Adobe PDF printer advanced settings dialog. You will see the default settings that I have used for thousands of CorelDRAW print jobs.

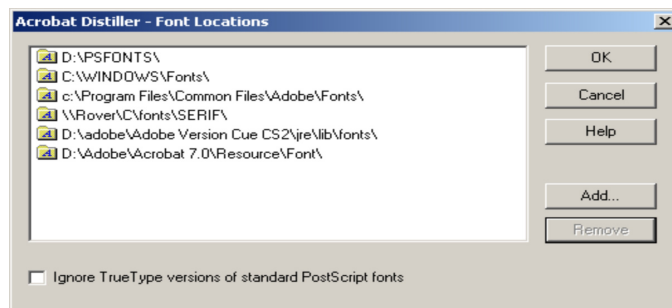
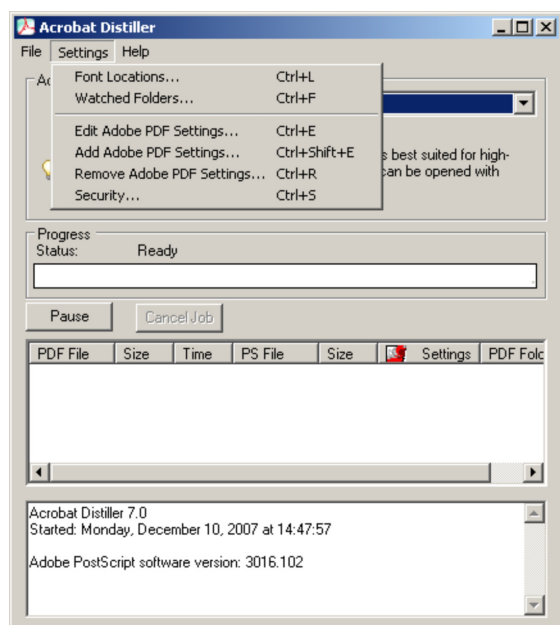
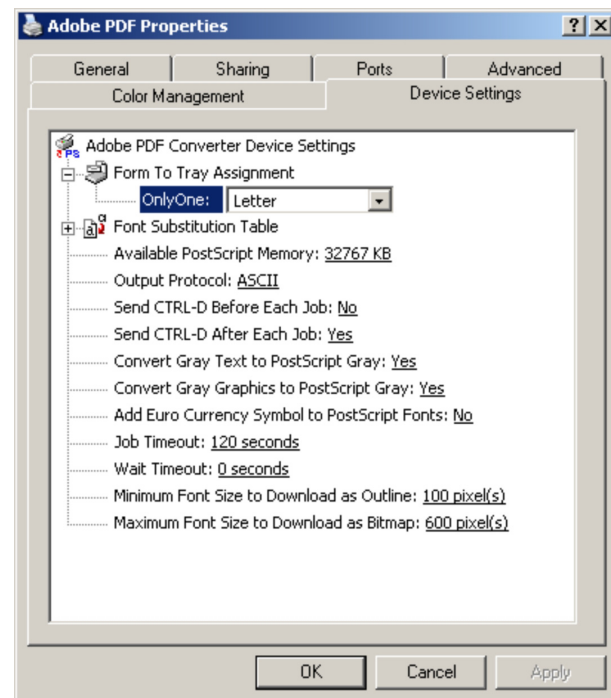
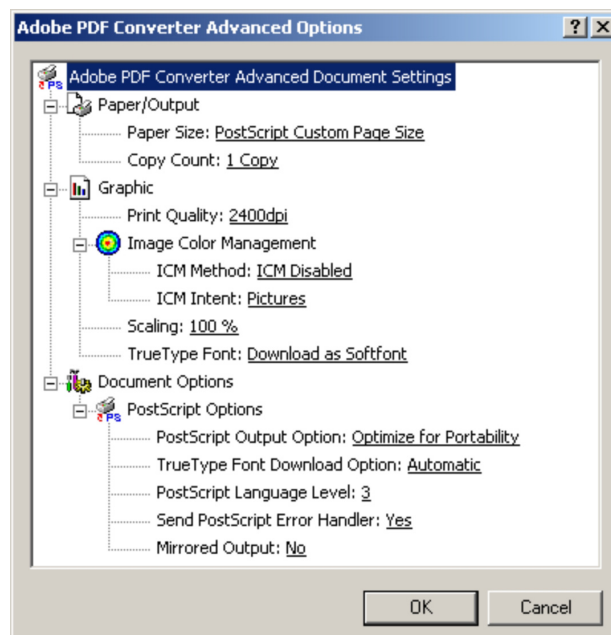
I believe the “Download as Softfont” setting to be critical in nature, as is the “Optimize for portability,” PS Level 3, and color management. The page size is always set by me for each job so your setting will be up to you, as well as the other settings in this dialog.

Directly below right is the device setting dialog where the only non-default setting I use is the Postscript memory. I set the memory up to the highest level I can get it.

Using Adobe products sometimes is like weaving a basket with your thumbs in splints. I say that because below left is the Acrobat Distiller program dialog, which, as far as I know, you must launch Distiller to be able to access. Under the Settings menu/Font Locations, there is a setting that you can only apply from Distiller and it is a critical one.

The Font Locations dialog at the lower right is where you tell Acrobat Distiller to find your fonts. I uncheck “Ignore True Type versions of standard Postscript fonts.” If you use a font manager, make sure Distiller knows where the font manager has stored the actual copies of your fonts, not shortcuts that it has placed into Windows.

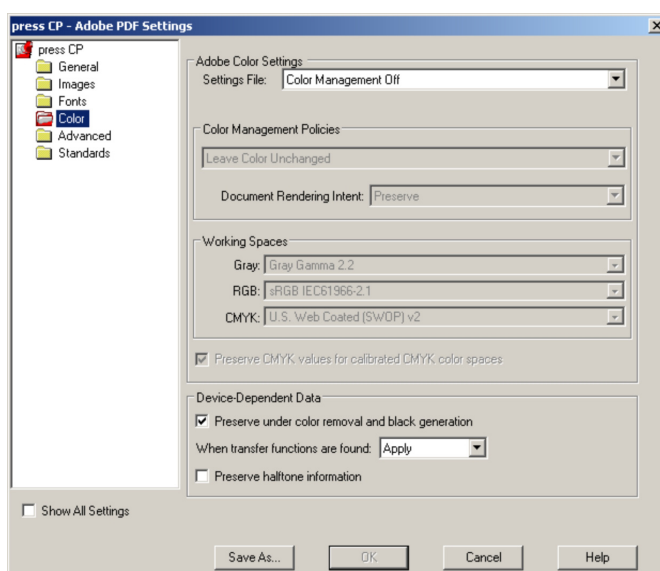
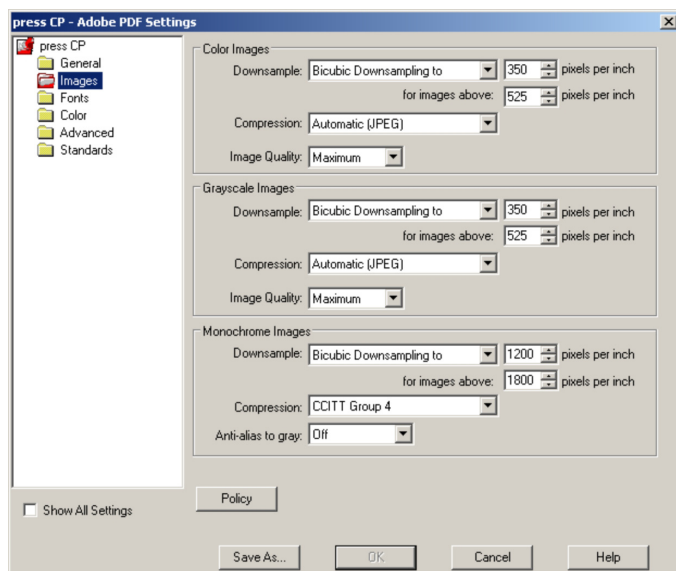
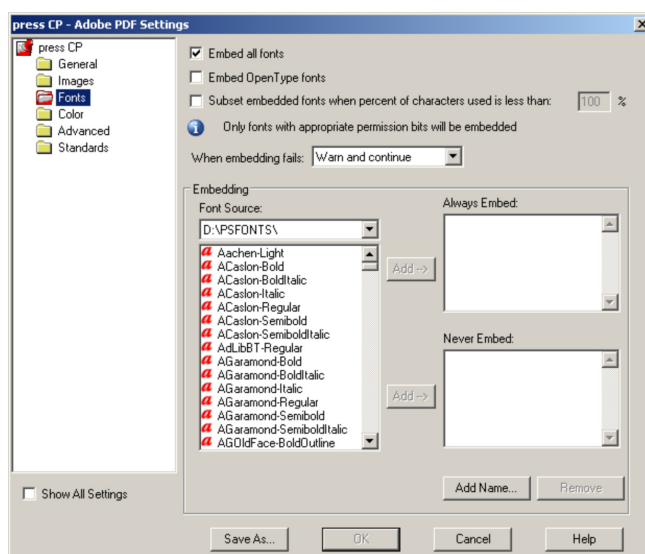
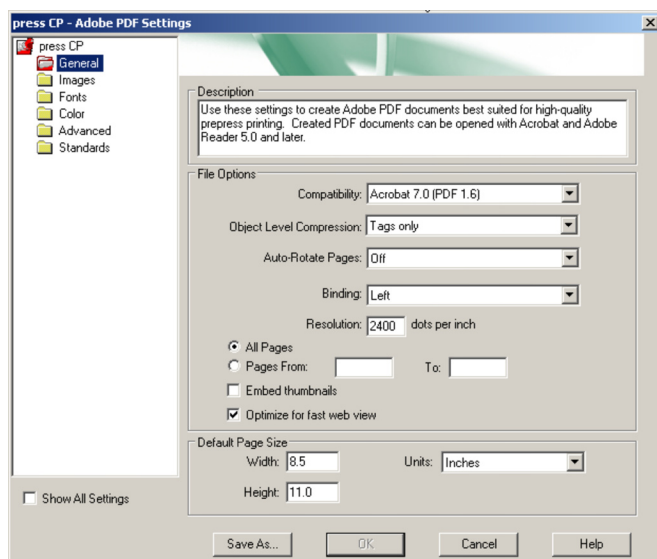
True Type support is part of all Postscript Level 2 and 3 RIP definitions since the creation of PS Level 2.



PDF Distiller Published: Setting Up Acrobat Distiller

Below are four screen capture dialogs from the Distiller -- general, images, fonts, and the color management tabs. I use these for 175 line screen offset printing. Image resolution setting would need to be changed for output line screens of different resolutions -- 400 PPI for 200 LPI and 200 PPI for 100 LPI. Notice that Color Management is turned off and that I do not subset fonts. I also only "Warn and continue" for failed font embedding, as I pre-flight all PDFs before outputting and I recommend you also pre-flight your PDF files.

I do not subset fonts as several fonts have in the past failed when subset but worked fine when not subset. Color management is not required for a PDF created for PDF-based digital front end press workflows.



PDF Distiller Published: Setting Up Acrobat Distiller

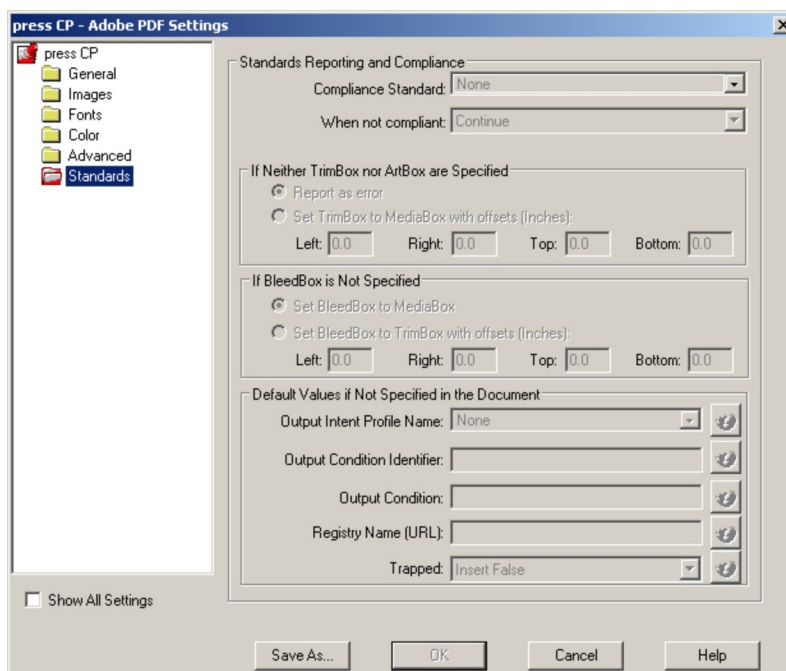
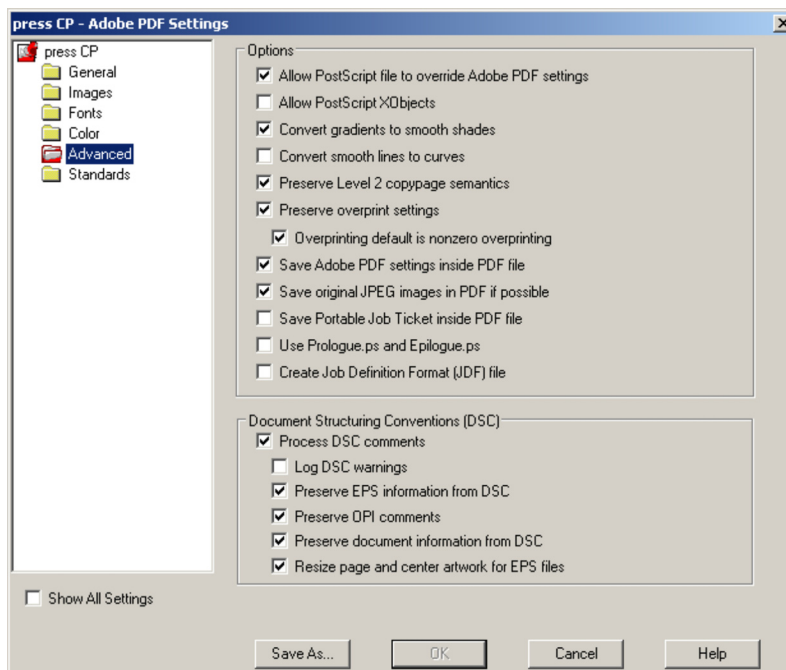
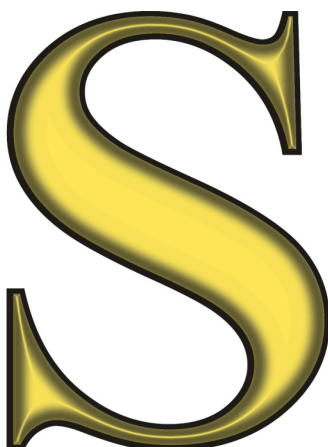
To the right, you see the Adobe PDF Advanced tab and below the Standards tab. In the Advanced tab, I sometimes check “Convert gradients to smooth shades” for CMYK work, such as for odd ball complex fills, but for spot color work I leave it unchecked (as my default).

PDF/X settings are many times used for the publishing industry, magazines and books. Basically this is a simplified PDF which will require flattening of all images, no transparency, and all complex fills to be images. This check assures that basic bounding boxes are assigned and the file is simplified.

To set new Standards, start with a default Adobe PDF X setting by selecting the drop-down arrow on the right of the dialog, modifying, and renaming it. You will then be able to access the setting for PDF X.

Complex fills are where Corel seems to always be setting the bar just a little too high with each release for Adobe to catch up. So for very complex fills using CMYK, one may want to convert these to an Image. With spot colors, I suggest that you develop your skills with PHOTO-PAINT’s spot color features. This will alleviate the complex object issue that Adobe has for you.

Below is an example of a complex spot color fill that will output more easily through Adobe RIPs



Non-Acrobat Published PDF

Any non-Acrobat published PDF will need to be tested in every area where you intend to use it.

To the right, you see the publish-to-PDF dialogs from CorelDRAW X4. You access this under the file menu, select Publish to PDF. I base my setting off the PDF for pre-press default, and the two dialogs below right show my settings for the General tab and the Objects tab. Acrobat 6 compatibility is working best right now for pre-press.

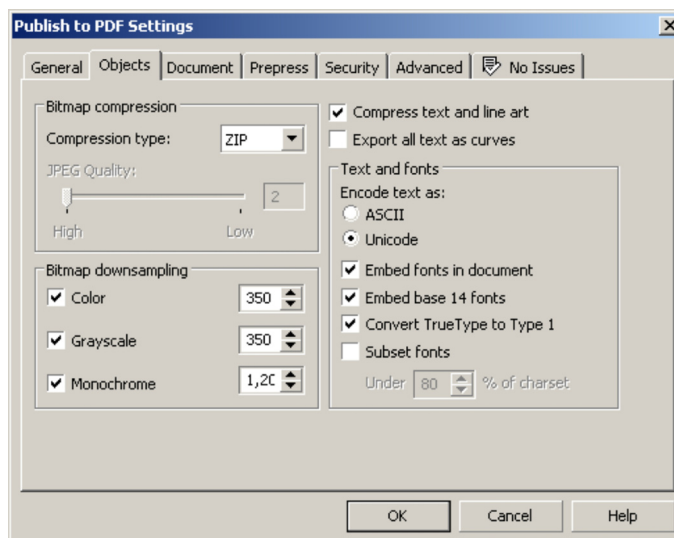
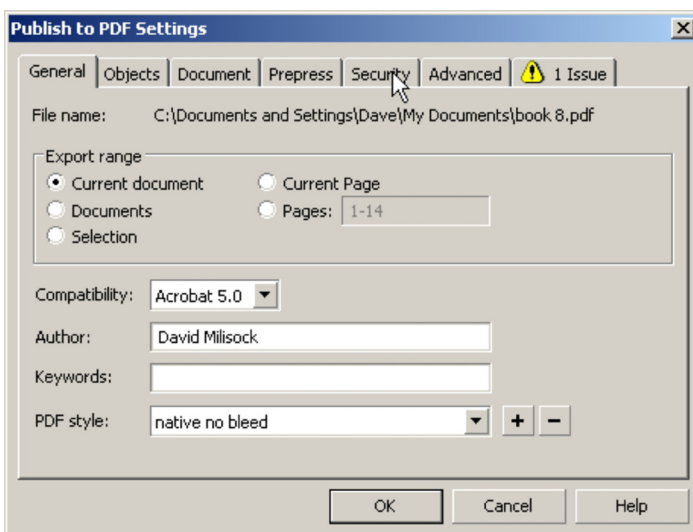
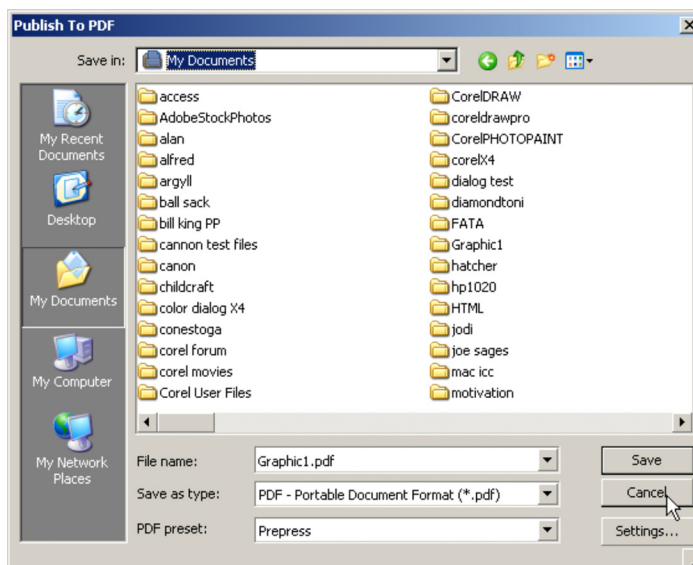
I never use any feature, except the current document feature, as my main concern is absolute pre-press compatibility and these other features could affect that function.

In the Objects dialog below right, you can see my default font, compression and image setting. Unicode support is required for those wishing Unicode fonts support. I must add that this feature needs to be selected each time we publish a PDF.

My settings are for a 175 line screen output and the bitmap down sampling would be adjusted appropriately for other output.

I do not subset fonts here for the same reason as mentioned before for Distiller.

Also one may want to pay particular attention to publishing PDFs from DRAW when you have artistic text that has a force justify applied to it, as some failures can take place. Convert such artistic text to paragraph text then publish your PDF.



Non-Acrobat Published PDF

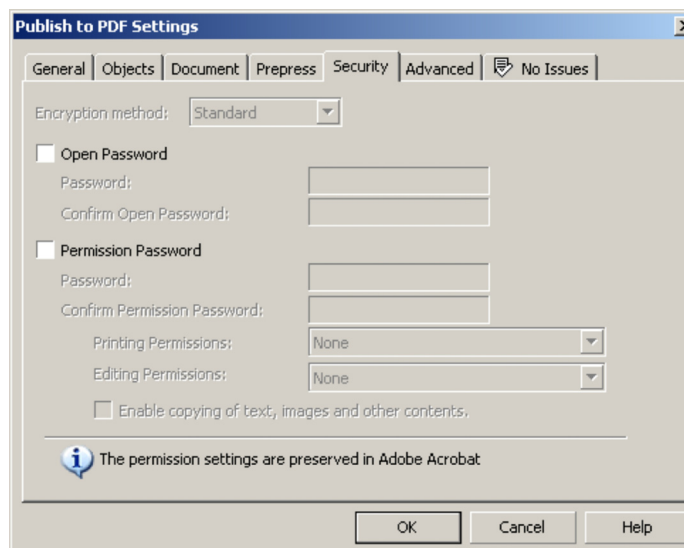
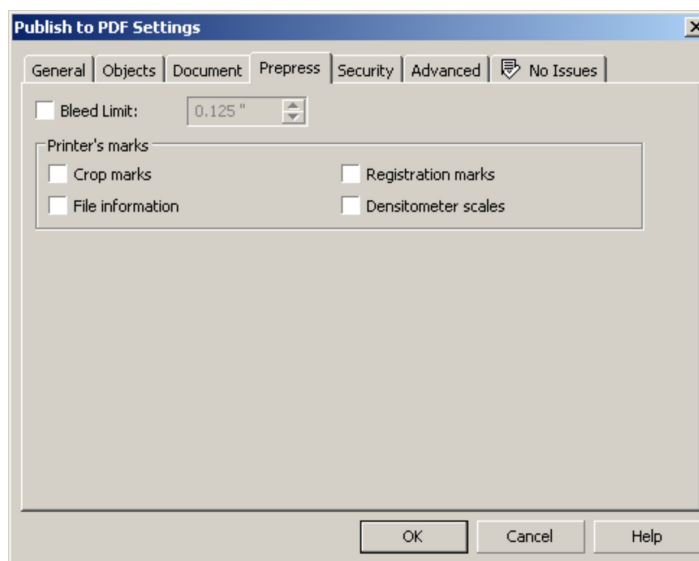
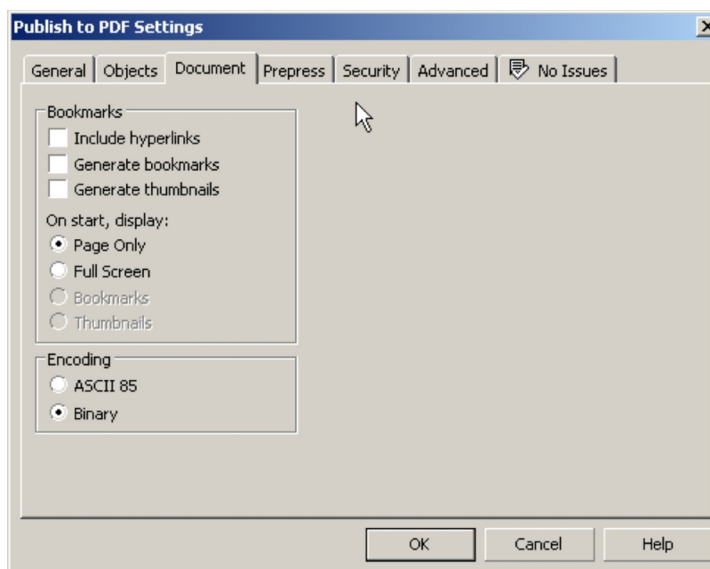
Any non-Acrobat published PDF will need to be tested in every area where you intend to use it.

To the right, you see the Document, Prepress and the Security tabs for CorelDRAW X4's publish-to-PDF functions.

The only settings I use in these dialogs that are not shown would be to set bleed limits for my document. CorelDRAW-published PDF files with bleed checked have been known to fail, and the resolution is, in some cases, to change the document size in CorelDRAW to included the bleed limit and then uncheck "document bleed" in the prepress tab during publishing to PDF.

Crop marks, file information, registration marks and densitometer scales should be discussed with your output provider and applied per their request.

I suggest that all security be turned off for pre-press work.



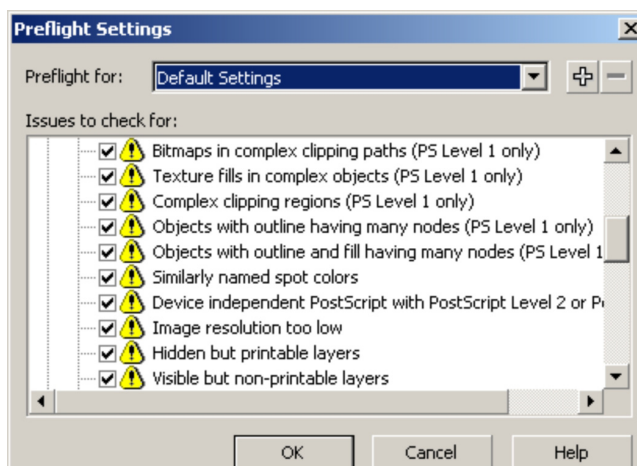
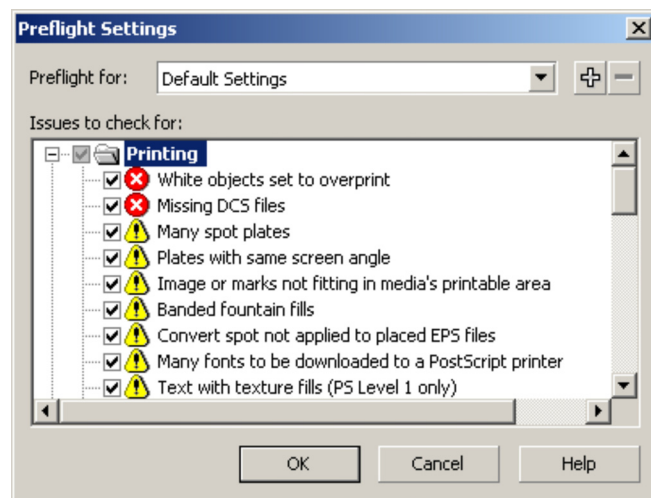
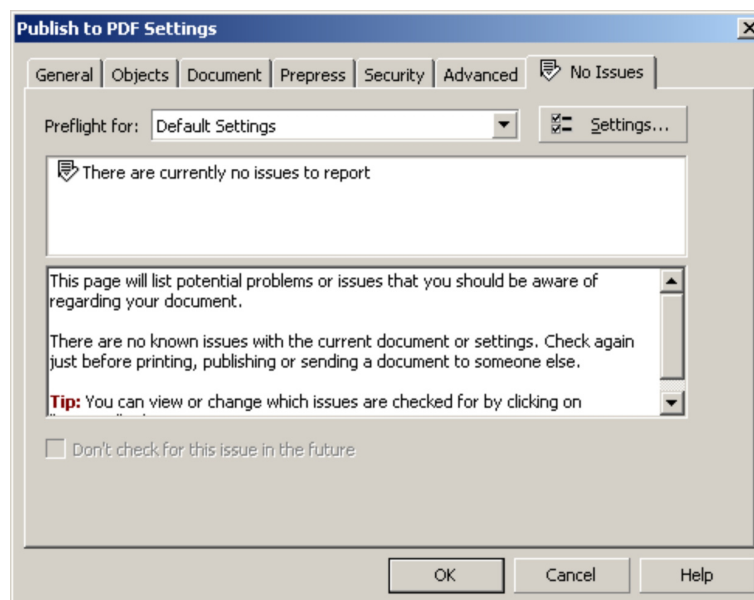
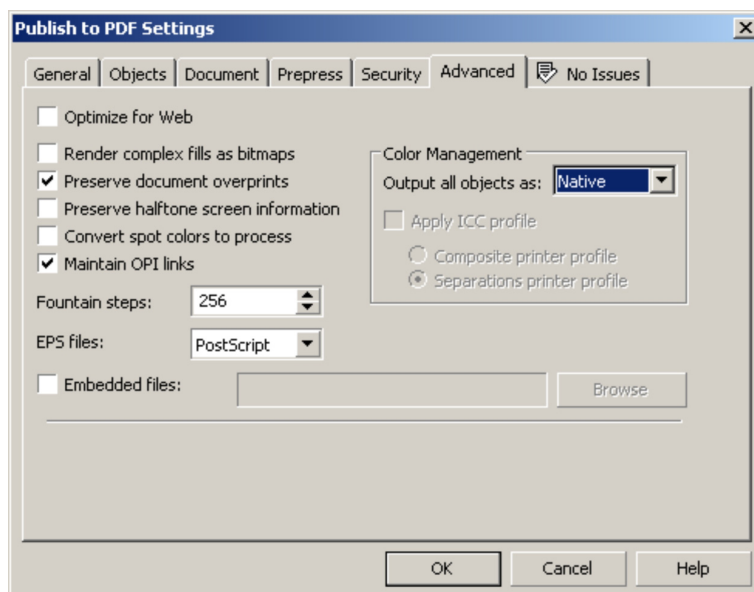
CorelDRAW-Published PDF

CorelDRAW-published PDF will need to be tested in every area where you intend to use it.

To the right, you see the Advanced tab, the Pre-flight Issues tab, and below two copies of the Pre-flight setting dialog for CorelDRAW X4.

In the Advanced tab, these are the settings I suggest for CMYK and for spot color work. Set Color management/Output all objects as “Native.” For objects with complex fills, you may want to check “Render complex fills as bitmaps.” I never apply an ICC profile, as color management is based on proper file construction and applying a profile now to an improperly created file would be of no benefit.

In Pre-flight tab where mine says “no issues,” you can select the Settings button and the pre-flight setting dialog at the bottom appears. You can then select from a list of properties for CorelDRAW to check and save these pre-flight settings to be used each time you publish a PDF.

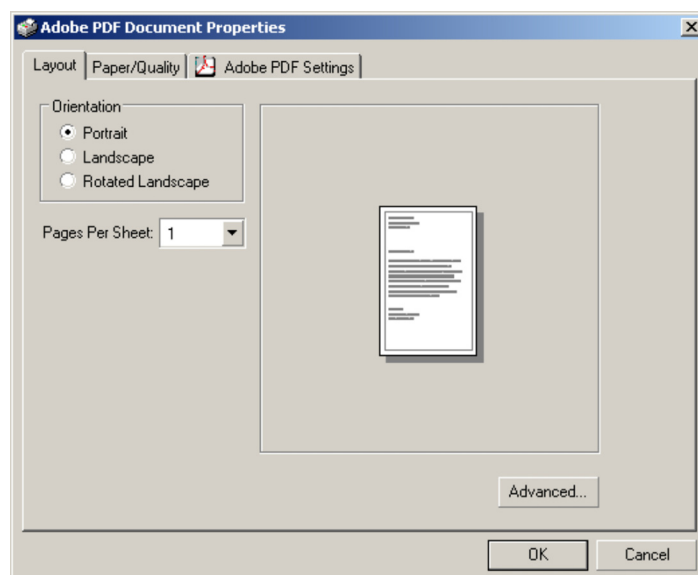
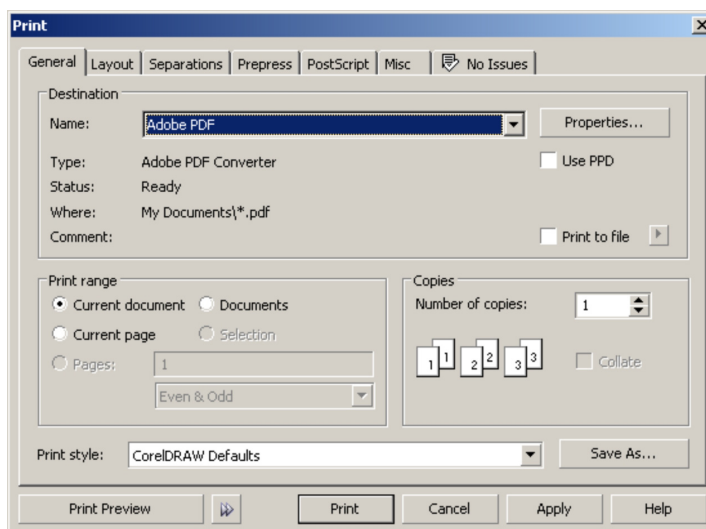
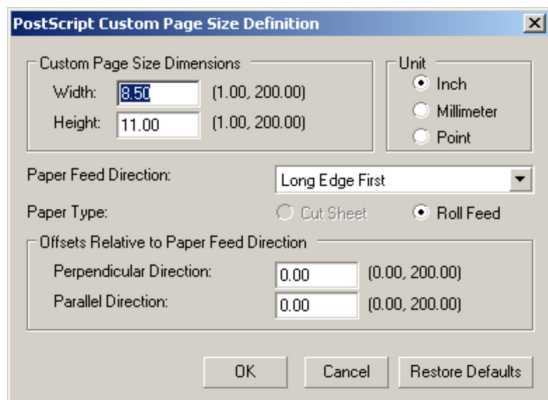
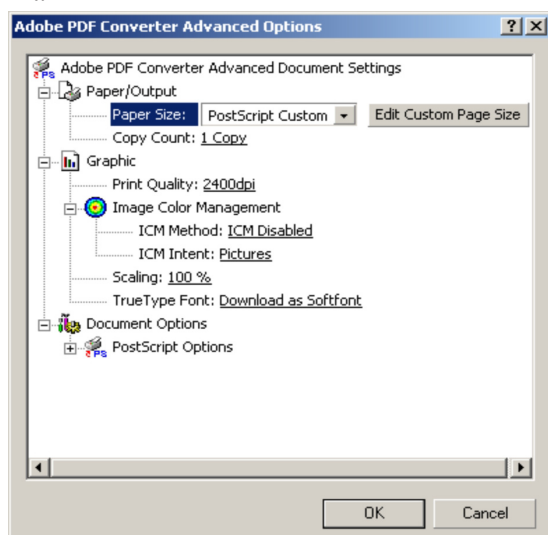


Page layout and printing procedures for publishing to PDF Via PDF printer

To make sure your PDF published through Distiller functions properly, create your CorelDRAW document to have a page size equal to the final trim size of your printed piece, such as 3.5 in. x 2 in. for a business card, 8.5 in. x 11 in. for a letterhead. There are always exceptions and printing a pocket folder or an odd shape would fall into this category. With a pocket folder your page size has to include the unfolded pockets; an odd shape would need to include all the folded or die cut areas and possibly enough room to make sure that fold or die cut marks can be placed manually on the sheet.

In the file menu, select Print and select the Adobe PDF or Distiller printer. **If the printer paper orientation warning is displayed always select no.**

Below to the right, you see the screen capture of the Print dialog with the Adobe PDF printer selected. We will select the Properties button and the Adobe PDF Properties dialog appears, bottom right, where we will select the Advanced button. The Advanced Options dialog, shown below left, appears where we will select the Postscript Custom Page Size and select the Edit Custom Page Size button. The Postscript Custom Page Size Definition dialog appears bottom left. Here is where you set your PDF page size. **For files with no bleed, you will set your print page to be exactly like your CorelDRAW document page size. For files with bleed, your print page size must be large enough to hold the required bleed image, that is an 8.5 in. x 11 in. letterhead with bleed would require a print page size of 8.75 in. x 11.25 in.** Ignore any concept of page orientation. Your CorelDRAW document width is your print page width plus bleed if needed, and the height is your print page height plus bleed if needed. Your PDF will be published to your My Documents folder after you make these settings. Say ok to all dialogs and select Print.



Page layout and printing procedures for publishing to PDF in CorelDRAW

To make sure your PDF published through CorelDRAW functions as best as possible, create your CorelDRAW document to have a page size equal to the final trim size of your printed piece, that is 3.5" x 2" for a business card, 8.5" x 11" for a letterhead. There are always exceptions and printing a pocket folder or an odd shape would fall into this category. With a pocket folder your page size has to include the unfolded pockets; an odd shape would need to include all the folded or die cut areas and possibly enough room to make sure that fold or die cut marks can be placed manually on the sheet.

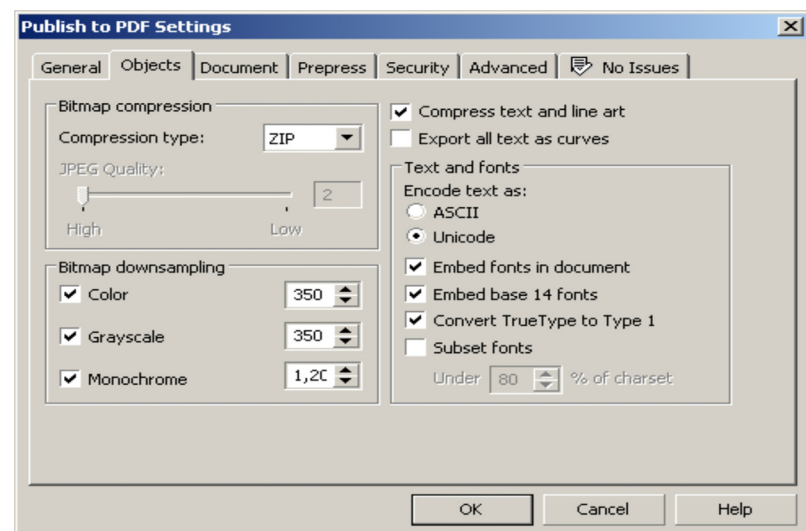
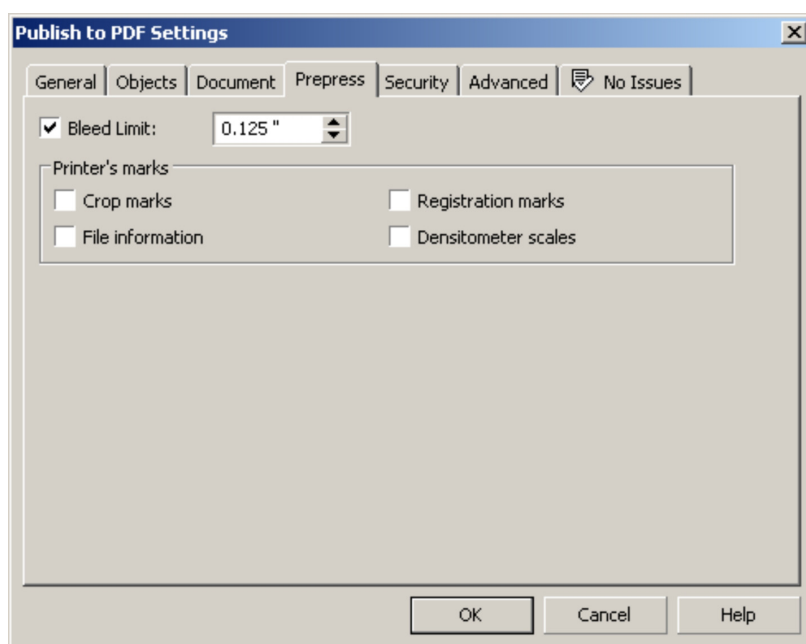
Here is where the issues can arise. There is never a guarantee that a PDF published in any other manner except through Distiller will work in a PDF digital front end; CorelDRAW X4 is no exception. You will need to test the workflow. You publish to PDF from CorelDRAW X4 by selecting Publish to PDF under the file menu, using the setting displayed previously in this tutorial except as below.

The same rules apply for publishing PDF from CorelDRAW except that in the pre-press tab of the CorelDRAW publish-to-PDF settings dialog you will check the "Bleed limit" and the PDF page size will include the bleed setting you selected.

Some workflows do not like this approach to creating bleed. If your test fails because of imposition issues, you may need to create the CorelDRAW document with a page size that includes bleed and do not check the "Bleed limit" in the Publish-to-PDF settings dialog.

The Publish-to-PDF settings dialog Objects tab shown to the right below has settings I have tested. Currently the Unicode setting is unable to be set in a style and this may cause fonts that support Unicode to fail in CorelDRAW PDF. So make sure to check this with every PDF you publish from CorelDRAW X4.

Publishing PDF from CorelDRAW 12 in many cases is unacceptable due to multiple issues that were resolved in X4.



CorelDRAW Color Management Expanded Gamut Printing

CorelDRAW-Published PDF for Expanded GAMUT Printing

The discussion today is expanded CMYK GAMUT PDF output from CorelDRAW X3 and X4. What is this?

This is a process where we create and output properly a CorelDRAW file that has a combination of RGB and CMYK elements utilizing the full GAMUT of a digital device. NOT FOR PRINTING PRESS WORK!

One must remember that all RGB elements will exhibit some color shift when printed. These methods are used to maximize the use of digital device output GAMUTS, minimize the RGB to print color shift, and accurately reproduce CMYK elements.

For example, consider a poster for a flower shop, where we have an image of a colorful floral arrangement and a vector web element where the colors are well out of the CMYK GAMUT. We would like to reproduce this project using the full GAMUT of our Epson printer, which is closer to sRGB. The issue is that the project, along with the RGB elements, requires accurate reproduction of traditional CMYK corporate identity vector and image elements.

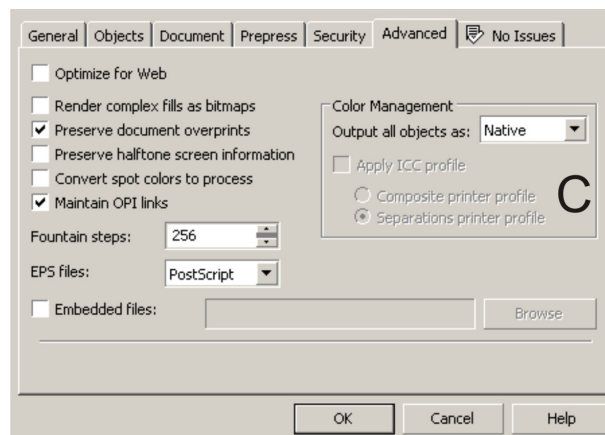
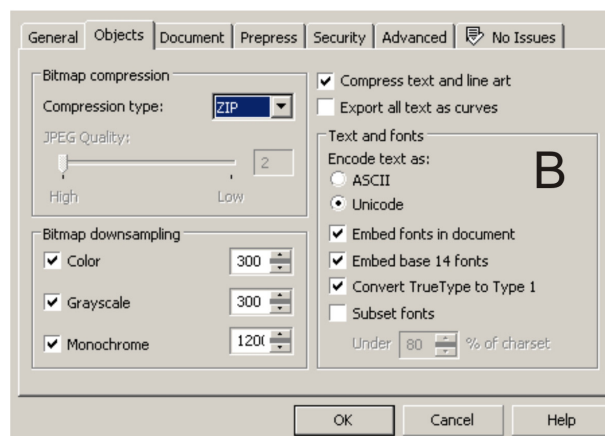
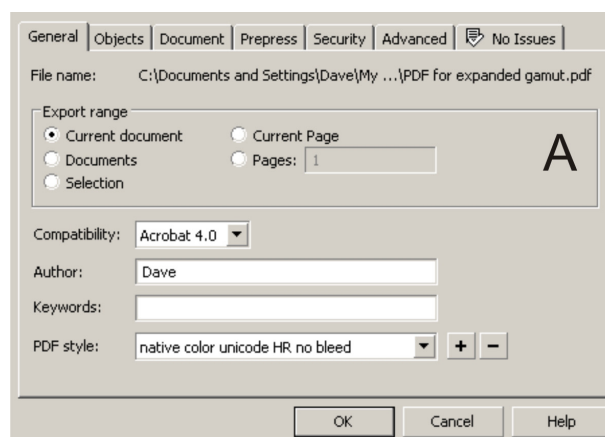
The question is how do we do this? First off, we need to coordinate our color management setting between CorelDRAW and PHOTO-PAINT. The next step is to import your flattened (no layers) images into CorelDRAW and create your vector content properly. Lastly, set up your CorelDRAW publish-to-PDF as shown in captures A, B and C. **Make sure to use Acrobat 4 compatibility in X3 and 6 in X4. Also in X3, RGB transparency will render as CMYK. This is a known issue. In X4 this has been resolved and it will now render as expanded gamut.** The settings you choose in the document, pre-press, and security tabs are up to you.

You must test your CorelDRAW-published PDF before using it for any live jobs at any vendor. Many RIPs properly output CorelDRAW-published PDF files; some will not.

Now some side notes: with your color management set up to render effects in CMYK (Corel X3 default), any special effects you apply to RGB elements will be rendered in CMYK. Also your display will not be proper for RGB elements. This will not affect how they will print.

With your color management setting set to render effects in RGB (default previous versions 12 and before), any effects applied to CMYK elements will be rendered in RGB and will exhibit a color shift when printed. However, the display will show all RGB elements and CMYK elements properly except the effects.

So be aware of what the color management settings will do to you!



CorelDRAW Published PDF for Expanded GAMUT Printing

Now to the how-to part of this. Simply place your properly prepared RGB, CMYK image, and vector elements into DRAW (make sure that image files are flattened, no layers). Then publish and test your CorelDRAW-published PDF using the setting shown in capture A, B and C. Remember our note on the previous page about RGB transparency in X3; X4 will deliver improved performance.

It really is just that simple!

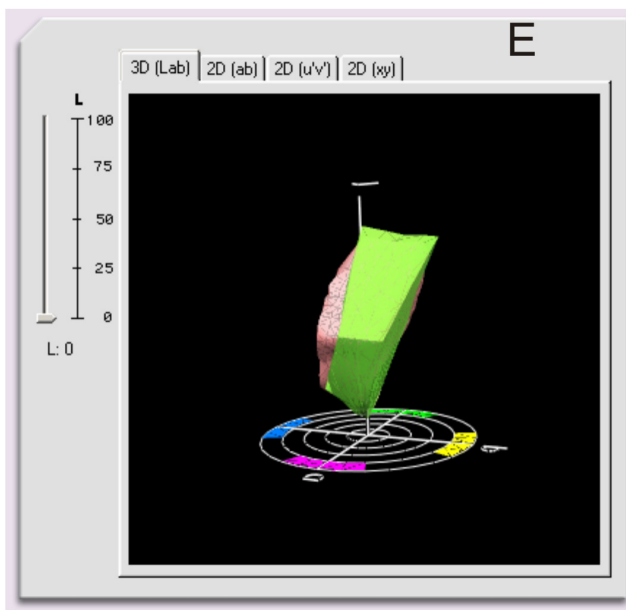
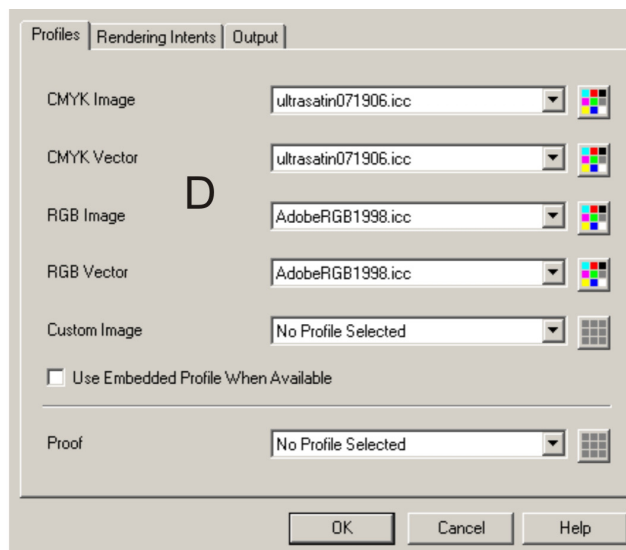
Here's why. Capture D is the ICC profile selection dialog from one of my RIPs. It shows vector and image ICC selections available for CMYK and RGB elements. My RGB and CMYK selections in the RIP must match the Corel RGB internal space and the CMYK separations profile that was used to create each element in the CorelDRAW file and the PDF file. Corel will use the Internal RGB and CMYK separations printer space selected in the color management dialog when we select Native in color management section of the Advanced tab of the publish-to-PDF dialog in Corel. You can then select a proof profile to match a press, or some other custom CMYK configuration (which is what I do and the details are too much to get into with this article). They are called your source profiles.

What takes place behind the dialogs is what makes this possible. Unseen in this dialog, but controlling all color, is a media profile. What that exactly does is a bit complex. This profile limits individual and total ink coverage and linearizes (50% looks like 50%) output specifically for the paper (media) used, allowing the printer to print the widest range of colors possible for that paper. All files are processed through this combination of source, proof, and media profiles controlling all color on the device.

What this does is demonstrated in capture E. The bright green represents a standard CMYK GAMUT (range of colors). The red represents the GAMUT of the ink jet device. The red area is larger and so will be the range of colors we can print with the ink jet device. What happens is that our RGB elements are allowed to print at the widest range of colors possible for the inkjet/digital printer without compressing the color down to true CMYK. We get brighter more vibrant colors, more like digital camera captures and presentation graphics, while our CMYK elements are processed accurately due to our CMYK calibration.

Any RIP that accepts RGB and CMYK elements, accepts Corel-published PDF files, and allows you to choose RGB and CMYK profiles should print these composite RGB, CMYK files properly.

This is a marvelous feature in CorelDRAW X4. I highly recommend that you take advantage of it. I do!



CorelDRAW Color Management for Windows

Setting Up Color Management for Windows

The setup of Windows 2000 and Windows XP for color-managed workflows is very similar. Right click on the desktop, and **capture A** the Display Properties dialog appears. As you can see here, I use an LCD flat screen so the resolution is the native resolution of the display. That is the only resolution in which an LCD display will function at the highest quality. Color quality is set at the highest possible for this system, 32 bit. By selecting the Advanced button, **capture B**, the properties of the combined monitor, video card, and Windows become available. Under the Color Management tab is where you can load the monitor profile created for your system. Every monitor calibration application I have ever used has copied the monitor profile to the Windows color folder and asks if you want to make the profile the default system profile during the calibration process. This is the color space in which all others are simulated.

You need to know that because using a custom monitor profile will totally negate the eyedropper readings you get from an application like Color Cop or Color Mania. They will be reading the changes made to the RGB curve by the monitor profile. Only the eyedropper readings of Corel PHOTO-PAINT or CorelDRAW will be accurate.

Whether you use Windows 2000, XP, or Vista, your color profiles and Windows color folder reside at c:\windows\system32\spool\drivers\color. I highly suggest that, for the Corel Graphics Suite X4, all ICC profiles used on your system should be placed in the Windows color folder.

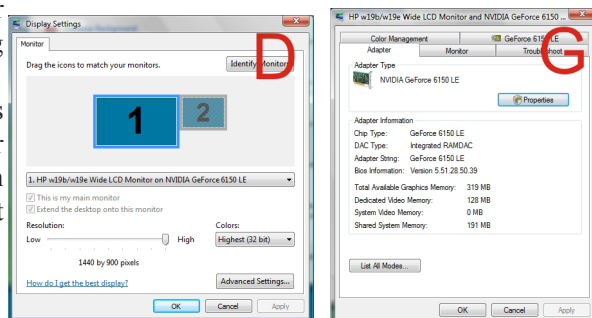
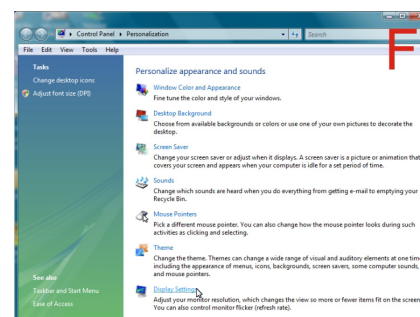
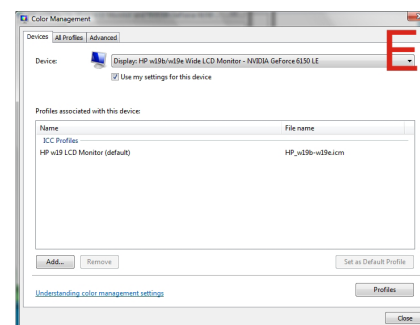
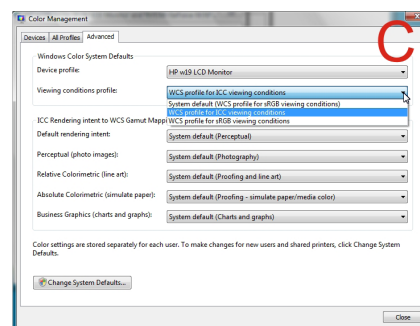
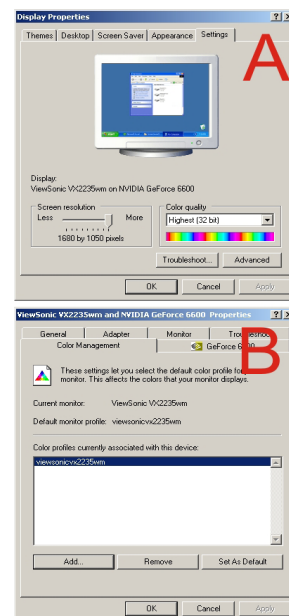
Use only the highest quality color settings as default for your video card before and after calibrating your monitor; do not change those settings. After calibrating your monitor, DO NOT use any adjustments in your monitor menu.

Windows Vista is another animal, all together. Unlike Windows 2000 and XP, after creating and installing your monitor profile, you need to set Vista so that it will use the monitor profile for the proper viewing conditions. Otherwise your display in the Graphics Suite will be incorrect. You see this in **capture C**, the Advanced tab of the Vista Color Management dialog. In the viewing conditions profile area, the default setting is WCS profile for sRGB viewing conditions. **You must select the choice highlighted in blue, "WCS profile for ICC viewing conditions."** Make sure your calibration application did load the custom monitor profile. If not, select it in the Advanced tab as the device profile. Then after you coordinate the color management settings in the CorelDRAW Graphics Suite, files that were created in previous versions of the Suite will match when displayed and printed in Vista. The caveat is that you properly use the CMYK or RGB mode of operation of the Suite.

The Device tab of the Vista color management dialog is shown in **capture E**. It is activated by choosing the display setting in **capture F**, the Control Panel Personalization dialog. You activate this by right clicking on the desktop and selecting Properties.

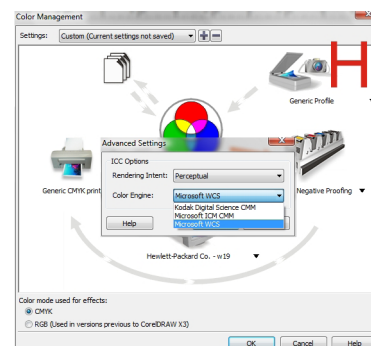
You can also access the display setting directly through the Control Panel which will bring up **capture D**, and the Advanced setting button brings up **capture G** where the Color Management tab will bring up **capture C & E**.

Vista has many modes of configuration, however the commands as shown in **capture C & E** are what you require.



Setting Up Color Management for Windows

The only significant difference between the CorelDRAW Graphics Suite X3 and X4 on Vista is shown in **capture H**. This is the main color management dialog in CorelDRAW X4 with the Advanced Setting activated in the Internal RGB. Notice that I have chosen Perceptual Rendering and the drop down shows the Kodak, Microsoft ICM, and the Microsoft WCS color engines as choices. If you have the Adobe Color Engine (ACE) installed on your system as a third party color engine, X3 and X4 will support that also. Support for WCS is new to the Graphics Suite in X4 under Vista. Activate the main color management dialog in CorelDRAW or PHOTO-PAINT under the Tools / Color Management menu.



I have tested many images that I have had on my systems for multiple versions of the Graphics Suite using X4 and the Windows Color System on Vista. These are known images with predictable conversion values that I have tested for years, and X4 on Vista using the WCS has provided the same results as every other version back to version 10 for RGB to CMYK, CMYK to RGB, RGB to RGB, and gray scale conversions -- provided you have coordinated your color management settings. Conversions from RGB to LAB in the application menu in X4 on Vista using the WCS color engine provides less than a .005 difference in the conversion when compared to X4 on XP using the Kodak engine. As there are an infinite number of print drivers, I suggest that you test any in print stream RGB to CMYK conversions before using them on live jobs.

While WCS (Windows Color System) color profiles are not compatible with ICC profiles, the system does place color tag information into an image so systems that use only ICC profiles can identify the color space of an image.

The RAW LAB in Corel PHOTO-PAINT X4 running under Windows XP and the Kodak color engine, and under Vista and the Windows Color System produce exactly the same results.

The Authorization Bug?

When reading early reports on Windows Vista, there was a great deal of discussion on some web sites about what was called the authorization bug. This is where, when Windows asks your permission to authorize the use of a specific file, it darkens the screen and then was supposed to fail at reloading the custom monitor profile. I spent a great deal of time reading the various associated web sites and articles on this issue. What I came away with was that most of those writing the articles left me with an impression that they didn't understand how to use the Windows operating system. I did my testing for this book in December 2007 on a fully updated version of Vista Home Premium and Business Ultimate and I could not reproduce the authorization bug. This may be that the issue had already been resolved through Windows service updates. As Microsoft has not mentioned the specific issue, I do not know. What I can tell you is that screen captures taken while the custom profile was known to be honored, and after an authorization event, were identical, suggesting to me that it was resolved.

I may as well address what I feel is the other Windows color management myth. That myth is that Windows does not load the custom monitor profile during system startup. Windows does load the custom profile when the system boots. Simply follow the instructions on the previous page.

In case you have such issues, I print **AT YOUR OWN RISK INSTRUCTIONS** to disable the User Account Control from darkening the screen. Doing this affects the default Windows security built into Vista; do so at your own risk. Doing this incorrectly may adversely affect your system. Do so at your own risk.

Vista Business/Ultimate. Type in Security in the start menu search box. The local security policy should be the top search item. Open the local security policy window and scroll down to the Local Policies/Security Options. On the right-hand window scroll down to User Account Control; switch to secure desktop when prompting for elevation; double click on the item and change it to disabled. Then click Ok.

Vista Home/Premium. Go to start menu search and open regedit; Scroll to this registry key [HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System]. You should see a key called promptonsecuredesktop. Double-click this and change the value to 0.

Making the change discussed in this article will give somebody the ability to "take over" the UAC dialog. Unlikely unless they have already penetrated your system with spyware.

AFTERWORD

As previously stated, the CorelDRAW Graphics Suite color management and the documentation supplied for it by Corel can best be described as a mostly functional conglomerate of incomplete processes. Believe me, I understand the material is not only detailed but that there is a large volume of it to digest. However, hopefully after reading the material a few times, you will understand that the key word for color management in the CorelDRAW Graphics Suite is **FUNCTIONAL!** The key now is that, with this book, you have a resource to understand how to properly use the features.

After taking the time to digest this material, you as a user of the CorelDRAW Graphics Suite now know:

- the answers to the question, “What choices do I make in the color management dialog?”
- basic color management terms and where they apply to Corel dialogs
- how the Corel color management dialogs function
- the importance of and the procedures in monitor and printer calibration
- how to locate, organize, manage, and use ICC profiles to improve your Corel graphic experience
- how to set up your files and color management for general processing and specific situations
- how to coordinate your color management settings with Adobe
- how to coordinate color management for use with various PDF workflows
- how to set up Corel and Windows color management for proper operation
- the proper conversion process to create files that will properly print and display in presentations and on the internet
- the effect of using CMYK profiles on an RGB image before converting to gray scale

The digital creation of graphic files and the applications that are used for that purpose are constantly evolving. The use of this publication can bring the CorelDRAW user’s understanding of how to use the application up to date with the current release of the CorelDRAW Graphics Suite X4 and the Windows Vista operating system. There will be updates to this publication in the future so we may continue our voyage!