



HP Scitex FB500 Printer  
HP Scitex FB700 Printer

White Ink Workflow Guide

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# 1 - Introduction

This guide will show you how to get started printing with white ink. It assumes that your printer is installed, it has been upgraded to work with white ink, and that white ink is loaded and ready to print. If your printer needs to be upgraded, contact your HP representative.

This guide includes the following topics:

- How printing with white ink works in the printer, design applications, and RIPs
- How to design for white ink in Adobe Photoshop and Adobe Illustrator
- How to print jobs with white ink via the Caldera and Onyx RIPs
- White ink profile selection (flowchart)
- Troubleshooting

Other graphic design software may have similar capabilities and procedures. Refer to the software documentation for details.

The images throughout this document were captured using Windows XP and Adobe Creative Suite 3. Other operating systems or software versions may have a slightly different appearance.

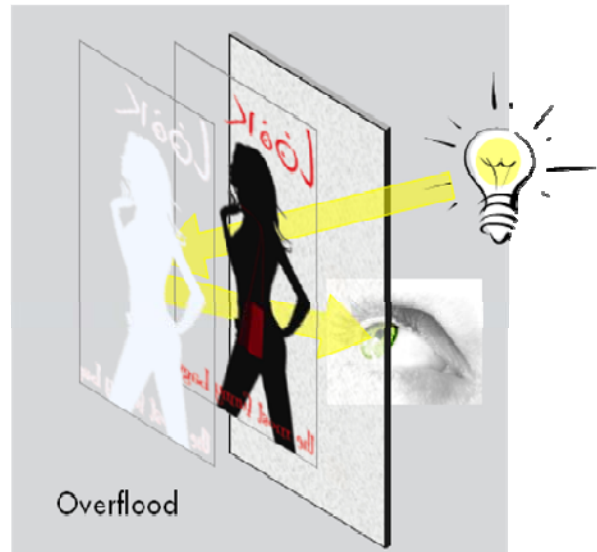
## Related documentation

- White Ink Example Files Tutorial
- HP Scitex FB500/FB700 Printer User Guide

## Printing with white ink

When equipped with the White Ink Upgrade Kit, the printer can print white ink and color ink in any of three methods, depending on the intended application and media to be used:

- An *Underflood* is when the white is placed under the color ink, typically used for printing on non-white opaque media such as black.
- An *Overflood* prints the white ink over the color ink and is normally used when the printed image will be viewed from the reverse side through clear media.
- In *Spot* mode, the white and color inks are printed on the same plane, in-line with each other. This mode is used for some backlit applications and printing white ink only on colored opaque media.



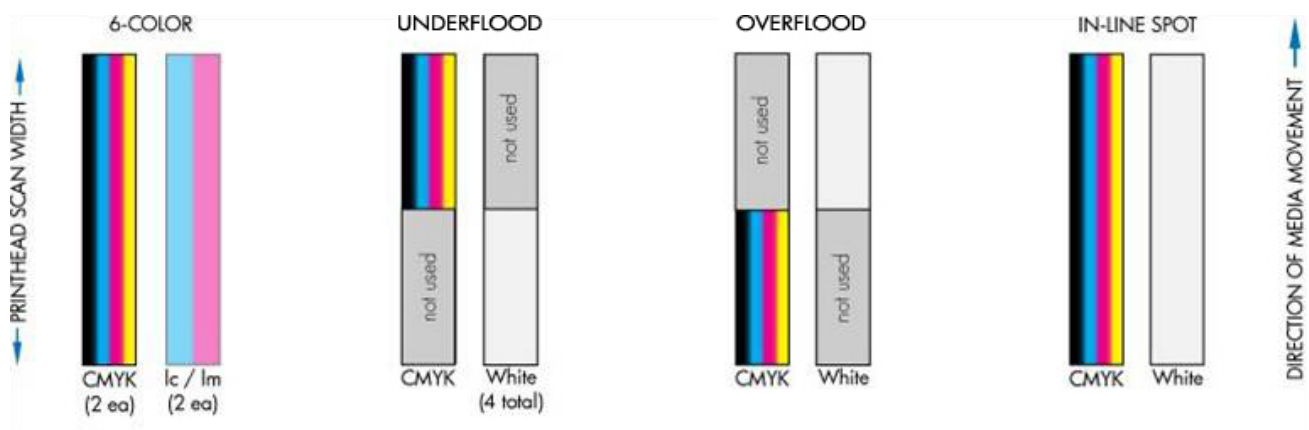
### Printing with white ink: underflood, overflood, spot

Selecting which mode is used and the order the printer lays down the ink is determined by the Media Profile selected in the RIP. This will be covered in more detail in chapters 4 and 5.

Most RGB and CMYK files are designed to print using a standard set of CMYK colors on white media. Printing with white ink often requires additional steps at the RIP to add white ink data to the print job or within the file itself, or both.

In overflood / underflood applications, the printheads are divided roughly in half to allow printing of white under color (underflood) or white over color (overflood). Print speeds are just under half that of 6-color printing.

For spot applications, the full width of printheads are used and white is printed in-line with color. This mode prints at the same speed as 6-color printing.



- In the **6-color** printhead configuration, the printheads move back and forth as media advances.
- In the **underflood** printhead configuration, the printheads are split to lay down white before color ink. This reduces print speeds by approximately half that of the 6-color modes.
- In the **overflood** printhead configuration, the printheads are split to lay down white after color ink. This reduces print speeds by approximately half that of the 6-color modes.

- In the **in-line spot** printhead configuration, the full width of printheads are used and white is printed in-line with color. This results in print speeds comparable to that of 6-color modes.

Controlling where white ink is placed is done in the RIP or in the design application (such as Adobe Photoshop or Illustrator).

You can adjust 4-color CMYK files at the **RIP** to add white ink:

- where there is color (underlay)
- where there is no color (mask)
- throughout the entire image (flood)

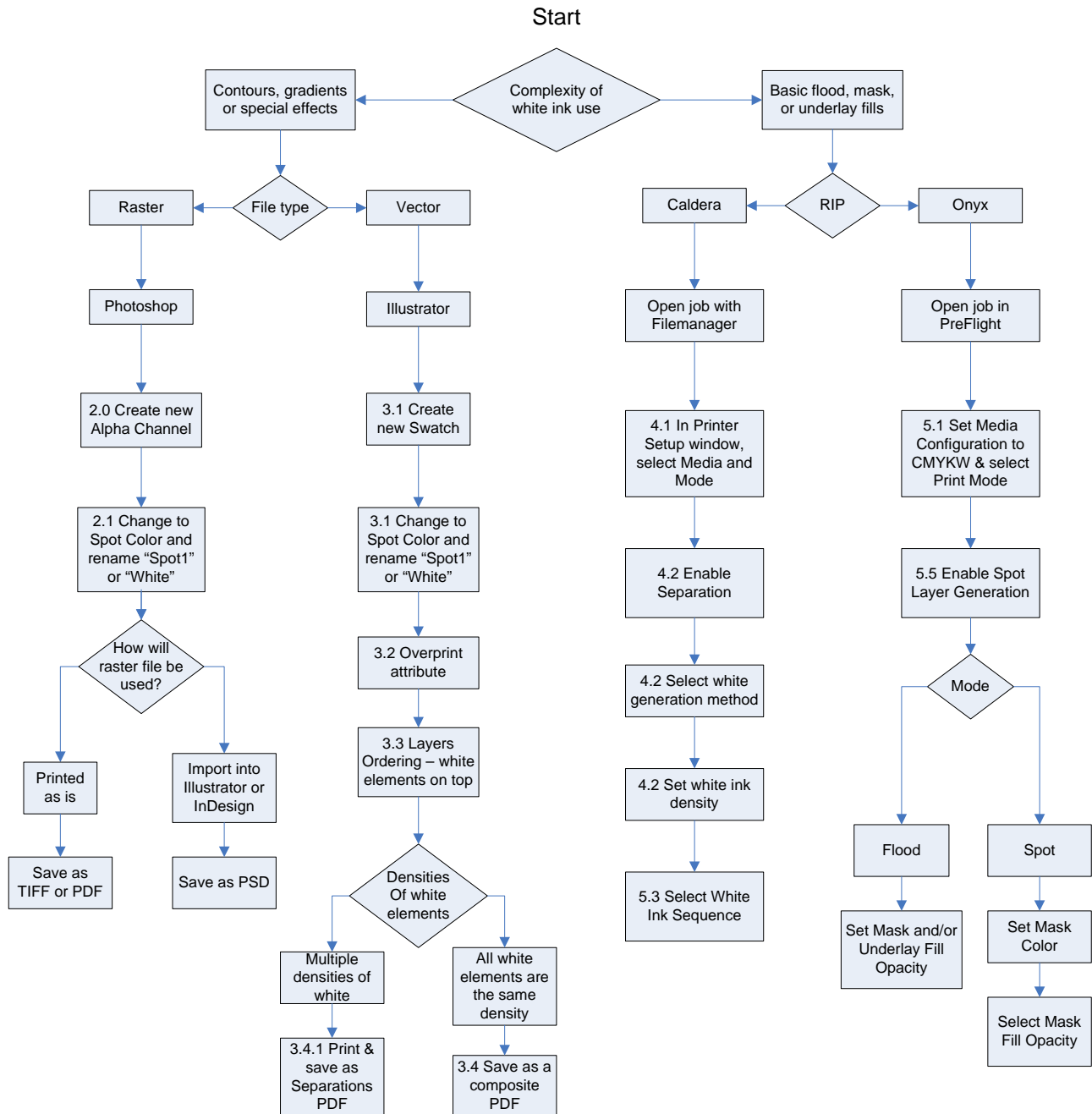
Using the RIP to add white areas simpler than using the **design application**, but provide less control of where white is used.

Adding a fifth channel in the design application provides precise placement of white ink:

- Add an alpha channel in Photoshop to raster images
- Add a spot layer in Illustrator to vector images

These options require more time with the design application, but provide more control of white ink placement.

# White ink workflow

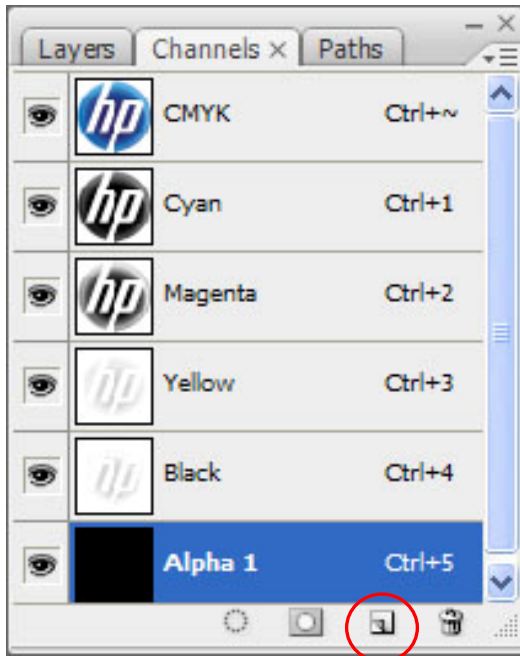


The numbers in the above flowchart refer to chapters within this document where the procedure is discussed in detail.

## 2 – Designing in Adobe Photoshop

White ink data is defined in Photoshop using an Alpha Channel or Spot Channel. In Photoshop, create or load an existing file. Ensure that *Channels* window is visible. If you do not see it, click on *Window* and choose *Channels*.

Create a new channel using the *Create new channel* icon at the bottom (📄).



**Image 2.1: Channels**

**Note:** this image above and throughout this document were captured using Windows XP and Adobe Creative Suite 3. Other operating systems or software versions may have a slightly different appearance.

When you first create your new channel, it will be called Alpha 1 and you will see the channel fill the entire image at 100% coverage. You will have the ability to change its name, color and opacity. The color and opacity are only a visual representation of the channel within the application and do not affect the printed output. The name is important as it needs to be associated with the white ink channel in the RIP software. Both Onyx and Caldera allow you to use any name and map that name to the white ink within the RIP, and each has a default name. For simplicity and clarity, only the default names will be used in this document. For Onyx, rename the Alpha Channel to “Spot1”. For Caldera, rename it to “White”.



## Channels as spot colors

To use the channel as a spot color, you must modify the channel options. Double click on the channel, or from the Channels menu choose *Channel Options*. A *Channel Options* window appears.

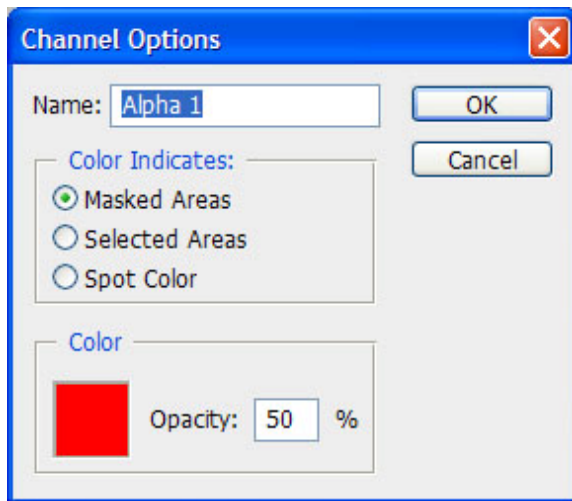


Image 1.2: Channel Options

Change the name to “Spot1” or “White”, depending on which RIP you are using, as discussed previously. Under the *Color Indicates* option, select *Spot Color*. You can change the *Color* option to select any color or opacity to visually represent the channel data when viewing the file in the application without affecting the printed color. This is helpful to differentiate the white ink spot color from areas that are blank or have no color data. It is recommended to select a color that is not present in the original file or leave it on the default setting.

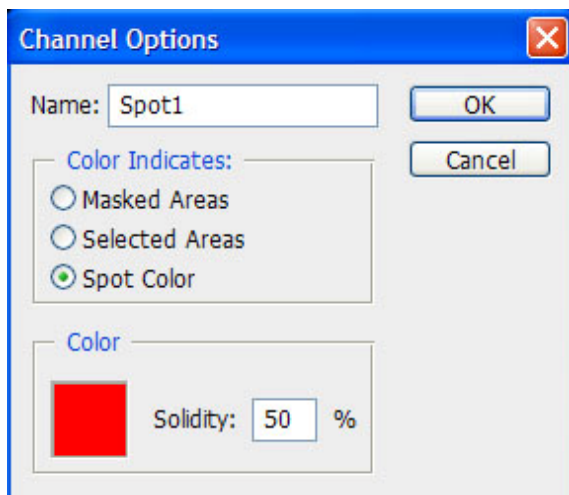
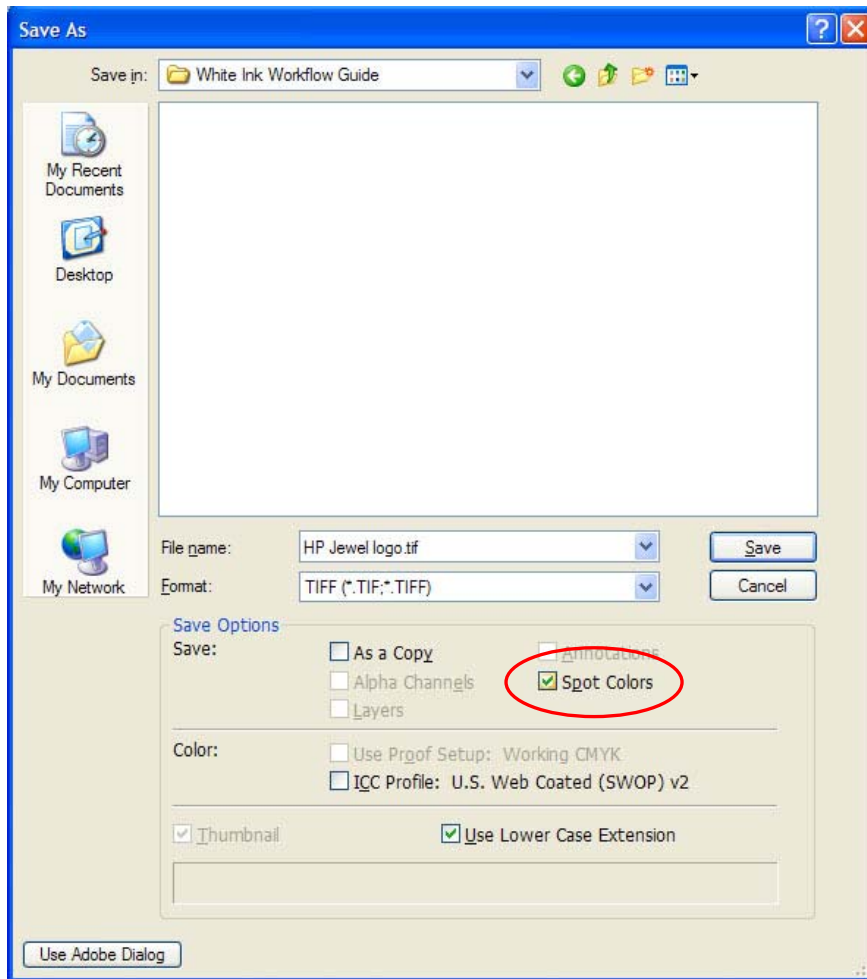


Image 2.3: Modified Channel Options

When you save your file you will see *Spot Colors* checked under *Save Options*. This is available only when you have assigned your channel as a spot color. By default this option is checked.



**Image 2.4: Save As Window**

If this raster file is going to be imported into another Adobe application, such as Illustrator or InDesign, it must be saved as a Photoshop PSD, otherwise the spot channel data will be discarded when imported. If the file is going to be opened directly from the RIP software and printed using its spot channel information, it can be saved as a TIFF or PDF.

## Designing your channel

Designing the white spot channel is much like using a *Layer Mask*, except that color (the color you indicated in Image 3) indicates white ink data. Remember that blank/white areas indicate no data therefore no white ink. You can use the same tools that are available for *layer masks*.

For more information on what you can do with your custom channels, use the Photoshop Help function.

## Creating a “whitescale” image

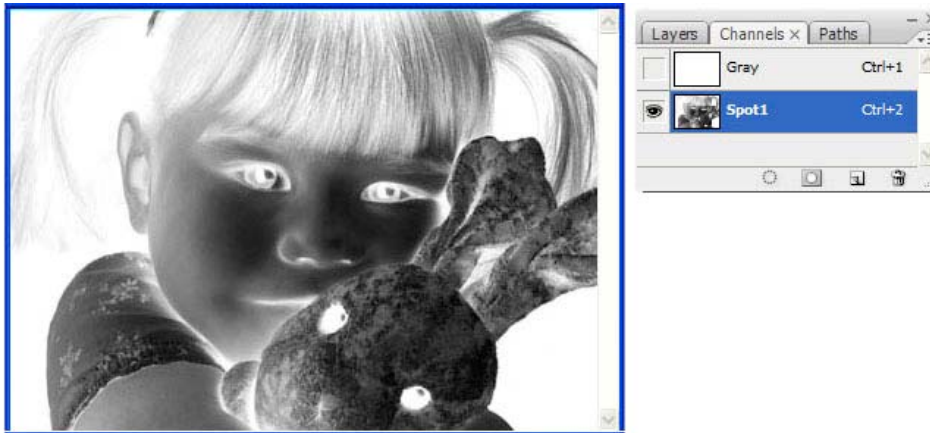
Printing grayscale images using only white ink is a fairly simple process and produces impressive results when printed on black media.



**Image 2.5: Whitescale image printed on black media**

Open a file in Photoshop. Convert it to grayscale by selecting *Image, Mode* and then *Grayscale*. Go to the *Channels* window and click on the *New Channel* icon ( ). A new channel named, Alpha 1 is created. Double-click on the new channel and in the *Channel Options* dialog box; change the name to "Spot1" (Onyx) or "White" (Caldera), select *Spot Color* under *Color Indicates:* and click *OK*.

Select the original channel and invert it by selecting *Image, Adjustments* and then *Invert*. Select and copy the entire image to the new channel. Go back to the original channel and delete all of its contents (select all, delete). Save the file as a TIFF with Spot Colors selected.




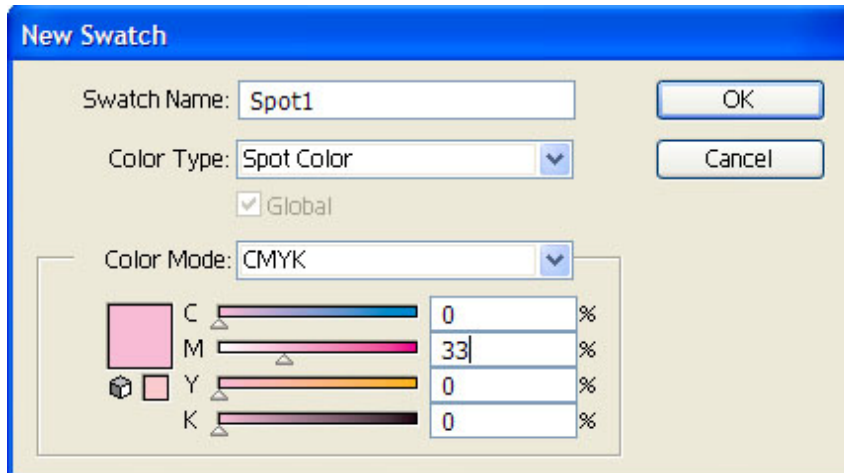
**Image 2.6: Whitescale image as seen in Photoshop**

## 3 – Designing in Adobe Illustrator

White ink data is defined in Adobe Illustrator and InDesign as spot colors. This chapter will cover the steps used within Illustrator only, although similar steps are used in InDesign. For more information about using spot colors within InDesign, refer to the InDesign Help function.

### Creating and using a spot color


To begin, ensure that the *Swatches* window is visible. If you do not see it, click on *Window* and choose *Swatches*. Create a new swatch using the *New Swatch* icon at the bottom (  ).



**Image 3.1: New Swatch Window**

Change the Swatch Name to “Spot1” (Onyx) or “White” (Caldera). Change the *Color Type* to *Spot Color*. These two steps are important for the RIP software to automatically assign your spot color to the white ink channel.

You can change the color to visually represent the white ink spot when viewing the file in the application. This is helpful to differentiate the white ink spot color from areas that are blank or have no color data. It is recommended to select a color that is not present in the original file.

Once you have created the spot color swatch, it is ready to be used in the design of your file. The swatch is found in the *Swatches* window. It has a small dot in the lower right corner of the swatch to indicate that is a spot color (  ). Selecting it will cause the Color window to change (see Image 6 below).

You can control the density of white ink using the slider or numerical control in the Color window. Note that using the *Transparency* control will also affect the density of the spot color and has a cumulative effect (70% density with 50% transparency results in a overall density of 35%).

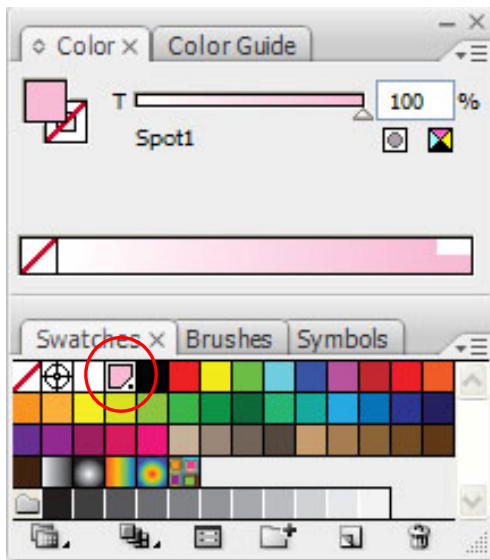


Image 3.2: Color and Swatches windows

## Overprint attribute

**NOTE:** In another context, the term *overprint* is used to discuss a configuration for full-bleed or edge-to-edge printing. In this document and context, *overprint* is used in its traditional graphic design sense. The overprint settings discussed below are unrelated to edge-to-edge printing configuration on the printer itself.

Normally, when you create and print overlapping elements, the top element knocks out the area of the element underneath. This is the default mode for Illustrator. In the example below, a box was created using the spot color swatch (white ink) and yellow text was placed on top. The yellow text knocks out the spot swatch data below. The two colors do not mix. If this was printed on black media, the yellow text would have no white ink underneath it and would be difficult to see the yellow.

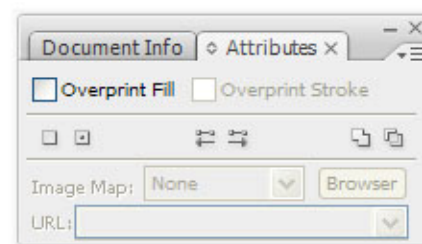


Image 3.3: Overprint attribute off (default setting)

Overprinting prevents knockout and allows elements to print over or under other elements. This is important when using white ink as a spot color. You must enable the overprint attribute when the artwork needs to be printed over top of or under the white ink. This option is found in the *Window* menu under *Attributes*. When you select your shape the options for *Fill* and *Stroke* will be available based on the object's characteristics.

If the example below was printed on black media, the yellow text would print on top of a uniform box of white ink.

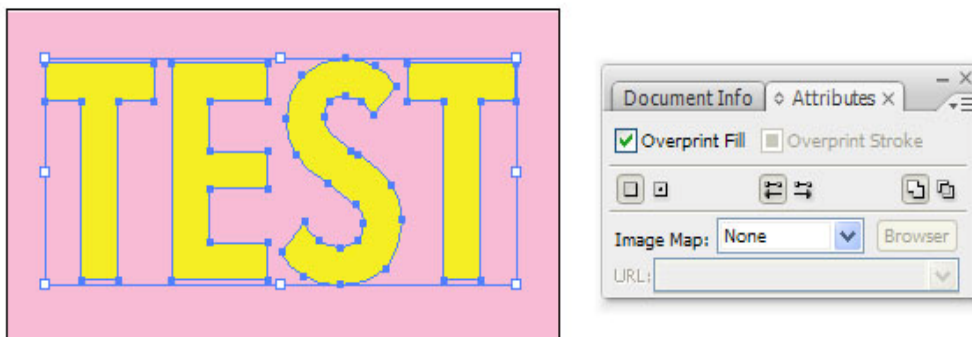


Image 3.4: Overprint attribute on

## Layers ordering

When printing using a spot color swatch, the order of the design elements, or *Layers*, is important. As a general rule, you want to place all of the elements that contain the spot color swatch (white ink) in the top layer and place color elements and images in the layer below. Also, if the top (white ink) layer contains both knock out elements and Overprint elements, place the elements with the *Overprint* attributes at the bottom of the top layer.

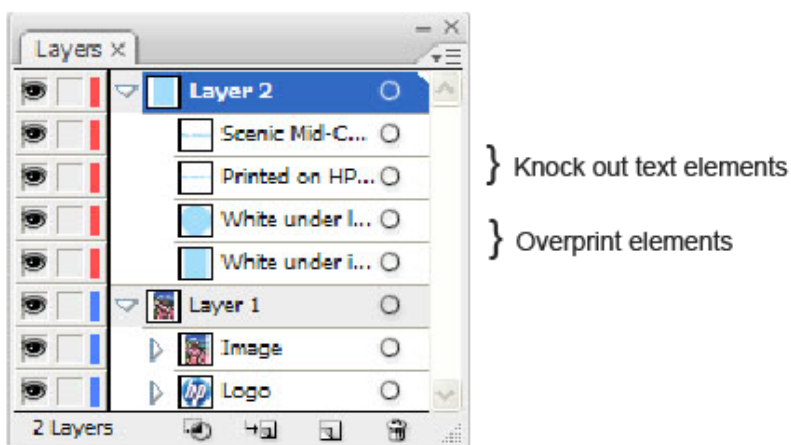


Image 3.5: Layer order

The order of the Layers in the image file does not affect the order of how the printer lays down the ink (white ink under color or color under white ink). This is controlled in the RIP software.

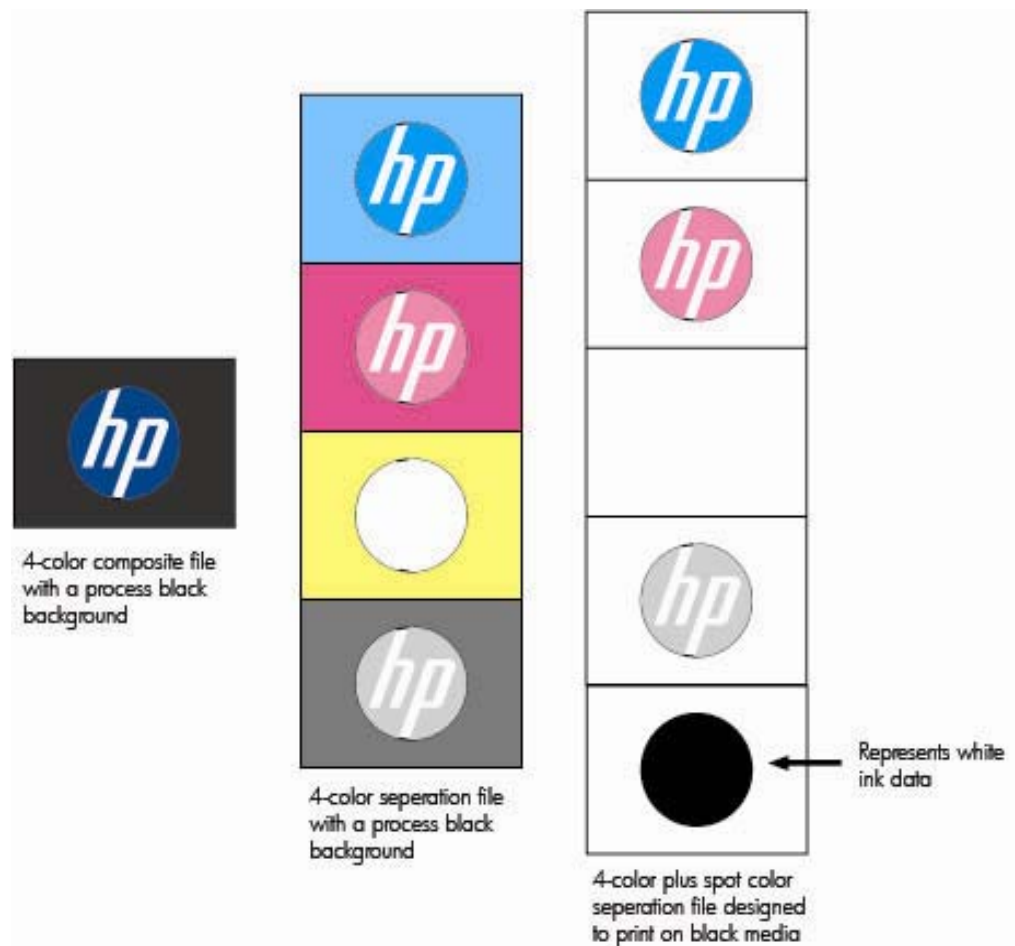
## Saving the file

It is recommended to save your file in Adobe Acrobat (PDF) format. While it is possible to save Illustrator files with white ink data out as a Postscript (PS) or Encapsulated Postscript (EPS) file, it is important to remember that of the three file types, only PDF supports transparency. This is important if your file has white ink data that crosses a transparency bounding box. When this happens, a PS or EPS file will flatten the transparency. As a result the white ink data is lost. In order for the white data to be maintained in transparency regions, you must save it to a PDF version 1.4 or higher (1.7 is recommended). Do not use any of PDF/x standards as most of these standards will flatten your transparent regions.

When saving the file as a PDF, Adobe Illustrator can output to either a composite or separation file. Composite files contain all the image color data on a single page. When you view the file, you get a full color display of your image. Most files you encounter are composite files. When printing with white ink, composite PDF files only work when the spot color swatch in the file has a single density. If the spot color swatch has more than one density, or uses a gradient, the file must be saved as a *Separation File*.

## Creating a Separation File

Creating a separation file involves using Illustrator's printing function. "Printing" a separation file takes the color data and creates multiple pages (also referred to as plates.), one for each color channel. A standard CMYK file contains four pages. Files containing a spot color have a fifth page.

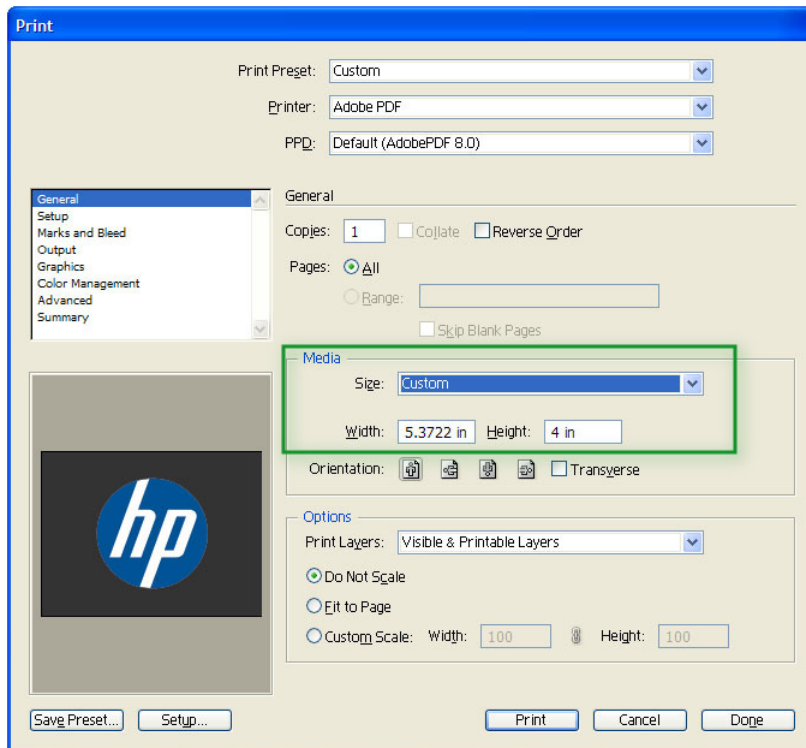


**Image 3.6: Composite file and representations of 4-color & 4-color + Spot separation files**

Unlike the representation above, when viewing a separation PDF file, the pages will be in black and white. Each page will reflect where that particular channel contains data (some percentage of black) and where it does not (white).

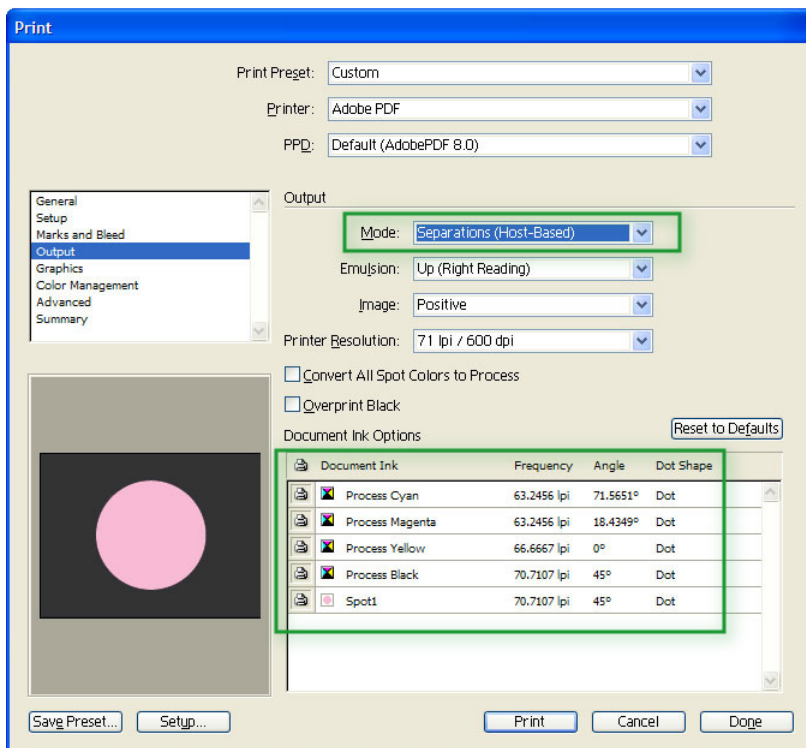
To save your file as a separation file, select *File* and then *Print*. In the print dialog window change the *Printer* to *Adobe PDF*.









**Image 3.7: Print to PDF - General**

You will likely see that the image preview is not sized correctly. The Adobe PDF printer uses standard page sizes, such as letter or *Defined by Printer*. To adjust the image to your art board size, change *Media Size* to *Custom*. Click on *Output*, located to the upper left of the *Print* window.



**Image 3.8: Print to PDF - Output**



Click on the *Mode* drop down menu and change from *Composite* to *Separations (Host-Based)*. This option indicates that this computer (your workstation, rather than the RIP) will create the separations. Once selected, the *Document Ink Options* change. You will see it lists the four process colors and the spot color. Next to each of the separation colors are  and  icons. These icons designate spot colors () and process colors ()

Select *Print* and when prompted, enter a file name and location to save the file.

## 4 – Printing white from Caldera

Depending on the file and how you setup your white ink data, there are specific methods to get your white ink data recognized by the Caldera RIP software. There are tools within the RIP software to apply white ink to a RGB or CMYK file. The RIP software can also process files that have white ink data in the file itself. The first step, however, is selecting the media profile.

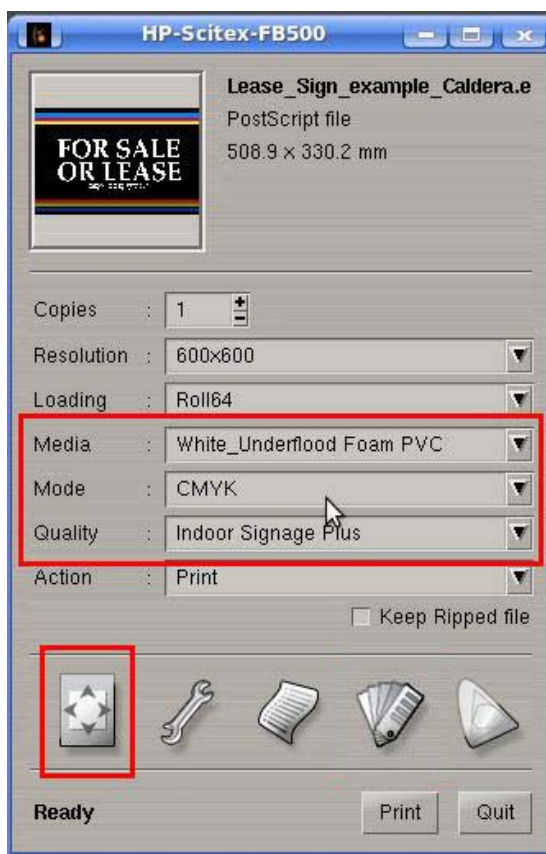
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**NOTE:** Refer to the Caldera GrandWhite documentation for updated and detailed information.

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### Selecting the media profile

Open the printer setup window by clicking on the HP Scitex FB500/FB700 printer button..



Note: When selecting the Quality mode, do not select Photo Plus, Outdoor Signage or Express Quality modes as these are not supported with white ink and will cause an error.

Image 4.1: Printer setup window

Press the *Page Setup* icon in the lower left corner for detailed white ink setup options.

### Enable Separation and Method selection

Click on the tab labeled *White* in the Page Setup window.

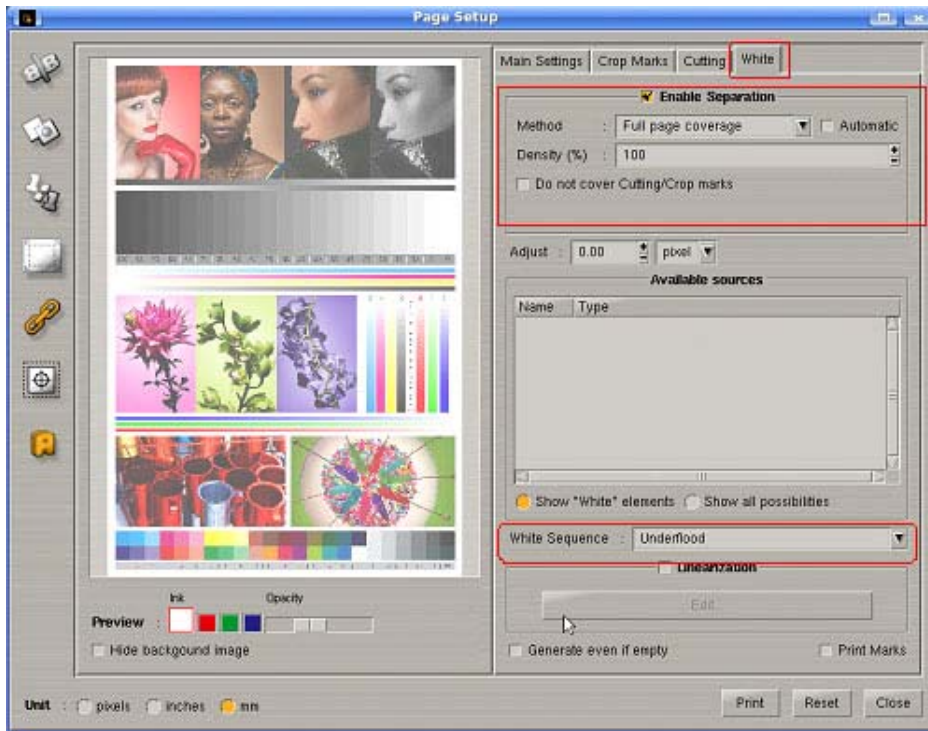


Image 4.2: Page Setup window

Click on the Enable Separation checkbox, and then select the *Method* for generating the white ink layer. The Method selection identifies what data will determine where white ink will be used. Choices are:

- **Use a Spot Color** – for files that have been created in Illustrator and contains a spot color identified as “White”. See section 3.1 for more detail.
- **Use an Extra-Channel** – for files that have been created in Photoshop and contains an Alpha channel spot color identified as “White”. See section 2 for more detail.
- **Fill a contour** – for files that have been created in Illustrator and contain a spot color stroke identified as “WhiteContour”. See *Caldera GrandWhite – User Guide* for more detail.
- **Generate from CMYK data** – selecting this provides three options:
  - Generate where there is some ink - a white ink fill is added to areas where there is CMYK image data
  - Generate where there is no ink - a white ink fill is added to areas where there is no CMYK image data.
  - Use a transfer function – a more precise method, using a look up table to adjust white ink, by pixel, based on the density of CMYK ink
- **Full page coverage** – this option generates a white ink fill over the entire page.

The density of the white ink can be controlled by entering a value in the *Density (%)* box for all but the Use a Spot Color and Use an Extra-Channel options as these are controlled within the design application. You can also choke and spread the white ink by changing the *Adjust* value.

## White ink sequence

In the lower right area of the *White tab* in the Page Setup window is the White Sequence selection box. This selection determines the order of which the printer lays down white ink in relationship to the CMYK color ink.

- **Underflood** – Prints and cures white ink immediately followed by printing and curing the CMYK ink over the white.
- **Overflood** – Prints and cures the CMYK ink immediately followed by printing and curing white ink on top. This mode is used when viewing the color image through clear media.
- **Spot** – Uses the full width of all printheads to deliver CMYK and white ink at the same time. In this mode, white and color areas cannot overlap.

## White ink preview

A preview of the page is displayed at the left. Normally it displays the CMYK data and white data, however to more clearly see the white ink only, click on the *Hide background image* checkbox in the lower left of the preview area.

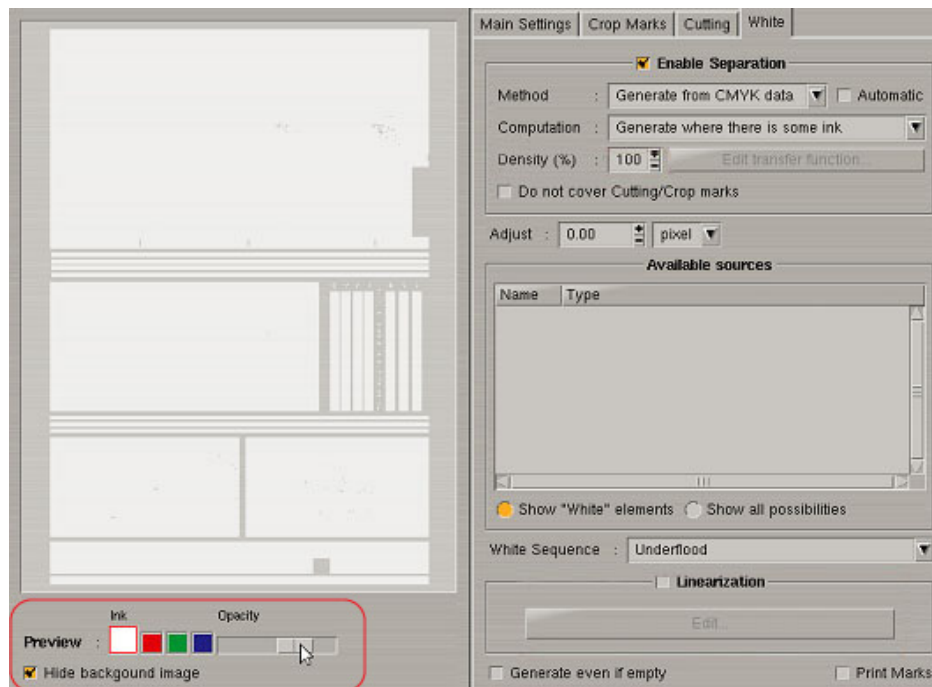


Image 4.3: Preview of white ink with CMYK data hidden

Once you are satisfied that the white ink has been set correctly, submit your job to print.

## 5 – Printing white from Onyx

Depending on the file and how you setup your white ink data, there are specific methods to get your white ink data recognized by the Onyx RIP software. The procedures and examples in this document refer to Onyx PreFlight. Similar capabilities are also available with Onyx PreEdge.

This section discusses:

- Selecting the media profile
- How to use tools within the RIP software to apply white ink to a RGB or CMYK file
- How to use files that already have white ink data in the image itself

### Selecting the media profile

With the image file open in PreFlight, from the *Printer & Media* tab, select a Media Configuration for the type of job you intend to print. To utilize white ink, select one of the CMYKW media configuration profiles. Selecting which CMYKW profile will determine both the order the printer lays down white ink versus color ink and the print mode which determines the print speed and image quality.

- **CMYKW Underflood** – Prints and cures white ink followed by printing CMYK ink over the white.
- **CMYKW Overflood** – Prints and cures the CMYK ink followed by printing white ink on top.
- **CMYKW Spot** – Uses the full width of all printheads to deliver CMYK and white ink at the same time. In this mode, white and color areas cannot overlap.

The default media configuration profiles include the most common print order and print mode combinations.

### TIFF Files with alpha channel

If the file being used is a TIFF file with an alpha channel (Spot1), getting it into Onyx is very simple. Open the file in PreFlight. Onyx will automatically take that alpha channel in the image and assign it to the white ink channel in your media profile.

### Composite PDF, PS, or EPS files

If using files from Illustrator, you need to enable *Overprint*. In Onyx X10 this is enabled by default for PDF files only. In earlier versions of Onyx, or when using non-PDF files in version X10, files need to have this option enabled manually. To do this simply go to the *Setup* menu in the Onyx Rip-Queue, choose *PostScript* and click on *Configure Rip*. Place a check mark next to the option *Overprint* and close by clicking *OK*.

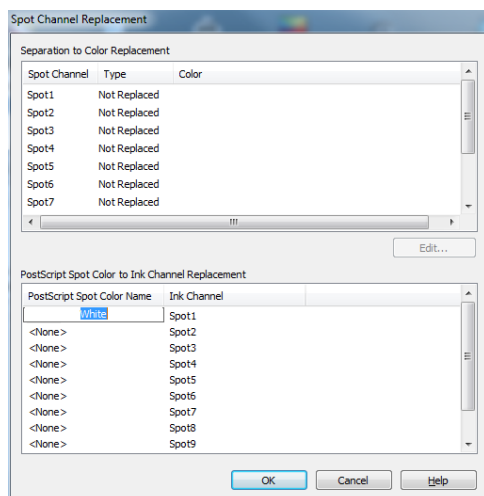
PDF, PS, and EPS files rely on spot colors to define the regions where white ink will be printed. This includes PDF files from Photoshop. The name of the spot color is important. To have Onyx automatically assign your spot color to the spot ink channel, the name must be *Spot1*.

If you did not create the file and the spot color is named something other than *Spot1* it is possible to assign that spot color name to the white ink channel in Onyx ProductionHouse.

In the color management settings in QuickSet or in PreFlight, is an option called *Spot Channel Replacement*.

The *Spot Channel Replacement* option is available only for ProductionHouse. If you do not have ProductionHouse your options are limited. In the design file, either rename the spot color to *Spot1* or output your work as a separation file.

The *Spot Channel Replacement* option allows you to specify which spot color will be assigned to which spot ink channel. Either edit or create a QuickSet. Under the first window click the button *Change Profiles* from the *Color Management* section. Click on the *Output* tab and select the *Spot Channel Replacement* button.



**Image 5.1: Spot Channel Replacement**

In the *PostScript Spot Color to Ink Channel Replacement* area, under the first entry double click on *<None>* and type in the spot color name. The name needs to match the spot color's name exactly to map it to the Spot1 white ink channel. Once completed, click OK and OK again to get out of the QuickSet dialogues. Now open the job using the QuickSet.

This option is also available in PreFlight, under the *Printer and Media* tab. Click the *Change Profiles* button and then go to *Output* tab.

## Separation files

To open a separation file into Onyx, first identify to Onyx in what order to reconstruct the separation file. This can be done in a QuickSet or in PreFlight.

Create or edit a QuickSet. Click on the *Advanced* button. Next choose the *PostScript File* tab. Check the box *Separation File*. The options shown below will now be available. Under most conditions the only option you need to alter is the section *Spot Separations*. Change this value from 0 (zero) to 1. The *Color Order* and other options can be left as the default values. Click on OK to exit.

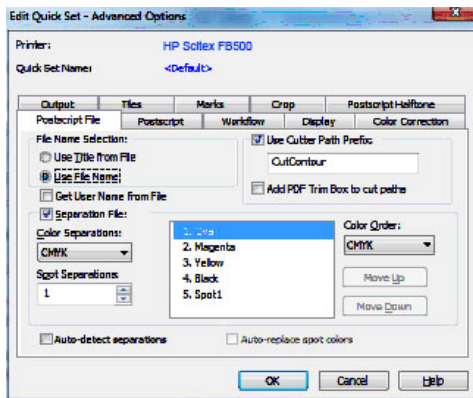


Image 5.2: Separation File options

As stated earlier, the same options in your QuickSet to configure handling separation files can also be found in PreFlight. This is located in the *File* menu, under *Job Properties* and the *Postscript File* tab. Enable *Separation File* and change the value to 1. Go to the *Preview and Size* tab and select *Apply* for the changes to take effect.

## Using the spot layer tool to add white to 4-color files

As an alternative to adding white ink data in the design application such as Photoshop or Illustrator, it is possible to add white ink data to RGB and CMYK files in the RIP, however, working in the design application will provide more capabilities.

With a CMYK file open in PreFlight, select the *Color Correction* tab. Select *Tools* and then *Spot Layer Tool*. Click on *Enable Spot Layer Generation*. This activates the available tools.

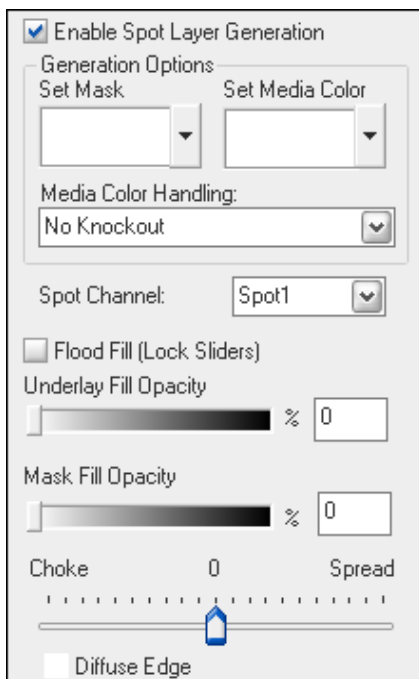


Image 5.3: Spot Layer Tool options

**Set Mask** - The Set Mask allows you to select the area that you want to print with white ink. Setting the mask color is optional. The default is white. To set the mask color, click the sample box to activate the color picker or use the drop down arrow to access the Color Dialog menu.

**Set Media Color** - Setting the media color is optional and serves two purposes:

1. Allows you to preview the file in Preflight as it will look on the color of media you will use. The default is white.
2. If there are areas in the image that use the media color and you want that color to be handled with special consideration. For example; you are printing on black media and you want the use media color in areas in place of printing black. To do this, you must first define your fill options, then set the media color and define the Media Color Handling Options as either "Spot Knockout" or "Full Knockout".

The generation options are used in combination with the fill options, except when the media color handling is set to "No Knockout". If you want to auto-generate flood fills, underlay fills or mask fills it is not always necessary to set a mask or media color to get the desired results.

To set the media color: Click the sample box to activate the color picker or use the drop down arrow to access the Color Dialog menu.

**Media Color Handling** - If you set a Media Color, you can choose one of three ways of handling that color:

**No Knockout** – If you've set a media color to help you visualize your output, choose this option. This will print the image with no knockout.

**Spot Knockout** – This option removes the Spot1 data (white ink) anywhere the image data matches the media color that you set. Use this option when you want to knockout the spot data but still print the image data that matches the media color.

**Full Knockout** – This option removes the spot data and the image data anywhere the image data matches the media color that you set. Use this option when you want to knockout the spot data and the image data, allowing the media to fully show through.

**Spot Channel** – This default to and should remain *Spot1*.

**Flood Fill (Lock Sliders)** – When you check this option, the underlay and mask fill sliders lock together and are set at 100%. This option is helpful if you want to automatically generate a flood fill for the entire image by combining the underlay and mask fills together. You can change the opacity for the flood fill by moving either of the sliders.

**Underlay Fill Opacity** – Adjusting this value generates a white ink fill in areas where image data exists. The fill will be generated anywhere that the image data does not match the *Mask Color*. For example, if your image is on a white background and the default (white) mask is used, this option will create a fill for all non-white data.

**Mask Fill Opacity** – Adjusting this value generates a white ink fill in areas where mask data matches the *Mask Color*. For example, if your image is on a white background and the default (white) mask is used, this option will create a fill for all white data.

**Choke/Spread** – Adjusting this value reduces or increases the outer edge of the white ink underlay fill. Each mark on the slider represents plus or minus 1 pixel width of choke or spread up to 10 pixels. The preview in Preflight is exaggerated from what is printed to make it easier to see the results from moving the slider.

**Diffuse Filter** – Use this option when you want a gradual transition from the underlay to the mask to create a soft edge for the fill.

**Filter** – Once you've defined your settings, save them by exporting a filter to use on similar jobs. Filters are a global color correction that can be applied to Quick Sets to automate the printing process for multiple jobs that use the same settings.

See the next page for examples.



**Example 1:** You have a CMYK file and you want to print a white ink fill over or under the entire image. Simply select *Flood Fill (Lock Sliders)*. You may want to adjust the opacity to get different results.

**Example 2:** You have a CMYK file that has large areas of black background and some white text. You wish to print this on black media using the media color instead of ink to print the black areas, and use white ink print the white text.



Image 5.4: CMYK file if printed on white media

1. With the file open in PreFlight, select a CMYKW Underflood media profile.
2. Go to the *Color Correction* tab and select the *Enable Spot Layer Generation* box.
3. Select *Full Knockout* in *Media Color Handling*.
4. Set *Mask* should be white (default). The mask will be the white type in the example.
5. Click on *Set Media Color* to enable the *Color Picker* tool and then click on the black area of the preview to set the media color to black, thereby using the media, not ink for this color area.
6. Click on *Flood Fill (Lock Sliders)* to set the mask and underlay at 100%.
7. Submit the file to print.



Image 5.5: CMYK file if printed on black media using above steps

The result is a reduction in ink use while producing a print with a better overall image quality.

## Sample point verification

You can verify that the Spot1 white ink channel has been properly setup prior to printing. With the job open in PreFlight, under *Color Replacement* click on *Tools* and choose *Sample Point* to open the *Sample Point* window. As you move your cursor over the preview in PreFlight, it will show the percentages of the CMYK and Spot1 white ink being used.

Once you have verified the white ink data is being rendered correctly, submit your job to print.

## 6 – White ink media profile selection

