

Chapter 7 *Colour Management*



Color Management

This chapter describes the concept of Color Management, how to set up the appropriate settings in SilverFast, and how to calibrate your scanner to get precise colors.

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Color Management

Introduction

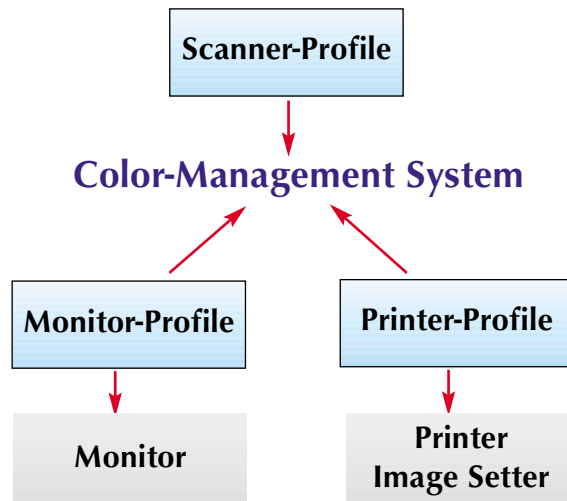
In the past getting professional results with color reproduction was only achieved by highly educated professionals. There have been two major reasons for this:

1. Devices for color reproduction demanded high investments
2. Operation of devices was complicated - complex Know-How was necessary.

Luckily the above mentioned reasons are not valid any more today, because the devices needed as, scanner, PC, printer have become affordable for almost everyone. Also operation has become easy with intelligent software and Color Management matured.

Objective of Color Management System (CMS)

Professional workflow without Color Management is not conceivable any more today. To save time and money it is desired to see the result of the final scan on the monitor or printer already on the preview. Since every input- and output-device has its own color gamut, one cannot assume colors to be consistent. This is where a CMS becomes relevant. A dedicated ICC-profile has to be generated for every input- and output device describing their color space behavior. Within the workflow the Color Management System compares two profiles, that of the data sender, i.e. a scanners, with that of the data



What is an ICC-profile?

An ICC-profile characterizes the color space behavior of a device. An ICC-profile is a data file and will be used to calibrate the device.

What is IT8?

IT8 is an industry standard test-form designed to measure the performance of input devices and generate ICC-profiles.

receiver, i.e. a monitor, and calculates a relation for the conversion, which will translate the image data into the right color impression.

Objective of the SilverFast Ai Color Management

SilverFast Ai differs from the majority of scan software by its functional power. With reference to *Color Management* SilverFast offers three significant functions:

1. Automatic Matching with Photoshop

The high level of integration of SilverFast's architecture into the Adobe Photoshop 5 architecture, assures *matching* of the SilverFast Preview with the final result in Photoshop. This is a very important highlight of SilverFast, because only this function makes sure that the user can predetermine (and control) his final result from the SilverFast Preview.

2. Safe IT8-Calibration (optional) with ICC-Profilers

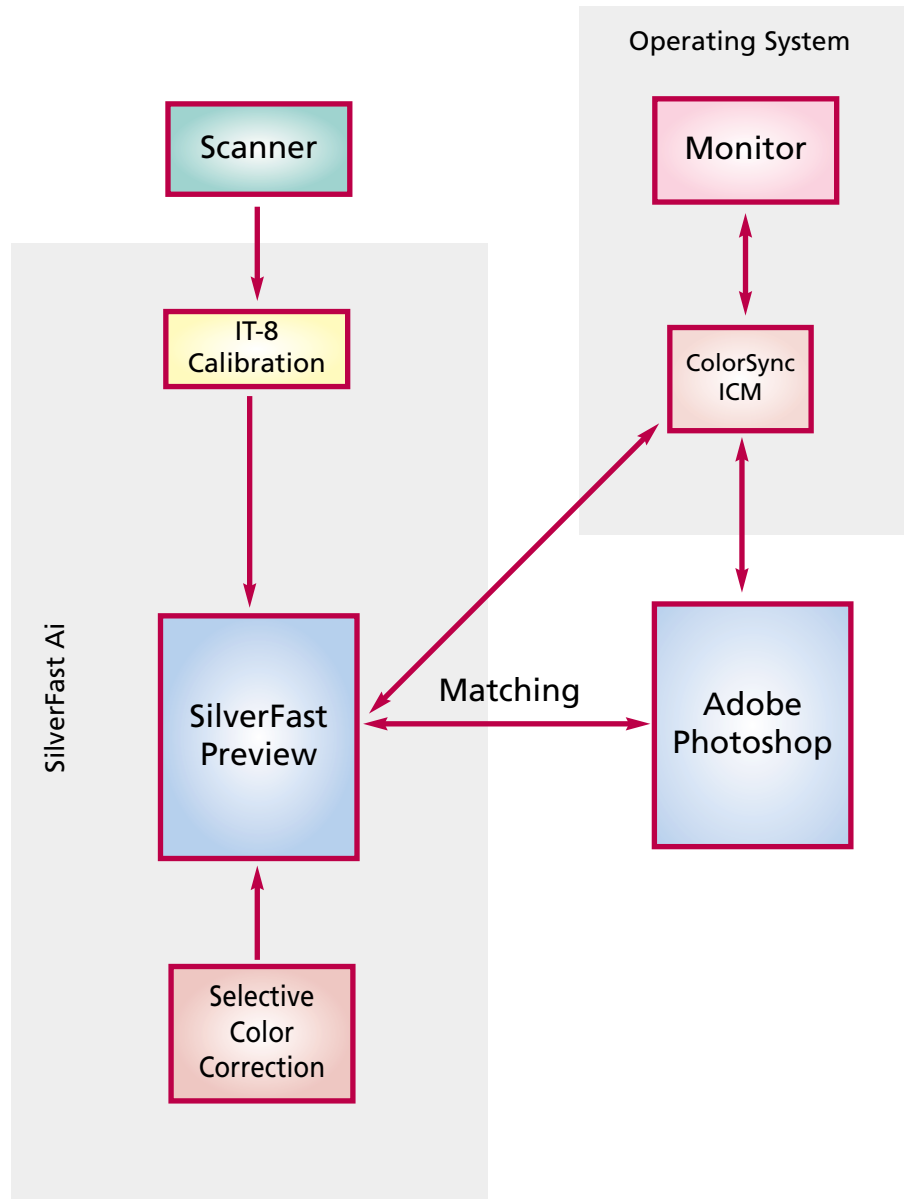
With SilverFast you can create a dedicated ICC profile for your scanner so your scanner can be used within the Color Management workflow. LaserSoft offers (optional) IT8-Calibration for all full versions of SilverFast Ai.

SilverFast's IT-8 calibration is integrated into the SilverFast application in such a way excluding any possible mis-operation.

3. Individual Color Control with Selective Color Correction

SilverFast's Selective Color Correction enables the user to change individual colors independently on the SilverFast Preview. Controlling the colors of the final result at a very professional level without trial and error and integrated with the Color Management, is a real boon for any level of user.

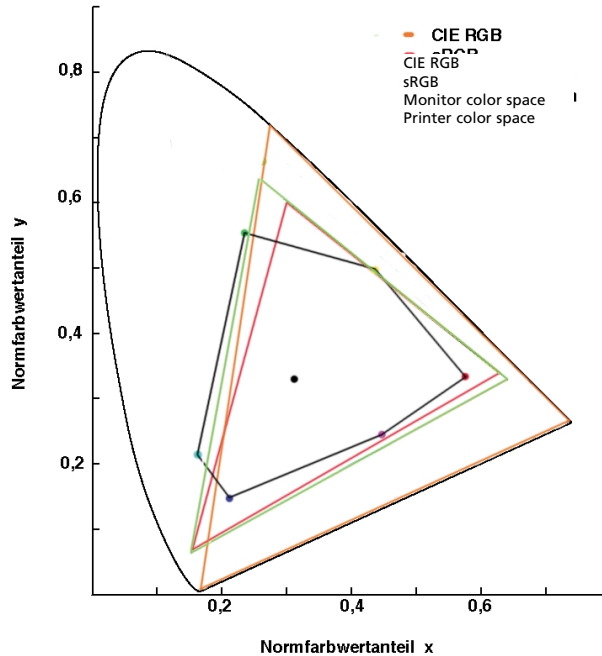
SilverFast Ai Color Management



Note!

Do not select sRGB as your default color space in Photoshop if you intend to do color reproduction with printing.

Obviously there are limits to the ability to display the same data on different devices the same way. The different color spaces have varying dimensions, d.h. displaying different amount of colors. Also the color shades they can display are varying. This is resulting in color deviations from the conversion. The color space "sRGB", which Photoshop offers as a default color in its set up is very small, so that even the small color space of a printer will not be properly rendered. sRGB color space is still big enough for any monitor making sRGB a suitable color space for the internet. For any documents containing images, which have to be printed, sRGB is not suitable. Use *Apple RGB* or *Adobe RGB* instead.



Comparing the color spaces. Shown is a projection of the color spaces on to a surface. The „curved triangle“ represents the L*a*b*-color space, which contains all visible colors.

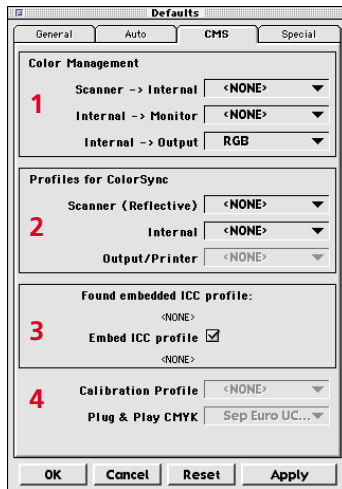
SilverFast offers different possibilities for *work flow* integration. On the system level under *ColorSync* (Mac) or *ICM* (Windows98/2000), or in with integration into the application - in general as realized with Photoshop. *CMYK-output* can already on the preview be checked by SilverFast's *Soft-proof* function.

Option

The CMS - Dialog

Clicking on the “Option” button brings you to the basic settings dialogue. Among others you will find the CMS card, where you can adjust the *Color Management* settings.

The “CMS”-card has four different sections.



1. Color Management

Here you can define whether and how SilverFast will communicate with its imaging functions and the different devices (Scanner, Digital Camera, Monitor, Printer).

2. Profiles for ColorSync (ICM)

In case you have chosen *ColorSync (ICM)* as your preferred *Color Management System*, you have to define the *in-* and *output profiles* for the different devices here.

3. Profile-Embedding

Here you will define whether SilverFast will embed a profile into the *output data* in order to render colors on another output device correctly at a later instant.

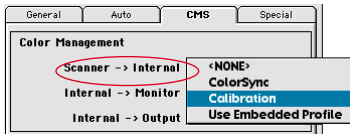
4. Plug & Play CMYK

When using P&P CMYK you have to choose a *separation table* or an *ICC (CMYK) output profile* to 4-color separate your images for the printer here.

1. Color Management

Scanner --> Internal

Here you define how your *scanner's color space* will be matched to your system. You decide whether the original scan will be transferred to the imaging application with accurate colors.



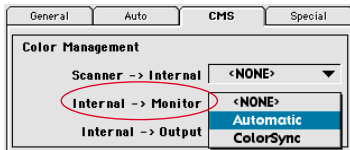
<NONE> You renounce matching of the scanner color space to the color space of the imaging software. Colors on the monitor may deviate from the image sample.

ColorSync You decide to integrate the scanner into the operating system's color management. By selecting the right *ICC-profile* images will be scanned *color-exact*. With SilverFast's *IT8-calibration* you can generate a profile describing your scanner (your scanner's color gamut).

Calibration The image sample will be passed on to the imaging application *color-exact*, *without* having to use *ColorSync* or *ICM*. It is required to use *IT8-Calibration* with *SilverFast's own calibration* module.

Internal --> Monitor

Here you define whether and how the monitor is matched to your system. You have to make sure that the work flow is *consistent* with the *color settings* in your *imaging application* (e.g. Photoshop).

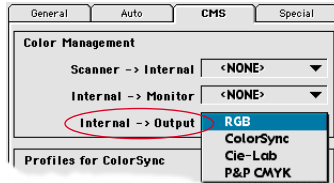


<NONE> Data will be passed on to the monitor without any matching. You do omit *color management*. Specially with Photoshop 5 it is very likely, that the SilverFast preview will *deviate* significantly from the results in Photoshop.

Automatic You rely on Photoshop to do the matching to your monitor. It is advised, to set the same color space (e.g. Adobe RGB) under "*Profiles for ColorSync (ICM)*" in the field "internal", you have defined inside Photoshop. Otherwise the color of the scan data could deviate. Since the *TWAIN-standard* does not support such functions, it is not available with the SilverFast Twain-module!

ColorSync You are integrating the monitor into the *OS's Color Management*. The appropriate *ICC-profile* for your monitor will be required. More sophisticated monitors get one supplied on disk or CD, if not, you might get it through the internet from the manufacturer's web site, last resort would be to create one with a

spectro-photometer. Adobe Photoshop 5 enables you to do your own *monitor calibration* (ICC-profile).



Internal-->Output

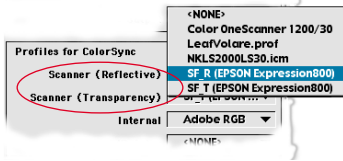
Here you can define what type of data the printer will get from SilverFast. Data to be transferred to the imaging application (e.g. Photoshop), can be in different formats. CMYK- and RGB-files can have profiles embedded, so the data will be matched to the printer's color space accordingly.

RGB You can output data in *RGB-data* format. This setting is recommended for users having no Postscript- but other printers or have no *printer ICC-profile*, or for those using their scans merely for internet- or multimedia projects.

ColorSync You are integrating your printer into the OS's Color Management. The appropriate ICC-profile for your printer will be required.

Lab CIE-L*a*b* is a *device-independent* color space, representing all visible colors. Color differences are not rendered very detailed, and many colors cannot be displayed on a monitor (see also graphic in introduction: the „*curved rectangle*“ represents Lab).

P&P CMYK High quality system to get CMYK-data directly from the *4-color separation* built into SilverFast. To get precise colors it is vital to select the same *CMYK-color space in Photoshop*, defined by a *separation table* or *ICC-profile*, as in SilverFast.



2. Profiles for ColorSync

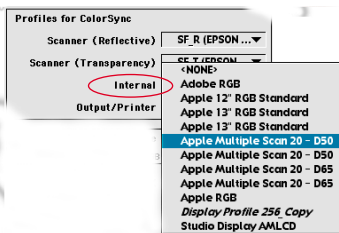
Only when you have chosen *ColorSync (ICM)* for Color Management, you will have to select the *appropriate profiles* for your device here. *Exception* is with the menu option "*Internal ---> Monitor*" which has to have an ICC-profile allocated to under "*Internal*".

Scanner (Reflective), Scanner (Transparency)

Here you allocate the appropriate (input) *scanner profiles*, which you have created with SilverFast or you have received from the scanner manufacturer. The profiles generated by SilverFast have the following naming convention:

**SF_T (T for Transparency) or
SF_R (R for Reflective).**

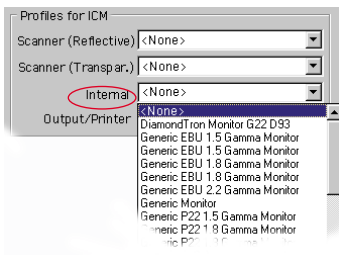
The scanner name follows within parenthesis. Example: SF_R(scanner name) Profiles of hardware manufacturer do not follow standard structure. You will mostly find the name of the device where the file-suffix is „.icc“ or „.icm“, does not have any significance, since the internal format is fully compatible.

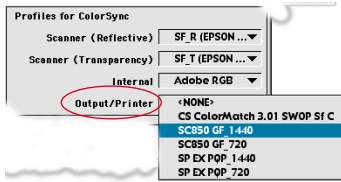


internal

The internal color space is independent from any device connected and is defined by a profile. This defines the color matching foundation the color management is building upon.. For the majority of users it is advised to select the monitor color space in order to unburden the computer.

Once you have selected *Internal --> Monitor ColorSync (ICM)* you have to define the *internal color space* by a profile you can select freely. In case you have chosen "*Automatic*" under "*Internal*", select the profile of the application's internal color space. The Photoshop PlugIn leaves the monitor matching to Photoshop.

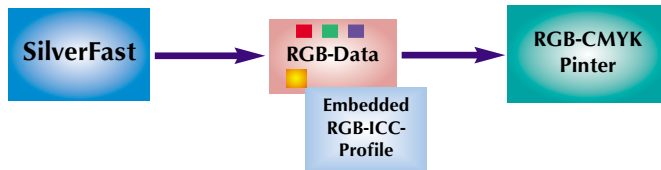




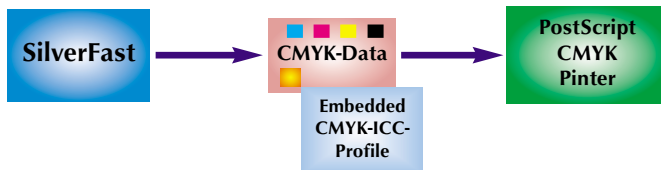
Output/Printer

The integration of the printer into *the Color-Management* is the highlight, but also the part inducing the most difficulties. The scanner's color space and the monitor's are the same in principle - *RGB* - there may be small differences in size, and the related *white points* are shifted against each other. The printer behaves differently: the output is not only depending on the inks but also on the paper stock - how is the *paper white*, how is the paper absorbancy. All this information has to be considered by the profile. The modern inkjet printers are equipped with drivers, which generally take these issues into account, but they can not so well be integrated with *ColorSync* .

After having chosen *Internal* -> *Output* ColorSync (ICM) under Color Management, you have to select the *output profile* of your printer or imagesetter here. This profile can be embedded into the file at your request.



Profile-Embedding with Output on Non-PostScript-Printer



Profile-Embedding with Output on PostScript-Printer

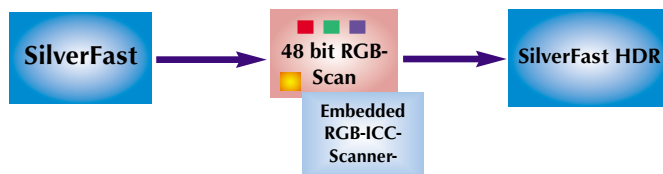
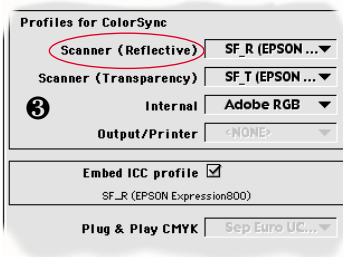
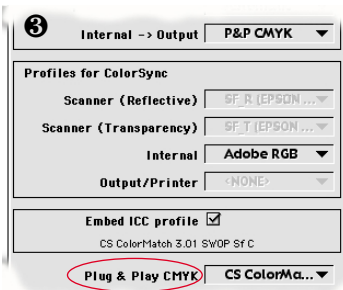
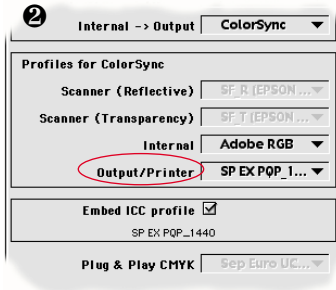
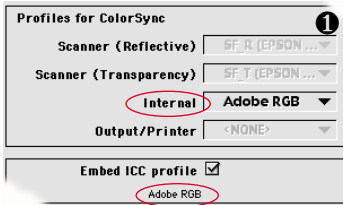
3. Embedding Profiles

Nowadays, digital images are transferred in various channels onto different computers. To assure the rendering of colors to be true without knowing from where they came and how they have been processed, images get a profile attached which will assure a basis for the color reproduction process.

If you want to embed the ICC-profile into the data, you have to check this field accordingly. You will automatically see which profile will be embedded.

There are four possible origins for an ICC-profile:

1. When selecting *RGB* in the section *Color-Management* under *Internal->Output* the profile originates from the field *Profiles for ColorSync --> Internal* (e.g. *Adobe RGB*).
2. When selecting *ColorSync* under *Internal->Output*, the profile originates from the field *Output/Printer* in the field *Profiles for ColorSync*.
3. When selecting *P&P CMYK*, the profile is the one (as long it is an ICC-profile and not a separation table), which has been selected under *Plug & Play CMYK*.
4. When scanning in 48Bit mode and having selected the *scanner-profile* under *Profiles for ColorSync*, the scanner profile will be embedded into the file.



Embedding a Scanner-Profile into the 48bit RGB-File

4. Plug + Play CMYK

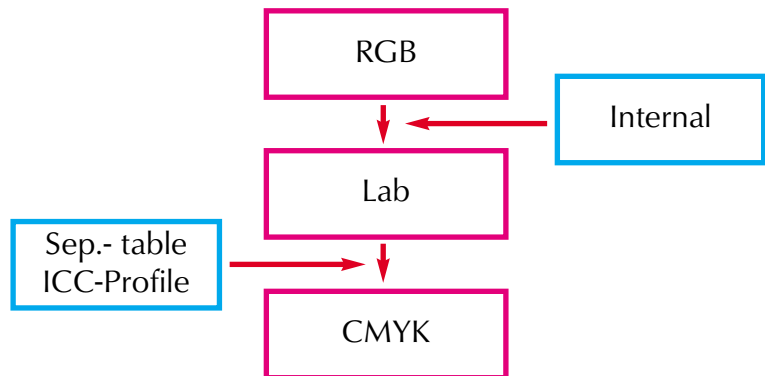
Scanning with color separation

LaserSoft has developed a new solution for high-end separation through Plug + Play CMYK. A new and revolutionary technique solved the problem of separation because the CMYK preview always used to look too different from the final result. Not so with SilverFast!

The following diagram explains the functionality of the new separation:

1. RGB data is internally calculated to the hardware independent Lab color space. Monitor settings are taken into account. The monitor should therefore always be adjusted properly (see below).
2. By using SilverFast separation as well as the Photoshop separation tables, we calculate via the Lab format into CMYK.

SilverFast Plug + Play separation

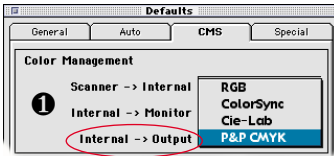


CMYK-Output with Color-management (Plug&Play CMYK-Separation)

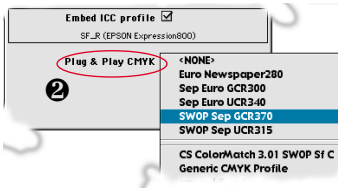
In order to activate the P&P CMYK separation, proceed as follows:

Select ① *Internal->Output* “P&P CMYK” under the SilverFast *Color-Management-Dialog*. Under ② *“Plug&Play CMYK”* at the bottom of the dialog, select the appropriate profile. You can choose between separation-tables and an ICC-CMYK-output-profile.

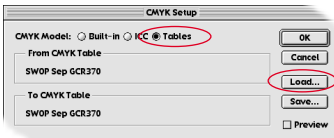
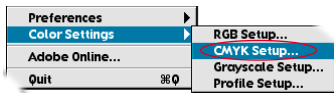
Make sure you have loaded the same profile in Photoshop under *Color Settings -->CMYK Setup*.



Selection of P&P CMYK Separation




Selection of output profile





Selection of same profile in Photoshop



When leaving the *Option's* dialog, the button “Scan RGB” will now show “Scan CMYK”.

SilverFast can also switch from RGB to CMYK when you press *command*  or *CONTROL* and click onto the “Scan“-button. The pop-up we just described will appear. Now select P&P CMYK. If you have not selected a separation table or ICC-profile previously, the selection will be gray and cannot be activated.

CMYK-Simulation on the Preview (CMYK-Preview)

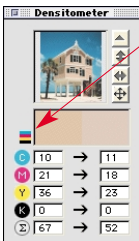
When the Scan-button shows “Scan CMYK”, you can switch the preview to CMYK-simulation by pressing “Alt“- “Command”   and clicking into the preview window. The CMYK-preview will remain until the next operation.

RGB-CMYK Toggling

Under Windows press right Mouse-button

Soft-Proof - CMYK-Simulation

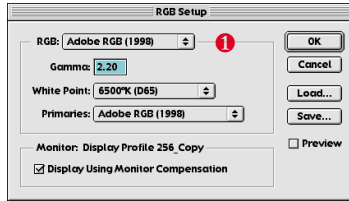
“Alt“-command and click into preview



The small CMYK-symbol above the CMYK densitometer colors indicates the soft-proof to be active.

Example Settings SilverFast/Photoshop 5

Following is a selection of example settings for the *SilverFast CMS-Dialog* with reference to *Photoshop 5*:



RGB-Output under Photoshop without Color-Management

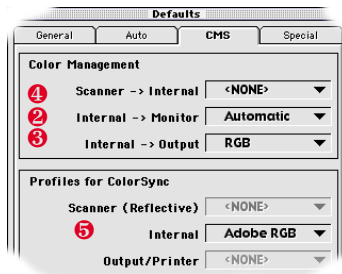
Under „*Photoshop File/Color Settings/ RGB Setup*“ you have selected e.g.: ❶ *Adobe RGB* as your working color space. An ICC-Profile for this color space should be exported, so you can select it later in SilverFast. To do this, you can save the settings with „save“ into the ICC-folder of the Operating System.

Now bring up SilverFast (from the Photoshop “*Import*“ menu).

Go to “*CMS*“ under “*Option*“ in the SilverFast main dialog.

In “*Color-Management*“ select ❷ “*Automatic*“ under “*Internal -> Monitor*“. Select ❸ “*RGB*“ under “*Internal -> Output*“. In this case select ❹ <NONE> or “*Calibration*“ under “*Scanner->Internal*“. You can only use Calibration with SilverFast’s own IT8-Calibration. In this example we left it at <NONE> .

Select ❺ *Adobe RGB* under “*Internal*“ in section “*Profiles for ColorSync*“ as the RGB-Profile, which you have selected previously in Photoshop.



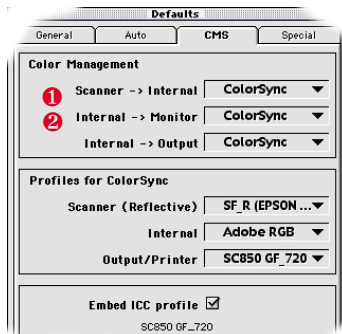
RGB-Output with Color-Management

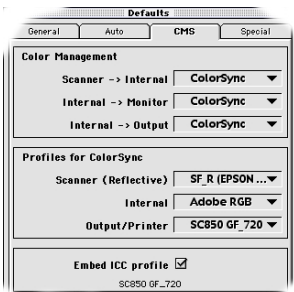
You have selected an RGB color space (e.g.: Adobe RGB) under “*Photoshop /Color Settings/ RGB Setup*“. For this you should have an ICC-profile defining this color space in which you can select later in the SilverFast CMS-dialog under “*Profiles for ColorSync / ICM*“ - “*Internal*“. (If you do not have this profile, use “*save*“ to save the profile into the System’s profile folder.)

Now bring up SilverFast (from “*Import menu*“).

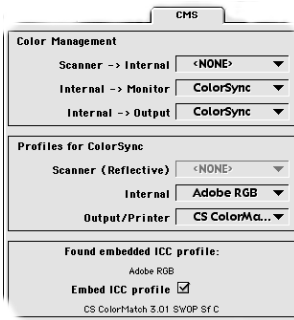
Go to “*CMS*“ under “*Option*“ in the SilverFast’s main dialog.

Select ❶ “*ColorSync*“ (ICM) in the “*Color-Management*“ section under *Internal -> Monitor* and *Internal -> Output* . *Scanner->Internal* is also set to ❷ “*ColorSync*“ (ICM) in our example. This is only possible, if you have a Scanner-ICC-profile - either from SilverFast’s IT8-calibration, or supplied from the scanner manufacturer. The profiles of the hardware manufacturer are not very accurate, since they are more generalized instead of scanner specific.





Select the Scanner profiles ❸ (*Reflective/Transparency*) of your scanner in section “Profiles for ColorSync” and under *Output/Printer* your printer profile. Select the profile of the internal System-color space under “Internal”. SilverFast assumes your image application supports complete Color-Management . Please check for this feature in the manual of your software manufacturer.



CMYK-Output with Color-Management (CMS-Separation)

you have selected a CMYK color space under “Photoshop / CMYK Setup”. For this you should have an ICC-profile you can select later in SilverFast. If not, you can save the settings with “save” into the System profile folder.

Now bring up SilverFast (from the “Import“-menu).

Under “Option” go to “CMS” in the SilverFast main dialog.

Under the section “Color-Management” select ❹ “ColorSync” under *Internal-> Monitor* and ❺ “ColorSync” under *Internal -> Output*.

Under *Scanner-> Internal* in our example it is again ❻ <NONE> .

In the section “Profiles for ColorSync” select the same CMYK-Profile under ❼ *Output/Printer*, which you have allocated in Photoshop.

Under *Internal*, select the *profile* of the internal System-color space.

How to save Profiles from Photoshop 5

Go to “File”, -->*Color Settings: RGB Setup*. In this dialog you can prepare your own settings and “Save...” them. Make sure, the profile goes into the right folder, so the System and SilverFast can access (load) it.

The path to save it into using MacOS is ...*System folder:ColorSync Profiles* and to save the file into.

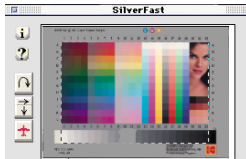
The path to save it into using Win98 is ...*Windows:System:Colors*.

Note: Profiles in SilverFast have a different name from the file name!

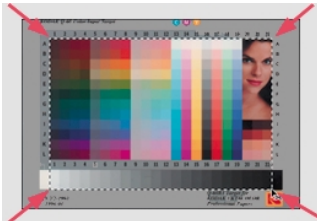


Note!

When using IT8-Calibration make sure you are only using targets with the correct reference data of the appropriate film manufacturer (e.g. Kodak, Agfa, Fuji).




Prescan



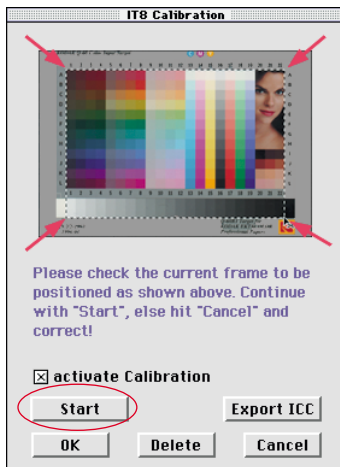
Calibration of your Scanner using SilverFast-IT8-Calibration

IT-8 target calibration is the industry standard for calibrating input devices. Now SilverFast has integrated (optional) a professional tool for calibration and for the creation of ICC profiles to be used with Apple's ColorSync 2.0.

SilverFast has made the process of IT-8 calibration very convenient – all steps are performed automatically by the software, just follow the instructions outlined below.

- ① Position the IT-8 reference chart on your scanner bed.
Make sure that the IT-8 target is positioned straight within the normal scan area, preferably where the scan starts. Avoid those areas which are reserved for scanner internal calibration. The orientation of the target should be as shown on the left.
- ② Click "prescan" **Prescan** (the scanner performs a prescan).
- ③ Drag the selection marquee across the IT-8 target so that:
 - a) the upper-left edge of the marquee aligns with the upper-left edge of the IT-8 colour patches,
 - b) the upper-right edge of the marquee aligns with the upper-right edge of the IT-8 colour patches,
 - c) the lower edge of the marquee aligns with the lower edge of the ray scale strip.Note that the uppermost left and right patches of the gray scale strip remain outside of the calibration selection..
- ④ Now click the IT-8 calibration button .

Color Management

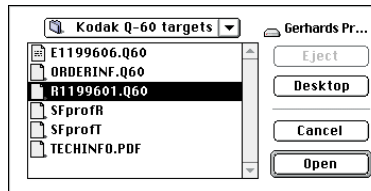


Check with your IT-8 target maker about the reference data file of your IT-8 target.

activate Calibration

- Click on “Start” in the dialog “IT-8 Calibration” and choose the reference data file in the file selection dialog, which came with your IT-8 target. Make sure to choose the right file: there is one reference file for reflective and one for transparency mode.

For example, the reflective IT-8 “Kodak Q-60 colour input Target” the file “R1199601.Q60” has to be selected.





The reference data file contains the exact spectro-photometric values of your IT-8 target.

- If the positioning of the selection marquee is correct, SilverFast will start the calibration procedure. If the positioning is incorrect, you will be asked to repeat the selection and start the calibration again.

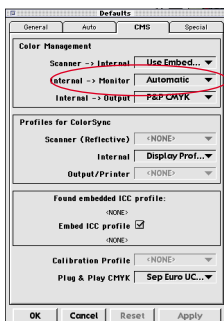
After the calibration has been completed you will get the message “Calibration has been successful”.

Now click the check box “Use Calibration” and leave the IT-8 calibration dialog by clicking .

- The calibration button has now become colored  and is no longer gray . This indicates that the calibration is now active.

If you later want to switch the calibration “On” or “Off”, select or deselect in the “Option” dialog , under “Manage Scan-Mon”, the item “Calibration”. Close the “Option” dialog with

.





Non-calibrated Scan



Calibrated Scan (IT8 Calibration)



