Color Management Guide

A supplement to the documentation for the Neo family of products:
NeoPack+
NeoPack/Professional
NeoComposite
NeoGroup
PrintTime
SOFTWARE LICENSE AGREEMENT

IMPORTANT - READ CAREFULLY

This is a legal agreement between you (either an individual or a single entity) and Timestone Software. By keeping this package and using the software, you are accepting the terms and are bound by the terms of this license. If you do not wish to enter into this agreement, please promptly return all copies of the Software, User Guides and Hardlock devices to Tasmine Software for a full refund. This User Guide and the software programs it describes are protected by copyright, trade secret and trademark law. By accepting this license, you have the right to use them, subject to the terms and conditions of this license agreement.

Definitions and Interpretation

- **Software** means the Program modules enabled and authorised for use for your installation.
- **Hardlock device** means the hardware device used to enable the Software to function.

**Scope of Agreement**

- Tasmine Software hereby grants you, the original purchaser, personal, non-exclusive license to use the User Guide and the Software subject to the terms and conditions of this Agreement.

**Grant of License.** You may use the Software on a maximum of one computer that you own or operate at a single physical location. You may transfer the Software from one computer to another provided that you do not use or permit the usage of the Software on more than one computer or computer terminal at a time.

**Copies.** You may not copy or duplicate the Software, except as necessary solely for archival purposes, program error verification, or to replace defective storage media, provided you keep the original and the copies. You may not alter, decompile or disassemble the Software.

**Transfers.** You may not sublicense, lease or rent or lend the Software or transfer any of your rights under this Agreement. You may transfer the Software (together with any backup copies you have made), Hardlock device and the User Guide on a permanent basis so long as you retain no copies, the transferee agrees to be bound by the terms of this Agreement, and Tasmine Software has authorised the transfer by written confirmation.

**Term.** The License granted in this agreement is effective until terminated. You may terminate it at any time by destroying or returning to Tasmine Software the Software and the User Guide, together with all copies, and returning to Tasmine Software the Hardlock Device. If you fail to comply with any term or condition of this Agreement, this License will terminate and, upon such termination, you agree to destroy or return to Tasmine Software the Software and the User Guide, together with all copies, and return to Tasmine Software the Hardlock Device. Termination of this license shall be in addition and not in lieu of any other remedies available to Tasmine Software.

**Limited Warranty, Disclaimer**

Tasmine Software warrants that the media on which the Software is recorded and the User Guide provided with it are free from defects in material and workmanship under normal use for a period of 90 days from the date of your original purchase. Except for the limited warranty described above, the Software is sold “as is”, and you are assuming the entire risk as to its quality and performance. It is your responsibility to verify the results obtained from the use of the Software.

**Limitation of Remedies**

If during the 90-day limited warranty period, you discover physical defects in the User Guide or in the Media on which the Software was recorded, Tasmine Software will replace them as no charge to you. This is your sole remedy.

**IN NO EVENT WILL TIMESTONE SOFTWARE BE LIABLE TO ANY PERSON FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR SIMILAR DAMAGES, EVEN IF TIMESTONE SOFTWARE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.**
# Color Management Guide

## Table of Contents

1 – Color Management with *Windows 2000* .................................................................................................................. 1  
   - Recommended settings ........................................................................................................................................... 1  
   - Can different images exist in different color spaces? .................................................................................................. 3  
   - About Color Profiles ........................................................................................................................................... 3  
   - ICC color workflow ............................................................................................................................................... 4  
   - Putting the workflow together ............................................................................................................................... 4  
   - If you need to install an ICC color profile ........................................................................................................... 4  

2 – Calibration under *Windows NT 4* ....................................................................................................................... 6  
   - Why calibrate? ....................................................................................................................................................... 6  
   - Calibration environments ....................................................................................................................................... 7  
   - Check the printer .................................................................................................................................................. 7  
   - Interpreting the test pattern ................................................................................................................................. 7  
   - Comparing printers ........................................................................................................................................... 8  
   - Calibrating monitors .......................................................................................................................................... 8  
   - The monitor calibration wizard ............................................................................................................................ 9  
   - Printer calibration ............................................................................................................................................. 12  
   - Constructing a printer correction ........................................................................................................................ 12  
   - Using LUTs ......................................................................................................................................................... 15  
   - Importing images with LUT correction .................................................................................................................. 15  
   - Exporting images with LUT correction ................................................................................................................ 15  
   - Printing images with LUT correction .................................................................................................................... 16  
   - Using the test image ............................................................................................................................................ 16  

Index ....................................................................................................................................................................... 17
Color Management with Windows 2000

If you are using Windows 2000, you can take advantage of ICC color management. ICC uses color profiles supplied by hardware manufacturers (or, alternatively) generated by you. In an ICC-managed color system, each device involved in the production process is characterized and its color closely understood. The result is that images displayed on your monitors will very closely match the printed result.

Timestone Software’s Neo Family of products uses Microsoft’s ICM-2 color management system built into Windows 2000. ICC color management is only available when using Windows 2000. If you’re not using Windows 2000, you can still achieve some degree of color management by following the instructions in Chapter 2 of this guide.

Recommended settings

Irrespective of which Neo application you’re using, Timestone Software recommends that you configure the following color management settings:

- In your Neo application, select File, Color Management
- On the Basics tab, select the Enable Color Management check box, and then click the View the most faithful image reproduction possible on the monitor, without regard to the printer option (owing to some inconsistencies in the way Windows 2000 handles the other option, we recommend that you do not choose ‘soft proofing’ at this time)

![Figure 1: Color Management dialog – Basics tab](image)
• For **Rendering Intent**, accept the default setting of **Relative Colorimetric**

• Select the **Bitmaps** tab, and click **Standard color space**. Choose the default sRGB setting unless you have a specific reason for choosing one of the other settings.

![Figure 2: Color Management dialog – Bitmaps tab](image)

**Note:** If you have an **ICC Profile** already set up for images on your system, you can choose that instead of a **Standard color space** option. If your **ICC Profile** isn’t shown, browse to the `systemroot\system32\spool\drivers\color` directory, or similar (where `systemroot` is the folder that contains your Windows 2000 files) and you should be able to find it there.

• Next, select the **Printer** tab. Your Neo application by default will use whatever profile is selected in your Windows Printer properties, but you can override this and use any ICC profile at this point:

![Figure 3: Color Management dialog – Printer tab](image)
Note: If you select None for your bitmaps’ color space, you must still select a valid printer profile. Why? So that your Neo application can transform the bitmap from the printer’s color space to the monitor’s color space for onscreen proofing.

Can different images exist in different color spaces?

The Neo applications at present cannot apply different color spaces to different bitmaps. There is a single global color space defined for all bitmaps.

It’s actually possible for a bitmap to have an embedded profile, but the Neo applications will not use this information. You must select your bitmap profile in the Color Management dialog as outlined above.

About Color Profiles

Each device in your lab displays color images in its unique way. A color monitor might display contrasty images when compared with the finished print. A system that is un-calibrated – either using Look-Up tables (LUTs) or with ICC style color management – can produce unpredictable results.

ICC color management relies on color profiles to ensure that images are reproduced and displayed accurately. The accuracy of an ICC color-managed system relies on high quality color profiles, particularly those for the printer. If the color profiles you have are poor quality, the results from the system may be unpredictable.

Profile types

There are several types of color profile:

- Input profiles for scanners, digital cameras and other digital capture devices
- Monitor profiles for color monitors whether CRT, LCD or other style displays
- Output profiles for output devices such as inkjets, CRT Xerox style or CMYK printing press style printers

Usually, the manufacturer will supply a generic color profile for a particular device. Sometimes, you’ll get better results by generating your own profiles, ensuring they are customised for each individual device in your lab.

There are various tools available to generate color profiles for each of these devices. If you want to have the ability to generate your own profiles, we recommend you investigate:

- Monaco Systems – have a range of tools to help you generate your own ICC profiles. More info at http://www.monacosys.com/
- Agfa FotoTune – software tool that will generate input, monitor and output profiles
- X-Rite – various software and hardware tools that generate monitor and output profiles
You should consult with the vendor of your preferred tool on the best way to characterize these various devices.

**ICC color workflow**

An ICC color workflow tracks the color characteristics of your images from the original (whether the original is a color film that you scan on a film scanner, or a scene captured by a digital camera) to a color monitor, then to the final printed image. In a well-managed system, images displayed on a monitor will closely resemble the original scene or photograph as well as the final printed image.

**Scanners**

Scanners can capture images from a reflective print, or the film used in a camera. A positive image (print or transparency) is easily profiled, as it is a finished product. Color negatives however are an intermediate step on the way to a finished positive print. You’ll already be aware of the many variables involved when making a print from a negative – the paper stock used, printing equipment, chemicals all influence the final printed result. For this reason, it is very difficult to profile a color negative.

**Monitors**

Color monitors have a number of controls that let you the user control how images are displayed. There are also a number of tools and calibration devices available to create monitor profiles – from ‘software only’ tools like Adobe’s monitor calibration software to X-Rite’s measurement device. A measurement device will result in a more accurate profile, but usually the ‘software only’ tools do an acceptable job.

**Output devices**

There are many different types of output device – from inkjet, CRT based to CMYK printing presses. Output devices must be profiled very accurately, and require special measurement devices. This means that the printer’s manufacturer will usually provide an output profile.

**Putting the workflow together**

Setting up the color workflow involves gathering together all the devices in the chain, then associating the various profiles to each device. Once done, the only maintenance normally required is ensuring that each device is calibrated as specified by the manufacturer.

If you need to install an ICC color profile

*Windows 2000* comes with a large range of predefined color profiles, but not all are fully installed by default.

In *My Computer*, usually in the `systemroot\system32\Spool\drivers\color` folder (*your systemroot* is the folder that contains your *Windows 2000* files), locate the color profile you want to install (profiles which are already installed are marked with a white icon rather than a gray one).

If you need to install a color profile, follow these steps:
- Right-click the profile, and then click **Install Profile**
- The file icon will change from a gray color to a white color

---

**Note:** Color profiles communicate the color characteristics of a device to the color management system. Associating the correct color profile with all of your publishing tools helps to ensure consistent color application throughout the publishing process.

Installing a profile modifies the registry and makes it available to the color management system.
Calibration under Windows NT 4

Note: Timestone Software’s Neo family of products utilise Microsoft’s ICC color management system built into Windows 2000. If you are using Windows 2000, you should use the ICM-2 color management system (detailed in Chapter 1 of this guide) in preference to taking the steps described in this chapter.

If you’re using Windows NT 4, follow the steps in this chapter.

Bear in mind that the display and output devices on your system will often have their own calibration settings and/or tests and that these should be configured before following the steps detailed in this chapter.

Why calibrate?

Calibrating your Neo application ensures that your printed results are consistent and predictable. If the system is not calibrated, it is not possible to gauge color or density anywhere in the system, and your results may vary.

Calibration of the system relies on keeping each device in the reproduction process fine tuned. Some devices (particularly printers) will vary in the kinds of controls available. There are controls available in your Neo application that allow adjustment for input or output devices, independent of the devices’ controls.

However, it is most important that each device is correctly calibrated before using these controls if the best possible quality is to be achieved.

Your Neo application offers calibration through a series of LUTs or Look-up Tables. Each device involved in your system can be brighter, darker, or have different contrast from others. This mis-match means that images that print well on one printer, may not on another. Likewise, images from one source, may be lighter or darker than those from a different source. Monitors as well can display images differently one to the other.

With a logical and step by step approach, each of these device differences can be identified and compensated for using LUTs.

As per the note at the start of this chapter, more sophisticated color management using ICC color profiles is available if you upgrade to Windows 2000.
Calibration environments

There are two types of production environments:

- Single workstation and single printer
- Multiple workstations and / or printers

In an environment where only one workstation and printer are involved, calibration can be much easier. If multiple workstations or printers are involved, there is obviously more to be done. However, in these multiple device environments, it is quite important to decide on one device as a ‘master’.

There are some common steps between the two environments.

Check the printer

The first check to be made is to check the calibration of the printer. Follow the manufacturer’s calibration procedures until it is ‘in control’.

Supplied with your Neo application is a printer test pattern. Print this image using the printer’s normal imaging software and any ‘normal’ corrections. If you have corrections that you have created for an existing workflow, disable these corrections.

Print the test pattern to each of the printers involved in this workflow.

Interpreting the test pattern

The test pattern has three areas of importance:

- The greyscale blend
- White point, fine highlight, fine shadow and black point patches
- An image for visual confirmation

The greyscale blend

The greyscale blend is the most important item on the test chart. It should be an even gradient from black to white, without any colored areas or ‘blocks’. If a particular portion of the blend is colored whilst the rest is neutral, you should return to the printer’s
calibration procedure. This situation is not easily repaired with your Neo application’s corrections, and should be corrected at the printer. When a printer is in this state, it is ‘not linear’ in its response.

If the blend and overall print is consistently cast, consult the manufacturer’s calibration procedure. This situation is easy to overcome with your Neo application’s corrections.

**The shadow and highlight patches**

The highlight and shadow patches reveal the amount of shadow and highlight detail being reproduced by the printer. Ideally there will be a difference between each of the steps. It’s more likely that the sets are not showing differences for each of the patches. This will be corrected later.

**The visual image**

The visual image shows a more intuitive read on your printer’s performance. Areas of greatest interest are:

- The background area is a mottled grey. If your printer is not linear, you’ll see colored bands through the mottling.
- The highlight area shows some fine highlight detail. If your printer may not reproduce the fine detail.
- The shadow areas show some fine shadow detail. If your printer may not reproduce the fine detail.

**Comparing printers**

If you have multiple printers, print the image on each, and compare the results by placing the prints side by side. Note differences between the printers for later attention.

**Calibrating monitors**

Once the printers are calibrated as best they can be with the manufacturer’s tools, proceed with monitor calibration.

**Room lighting**

It is most important to have subdued and neutral lighting conditions. If the lighting in the room changes dramatically during the day, the images displayed will also seem to change. Viewing conditions should be controlled and subdued. This doesn’t mean a darkened room, but means no direct, harsh lights such as spotlights or direct sunlit rooms.

**Monitor calibration tools**

Some video cards allow the monitor color and gamma to be adjusted from the Windows Monitor control panel. If this is possible, follow the manufacturer’s recommended procedure. Choose a system gamma of 2.2 if possible. You should still run the monitor calibration wizard to confirm the settings.
Monitor calibration and Adobe Photoshop

If you own Adobe Photoshop, and intend to use it to edit images from your Neo application, it is important to calibrate Photoshop as recommended.

If you are using Adobe Photoshop 5.0 or higher, it is most important to disable the color profile handling built into Photoshop 5.0. This can unintentionally change the color of images edited in Photoshop.

The monitor calibration wizard

Choose Options from the File menu. Choose the LUTs tab. Ensure Enable monitor LUT is checked.

Click Calibrate to start the calibration wizard.

Choose Next to start the calibration procedure, or Cancel to cancel.
Many monitors have some built-in color controls. The most basic is usually a choice between various color temperatures. Choose a color temperature of 9300K. If your monitor allows custom color balancing, use it if you wish. Adjust the monitor so that the grey window appears neutral.

Click **Next** to proceed.

Turn the contrast setting as high as possible. Next, click the **Full screen** button to adjust the brightness. The screen will fill with the brightness calibration pattern.

Adjust the brightness control until you can just see the centre ellipse. If you can easily see the square area to the left of the circle, the screen is too bright. If you can’t see it at all, your screen may be too dark, although on some monitors even maximum brightness won’t display the ellipse. In this case, just turn brightness up all the way.

Once you’re happy with your adjustment, click the button in the lower right of the screen to return to the wizard.

⚠️ If the brightness or contrast controls are changed after this step, you will need to run the wizard again. If you have controls that are a dial, tape them over so others don’t change the setting!
The next step involves adjusting the sliders of the Red, Green and Blue areas until the centre area of each is no longer visible. This is best done by moving at least 1 m from the monitor, and de-focussing your eyes. Move each of the sliders until the centre area is no longer visible for all three squares.

Choose the target gamma for your monitor. Usually, this will be 2.2, but it may change later. Choose 2.2 now.
Click **Finish** to complete the wizard. Choosing **Cancel** dismisses the wizard without applying any of the changes.

Finally, choose **OK** in the **Options** dialog. Note that any images currently displayed may change in brightness, reflecting the calibration changes.

**What has been achieved?**

By running the calibration wizard, the black and white point has been set, and the monitor’s gamma determined. Finally, the monitor has been set to a known gamma.

This means that the same image can be displayed on several monitors that have been similarly calibrated, and the image will appear the same on each one.

**When to run the wizard**

The wizard should be run:

- Whenever any monitor controls are adjusted
- Whenever any other monitor or video board calibration utilities are run and settings changed
- If the room lighting dramatically changes
- Regularly, to allow for monitor ageing

**Printer calibration**

Each image printed can be corrected for brightness, color balance or contrast, as it is printed. Different corrections can be created for different printers, and are easily selectable from the **Print setup** dialog box.

**Constructing a printer correction**

Choose **Print setup** from the **File** menu. The print setup dialog is opened. At the bottom of the dialog, locate the **Apply LUT** section.

![Apply LUT](image)

Click the button. The LUT construction window opens.
There are three main areas of interest:

- List of available LUTs
- LUT construction tools
- LUT mode switches

**Create a new LUT**
Choose New. A new entry appears in the list of available LUTs. Type a name.

**LUT modes**
There are several types of LUT that can be constructed. The most important are:

- Basic
- Advanced

There are other modes available by using the mode switch buttons, ![mode switches]. These should only be configured by experienced users.

Switch a LUT mode by choosing the Basic / Advanced switch and choosing the desired mode.

**Create a basic LUT**
Basic LUTs allow:

- An overall gamma
- A specific Red, Green or Blue gamma
A custom black and white point

Choose a gamma
Enter the required gamma value either by sliding the gamma slider, or entering a value. The graph will preview the new LUT.
Choose a specific color’s gamma by choosing the color from the toolbar, and applying the required gamma.

Choosing a black and white point
Black and white points can chosen by sliding the slider, or entering a value. As the value is changed, the graph previews the change.
You might want to change the black or white points if the images being printed have bad black points. You can see this by inspecting the images in a bitmap editing program such as Adobe Photoshop. If the darkest pixel is greater than 0, and the whitest lower than 255, you might want to adjust these values.

A LUT is constructed by choosing the required gamma value, either with the slider, or by entering a value.

Create an advanced LUT
Advanced LUTs allow:
- Overall gamma correction
- Black point setting
- White point setting
- Shadow correction
- Highlight correction

If you want to specifically brighten the shadow areas, or darken the highlights, or even bias the color of the shadow or highlight areas, the advanced LUT tools will be very useful.

The adjustments available for gamma, black and white point correction are similar to the basic LUT. The added tools are Gamma High and Gamma low corrections. As you adjust these sliders, the shadow or highlight areas only are changed.
If you want to bias a particular color, choose the color from the LUT mode toolbar, and make the corrections.

**Using LUTs**

Several default LUTs are supplied with the program. Once a LUT has been constructed, it is available for use by choosing it in the dialog box. LUT corrections are available when:

- Importing images
- Exporting images
- Printing packages

**Importing images with LUT correction**

Choose `Import from disk...` from the Images menu. Choose the Setup button. Specify or construct the LUT required to apply when importing the images.

**Exporting images with LUT correction**

Choose `Export...` from the Images menu. Choose the Setup button. Specify or construct the LUT required to apply when exporting the images.
Printing images with LUT correction

Choose **Print setup...** from the File menu. Specify or construct the LUT required to apply when printing the packages.

![Apply LUT](image)

Using the test image

The image supplied provides a standard image that allows you to compare printers and monitors. If after calibrating your printer, the test image still prints with a color cast, apply a correction as specified below:

<table>
<thead>
<tr>
<th>The test image is...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too dark</td>
<td>Increase the printer LUT gamma. For example, change the gamma from 1.0 to 1.3</td>
</tr>
<tr>
<td>Too light</td>
<td>Decrease the printer LUT gamma</td>
</tr>
<tr>
<td>Too red</td>
<td>Decrease the printer LUT red gamma</td>
</tr>
<tr>
<td>Too cyan</td>
<td>Increase the printer LUT red gamma</td>
</tr>
<tr>
<td>Too green</td>
<td>Decrease the printer LUT green gamma</td>
</tr>
<tr>
<td>Too magenta</td>
<td>Increase the printer LUT green gamma</td>
</tr>
<tr>
<td>Too blue</td>
<td>Decrease the printer LUT blue gamma</td>
</tr>
<tr>
<td>Too yellow</td>
<td>Increase the printer LUT yellow gamma</td>
</tr>
</tbody>
</table>

If you are calibrating multiple printers, pick one of the printers as the master, and balance this one first. After the system is calibrated with one printer, construct a LUT that corrects any differences between the printers.

The test image is called **Calibration.tif** and is in the **Program Files\Timestone Software\** directory of your hard disk.
## Index

| Black and white point                        | 14 |
| Calibrating monitors                        | 6  |
| Color Management                             |    |
| Monitor calibration                          | 8  |
| Printer calibration                          | 12 |
| Color spaces                                | 3  |
| Gamma value                                 | 14 |
| Images                                      |    |
| exporting with LUT correction               | 15 |
| importing with LUT correction               | 15 |
| printing with LUT correction                | 16 |
| Color Management                             |    |
| Color profiles                               | 3  |
| generating your own                         | 3  |
| Color Profiles                               |    |
| location of                                  | 2  |
| Color spaces                                | 3  |
| Gamma value                                 | 14 |
| LUTs                                         |    |
| advanced                                     | 14 |
| basic                                        | 13 |
| Monitor calibration                          | 8  |
| Printer calibration                          | 12 |
| Profile types                                | 3  |
| Rendering intent                             | 2  |
| Standard color space                         | 2  |
| Test image                                   | 16 |
| Test pattern                                 | 7  |
| Using LUTs                                   |    |
| the test image                               | 16 |
| Windows 2000                                 |    |
| color management                             | 1  |
| Windows NT 4                                 |    |
| color management                             | 6  |