# Monitor and Calibration Check

## What is Calibration, What is Profiling?

Before we start with practical work, we should clarify some terms and the concept of calibrating and profiling. The comprehension of that is an essential prerequisite for the assessment of your system.

The adjustment of color input and output systems is generally performed in 2 steps. First you calibrate the system. That means, you adjust the device to a known state (usually the ideal state for this device), using software or hardware controls or a calibration table. Scanners normally auto-calibrate themselves with a white-black reference. For printers, the process is normally called linearization and ensures a correct gray balance, TVI and total color values. Monitor calibration generates the correct white point (5000 Kelvin for use in the graphic arts)„ a predefined tonal response curve (e.g. LStar, gamma 1.8 or the sRGB curve, which by the wa is not gamma 2.2, but a modified 2.2) and a perfectly neutral gray balance (R=G=B). High-End programs like basICColor display (Demo on CD-ROM) first use the hardware controls (Brightness, Contrast, RGB) for pre-calibration and then build a correction table that is downloaded into the graphic card or even the monitor (hardware-calibratable monitor required) for fine tuning the display calibration.

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## Calibration and Profiling

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In the second step after the calibration the device will be profiled. The resulting ICC-profile describes the calibrated state of the device. It will be used by ICC-compatible software like Photoshop to display color data correctly on your monitor. For this color conversion, you need a minimum of 2 profiles, one for the source color space, one for the output (monitor).

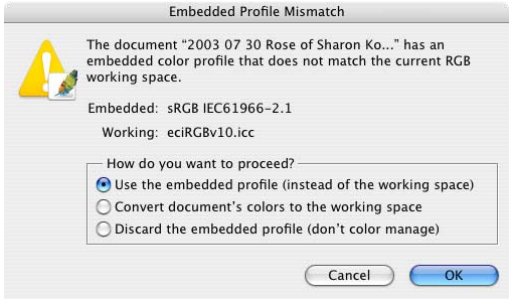
Examples for the use of monitor profiles:

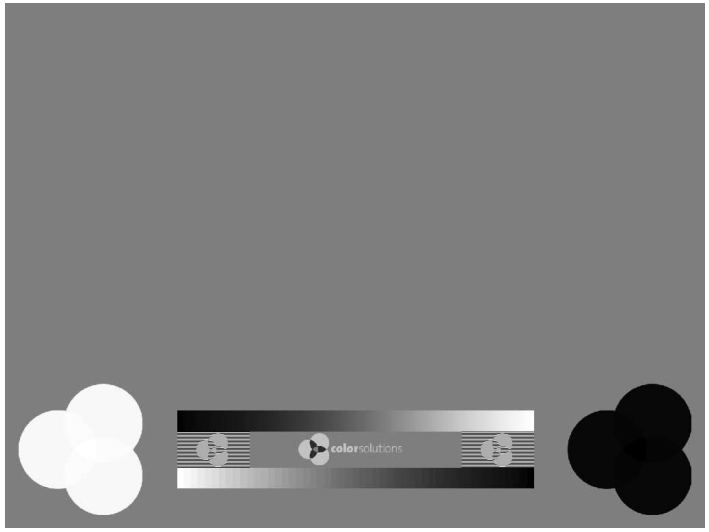
- Softproof of offset data on a profiled monitor:
  Source color space = offset profile
  Output color space = monitor profile
- Image editing of RGB data on a profiled monitor:
  Source color space = working space (e.g. eciRGB or LStar-RGB)
  Output color space = monitor profile

ICC-compatible programs like Photoshop send color data to the graphic card which have been color converted through source profile and monitor profile. This ensures a color correct representation independent of the working space (LStar-RGB, eciRGB, AdobeRGB, sRGB, offset-CMYK, gravure-CMYK, ...).

Calibration and profile are closely linked with each other. In general, only a well calibrated system can be described perfectly in a profile. If the calibration is faulty or inaccurate, the profile may not be able to completely correct for these deficiencies.

# Monitor and Calibration Check




## Use of the Desktop Background Images

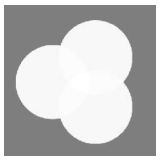
There are 2 different sets of images, 1 set for monitors calibrated to a gamma of 1.8 and 1 set for monitors calibrated to an LStar tonal response. Be sure to use the correct one for your calibration. The images were created in the visually equidistant L*a*b* color space and then converted to eciRGB (with a gamma of 1.8) and to LStar-RGB (with an equidistant tonal response curve). Gray scales (0% - 100%) are not suited for the creation of visually equidistant test charts since the human eye does not render lightness in a linear but a logarithmic scale. In reality, this means that a 5% difference in lightness is perceived differently in highlight, midtone and shadow areas. The L*a*b* color system compensates for this effect (L*= 100 absolute white, L*= 0 absolute black, L* = 50 perfect midtone) .
Now, have a look at the desktop background image - here, you see the effect of your monitor calibration without any influences from an ICC-profile. Then, load the image in Photoshop (Version 6 or higher), use the embedded profile (instead of the working space). Now calibration and ICC-profile are being used. Photoshop automatically uses the active system profile.
Since Photoshop converts from the (active) working space to monitor space, you should not see any differences if your monitor is calibrated properly. If you see significant differences, first check your Photoshop settings. If these are correct, re-calibrate and profile your monitor. Should the differences remain to be visible, the calibration table and the ICC-profile do not match. In this case, make sure your software performs a calibration and stores the results in the profile (vcg tag) or as a separate file (PC only) that then is downloaded to your graphic card with a separate gamma loader. basICColor display ensures all these prerequisites, in doubt just use basICColor display in try-out mode. Also, make sure your graphic card allows for a LUT-download. Small differences may be due to interpolation in 8 bits accuracy on the graphic board and must be accepted.
From now on, we refer to the desktop background image as seen on the desktop, not in Photoshop.

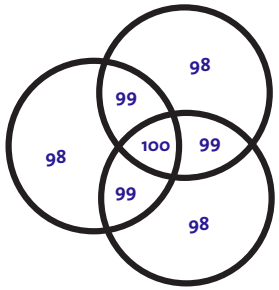
# Function of the Test Elements

## Monitor Calibration Check

**Rosette 1:**

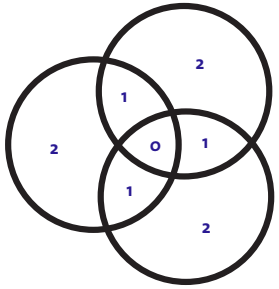
**White definition check**






**Rosette 2:**

**Black definition check**




**Step Wedge:**

**Gradient:**

## Test Elements

**Rosettes**

Both rosettes show a difference in lightness of Delta L* = 1 . Die lightest (L*= 100) and darkest areas (L*= 0) are located in the center of the rosettes. The values L*= 99 and L*= 1 are located in the ovelapping areas of two discs, the outer areas of the discs are L*= 98 and L*= 2. You should be able to distinguish these areas slightly. The differences between these areas should be equidistant. If not, please re-calibrate and profile your monitor with slightly different hardware settings (brightness and contrast).

**Step Wedge**

The wedge consists of 51 steps with a distance of Delta L*= 2 each. A correctly calibrated monitor (gamma 1.8 or LStar) with a perfect gray balance will show all steps without a color cast and with equidistant gray shades. If not, please re-calibrate and profile your monitor with slightly different hardware settings (brightness and contrast).

**Gradient**

in the continuous gradient, no steps should show. If you see discrete steps along the entire gradient, your graphic card may not be set to millions (16.7 million) of colors. A few steps at random places indicate a bad calibration table or inadequate hardware settings. A bad gray balance can easily be detected in the gradient. In these cases, set your graphic card to millions of colors and re-calibrate and profile your monitor with slightly different hardware settings (brightness and contrast).

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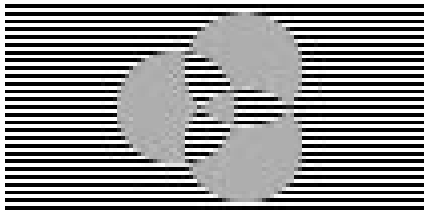
## Functioning of the Test Elements

# Monitor Calibration Check



**Gamma Check**

If your monitor is calibrated correctly, the gamma check rosette shows the same lightness as the striped background. This element only works in it´s native resolution (100%). Make sure you selected the correct background image. If your monitor has a different resolution than the images supplied, do not rescale the image. You can increase canvas size e.g. in Photoshop and add gray areas to the background.

**Background**

Take a look at the background from some distance (ca. 2 to 3 meters). That way, you can easily detect irregularities of your monitor. Some monitors, especially CRTs are "patchy". This problem cannot be corrected by calibration. You need a skilled monitor technician to fix this. If you should encounter patchyness on your CRT, you can try to degauss it several times. Also make sure that there are no electromagnetic or magnetic sources in the vicinity of your monitor (loudspeakers, power supply units, power lines ...). If the patches remain, you´ve got to live with them – or buy a new monitor. Calibrate the monitor in the center, where you intend to do color critical work. Remember the position of the patches because you will not be able to detect them in a color image.