



## Calibrating a display:

**Note:** Windows has a very similar program built into its operating system as the one described below for Apple. The windows application is called “**Display Color Calibration**”. Here’s how you open it:

1. Open Display Color Calibration by clicking the **Start** button , and then clicking **Control Panel**. In the search box, type “**calibrate display**”, and then click **Calibrate display color**.  If you're prompted for an administrator password or confirmation, type the password or provide confirmation.
2. In **Display Color Calibration**, click **Next** to continue and follow the prompts. Like on the Apple calibration utility below, choose D65 (6500°K) as your white point.

*(The following is an edited version of a document found on Ian Lyons website: [http://www.computer-darkroom.com/colors-sync-display/colors-sync\\_1.htm](http://www.computer-darkroom.com/colors-sync-display/colors-sync_1.htm))*

The following tutorial describes the process of calibrating an Apple LCD display using the Apple built-in **Display Calibrator Assistant Utility**. Before beginning the process of calibrating your LCD display and to make it easier for yourself I recommend that you use a mid grey desktop background. You can change back to your favourite background image/color when the calibration process is completed.



- From **Mac OS X System Preferences** panel open the **Displays** applet

- Ensure you display is set to the Native resolution (LCD's should always be set to the native resolution otherwise images will appear soft)
- Ensure **Colors** is set to **Millions**
- Set the **Brightness** slider to your preferred value (the Apple default is approximately 60%, although a slightly brighter level might be necessary on aging displays).

**Note:** the screenshots used in this tutorial are based on the version of **Display Calibrator Assistant** that shipped with Mac OSX 10.4 (Tiger)

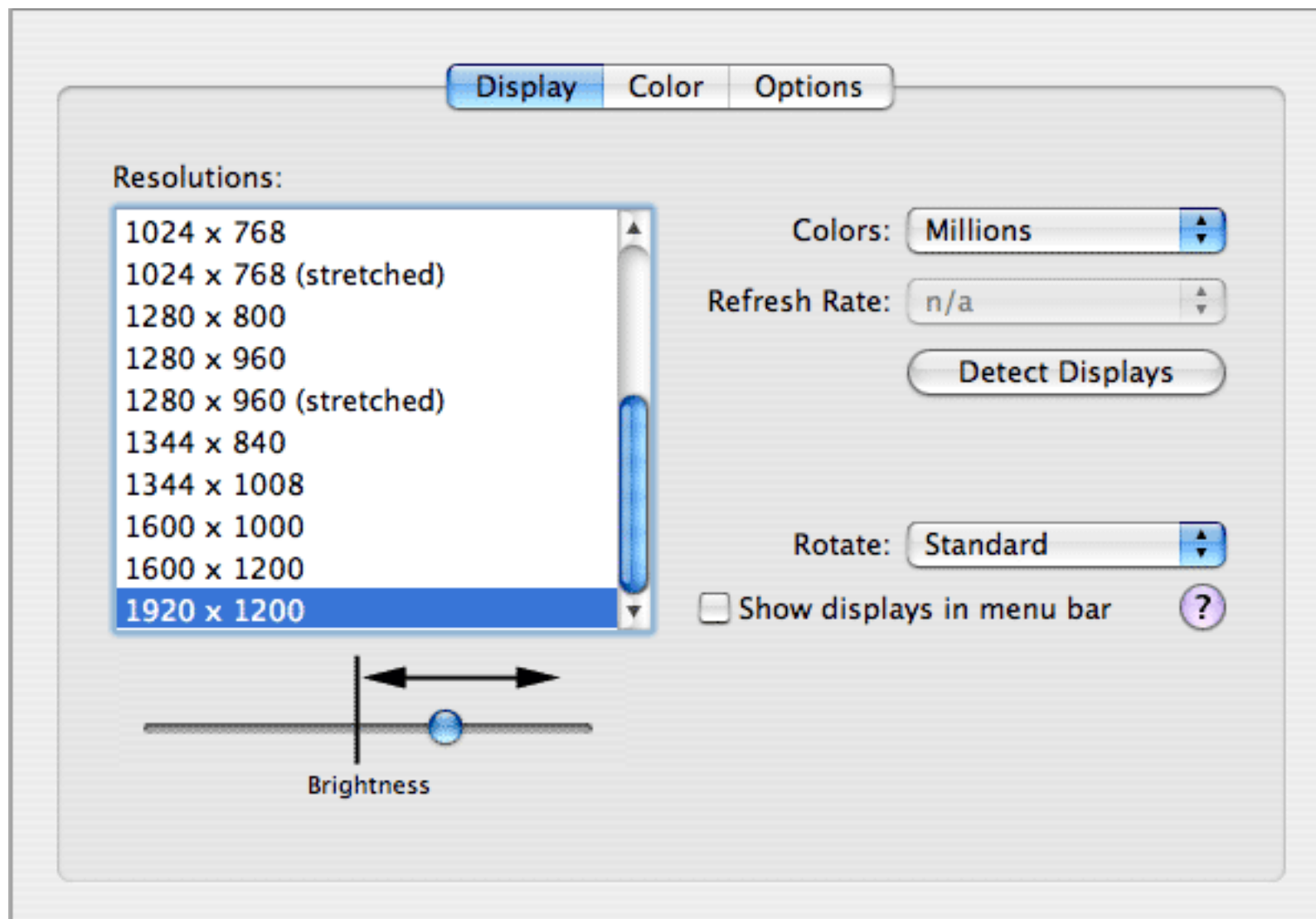


Figure 1

- Choose the **Color** tab
- Search the list of **Display Profiles** for one that matches your display and select it. In truth this step shouldn't be required since the calibration utility automatically picks up the necessary data from the display via the DVI/ADC connector.
- Press the **Calibrate** button.

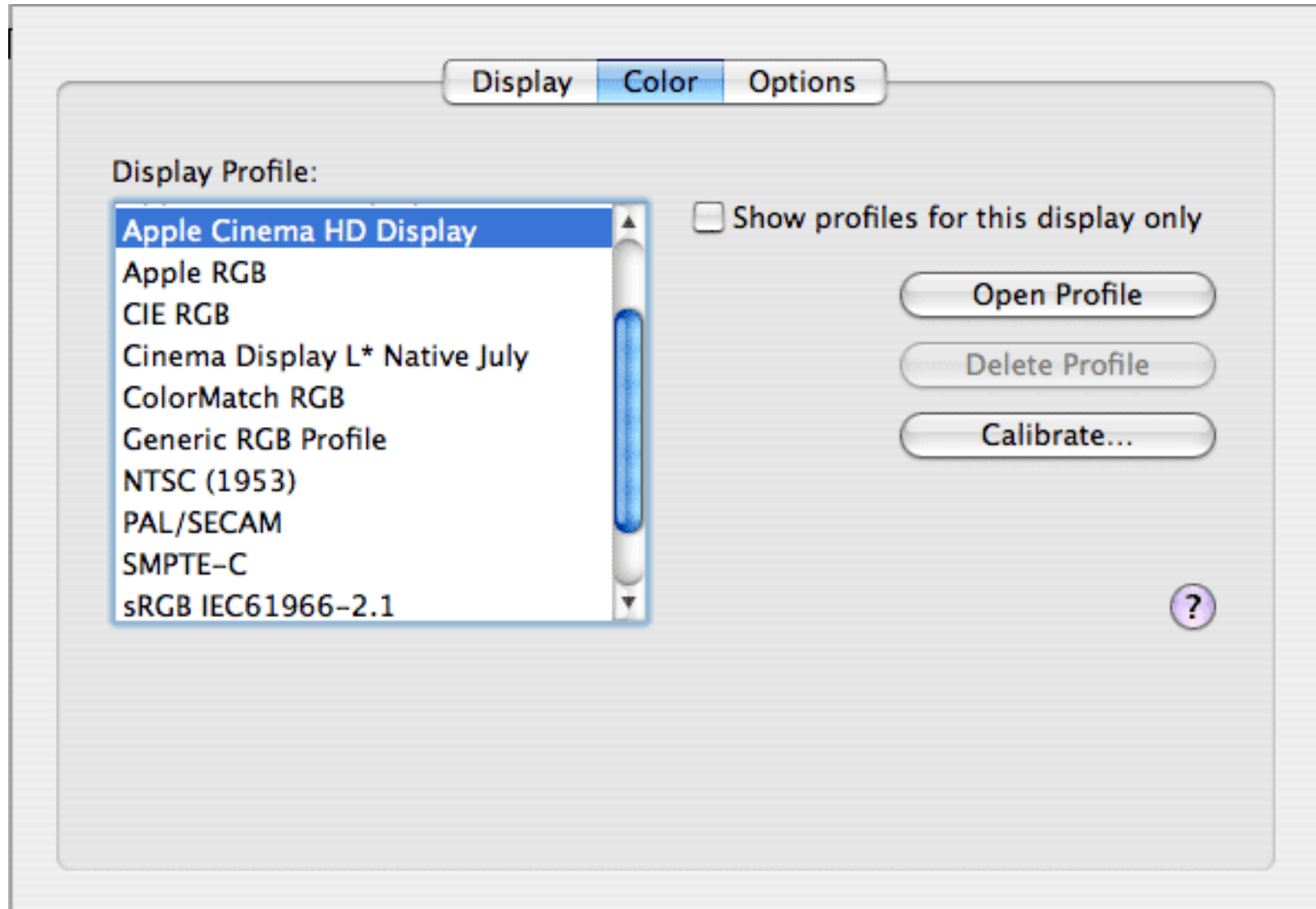


Figure 2

**Note:** if after calibrating your display you find that it appears to revert to the uncalibrated state then repeat the step outlined above but this time select the new calibration profile. Very often this problem arises after the computer wakes from sleep mode and is especially prevalent with the MacBook and MacBook Pro range. It's actually a bug in the Operating System that for one reason or another Apple seems unable or unwilling to fix.

- **Expert Mode should** be selected so that all the **available** settings can be adjusted.

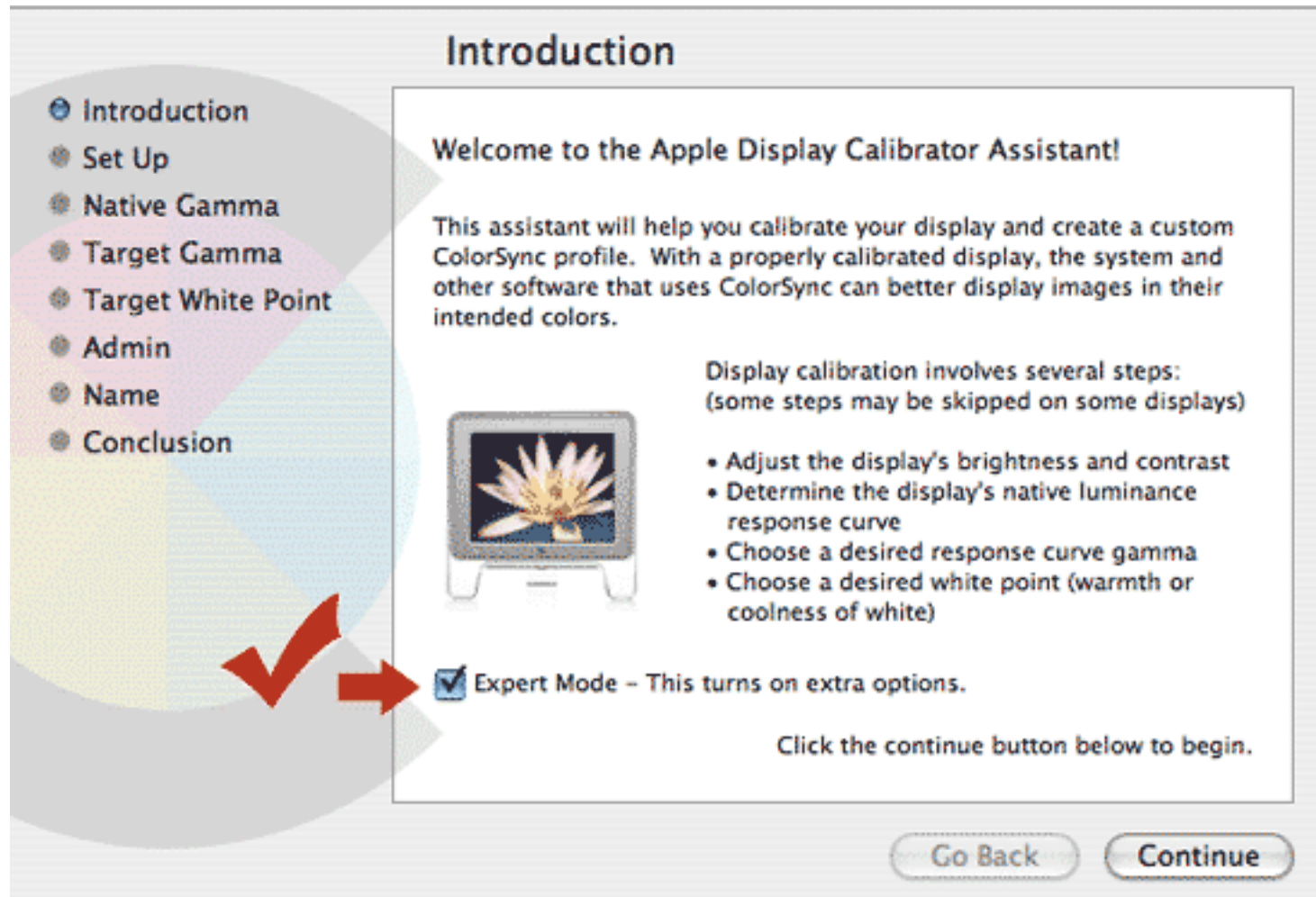


Figure 3

### Determine the Native Gamma of the Display

The checklist down the left side of the **Display Calibrator Assistant** dialog is only a guide and not all steps will be applicable to all display types. The following screenshot shows the first of five steps used to determine the **native gamma** of the display. This arrangement is an improvement on the old scheme used by Apple and was developed because they recognised the difficulty many users had in adjusting the blue channel gamma. In each step you will be adjusting the **Brightness** and **Tint** thus obtaining much finer control of the gamma curves.

- Begin by adjusting the **Brightness** slider (1) vertically so that the apple symbol blends with the background.
- Next using the **Tint** slider (2) trim out any color imbalance that may be present. You may need to readjust the left hand brightness slider a little more after this step.
- It's helpful to squint when trying to blend the inner and outer shapes.

**Determine your display's native response**

This is the first of five steps used to determine the display's native luminance response curves.

Move the left slider until the brightness of the grey shape in the middle matches the backgrounds as much as possible. Move the right slider until the shape is neutral compared to its background. It may help to squint or sit back from the display.

1

2

After you have done this step, click the continue button.

Go Back Continue

**Step 1 - Native Gamma - Brightness and Tint Adjustment**

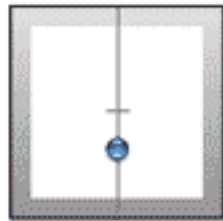
The remaining four steps are basically a repeat of the first but effect other parts of the gamma curve. You should follow the instructions given by Apple in the dialogs.

## Determine your display's native response

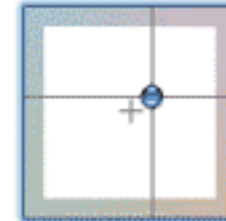
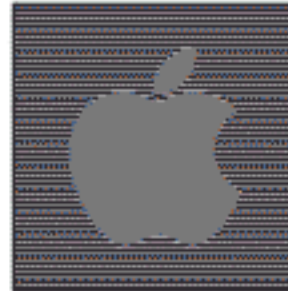
- Introduction
- Set Up
- Native Gamma
- Target Gamma
- Target White Point
- Admin
- Name
- Conclusion

This is the second of five steps used to determine the display's native luminance response curves.

Move the left slider until the brightness of the grey shape in the middle matches the backgrounds as much as possible. Move the right slider until the shape is neutral compared to its background. It may help to squint or sit back from the display.



1



2

After you have done this step, click the continue button.

Go Back

Continue


Step 2 - Fine-tuning the Mid-tone Response

## Determine your display's native response

- Introduction
- Set Up
- **Native Gamma**
- Target Gamma
- Target White Point
- Admin
- Name
- Conclusion

This is the third of five steps used to determine the display's native luminance response curves.

Move the left slider until the brightness of the grey shape in the middle matches the backgrounds as much as possible. Move the right slider until the shape is neutral compared to its background. It may help to squint or sit back from the display.



After you have done this step, click the continue button.

[Go Back](#) [Continue](#)

### Step 3 - Fine-tuning the 3/4-tone Response

#### Setting the Target Gamma

Once the native gamma has been determined it only remains for you to decide on your preferred target Gamma. For many years the standard gamma setting for Macs was 1.8. Compared to gamma 2.2 a setting of 1.8 will appear quite bright. In other words gamma 2.2 will appear darker and more contrasty than what many long time Mac users are used to. If you don't have a need (or love affair) with gamma 1.8 I **recommend** that you choose gamma 2.2. The majority of displays (CRT and LCD) will have a **Native** gamma somewhere between 2.0 and 2.2 so choosing a lesser value requires a fair amount of adjustment on the part of the graphics card LUT, and will tend to cause banding or posterisation.

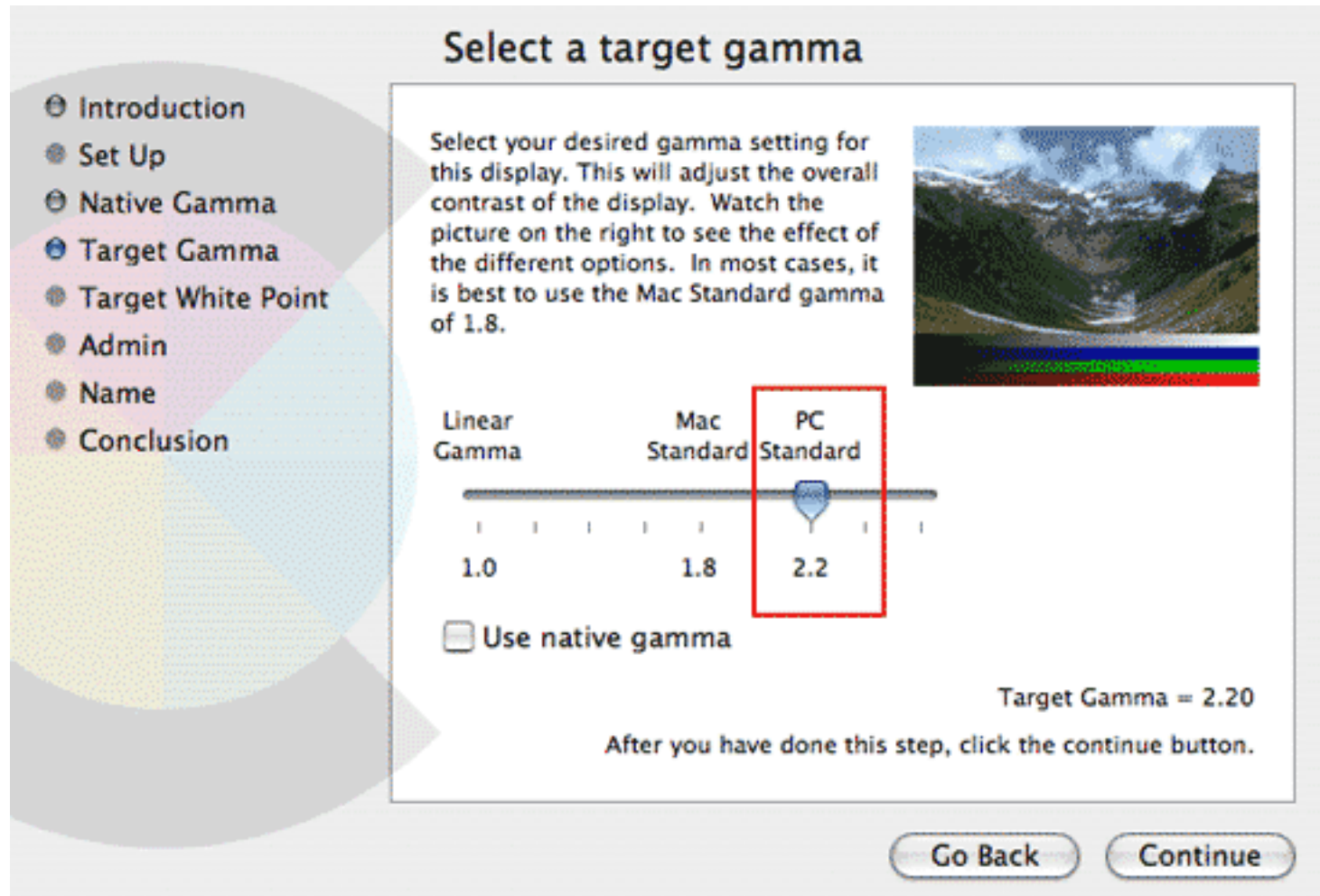


Figure 4 - Setting the Target Gamma

#### Choosing the White Point

High-end LCD's such as those from **Apple** tend to be factory set to a value of around **6500°K** (i.e. their **Native White Point** is **6500°K**) and so it only remains for the user to check the box labeled **Use native white point**. However, it is worth mentioning that as the display ages the backlight will slowly begin to discolor. At time of writing (2007) this tutorial my display is measuring around **6350°K** which is well within the margin of error when using the human eye as a measuring device (see footnote).

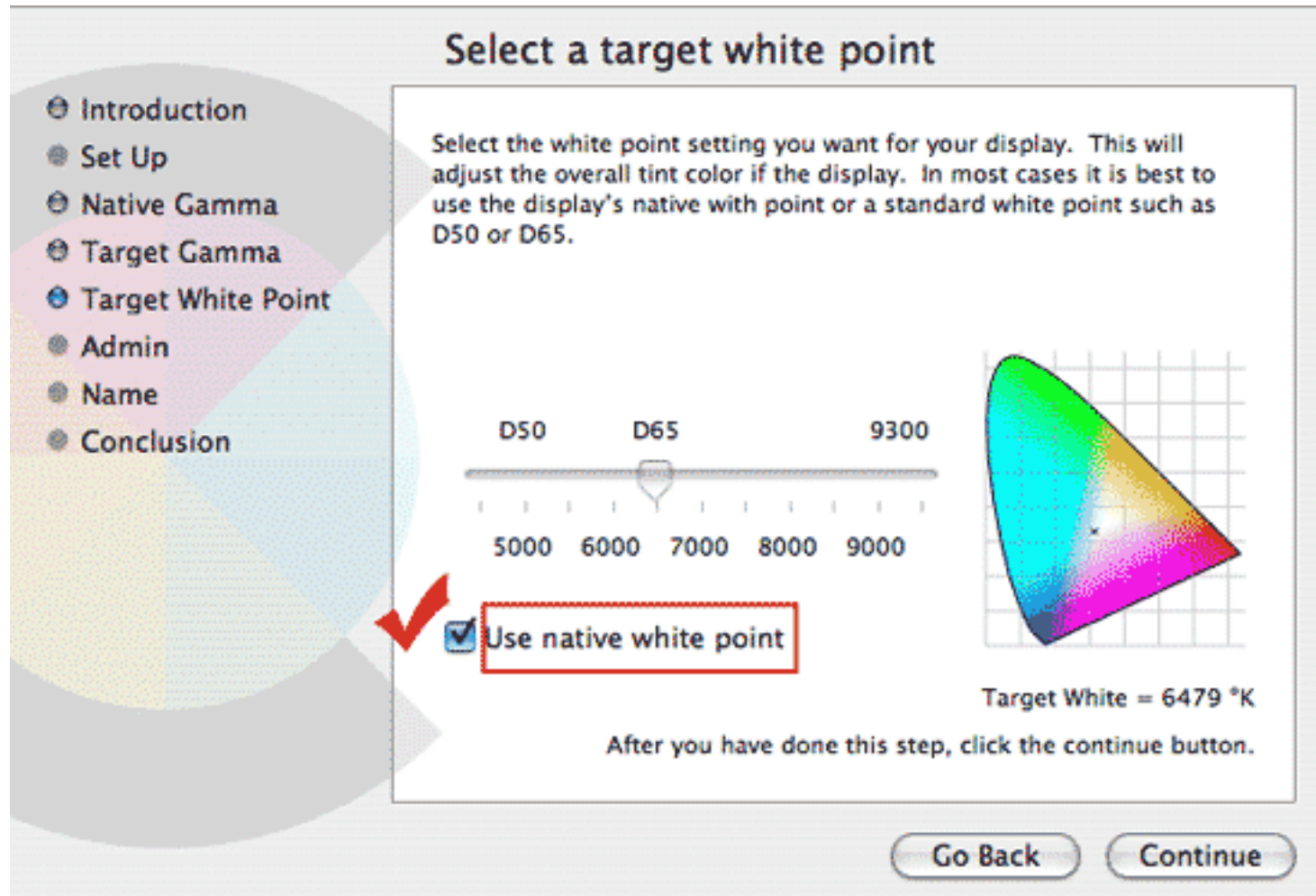


Figure 5 - Typical LCD White Point Setting

#### Naming and Saving the Display Profile

The final step requires that you give the display profile a name. Pressing the **Create** button will create the new display profile and save it to the appropriate folder for use by the system. Photoshop will automatically read and use this display profile until it is superseded or deleted.

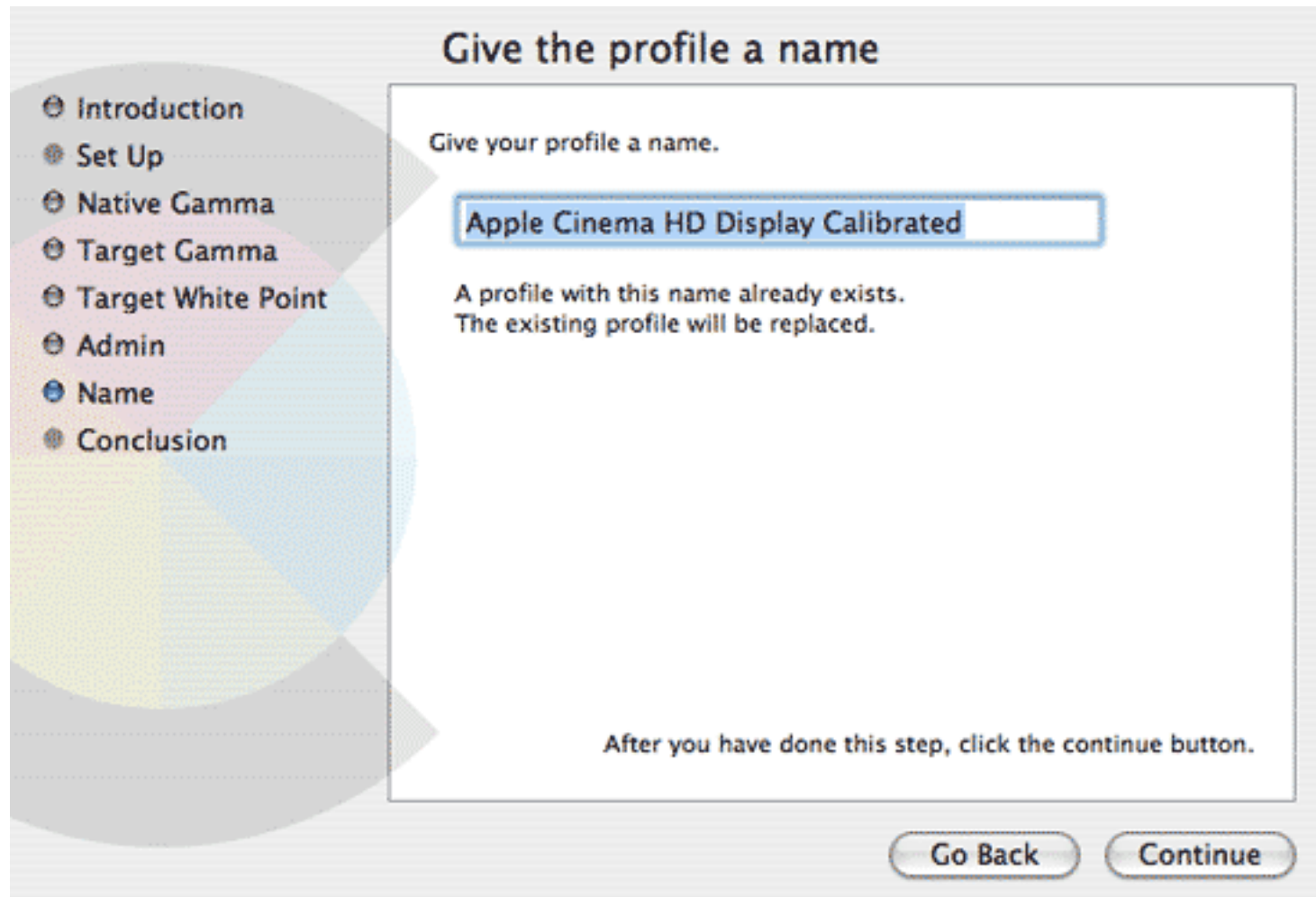


Figure 6 - Name and Save the Profile

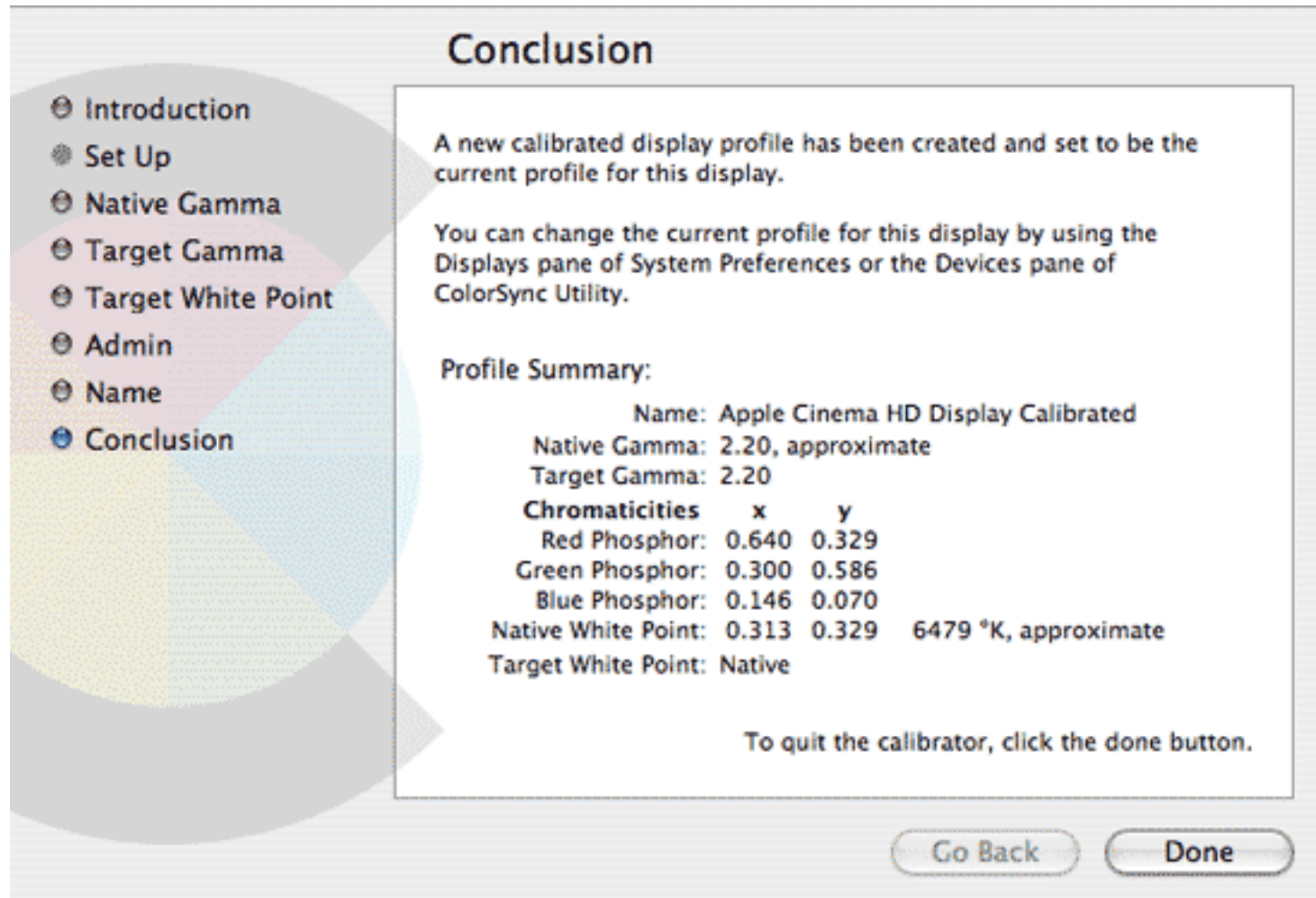


Figure 7 - Summary of calibration results

Whilst this tutorial used the **Apple Display Calibrator Utility** some find that a shareware application called [SuperCal](#) to be much better. I haven't used it but have been told by readers of this site that it delivers superior results to Apple's Display Calibrator.

**Footnote:**

Visual display calibration can get you in the right ballpark, but it comes a very poor second to proper hardware based calibration. This is especially true as the display ages. Many who make the transition find the difference between software only and hardware based systems to be quite significant, and the initial cash outlay for the hardware is quickly recovered through a reduction in poor screen-to-print matches. The following hardware based solutions are worth investigating: [Datacolor Spyder3PRO](#) and [X-rite Photo i1-Display 2](#).