

Hubble Display



Software Manual (version 1.24)



Overview

Hubble Display program provides field technicians the ability to control hubble, make measurements and aids in setting Color Temperature.

This document applies to the Hubble Display application at the version V1.24 level. The Hubble applications are only available for Windows XP and Windows 2000.

Installation

To install the Hubble Display application, simply double-click on the Hubble Display installation icon on the CD that comes with hubble and follow the simple on-screen instructions. The application is installed into a folder that you can specify on your hard drive. The default install location is: C:\Program Files\X-Rite\Hubble\

The installer also allows the option to create a shortcut in the Windows **Start** Menu.

Functions

- ***Measure Dark*** - Set the dark current correction
- ***Active Calibration*** - Select one of the stored calibration settings
- ***Measure*** - Make a measurement (or start/stop a series of measurements in continuous measurement mode)
- ***Adjust to Aim*** - Support adjustment of a display to a target color temperature
- **Operational Parameters**
 - ***Measurement Speed*** - Measurement integration time
 - ***Continuous*** - Single or continuous measurement modes
 - ***Luminance Units*** - Measurement Luminance units (Candelas M² or Foot Lamberts)
 - ***Measurement Units*** - Measurement color units (Yxy or XYZ)
 - ***Show Large Display*** - Optional large-font measurement display window
 - ***Beep*** - Audible measurement tone
 - ***Open Data File*** - Log measurement data to comma-delimited text file
 - ***Use Smart Smoothing*** – Improved measurement approach for low light conditions

Operation

Connect hubble to an available powered USB port on your computer using the supplied USB A/B cable. Double-click on the program icon or select **Hubble Display** from the Windows **Start** Menu to launch the Hubble Display program as seen in figure 1.

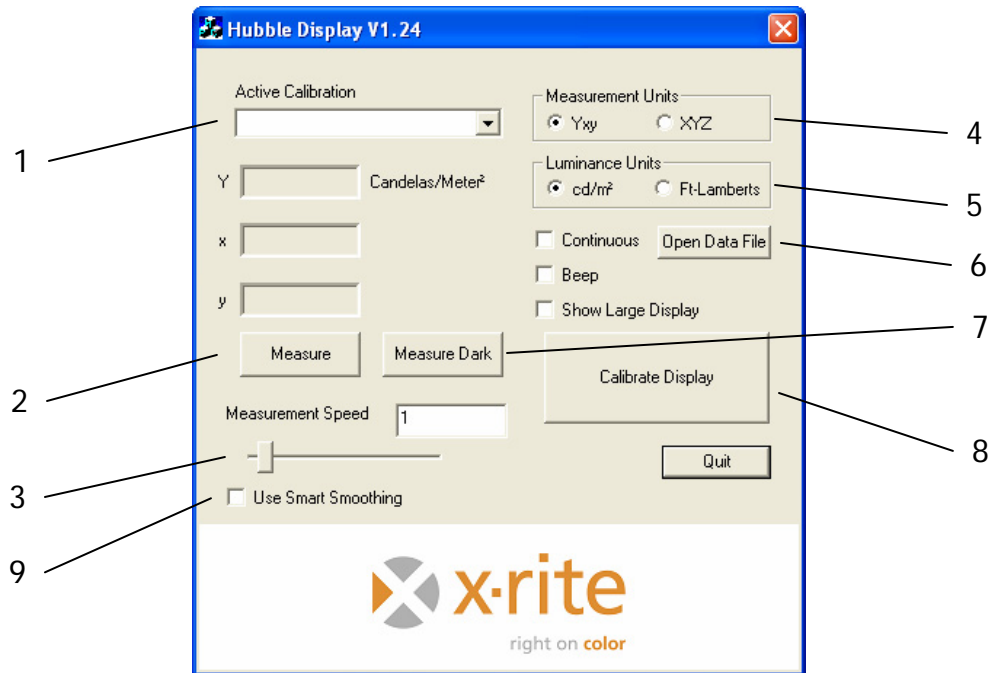


Figure 1

1. The **Active Calibration** field shows the calibration that will be used when the **Measure** button is clicked. Change the active calibration at any time by selecting any of the entries from the Active Calibration list box; these include factory calibrations for CRT, LCD and Projector display technologies. (Additional calibrations can be added using the Hubble Manage application).
2. The **Measure** button on the dialog (or the blue **Measure** button on the back of hubble) initiates a measurement. Measured values are then displayed. Continuous measurements may be made by first checking the **Continuous** option. When the Continuous option is selected, click the **Measure** button and hubble will repeat measurements at the intervals determined by the integration time setting, (Measurement Speed) until the **Stop** button is clicked. The **Measure** button changes to Stop during the continuous measurement mode.

NOTE: Pressing and holding the blue **Measure** button on hubble will take measurements continuously until the button is released.

Check the **Beep** option for an audible tone each time a measurement is made.

Check the **Show Large Display** option to show an additional, unattached, window that displays measured data. The window may be freely moved and resized for easy viewing at a distance.

3. The **Measurement Speed** slider controls the measurement integration time. Use the left and right arrow buttons on the keyboard for fine control. The selected integration time (in seconds) is displayed in the **Measurement Speed** window. Longer integration times produce more precise measurements, especially at very low light levels, but 0.25 seconds will produce accurate results in almost all cases. In continuous mode the **Measurement Speed** setting also determines the period between successive measurements.
4. The **Measurement Units** can be set to Yxy or XYZ by selecting the desired option. Changing these settings causes currently-displayed measurement data to be modified to conform to the new units. All measurements use the CIE 1931 Standard (2°) Observer.
5. The **Luminance Units** can be set to candelas/square meter or foot-lamberts by selecting the desired option. Changing these settings causes currently-displayed measurements to be modified to conform to the new units. All measurements use the CIE 1931 Standard (2°) Observer.
6. The **Open Data File** button allows the logging of measurement data to an ASCII text file. Opening an existing file causes new data to be appended to the end of the file; previously recorded data is preserved. Ending this mode is accomplished by pressing the same button (re-labeled as **Close File**). The ASCII file contains one line for each measurement. Data across the line are comma delimited with entries for

Luminance (Ft-Lamberts), Luminance (cd/m²), x-chromaticity, y-chromaticity, measurement integration time, date/time stamp (DDD MMM DD HR:MIN:SEC YYYY). The format of the file is always the same, even when XYZ units are selected in the main program window.

7. The **Measure Dark** button allows for a measurement of the base value of dark current. This value is used to correct all subsequent measurements. It is important to perform a Measure Dark prior to use of the instrument and before making highly critical measurements, especially those at very low light levels.

NOTE: For the most stable and accurate measurements, allow hubble to warm up for 30 minutes before taking a dark current measurement. This allows for more accurate measurements in low light levels. To warm up hubble, simply plug it into a powered USB port. To perform a Dark current measurement, place the lens cap on hubble and click on the **Measure Dark** button; be sure that the lens cap is seated properly in the lens opening.

8. The **Calibrate Display** button functions are described later in the manual in the **Setting Color Temperature** section.

9. New to version 1.24 of the Hubble Display software is an improved measurement approach for low light conditions called Smart Smoothing. When the **Use Smart Smoothing** option is selected using the checkbox, the Hubble Display software will take a number of measurements over time and return an average measurement value. Smart Smoothing only operates when luminance is below 10 cd/m². Selecting Smart Smoothing when luminance is above this level will have no affect on the operation of Hubble. When Smart Smoothing is enabled and after a measurement is found to be below 10 cd/m², subsequent measurements which are within 10% (in luminance) of that initial measurement are averaged. Color values (x, y) returned are a rolling average of up to the last 16 previous measurements.

Setting Color Temperature

To use Hubble Display to set the color temperature of a display, click the **Calibrate Display** button to interactively adjust a display to a color temperature. A new window will be displayed as shown in figure 2.

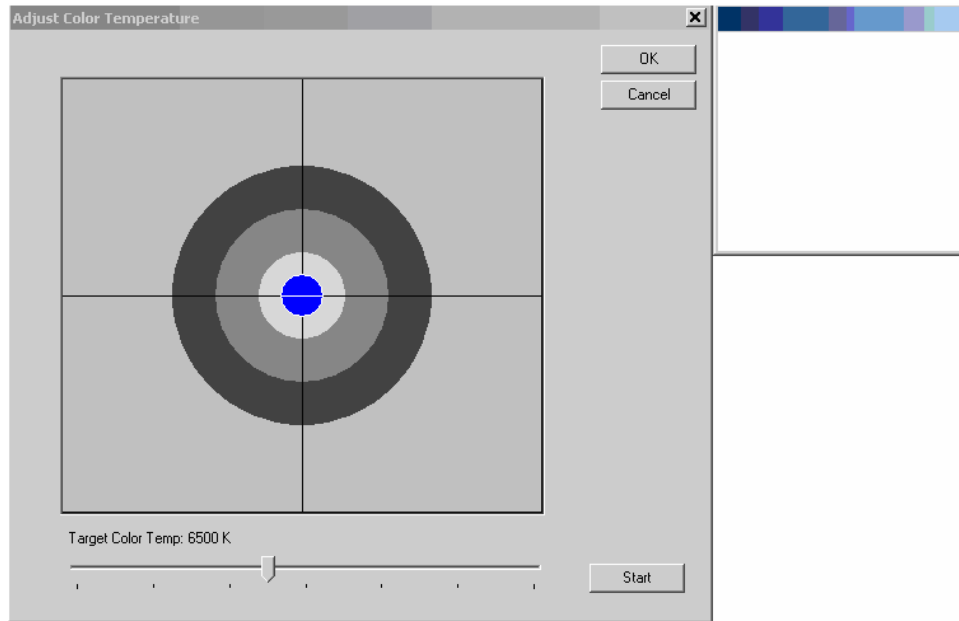


Figure 2

The window with the white target is freely-moveable and resizable.

Adjust the **Target Color Temperature** slider to the required color temperature aim from 4000 K to 10,000 K in increments of 100 K. Use the left and right arrow buttons on the keyboard for fine control.

1. Position the white window, or use another video source to display a full white field, and aim hubble so that it measures the white patch.
2. Click the **Start** button to begin a continuous measurement cycle. The window changes to help aid the adjustment of the display to the specified color temperature.

If the display white point requires significant adjustment the display will show a red or blue color circle with a minus (-) as shown in figure 3 or plus (+) as shown in figure 4.

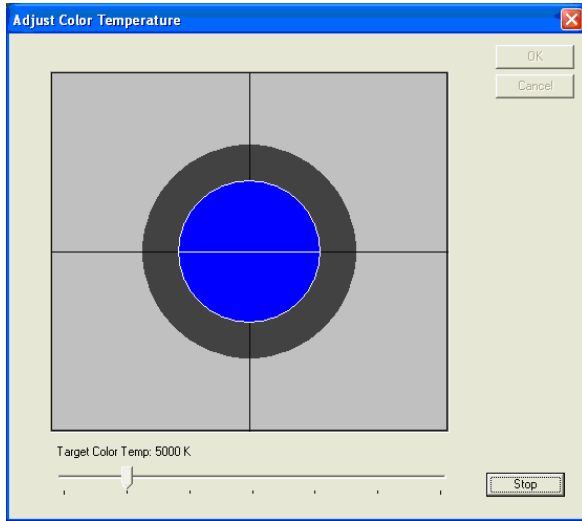


Figure 3

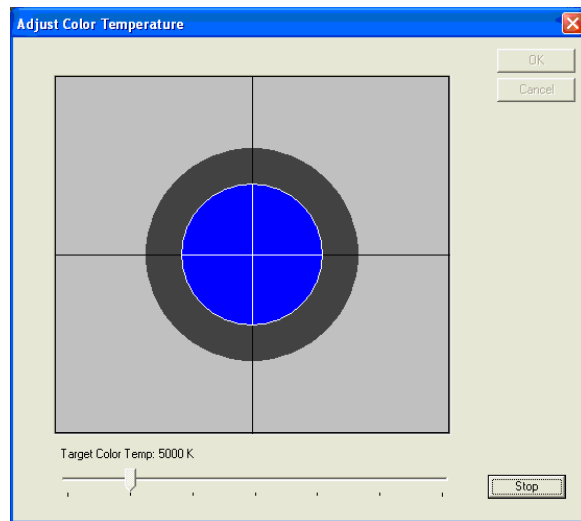


Figure 4

3. Increase the adjustment of the indicated color if a plus (+) sign is shown, decrease it if a minus (-) sign is shown. When the adjustment is close to the aim color temperature the display changes as shown in figure 5.

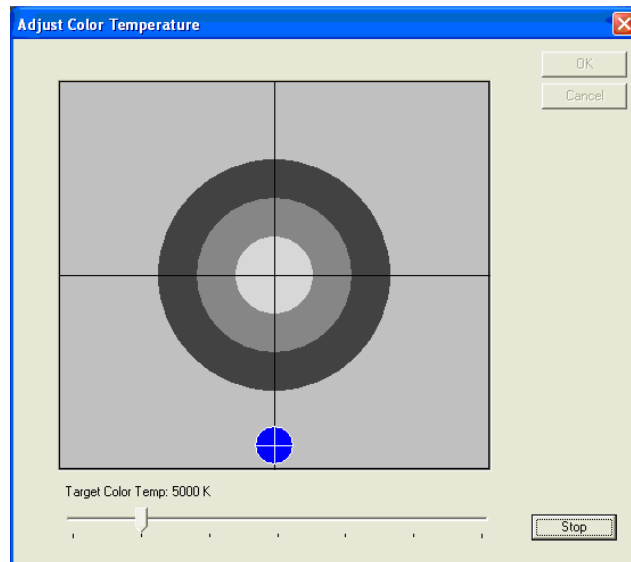


Figure 5

4. Continue to make the adjustments indicated by the colored circle (the color may change several times as the aim color temperature is approached, adjust the indicated color each time). The colored circle moves with each adjustment toward

the center of the target. When the adjustment is correct the display changes as shown in figure 6.

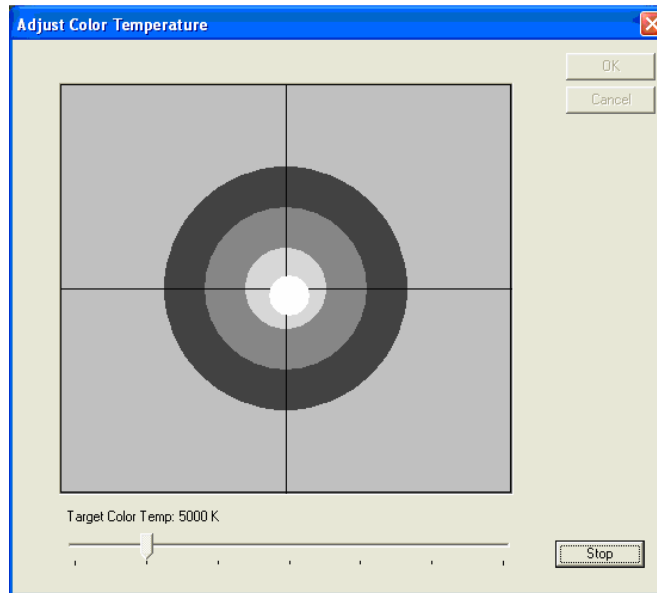


Figure 6

→ Hint: Instead of increasing the color that requires adjustment, try decreasing the other two colors.

5. Click the **Stop** button to complete the adjustment mode, and click **OK** to exit the **Adjust Color Temperature** function and return to the main Hubble Display window.
6. Click the **Done** button to button to exit Hubble Display.