

Hubble Manager



Software Manual (version 1.24)



Overview

Hubble Manager allows the calibration of hubble to specific standards and to manage the use and storage of different calibrations.

Each hubble has been calibrated at the factory with three calibration settings. These factory supplied calibrations are sufficient for normal use and are write-protected. You cannot change or delete these calibrations.

Hubble Manager allows you to create up to thirteen additional calibrations to provide closer correlation to specific standard reference instruments or to provide extra accuracy for specific displays. Customer specific calibrations may be created, saved to disk and reloaded into hubble as required. This allows you to reconfigure hubble so that Hubble Display or other measurement applications have the calibration settings required for specific customer applications.

Hubble Manager creates calibration sets from measurements of identical color patches on a specific display that have been measured with hubble, and with a standard measurement instrument (the reference). These are referred to in the program as: Color Patch Data, Measurement Data, and Reference Data. Calculation of the calibration can be made from previously stored Measurement Data and previously stored Reference Data; Reference Data manually entered into the program; or Reference Data or Measurement Data collected by the program (Auto Measure/Auto Measure Both). Hubble Manager can display color patches for measurement if the calibration display is connected to the Windows PC that is running Hubble Manager.

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

Installation

To install the Hubble Manager application, simply double-click on the Hubble Manager 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\

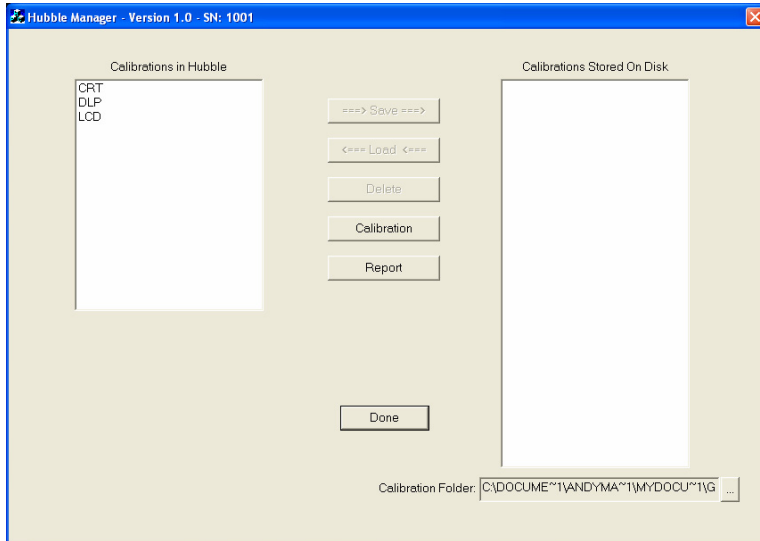
The installer also allows the option to create a shortcut in the Windows Start Menu.

Functions

- Download stored calibration settings from hubble and stores them in disk files
- Browse disk-based libraries of calibration settings and uploading them to hubble (settings are associated with each specific hubble by serial number)
- Report stored calibration settings as text files
- Enter reference calibration measurements via a text file, through direct keyboard entry, or automatically (for supported reference instruments), and save and recall those measurements to disk
- Display optional color patches for measurement by hubble and a reference device
- Provide an optional audible feedback on completion of measurements
- Specify user-defined calibration color patches or selection of the default color patches (White, Red, Green, and Blue)
- Save user-defined color patches to files for later recall and use
- Select between color units (either Yxy or XYZ) for reference measurements
- Select between Luminance units (either candelas/square meter or foot-lamberts) for reference measurements
- Have control of and data collection of hubble and reference instrument for measurement of calibration patches with support for manual entry, manual measurement, and automatic patch display and measurement

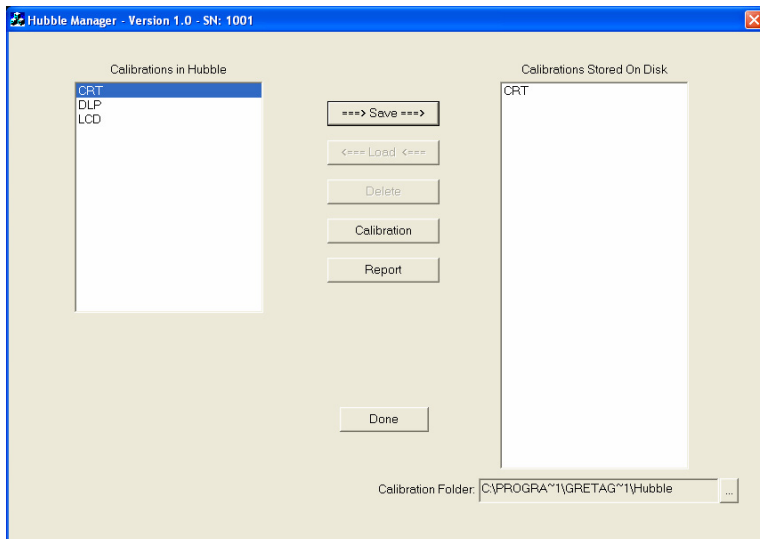
Operation

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 Manager from the Windows Start Menu to launch the Hubble Manager program.

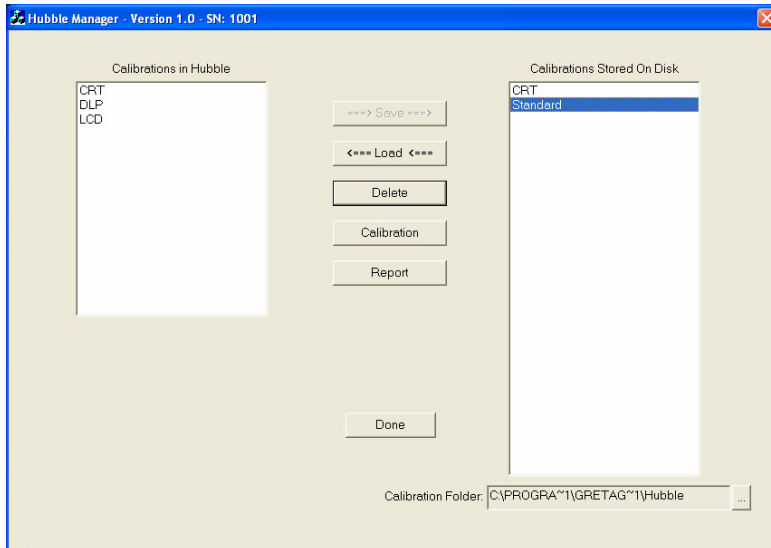


Moving Calibration Files

The list on the left shows calibrations stored in hubble with serial number shown at the top of the Window (SN: 1001 in this example). Calibrations for this hubble that are stored on disk. The Calibration Folder text box at the bottom of the dialog shows where the calibrations are stored. Highlight a calibration and click the **Save** button to download the calibration.

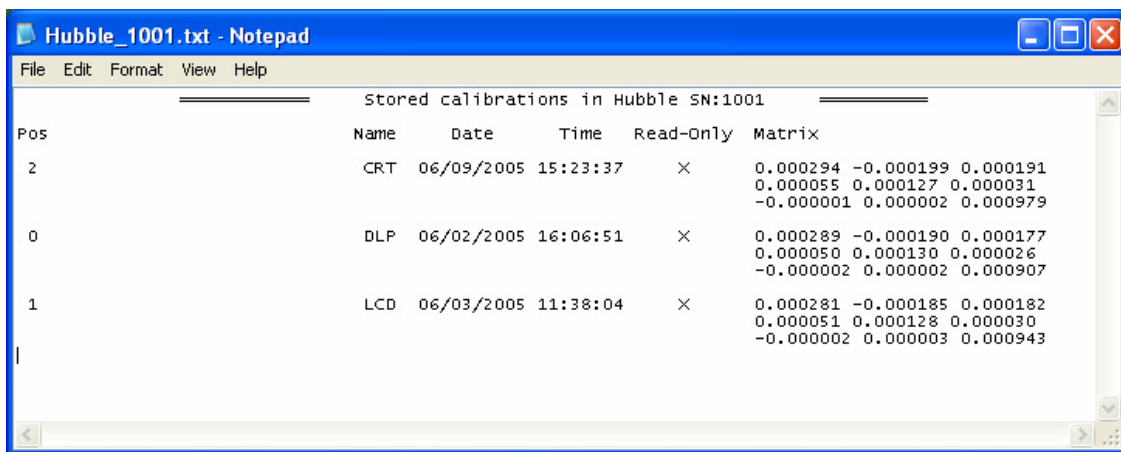


Highlight a Calibration on disk and click **Load** to upload the calibration to hubble's EEPROM.



Creating Reports

Click the **Report** button to create and display a text file listing each calibration stored in hubble. The report file is named: **Hubble_xxxx.txt** (xxxx is the serial number of the hubble containing the calibrations) and is contained in the directory in which the program is installed. This file can be opened with a text editor and may be printed. A typical report file is shown below.

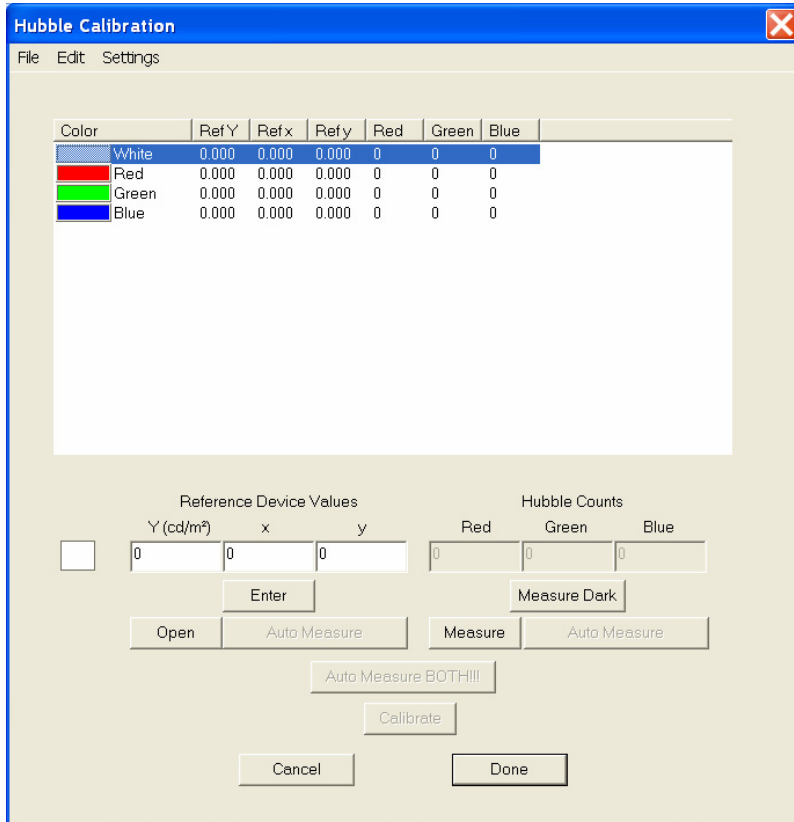


For each stored calibration the file indicates the position (Pos) in hubble EEPROM in which the calibration is stored (numbered 0 through 15), the name of the calibration, the date (MM/DD/YYYY) and time (HR:MIN:SEC) that the calibration was created, an X

to indicate if the calibration is a “factory” calibration and is Read-Only, and the actual calibration matrix values. You can close the report display window without deleting the report file.

Creating a New Calibration

Click the **Calibration** button on the main Hubble Manager window to create a new calibration. The following screen displays.



From this window you can modify settings through the use of the File, Edit, and Settings menus.

File Menu

This menu contains an **Open** item that allows opening of Reference Data, Measurement Data and Color Patch Data. Selection of any of these entries opens a file browser that allows you to load a file of the selected type. Reference Data and Color Patch Data files may be freely loaded, but a previous Measurement Data file may only be loaded if it contains data measured by the currently attached hubble. If any measurements have been taken with hubble, or entered manually for the reference device, you are

prompted to save those values before the loading another file (which overwrites entered data).

The **Save** option allows you to save the entered Reference Data or Measurement Data to a file.

Edit Menu

This menu contains a Color Patch Data item that opens the Color Patch Editor dialog.

This allows you to either edit a new list of color patches, or to modify a previously created list. (See the section on “Color Patch Editor” for details). When the list has been edited and saved to a file it is automatically loaded as the current list.

Settings Menu

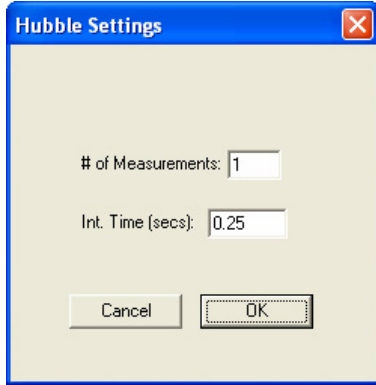
This menu contains Display Color Patches, Luminance Units, Measurement Units, and Hubble Settings items.

When the Display Color Patches item is checked, it causes a separate window to open and display the currently selected color patch for measurement with the hubble being calibrated, the reference instrument, or both. This window can be resized and moved freely to allow placement on any connected display. Leaving this unchecked requires that color patches be displayed in some other manner that is outside the control of the Hubble Manager program (e.g., other software, or a DVD). When Display Color Patches is selected, the Hubble Auto Measure, Reference Device Auto Measure (if connected), and Auto Measure Both (if a reference device is connected) functions are enabled.

The Luminance Units item allows you to select between Candelas/Meter² or Foot-Lamberts. The current selection is displayed with a check mark. Choose the units in which your reference device measures.

The Measurement Units item allows the selection of Luminance and chromaticity coordinates (Yxy) or tristimulus values (XYZ) units, and indicates the selection with a check mark. All colorimetric measurements are for the CIE (1931) Standard Observer. Choose the units in which your reference device measures.

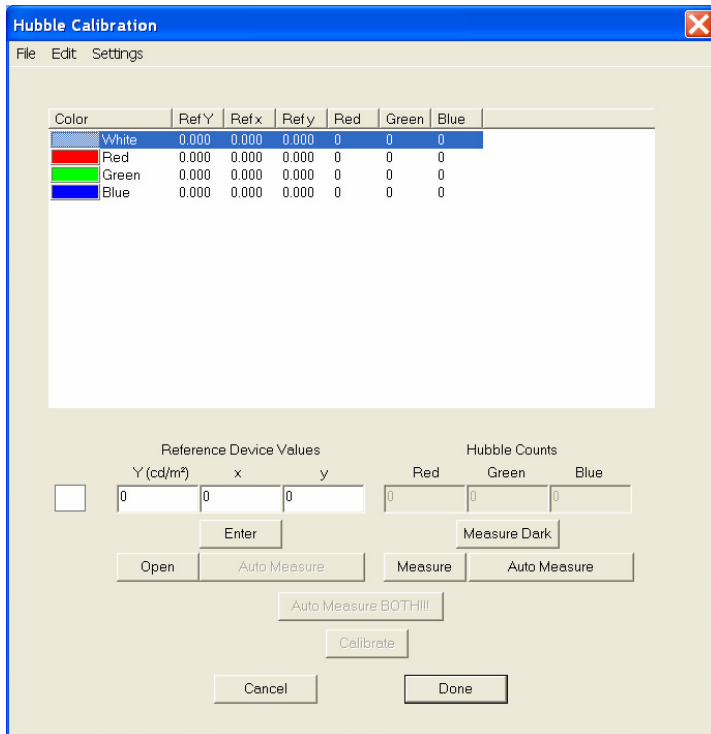
The Hubble Settings item opens the Hubble Settings dialog. This dialog allows you to specify the hubble integration time, and the number of individual measurements to average for a complete measurement. The default values are 1 Measurement and 0.25 seconds Int. which is normally adequate.



Measurement Operation

When all required settings have been completed, measurement operations may be performed from the Hubble Calibration window.

In this example, the Display Color Patches setting has been selected so the Hubble **Auto Measure** button is now active (not grayed out).



To perform the measurement operation:

Make a dark current correction by covering the lens with the lens cap and clicking the **Measure Dark** button (this is advised at the beginning of each measurement sequence).

Select one of the rows in the list. (The white patch is shown selected in the example). The values displayed on that list (or blanks if no measurements of that color were previously made), are displayed in the three edit boxes below the list box and the small color box to the left of those values shows the selected color. If **Display Color Patches** is checked in the Settings menu, the color of the color patch window is updated to match.

Take a measurement with the reference device and enter the measured values into the three Reference Device Values edit fields. If a reference device is connected that is supported by the Auto Measure function (current support is for Photo Research PR-650), the Auto Measure function can be used.

To accept manually entered values, click the **Enter** button. The values from the edit boxes are copied into the list box for the current color.

You can measure the same patch color with hubble at this time or do this at a later time.

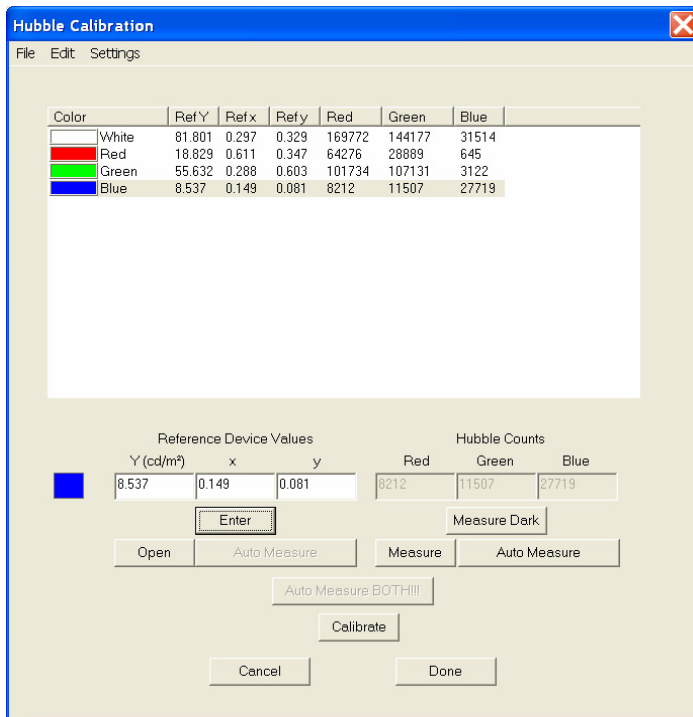
To measure immediately, click the Hubble Counts **Measure** button. Hubble measurements are made according to the current Hubble Settings and their values added into the list box in the Red, Green, and Blue columns. The list box then advances to the next line and the color patch is updated.

Alternately, you can automatically measure all of the patches in sequence with hubble by clicking the **Auto Measure** button (only active when Color Patches are displayed). Hubble Manager will automatically display all of the color patches in the list, measure each with hubble, and continue to the next color patch.

If you do not make a hubble measurement, you must manually select the next color patch to be measured in the list box by clicking it to highlight.

Any of the patches can be selected for re-measurement at any time by highlighting the appropriate row.

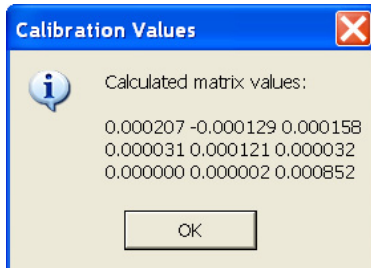
The example below is how the Hubble Calibration dialog appears when all of the measurements have been entered.



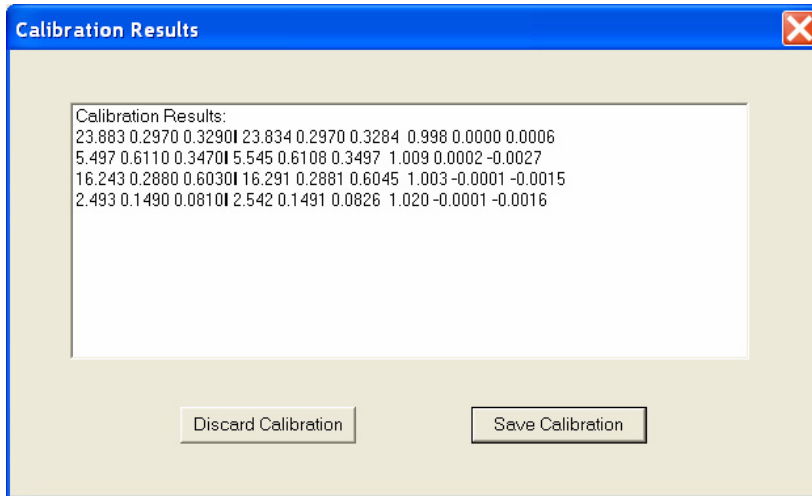
Viewing and Saving Calibration Results

Create calibration settings for these measurements by clicking the **Calibrate** button.

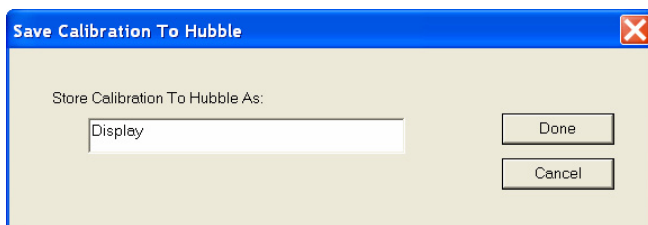
This opens a new dialog box that reports the calculated matrix values.



Clicking the **OK** button displays the Calibration Results window.



The Calibration Results window reports the measured reference Yxy values, the Yxy values computed from hubble measurements using the calibration matrix, and the differences between these values for each color patch. (The luminance difference is reported as the luminance ratio). Click the **Save Calibration** button to save a good calibration (luminance errors near 1.00 and chromaticity errors near 0.0) in hubble's EEPROM, or click **Discard Calibration** to go back and re-measure color patches with possible measurement errors. If **Save Calibration** is selected; fill in the name under which the calibration is to be saved in the **Save Calibration To Hubble** window.



No data is stored if the calibration is rejected by clicking the **Discard Calibration** button.

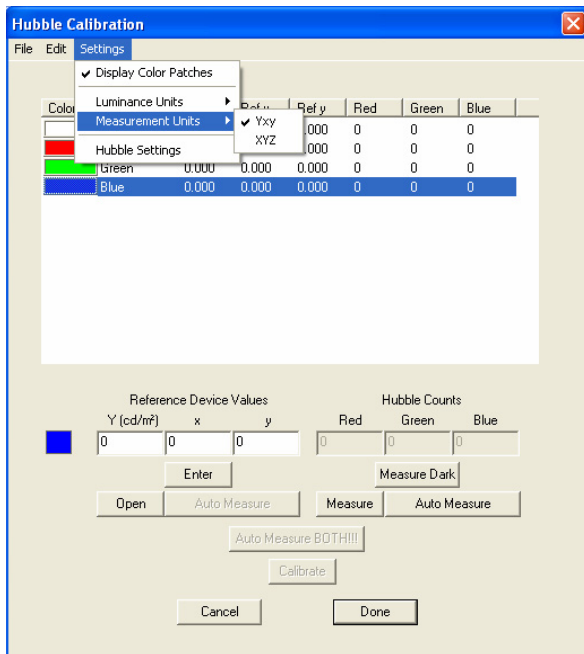
Save the measurement data to a file (using the File -> Save -> Measurement Data menu) without calculating a calibration setting. This file can be recalled later for calculation of calibration settings.

Save the reference data to a file (using the File -> Save -> Reference Data menu). This enables you to accumulate reference device data once and recall it for the calibration of numerous hubbles.

Additional Features

Units Setting

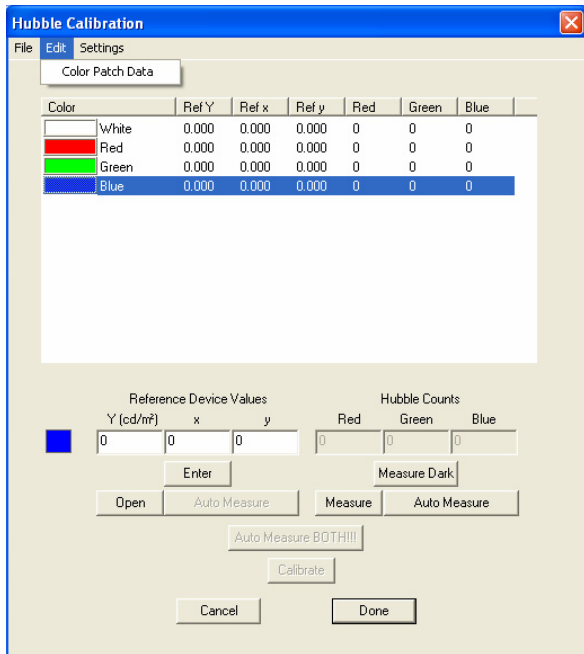
You can change the Measurement Units or Luminance Units settings at any time by selecting the items from the Setting menu in the Hubble Calibration window.



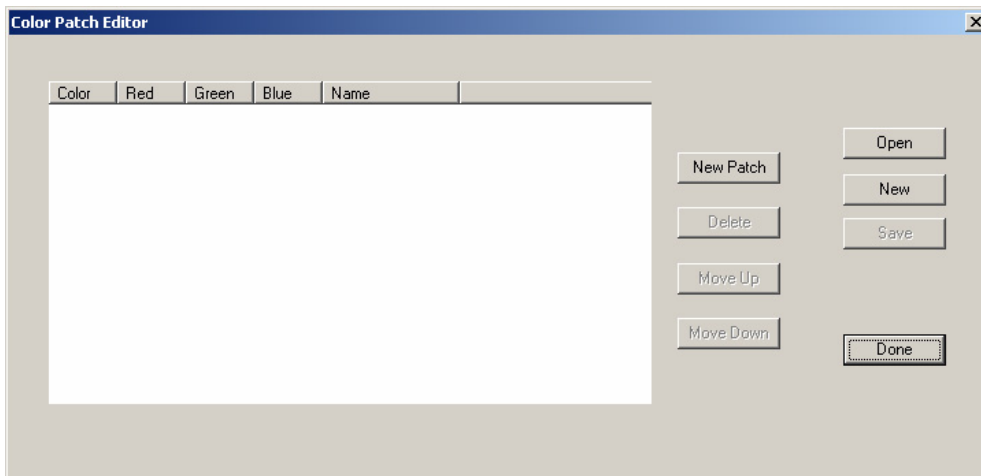
All displayed data is converted appropriately. When data is saved to a file, it is saved in the units selected and the file is tagged correspondingly.

Color Patch Editor

The **Color Patch Editor** is activated by selecting the **Color Patch Data** item in the Edit menu.

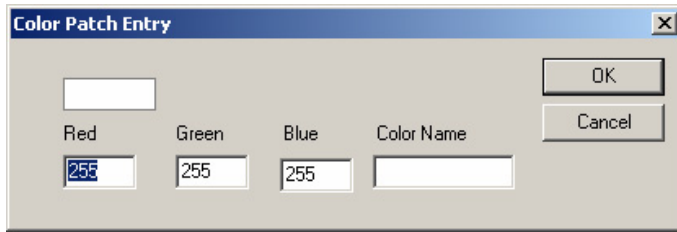


The Color Patch Editor window appears.

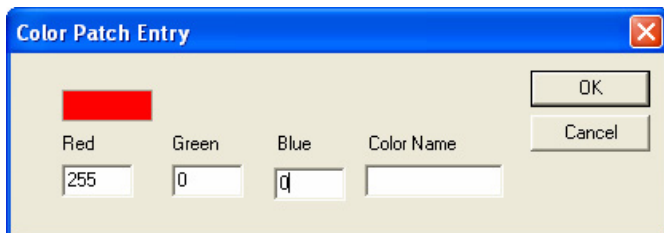


You can open a previously defined color patch file by clicking the **Open** button (a standard file browser appears), or you may create a new list by clicking the **New** button and then entering a patch by clicking the **New Patch** button.

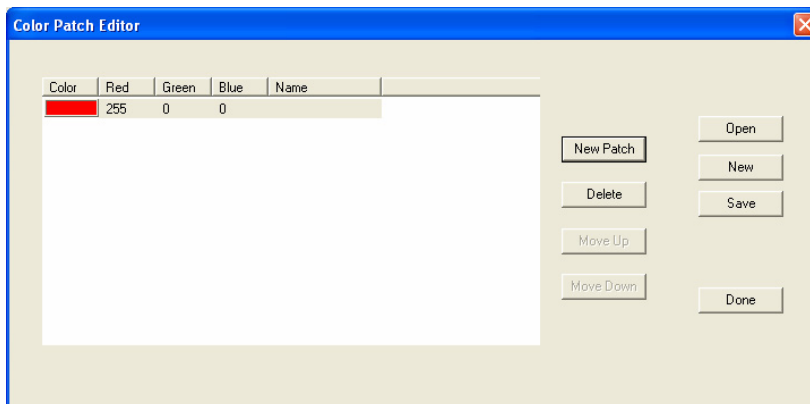
Clicking the **New Patch** button causes a new patch entry to be generated and opened for editing as follows.



You may change the color by entering the Red, Green and Blue values (0 to 255 scale) for the patch. A Color Name may be assigned to the color. As the Red, Green and Blue values are entered the updated color is displayed in the box at the top of the dialog.



Click the **OK** button to add the new color patch to the list.



Patches may be deleted from the list by selecting them and clicking the **Delete** button. The order of the patches can also be changed using the **Move Up** and **Move Down** buttons (enabled only when the list contains more than one color entry).

Click the **Save** button to save the color patch list to a file for later use. (Selecting the **Save** button brings up a standard Windows file browser that allows entry or selection

of the filename to which the patches are saved). Click the **Done** button when finished editing color patches.