SpectraCal

CalMAN Setup Guide

HP DreamColor Z27x

Rev. 1.5

PORTRAIT
DISPLAYS

Introduction

CalMAN Display Calibration Software can automatically create an optimized calibration 1D LUT and color matrix for the DreamColor Z27x monitor and automatically load the calibration data into the monitor. Because of the inherent linearity of the DreamColor monitor, very accurate performance is obtained without employing a 3D LUT.

Note: The DreamColor Z24x, Z31x, and Z32x monitors do not contain the features required to support CalMAN auto calibration.

CalMAN Required Software Version

- Version 5.3.5 or newer

CalMAN Recommended Workflow

- **Video monitor mode**: SI Advanced Calibration
- **RGB monitor mode**: Monitor - Direct (EIZO/HP)

DreamColor Z27x Control Port

- USB 3.0 (USB 3.0 A to B cable required for proper connection and control)

DreamColor Z27x Initial Setup

To connect a DreamColor Z27x to a host calibration computer with a USB 3.0 cable:

1. Install the device driver for the DreamColor Z27x (available either from SpectraCal or the HP web site).

   When the driver is properly installed, the monitor should be listed in Device Manager as "HP Z27x USB."

Note: The DreamColor USB driver does not currently support operation under VMware Fusion.

2. Connect a USB 3.0 cable (required) between the display and the CalMAN computer.

3. On the DreamColor Z27x, under Open Menu / Management / Manage Internal Processor, select "Enable."

4. Under Open Menu / Image Adjustment, uncheck the "Use Video Levels (16-235)" selection. After calibration is complete, you can select the Video Levels option, if desired.

5. *Cycle the master power switch on the rear panel of the DreamColor Z27x, and then wait 2 minutes before connecting to the DreamColor within CalMAN.*

DreamColor Z27x Calibration Mode Selection

A DreamColor Z27x may be operated either as a video monitor or as an RGB computer monitor, depending upon its normal signal source connection. The monitor's normal signal source connection/operating mode determines which of the following calibration modes to use.

Click on one of the links below to jump to the section in this document outlining the desired DreamColor Z27x calibration mode.

- **Video Monitor** - The DreamColor Z27x monitor is connected to a video signal source (e.g. SDI signal router, video output adapter device (AJA or Blackmagic), etc.).

    1D LUT & Color Matrix - *SI Advanced Calibration* workflow

- **RGB Monitor** – The DreamColor Z27x monitor is connected to a computer's standard graphics adapter RGB output.

    1D LUT & Color Matrix - *Monitor - Direct (EIZO/HP)* workflow

Video Monitor – Calibrate 1D LUT & Color Matrix

Back to Calibration Mode Selection

Follow this procedure to calibrate an HP DreamColor monitor that is normally connected to an independent signal source, such as a signal router or video adapter device (not directly connected to the output of a computer's standard graphics display adapter).

This procedure will:

- Automatically create and load an optimized 1D LUT monitor calibration file into the HP DreamColor Z27x monitor.

- Adjust the color matrix.

- Create an ICC profile.

Note: See the "*Graphics Adapter Connection Mode Calibration*" section above for calibrating DreamColor monitors that are normally connected to the output of a computer's standard graphics display adapter (DVI, HDMI, DisplayPort).

Test Pattern Connection

When the DreamColor monitor to be calibrated is not normally connected to the output of a computer's standard graphics display adapter, the DreamColor monitor's internal test patterns are used.

SI Advanced Calibration Workflow

The *SI Advanced Calibration* workflow in CalMAN is used to automatically create a 1D display calibration LUT, adjust the color matrix, and create an ICC profile. To open this CalMAN workflow, in the main menu select *Open Workflow Template / SI Advanced Calibration*. Proceed through each step of the workflow (Figure 2) in a normal fashion, using the following notes for DreamColor monitor specifics.
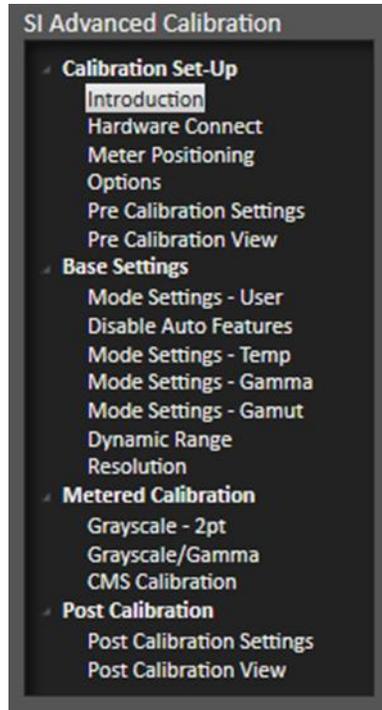
Figure 2. CalMAN SI Advanced Calibration workflow outline.

1. Base Settings section

In the Base Settings section of the *SI Advanced Calibration* workflow (Figure 2), step through the following pages:

Hardware Connect

Follow the instructions on the *Hardware Connect* page to connect to your meter and to connect to your DreamColor display, both as a test pattern source and for display control. If you haven't already done so, connect the DreamColor display to the host calibration computer with a USB cable, as detailed in the DreamColor Z27x Initial Setup section above.

Meter

Connect your color meter to the CalMAN computer.

Then, click the *Find Meter* button. On the *Find Meters* dialog, select your meter if it is listed, then click *Search*. If your meter is not listed on the *Find Meters* dialog, just click *Search*.

The DreamColor Z27x has a very wide color gamut. For the Target Display Type for a colorimeter, select "LCD (LED Blue Green DCI/P3 Gamut)." No special selection is required for a spectrophotometer.

The DreamColor pops up message windows in the middle of the screen. Position your meter at least 3 inches to the side of the screen center to avoid those message windows. Alternately, you can move the message window away from the center of the screen (Main Menu > Menus and Message Control > Menu and Message Position).

Source

Click the *Find Source* button. On the Source dialog, select "HP – DreamColor Z27x (USB)," then click *Connect*.

Note: The HP internal test patterns are used in this situation.

Display Control

First, in the DreamColor menu (Main Menu > Open Menu > Color Space), select "Native."

Then, in CalMAN, click the Find Display/Processor button. On the Display dialog, select "HP – DreamColor Z27x (USB)," then click Connect.

> During the connection process, the following message is displayed on the DreamColor: "The LUT download is in progress. Do not turn off your display during the download process."

> When the connection is about complete, the following message is displayed on the DreamColor: "The LUT has been successfully downloaded."

> While connecting to the DreamColor monitor, CalMAN automatically resets the DreamColor internal 1D LUT.

> NOTE: If CalMAN fails to connect to the DreamColor Z27x, you may need to reset the monitor. To do this, cycle the master power switch on the rear panel of the DreamColor Z27x, and then wait 2 minutes before connecting to the DreamColor within CalMAN.

Meter Positioning

Position your color meter at the center of the DreamColor screen, touching the screen.

Options

- On the *Session Options* page, make any desired changes to the default Color Space, White Point, and Gamma targets.

- On the Settings tab (gear wheel), select "PC (0-255)" for *Luminance Levels*. This is required to support 1D LUT calibration.

Pre Calibration Settings

If you wish to document the monitor's control settings prior to calibration, you can record that information on this page. This information will then be available on a calibration report.

Pre Calibration View

If you wish to document the monitor's performance prior to calibration, you can do that on this page. This information will then be available on a calibration report.

2. Base Settings section

In the Base Settings section of the *SI Advanced Calibration* workflow (Figure 2), follow the instructions on each page to optimize the adjustments of the monitor's picture controls prior to the metered grayscale and CMS calibration.

Mode Settings - User

On the Mode Settings page, you can make monitor measurements to decide in which mode to operate the monitor for calibration.

Disable Auto Features

Skip this page.

The DreamColor monitor has no automatic features that require disabling.

Mode Settings – Temp

Select the DreamColor monitor's color temp setting that produces color temps closest to the desired target (usually 6500K).

Mode Settings – Gamma

Select the DreamColor monitor's gamma setting that produces color temps closest to the desired target (2.4 for BT.1886 target).

Mode Settings – Gamut

Skip this page.

The DreamColor monitor has no color space or color gamut selection.

Dynamic Range

Follow the instructions on the Dynamic Range page to adjust the monitor's Contrast control as high as possible without causing one of the red, green, or blue lines to become nonlinear. Do not be concerned that the RGB lines are separated from each other at this point in the calibration process.

Adjust the monitor's Brightness control to produce the desired maximum luminance level.

Resolution

Skip this page.

The DreamColor monitor has no controls that can degrade resolution.

Metered Calibration Section

The DreamColor monitor requires a specialized calibration process. In the Metered Calibration section of the *SI Advanced Calibration* workflow, first perform the CMS Calibration, then perform the Grayscale/Gamma calibration, then repeat the CMS Calibration.

Grayscale – 2pt

Skip this page.

Grayscale/Gamma

Start the calibration on the CMS Calibration page.

CMS Calibration

Start the calibration on the CMS Calibration page by pressing the AutoCal button.

Then, perform the AutoCal on the Grayscale/Gamma page.

Finally, repeat the AutoCal on the CMS Calibration page.

3. Post Calibration Section

In the Post Calibration section of the *SI Advanced Calibration* workflow, step through the following pages to check and document the DreamColor monitor calibration:

Post Calibration Settings

If you wish to document the monitor's control settings after calibration, you can record that information on this page. This information will then be available on a calibration report.

Post Calibration View

If you wish to document the monitor's performance prior to calibration, you can do that on this page. This information will then be available on a calibration report.

DONE – You are done with calibrating the HP DreamColor that is not normally connected to a computer's standard graphics adapter output.

RGB Monitor – Calibrate 1D LUT & Color Matrix

Back to Calibration Mode Selection

Follow this procedure to calibrate an HP DreamColor monitor that is normally connected to the output of a computer's standard graphics display adapter (DVI, HDMI, DisplayPort).

This calibration procedure will:

- Automatically create and load an optimized 1D LUT monitor calibration file into the HP DreamColor Z27x monitor.

- Adjust the color matrix.

- Create an ICC profile.

Note: See the "Independent Source Mode Calibration" section below for calibrating DreamColor monitors that are normally driven from a source other than a computer's standard graphics adapter output.

Test Pattern Connection

CalMAN Client 3, running on the computer that is driving the HP DreamColor monitor, will be the test pattern source for monitor calibration. However, for accurate calibration, it is important that the computer sends a full range RGB signal to the monitor during CalMAN measurement and calibration, even if the monitor will be used for monitoring video level signals.

If the monitor is connected to a DisplayPort output, the signal will always be full range RGB. If the monitor is connected to an HDMI output, the signal may be full range RGB or it may be video level YCC. If you wish to use the HDMI output, you will need to make sure that the graphics display adapter is set for RGB output.

Monitor - Direct (EIZO/HP) Workflow

The *Monitor - Direct (EIZO/HP)* workflow in CalMAN is used to automatically create a 1D display calibration LUT, adjust the color matrix, and create an ICC profile. To open this CalMAN workflow, in the main menu select *Open Workflow Template / Monitor - Direct (EIZO/HP).* Proceed through each step of the workflow (Figure 1) in a normal fashion, using the following notes for DreamColor monitor specifics.
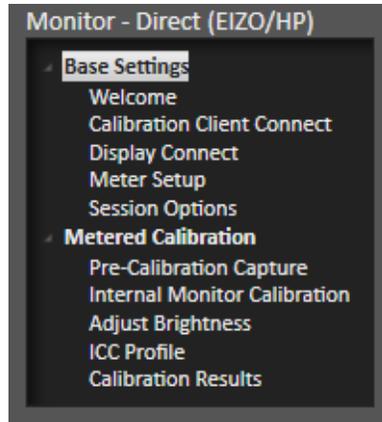
Figure 1. CalMAN Monitor - Direct (EIZO/HP) workflow outline.

1. Base Settings section

In the Base Settings section of the *Monitor - Direct (EIZO/HP)* workflow, step through the following pages:

Calibration Client Connect

To connect to CalMAN Client 3 on the local computer on which CalMAN is running, in order to calibrate an HP monitor on the local computer, click the "Local Client Connect" button. CalMAN will automatically connect to the locally installed CalMAN Client 3 as a Source device and as a Display Control device.

To connect to CalMAN Client 3 on another computer on the local network, in order to calibrate an HP monitor on that computer, click the "Networked Client Connect" button. On the *Source* dialog, under *Manufacturer*, select "SpectraCal." Under *Model*, select "SpectraCal – CalMAN Client 3 Pattern Source." In the Socket Connection search box, select the IP address for the desired target computer, and then click Connect.

Note: The HP internal test patterns are not an advantage in this situation, and cannot be used on an HP monitor that is being used as a workstation's primary display.

On the *Select Monitor and Calibration Memory* drop down, select "Native."

Display Connect

On the *Display Connect* page, follow the instructions to make a USB connection from the CalMAN computer to the HP monitor that is to be calibrated. This connection will be used to load calibration data into the target monitor.

Note: If more than one HP monitor is connected to the computer, disconnect all the HP monitors except for the one that you are currently calibrating.

To connect CalMAN to the HP monitor, click the "HP Connect" button.

During the connection process, the following message is displayed on the DreamColor: "The LUT download is in progress. Do not turn off your display during the download process."

When the connection is about complete, the following message is displayed on the DreamColor: "The LUT has been successfully downloaded."

While connecting to the DreamColor monitor, CalMAN automatically resets the DreamColor internal 1D LUT.

NOTE: If CalMAN fails to connect to the DreamColor Z27x, you may need to reset the monitor. To do this, cycle the master power switch on the rear panel of the DreamColor Z27x, and then wait 2 minutes before connecting to the DreamColor within CalMAN.

Meter Setup

Connect your color meter to the CalMAN computer.

Then, on the *Meter Setup* page, click the *Find Meter* button. On the *Find Meters* dialog, select your meter if it is listed, then click *Search*. If your meter is not listed on the *Find Meters* dialog, just click *Search*.

The DreamColor Z27x has a very wide color gamut. For the Target Display Type for a colorimeter, select "LCD (LED Blue Green DCI/P3 Gamut)." No special selection is required for a spectrophotometer.

The DreamColor pops up message windows in the middle of the screen. Position your meter at least 3 inches to the side of the screen center to avoid those message windows. Alternately, you can move the message window away from the center of the screen (Main Menu > Menus and Message Control > Menu and Message Position).

Session Options

On the *Session Options* page, confirm that the listed monitor and display mode are correct. If not, step back to the *Select Monitor and Calibration Memory* drop down*, on the Calibration Client Connect* page, to make the desired selection.

Make any desired changes to the default Color Space, White Point, and Gamma targets.

Note: This workflow defaults to PC (0-255) for Input Signal Levels. This is required to support 1D LUT calibration.

2. Metered Calibration section

In the Metered Calibration section of the *Monitor - Direct (EIZO/HP)* workflow (Figure 1), step through the following pages:

Pre-Calibration Capture

On the *Pre-Calibration Capture* page, you can measure the monitor's performance before you calibrate it. When you click the *Read Series* button, CalMAN measures the monitor's grayscale balance, the luminance at reference white, and the ColorChecker* error across the monitor's color gamut.

*CalMAN uses the X-Rite/Pantone ColorChecker® target colors to analyze a monitor's color gamut performance.

Internal Monitor Calibration

On the *Monitor Optimization* page, CalMAN automatically adjusts the HP monitor's output 1D LUT to calibrate gamma and adjusts its color matrix to calibrate CMS. Click the CalMAN *AutoCal* button to start the automatic calibration process.

Note: There are no CMS controls available in the CalMAN DDC controls window for manual color matrix adjustments.

Adjust Brightness

On the *Adjust Brightness* page, you can change the monitor's luminance output by adjusting its Brightness control. Click the CalMAN *AutoCal* button and input your desired White Level Target to automatically adjust the Brightness control. Or, click the *Read Continuous* button and adjust the software Brightness control in CalMAN to change the white level luminance.

ICC Profile

On the *ICC Profile* page, CalMAN automatically measures the HP monitor's color primaries and its grayscale levels. It then creates an ICC profile that it writes to the computer that is driving the HP monitor. Click the CalMAN *AutoCal* button to start the automatic profile process.

Calibration Results

On the *Calibration Results* page, click the *Read Series* button to start the post-calibration measurement. CalMAN displays the monitor measurement data from the previous Pre-Calibration Capture page. It also displays monitor's post-calibration performance for comparison.

DONE – You are done with calibrating the HP DreamColor that is normally connected to a computer's standard graphics adapter output.

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About Portrait Displays

Portrait Displays, Inc., since 1993, is a leading application software provider (ASP) for PC, smartphone, and tablet displays. The Portrait Displays team now includes **SpectraCal**, the world's leading provider of video display calibration software. The combined companies offer value-added, feature-rich solutions to both OEM display manufacturers and end users seeking improved accuracy and manageability of their displays.

Portrait Displays, an Intel Capital Portfolio company, is a private corporation with headquarters in Pleasanton, California, USA with representatives in Europe, Taiwan, China, Japan, and Korea.

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