SpectraCal

CM CalMAN
Setup Guide

Pandora Pluto

Color Management System

Rev. 1.1

PORTRAIT
DISPLAYS

Introduction

CalMAN takes advantage of the Pandora Pluto features to calibrate a video display with a 10-bit 17x17x17 3D cube lookup table (LUT) for SMPTE video level signals. This setup guide assists you in calibrating the Pluto with the CalMAN Color Cube workflow.

CalMAN Recommended Workflow

- Color Cube (3D LUT)

Pluto Required Firmware

- Version 1.36 or newer

Pluto Control Port

- Ethernet (use standard straight-through cable)

Pluto Initial Setup

To set up a Pluto for 3D LUT color calibration:

1. Connect the Pluto signal output to the display to be calibrated.

2. Connect a video input signal to the Pluto.

3. Power on the Pluto.

4. Connect the Pluto and your calibration computer to the same network.

5. Click the left knob on the Pluto front panel. On the video display, record the Pluto IP address at the top of the screen (192.168.0.198 default).

6. On your calibration computer, either disable any firewall or create an exception for the Pluto IP address.

7. Rotate the left Pluto knob to select the Setup screen.

8. Set both the Black level and the White level to Full range.

Note: The Pluto needs to be set for Full range during 3D LUT calibration, even if you are calibrating for SMPTE range operation, and it must be left in Full range, even for operation in a SMPTE (legal) signal path.

CalMAN 3D LUT Display Calibration

CalMAN can calibrate the 3D LUT in the Pluto with a direct USB control connection. To produce an optimized 3D LUT calibration file and automatically load it into the Pluto:

1. In CalMAN, load the "Color Cube (3D LUT)" workflow.

2. On the CalMAN Settings tab (gear icon), under Workflow Basic Options, select either *Video (16-235)* [SMPTE legal] or *PC (0-255)* [Full] to match the intended signal levels to be sent to the display.

3. Proceed through each step of the workflow in the normal fashion, using the following notes for guidance on the indicated workflow pages.

4. On the CalMAN *Session Setup* page, click the *Find 3D LUT Device* button, then select "Pandora – Pluto (Ethernet)."

5. On the *Dynamic Range* page, adjust the display's black level/Brightness control to the black level of the signal content that will be processed through the Pluto (16 for video or 0 for PC/full range).

6. On the *RGB Adjust* page, under the *RGB Adjust Levels* selection, select "2 Point 30, 100%." Click *Read Continuous* and adjust the display's RGB Gain controls for RGB balance at 100%. Adjust the display's RGB Offset/Bias controls (if provided) for RGB balance at 30%.

7. Skip the *1D Ramp LUT* page (a 1D LUT does not need to be created).

8. On the *3D Cube LUT* page click the *AutoCal* (rotating arrows) button at the right end of the meter action buttons. The *AutoCal Setup* dialog then appears (see below).
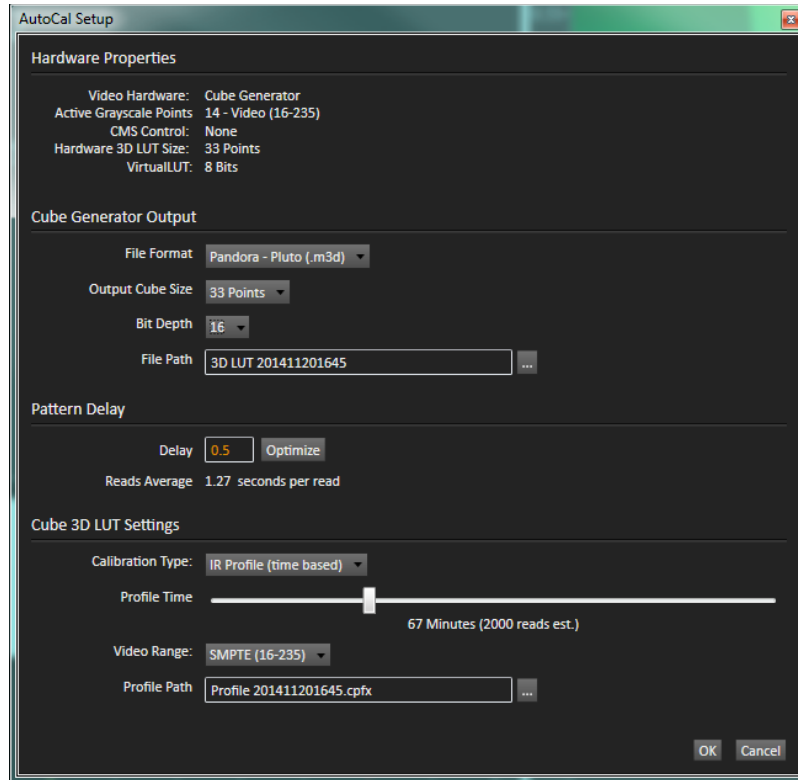
Figure X. CalMAN AutoCal Setup dialog, for selecting options for creating a 3D calibration LUT.

1. Under *File Path*, select the desired directory path and provide a name for the LUT file that CalMAN will create (e.g. monitor ID and date).

2. Under *Calibration Type*, select the desired type of 3D LUT calibration process.

   - **IR Profile (time based)**: Creates the best quality display calibration 3D LUT possible in the selected period of time. You select how much display quality you have time for, from 30 minutes to maximum display quality (6,000 points max). Uses Intelligent Resolution Profiling to search out the most nonlinear color space areas and correct those first.

   - **IR Profile (point based)**: Creates the best quality display calibration 3D LUT possible with the selected number of measurement points (1,000 - 10,000 points). Uses Intelligent Resolution Profiling to search out the most nonlinear color space areas and correct those first.

   - **Lightning LUT**: Creates a display calibration 3D LUT in five minutes or less. Produces a very high quality result on professional displays with moderate linearity. Displays with significant nonlinearity may produce marginal results.

3. Under *Video Range*, select "SMPTE (16-235)" if you are calibrating a video display that clips or compresses signals above reference white, as tested on the CalMAN Dynamic Range page.

4. Click *OK*.

Upon completion of the AutoCal 3D hardware LUT calibration process, CalMAN automatically loads the optimized 33x33x33 LUT calibration data into the Pluto.

DONE – Pluto 3D LUT calibration and setup is complete.

CalMAN 3D LUT Display Calibration File Creation for Pluto

CalMAN can also create a 3D LUT display calibration file for the Pluto without immediately loading the file into the Pluto. The Pluto does not need to be available during this display calibration and file creation process. The file created will be a .3dl file with the proper Pluto data format for later loading into the Pluto with CalMAN (as detailed below).

To create a 3D LUT display calibration file for the Pluto with CalMAN:

1. In the CalMAN main menu, select *Open Workflow Template*, then select the 'Color Cube (3D LUT)' workflow.

2. On the CalMAN Display Control tab, connect to the SpectraCal Cube Generator as a Display Control device.

3. On the Display Control tab, under 'File Format,' select '3DL – common .3dl formats.'

4. On the Display Control tab, under 'File Path,' select your desired destination for the .3dl LUT file.

5. On the CalMAN Source Settings tab, select your desired test pattern source for display calibration (this can be the Pandora Pluto, if available).

6. Follow the display calibration instructions in the 'CalMAN 3D LUT Display Calibration' section above.

7. On the *AutoCal Setup* popup dialog, under 'Output Cube Size,' select 33 Points. Under 'Bit Depth,' select 10.

Done: Upon completion of the AutoCal 3D LUT calibration process, CalMAN automatically writes a .3dl file, containing color cube display calibration data, to your selected file destination. This display calibration file can be later loaded to a Pluto, using the procedure in the 'CalMAN 3D LUT Load to Pluto' section below.

CalMAN 3D LUT Load to Pluto

CalMAN can load a properly formatted 3D LUT file into the Pluto. The LUT needs to be a .3dl LUT file with a bit depth of 10 bits and 33x33x33 data points, with the data points at the following bit levels: 0,32,64,96,128,160,192,224,256,288,320,352,384,416,448,480,512,544,576,608,640,672,704,736,768, 800,832,864,896,928,960,992,1023.

This .3dl LUT file can be a display calibration LUT created with the CalMAN Cube Generator function (as detailed above). Or, it can be a creative (look) LUT created by any other application (with the proper data points). During the load process, CalMAN converts the .3dl file into the file format required by the Pluto.

To load a 3D LUT file into a Pluto:

1. In CalMAN, on the Display Control tab, connect to the Pluto as a Display Control device.

2. On the Display Control tab, click the 'Open DDC Window' button.

3. On the DDC Controls dialog, scroll to the '3D LUT Controls' page.

4. Click the 'Load LUT File' button.

5. In the resulting file navigation window, select the .3dl LUT file that has been created for the Pluto.

Done: The selected 3D LUT file is now contained in the Pluto.

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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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