

# Blackmagic Design HDLink Pro CalMAN Setup Guide

CalMAN takes advantage of the Blackmagic Design HDLink Pro features to calibrate a video display with a 10-bit 17x17x17 3D cube lookup table (LUT). This setup guide assists you in calibrating the HDLink Pro with the CalMAN Color Cube workflow.

## Recommended CalMAN Workflow:

- Color Cube (3D LUT)

## Required HDLink Pro Firmware:

- Version 3.5 or newer

## HDLink Pro Control Connection:

- USB A to USB B (printer) cable
- USB driver contained in SpectraCal Device Driver Kit v2.3 or newer

## CalMAN 3D LUT Display Calibration

CalMAN can calibrate the 3D LUT in the HDLink Pro either with a direct hardware connection or by creating a software 3D LUT file and then using the Blackmagic HDLink Utility software to manually load the software file into the HDLink Pro.

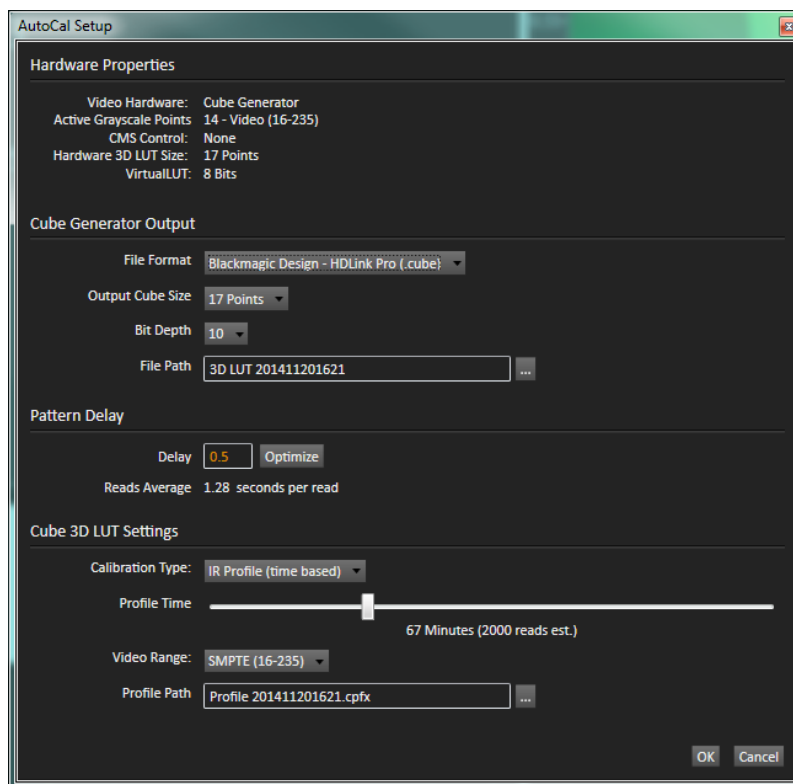
- A. To create a LUT file with a direct hardware connection and automatically load the LUT into an HDLink Pro, proceed with the [Hardware LUT Load](#) section, immediately below.
- B. To create a software LUT file, skip to the [Software LUT File](#) section, further below.

## CalMAN 3D LUT Display Calibration – Hardware LUT Load

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

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. When you connect to your test pattern source, be sure to set the generator output levels, Video (16-235) or PC (0-255), to match the signal content that will be processed through the HDLink Pro. Also, set the generator for YCC (YCrCb) output.
5. On the *Session Options* page, select the *Input Signal Levels*, Video (16-235) or PC (0-255), to match the signal content that will be processed through the HDLink Pro.

6. On the *Session Setup* page, click the *Find 3D LUT Device* button, then select "Blackmagic Design – HDLink Pro (USB)."
7. 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 HDLink Pro (16 for video or 0 for PC/full range).
8. 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%.
9. Skip the *1D Ramp LUT* page (a 1D LUT does not need to be created).
10. On the *3D Cube LUT* page, click the *AutoCal* (rotating arrows) button at the right end of the meteraction buttons. The *AutoCal Setup* dialog then appears (see below).



- A. 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).
- B. 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.
- C. Under *Video Range*, select “SMPTE (16-235)” if you are calibrating a video display that clips signal values above reference white.
- D. Click *OK*.

Upon completion of the AutoCal 3D hardware LUT calibration process, CalMAN automatically loads the optimized 17x17x17 LUT calibration data into the HDLink Pro.

**DONE** – HDLink Pro 3D LUT calibration and setup is complete.

### Potential Crash Warning

*With Windows 8, there may be instability with the HDLink Pro driver that causes a CalMAN crash during the automatic LUT data load. CalMAN saves the LUT data to the CalMAN LUTs folder before attempting to load the data into the HDLink Pro, so you won't need to run the calibration again. If CalMAN crashes during the data load process, perform the following steps to load the saved LUT data into the HDLink Pro.*

1. *Reopen CalMAN and connect to the HDLink Pro on the Display Control tab.*
2. *On the Display Control tab, click the Open DDC Window button.*
3. *Scroll left or right to the 3D LUT Controls screen.*
4. *Click the Load LUT button.*
5. *Select the LUT that you just created.*
6. *Click the Commit button.*

*The LUT data that was created before the CalMAN crash will be loaded into the HDLink Pro.*

## CalMAN 3D LUT Display Calibration – Software LUT File

CalMAN can also create a 3D LUT display calibration file for the HDLink Pro, without immediately loading the file into the HDLink Pro. The HDLink Pro 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 HDLink Pro data format for later loading into the HDLink Pro with CalMAN (as detailed below).

To create a 3D LUT display calibration file for the HDLink Pro 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.
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 17. 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 an HDLink Pro, using the procedure in the 'CalMAN 3D LUT File Load to HDLink Pro' section below.

## CalMAN 3D LUT File Load to HDLink Pro

CalMAN can load a properly formatted 3D LUT file into the HDLink Pro. The LUT needs to be a .3dl LUT file with a bit depth of 10 bits and 17x17x17 data points, with the data points at the following bit levels: 0,64,128,192,256,320,384,448,512,576,640,704,768,832,896,960,1023.

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 HDLink Pro.

To load a 3D LUT file into an HDLink Pro:

1. In CalMAN, on the Display Control tab, connect to the HDLink Pro 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 HDLink Pro.

**Done:** The selected 3D LUT file is now contained in the HDLink Pro.