

# 1.X.0 Lumencor Light Engine Electrical Interface with TTL (DB-15HD) and RS-232 December 22, 2009

This document describes the interface and control of the Light Engine using the TTL on/off enables and the enables and intensity control via RS-232/(optional USB). This document applies to the two, three, four and five-channel light engine models. This document is targeted at an inclusive set of all the various configuration options that are available and describes the complete functions appropriate for the five channel light engine. For models with fewer channels, some features will not be available and the relevant commands should be ignored.

## 1.X.1 TTL and RS-232 Connector Pinouts and Signals.

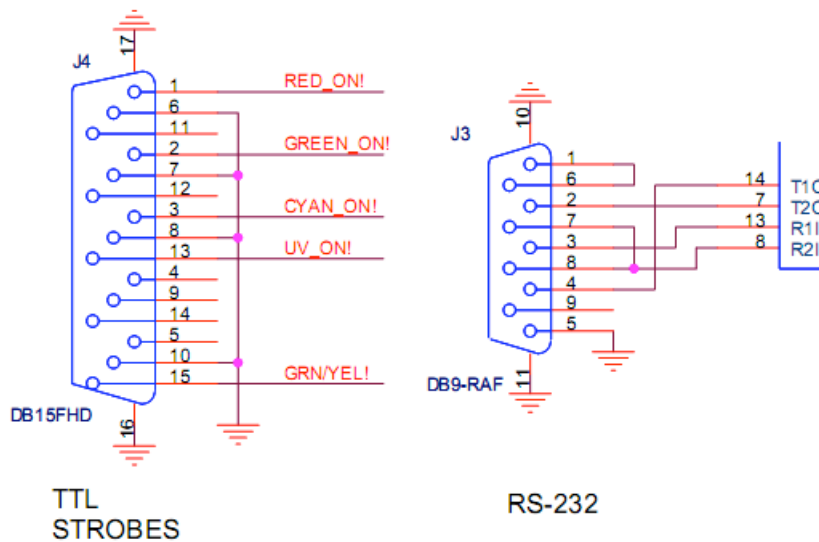


Figure 1

**TTL:** See figure 1 for TTL (5V/3.3V) enable color channel pin mapping. The front panel switch should be set to 'EXT' before using these TTL enables. These signals are active low (i.e., a low enables or turns on a channel, a high disables or turns off a channel) with internal pull-ups compatible with an open-collector or bipolar drive. Channel intensity is controlled by front panel potentiometers. If external intensity is also desired, then the RS-232 connector must be used.

For light engines containing yellow outputs, the green and yellow channels both use the green enable. A 5<sup>th</sup> line was added (pin # 15) which selects and positions the green and yellow excitation filters. A logic=high selects the green filter, a logic=low selects the yellow filter.

*Note- If the Green Channel is enabled, then no other channels can be enabled simultaneously. If other channels are enabled, then the green channel enable will have priority.*

**RS-232:** See figure 1 for RS-232 Pinout. Pin 2 is host RX, pin 3 host TX. Default port parameters are 9600,8,N,1. The front panel switch should be set to 'EXT' before using this RS-232 Port. This port can control both enables and intensity of each channel. Using a USB->RS-232 Adapter, (optional) USB controlled enables and intensities are also provided. See section 1.X.2 for the RS-232 command structure and bit definitions.

### **1.X.2 RS-232 Command Strings and Bit Definitions.**

The following section defines the command strings and bit assignments. Bytes #s and bit #s are LSB=0. Bytes are expressed as hexadecimal. Bits not specifically defined here should remain as shown in the examples.

Initialization Command String for RS-232 Intensity and RS-232 OR TTL Enables:

*The first two commands MUST be issued after every power cycle to properly configure controls for further commands.*

*57 02 FF 50- Set GPIO0-3 as open drain output*

*57 03 AB 50- Set GPIO5-7 push-pull out, GPIO4 open drain out*

*4F 5F 50- Set GPIO for all colors off, DAC control.*

Channel Enable Command String:

*Byte 1, Bit 0, controls Red. 0 enables, 1 disables.*

*Byte 1, Bit 1, controls Green. 0 enables, 1 disables.*

*Byte 1, Bit 2, controls Cyan. 0 enables, 1 disables.*

*Byte 1, Bit 3, controls UV. 0 enables, 1 disables.*

*Note- If the Green Channel is enabled, then no other channels can be enabled simultaneously. If other channels are enabled, then the green channel enable will have priority.*

**Examples:**

*4F 7E 50- Enables Red, Disables Green, Cyan, UV.*

*4F 7D 50- Enables Green, Disables Red, Cyan, UV.*

*4F 7B 50- Enables Cyan, Disables Red, Green, UV.*

*4F 77 50- Enables UV, Disables Red, Green, Cyan.*

*4F 70 50- Enables All.*

*4F 75 50- Enables Green and UV, Disables Red and Cyan.*

*4F 7A 50- Enables Red and Cyan, Disables Green and UV.*

Green/Yellow Filter Select Command String:

*Byte 1, Bit 4, controls Green/Yellow filter selection. 0 selects Yellow Filter, 1 selects Green Filter.*

**Examples:**

*4F 7D 50- Enables Green, Disables Red, Cyan, UV. Selects Green Excitation Filter.*

*4F 6D 50- Enables Green, Disables Red, Cyan, UV. Selects Yellow Excitation Filter.*

Front-Panel Pot / DAC Intensity Control selection Command:

*Byte 1, Bit 5, controls Pots/DAC selection. 0 selects DAC, 1 selects front-panel pots.*

**Examples:**

**4F 70 50-** Selects POT intensity control and all channels on.

**4F 50 50-** Selects DAC intensity control and all channels on.

**IIC DAC Intensity Control Command Strings:**

*Byte 3, Bit 3, selects RED DAC. 1 selects, 0 deselects.*

*Byte 3, Bit 2, selects GREEN DAC. 1 selects, 0 deselects.*

*Byte 3, Bit 1, selects CYAN DAC. 1 selects, 0 deselects.*

*Byte 3, Bit 0, selects UV DAC. 1 selects, 0 deselects.*

*Byte 2, Bits 3..0, Contain the high nibble of 8-bit DAC data.*

*Byte 1, Bits 7..4, Contain the low nibble of 8-bit DAC data.*

*Note this 8-bit data is 'inverted'. 0xFF is full off, 0x00 is full on.*

**Examples:**

**53 18 03 0F FF F0 50-** Sets all DACS to 0xFF (Full off)

**53 18 03 0F F0 00 50-** Sets all DACS to 0x00 (Full on)

**53 18 03 01 FA A0 50-** Sets UV DACS to 0xAA

**53 18 03 02 F5 50 50-** Sets CYAN DACS to 0x55

**53 18 03 04 F8 00 50-** Sets GREEN DACS to 0x80

**53 18 03 08 F4 40 50-** Sets RED DACS to 0x44

**53 18 03 05 F2 20 50-** Sets UV and GREEN DACS to 0x22

**Read IIC Temp Sensor Strings:**

*The IIC Temperature Sensor can be read with the following command string:*

**53 91 02 50-** Reads the IIC Temp Sensor

Two bytes should be returned which contains the temperature data. The most significant 11 bits of the two bytes are used with a resolution of 0.125 deg C.

**Examples:**

**[TX] 53 91 02 50-** Command String to the IIC Temp Sensor.

**[RX] 26 A0-** Two bytes returned from Temp Sensor.

**26 A0 (hex) = 0010 0110 1010 0000 (binary).**

**1<sup>st</sup> 11 MSb = 001 0011 0101 (binary)**

**001 0011 0101 (b) = 135 (h) = 309 (decimal)**

**309 \* 0.125 = 38.625 deg C.**

**Reset Serial I/F and return to full Manual Strings:**

**Examples:**

**57 02 55 50-** Set GPIO0-3 as input

**57 03 55 50-** Set GPIO4-7 as input

# Lumencor Light Engine Graphical User Interface- Installation and Operation

Installation: Double-click the Setup.exe file. This VB 2008 application require Microsoft .Net Framework 3.5. If needed, the user will be prompted to download and install this prior to the completion of the LLEController installation. Once installed, the application can be launched by double-clicking the LLEController.exe icon. Multiple instances may be executed to control multiple Light Engines.

