HO/Hon3 Layout LED lighting – Theory of Operation

The system is comprised of 156 channels of PWM lighting driving custom LED strip light panels.

Equipment:

The Decoders and Computer control module came from www.ecolocityled.com. We use the U7 controller, 6 – LC-EU-DMX-PX243 24 channel decoders for the HO layout (3 Amps/channel) and 1 – LC-LT-DMX-12CHA for the Hon3 layout (4 Amps/Channel). We use two 30 Amp 12VDC power supplies to power each 3A decoders. We use one 40 Amp 12VDC power supply to power the 4A decoder. The power bricks come from Amazon and are generic.

Warning: Do not use the Flicker Free Decoders they will kill the strip lights that most sell. No one can explain why.

We use the LE brand 5-meter warm white strip lights from Amazon (70, 000 LED's about 225 sets).

Each panel design is based on the lumen level at the surface of the layout. We have a light meter. The main layout was straight forward as levels are similar but the Hon3 has four different levels on 4 of the panels. Notice the different LED strip spacing on the panels.

We use Warm White LED Rope lights in Staging and the Helix's from 1000Bulbs.com.

Design:

We call each panel and circuit a channel. We limit the 3A decoders to 2.5 Amps per channel and 3.5 Amps for the 4A decoders. The wire size is based on length and load. Up to 40' is 18 gauge and over 40' is 16 gauge. All the 4 Amp channels use the 16 Gauge wire. Each of the 156 channels is a separate cable. We used Red and Black speaker wire, about 5000'.

A spreadsheet covers the load and wire length for each channel.

We used 3/16" plywood to build the panels. The lower-level panes are screwed to the surface above. Some panels needed stiffeners. The Hon3 and upper level uses suspended ceiling grids to support the panels and a valance to cover the sides. Most panels are 2' x 4' in size. Some are custom. The panels were painted a very light sky blue. The LED strips have double stick tape but we superglue about every foot on alternating sides. Superglue from Amazon (Loctite – large bottles).

The power supplies, decoders and controller are in a three-level chassis near the DCC power area. This chassis also has the master power switches (DCC power, Layout power, upper-level lights, Lower level lights). Four cooling fans are on the right side of this chassis and require monthly cleaning. This chassis had a fair amount of heat.

The Power supply and decoder for the Hon3 are located in the ceiling above the Roundhouse. There is an access panel on the isle. The decoder uses a serial cable to connect to the U7 computer controller.

We now use about 650 Watts of power to run all the LED lighting compared to 6000 watts for the old incandescent lights.

We use the ESA Pro PC software to change and upload settings in the U7 DMX controller.

Today we run the system at 50% light levels. Each channel can have custom settings. Today we have buttons to select Off, 25%, 50%, 75% and 100%. The controller can do dusk to dawn via scene controls but we do not use this today. We did find we got more light from adjacent side panels than we first thought. This likely accounts for what we can run the layout at 50% lighting. You need sun glasses at 100%.

During the design we looked at warm white and day light. We felt day light was too white and went with warm white (2700K). The Photographer for Model Railroader felt our light levels and color was very good.