TAM VALLEY DEPOT
Great Electronics for Great Model Railroads
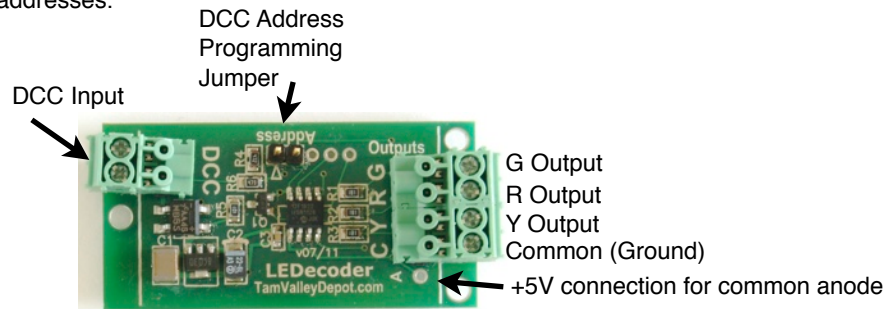
LEDecoder
3 Output LED Driver and DCC Decoder

Overview

LEDecoder is a DCC accessory (stationary) decoder that will drive up to 3 LEDs such as a red, green and yellow LED signal mast or lights for a building, a passenger car and so forth. It can also be used to control one bi-color LED and one regular LED. LEDecoder has the LED resistors built-in so an external resistor is not needed. The brightness as well as the turn-on and turn-off rate of each LED can be set. In addition a flicker function is included in order to simulate an incandescent bulb with a loose filament, a welding torch or a fireplace. Each LEDecoder uses 2 consecutive DCC addresses.

DCC Address Programming Jumper

DCC Input

G Output
R Output
Y Output
Common (Ground)
+5V connection for common anode

Installation

Mount the decoder with a couple of wood screws through the mounting holes, or use double sided tape. In some cases you may just want to leave the decoder floating and tack down the wires around the decoder to keep it in place. *Make sure to keep the decoder away from conductive surfaces such as metal that could short the board. Also you can kill the board if let a hot DCC wire touch the wrong part of the board.*

Connect the DCC power terminal to your DCC bus.

LEDs

You can use whatever color LED suits. Although the outputs are labeled R, G, Y this is just for convenience. See the schematic figures for how to connect up the LEDs in various situations.

DCC Operation

The decoder comes from the factory programmed for addresses 1-2. Each board uses 2 consecutive addresses (see tables). On Digitrax systems the accessory commands are accessed with the **Switch** button. On NCE systems use the **Select Accy** button. Issue a DCC accessory command by entering the address into the DCC system and then issue either a "t" or "c" command (for NCE these are called **N**ormal and **R**everse). Consult your manual if you are unsure how to issue accessory commands on your system. The way the commands are interpreted depends upon the operating mode in CV 33. See the Mode Tables.

Reset to Factory Defaults

To reset the memory to the factory defaults (Address 1-4 and the default servo positions), turn off the power, put on the Address jumper and turn the power back on.

Mode Logic Tables

CV33 = 0	Common Cathode/ Ground		DCC Address (Default)	
Red	**Green**	**Yellow**	**1**	**2**
Hi	Lo	Lo	throw/R	close/N
Lo	**Hi**	Lo	close/N	throw/R
Lo	Lo	**Hi**	throw/R	throw/R
Lo	Lo	Lo	close/N	close/N

CV33 = 1	Common Anode/+5V		DCC Address (Default)	
Red	**Green**	**Yellow**	**1**	**2**
Lo	Hi	Hi	throw/R	close/N
Hi	**Lo**	Hi	close/N	throw/R
Hi	Hi	**Lo**	throw/R	throw/R
Hi	Hi	Hi	close/N	close/N

CV33 = 2	Bicolor + 1		DCC Address (Default)	
Red	**Green**	**Yellow**	**1**	**2**
Hi	Lo	Lo	throw/R	close/N
Lo	**Hi**	**Hi**	close/N	throw/R
Hi	Lo	**Hi**	throw/R	throw/R
Lo	**Hi**	Lo	close/N	close/N

In addition there are 2 trivial modes:

CV33 = 3 - all outputs high
CV33 = 4 - All outputs low

Flicker

The amount and timing of the flicker are controlled by two CVs, FlickerAmplitude, CV34 and FlickerRate, CV35. FlickerAmplitude controls the amount of flicker with 0 being none and 255 being the maximum. FlickerRate controls how often the flicker occurs. It is in units of 0.1 seconds with 1 being every 0.1 seconds and 255 (the maximum), every 25.5 seconds. The ramp rates CV40-44 should all be set to 0 to see the flicker. For a fire effect use a large value for the amplitude - say 128 and a short period of 1. For a lightbulb with an occasional flicker use a smaller amplitude, say 25 and a longer period of 100. The actual flicker size and rate are controlled by random numbers so the values in the CVs represent approximate averages over time.

More Information and Help

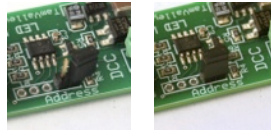Please feel free to contact us at dmcree@tamvalleyrr.com.

DCC Programming

The decoder can be programmed in two ways to enable it to work with most DCC systems.

1) **OPS mode for Accessory Decoders (programming on the main)**. If this mode is available then it is the preferred mode. It can be done with the decoder in place. While there is no way to read back CVs in this mode you can see the affects of the commands immediately. Not all DCC systems support this mode however (NCE does support this mode).

2) **Direct Mode on a programming track**. Connect the DCC terminals of the decoder to your programming track (alligator clips will work fine). The advantage of the programming track is you can read CVs as well as write them. To test your changes you will need to move the power leads to the track bus. For the SPROG, use the **Direct Bit** mode.

DCC Address Jumper

HINT: It is easiest to program the Address with the Address jumper - calculating the address from CV 1 and CV 9 for accessory decoders is complicated. To program the base DCC address, place the jumper across the two Address pins and issue an accessory (switch) command

OFF   ON

from your throttle. The decoder will store the address. The decoder uses 2 consecutive addresses starting with 1-2, the next groups are 3-4, 5-6, 7-8 and so forth. That is, the first address is odd and the second even. The upper limit is 2048. Be sure to remove the jumper when finished programming. It can be stored on a single pin.
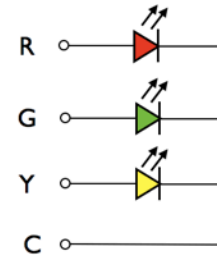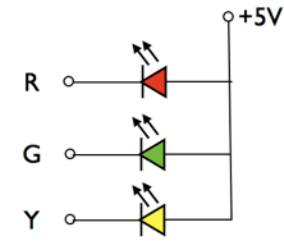
CV Table

CV	Function	Default	Range	Notes
1	Address	1	1 - 64	The decoder responds to a group of 2 consecutive addresses with the first being odd. Address = (CV1-1)*4 + 256*CV9 +1
7	Version	37		
8	Manufacturer	59		NMRA Manufacturer ID
9	High address	0	0-7	
29	Configuration	0		No uses of CV29 are currently supported
33	Mode	0	0-4	See mode tables
34	FlickerSize	0	0-255	Amount of flicker (both 11 and 12 must be non-zero to get flicker)
35	FlickerRate	0	0-255	Flicker rate
36	Max Red Brightness	250	0-255	0=off, 255= max brightness
37	Max Green Brightness	250	0-255	0=off, 255= max brightness
38	Max Yellow Brightness	250	0-255	0=off, 255= max brightness

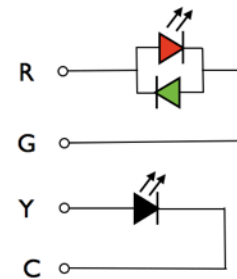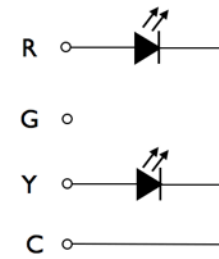| CV	Function	Default	Range	Notes
39	R Rate Up	20	0-255	Controls the rate red ramps up when turned on in 0.1 second units. 0 = instant, 255 = 2.55 seconds
40	G RateUp	20	0-255	
41	Y Rate Up	20	0-255	
42	R Rate Down	20	0-255	Controls the rate red ramps down when turned on in 0.1 second units. 0 = instant, 255 = 2.55 seconds
43	G Rate Down	20	0-255	
44	Y Rate Down	20	0-255	

Common Cathode (Mode 0 and 3)

Common Anode (Mode 1 and 4)

Bicolor+1 (Mode 2)

2 LEDs on 2 Addresses (Mode 0)

Anode is long leg

Cathode is flat face