2mm Directional Marker LED Board R1.21 04-23-2023

This small board is intended to make adding red/green directional marker leds to a hood diesel or switcher faster and easier. It should fit inside either hood of most any O scale or near scale diesel, switcher, GG1, boxcab, or subway car. It's 9 x 35 mm overall size, with pads to fit a right side led, and two alternate locations for a left side led. The 28mm C-C spacing between left and right leds is for narrower hoods; the 32mm C-C is for wider ones. Choose the closest fit and bend the led leads slightly if required. You can use any bi-color 2 pin led; 2, 3, or 5mm, round or flat face, in this board. 2mm post type leds seem to look the best.

How It Works: These boards will only work with DC can motor powered engines, with either one or two motors. The direction of a DC can motor is determined by which way the + & - power is applied. So we can simply attach the wires from this board to the motor power terminals and the leds will light red in one motor direction and green in the other. Simple. Optionally we can install a board in each end of an engine and have the leds glow red on one end, and green on the other; switching when the direction of motion is reversed. How cool is that?

The left end of the board can be shortened when using the narrower pads, by using a Dremel to cut the board just outside the D3 pad connections. See picture below. Note that components can be installed on either the front or back (or both) sides of the board, and it can be installed in any position in the engine hood that will fit.

The board includes pads for a fixed series load resistor R2, or alternately a 3362P trim pot R1. For this application a fixed resistor of 470 ohms is a good choice, or a trim pot of 500 ohms or 1K works well. The trim pot provides for adjustment to get the marker led intensity that looks best. Adjustment will be a compromise between lowest starting voltage required to light the leds (about 4 volts), and minimizing excessive led current at high speeds. Be careful you don't get too aggressive turning up the led intensity such that they go "poof" from over-current! Use of an inline ammeter while setting the pot is a good idea. Since the 2 leds are in parallel you should not exceed about 20-30 ma total current at high motor voltage. The R1 pads will also fit 3362S or 3306K style side adjust pots.

To assemble the board first solder the two leds into the board making the leads fairly short (6mm or less), observing polarity, then install the other components. You can use a standard 0.1" pitch 2 pin header and connector for wiring, such as JST-XH or EH style, or JST micro 1.25mm pigtails for convenient shell removal in the future. Otherwise simply solder 2 short lengths of #30 wire to the pads to connect it to the can motor. Dress the leads to minimize flexing as the motor swivels in the frame when negotiating turns.

Install the board by inserting the leds into existing class light holes (bending the leads as needed) using CA glue, or similar. If the shell does not already have holes, a #46 drill bit will make a perfect size hole for 2mm post leds. A 5/64" bit will also work but may be a little tight. The board should not need any other means of support once the leds are affixed. Then attach the power wires to the can motor as required. You may have to do some testing to determine which way to hook the wires to get the directional color you wish. Note that when + is applied to the board +, the leds will glow red if installed in the correct polarity. A simple test of the engine polarity when it just starts to move will determine which way to connect the board to get the right color.
You can pre-build a few of these at a time, ready to drop in whenever needed.

Cut lines for a narrow hood diesel: (ignore the “Cut here for headlights” marking)