The N Scale LED light boards (with DCC Decoder) have either 5 or 6 built-in LEDs and two pads (AUX) to connect two additional LEDs that are typically used for red end-of-car lighting. The Decoder has an ATTINY85 Microprocessor (MCU) and the board behaves like an engine decoder (NMRA Multi-Function Decoder) using the function keys and speed control for brightness adjustments. Typical current draw @ 50% brightness (recommended) is 75 ma.

As per NMRA standards, the board default address is 3.

You can set it to anything that your DCC system supports (short and long addresses).

**RESET**

If you get lost, stuck, can’t remember your board’s address or just want to start over then follow these steps. You don’t need to do this with a new board it’s already ready to go:

1. Power the board with any 12~16v AC or DC power source. Your DCC track power will also work just fine. However, this will NOT work on a programming track.

2. With a small flathead screwdriver, short the RESET solder pad for about 5 seconds (not exact) - and wait until the main board lights turn on and stay on. If board lights were on when you started this process, they will turn off momentarily and then back on to 100%. After the lights have been ON at 100% for more than 1 second, you can release the button. The lights will stay on for about 5 seconds while the reset is performed. After the lights go out, wait about 2 seconds. The board address will be reset to 3 and the default brightness values will be reset to 100%.

**OPERATIONS:**

**FUNCTION KEYS F0-F4**

F0   Turn on the lights to the default brightness. If this is a new board, or you performed a RESET, the brightness will be 100%
F1 Force the brightness of the Main Lights to 100% regardless of the default setting. This has no effect on the AUX lights.

F2 This is the momentary push button (HORN) and is used for two operations:
  o PUSH ONCE to SAVE the default brightness for the MAIN LEDs and AUX LEDs.
  o PRESS and HOLD for 10 seconds to set the DECODER BOARD ADDRESS while the car is on the main track. This is a cool feature we added that avoids having to move the car to a programming track! (see below)

F3 Turns ON/OFF the AUX lights

F4 ACTIVATE the speed throttle to adjust the brightness of the lights. If you move the speed control very fast there might be a slight delay in the LED response/adjustment. Fooling around you might spin up and down quickly for example. Once you stop though, the board will catch up.

SAVING THE BRIGHTNESS LEVELS:

F2 works in conjunction with F4 (which activates the SPEED THROTTLE) to set the brightness of either or both the main LED’s and the Read End lights.

The way it works: Press F2 ONCE to save the displayed LED brightness.

Step-by-step:
Set your DCC Throttle to match the address of the board just as you would to select an engine decoder. (remember, default is 3). Turn ON the light(s) you want to control/ adjust. You can set the MAIN lights and the AUX light bright separately OR together. If they are BOTH on when you press F2 (SAVE), the SAME brightness will be saved for both. If you want different light levels for the MAIN and AUX lights, then SAVE one first, and then turn it off, then turn on the other, adjust its brightness and then press F2 to save the setting for that light.

SET THE DECODER BOARD ADDRESS (without the programming track!)

Using this method, you can set the light board to an any address between 1 and 2048. (the range of switch addresses)

Turn OFF both F0 and F3 lights. The board will not enter programming mode if either is ON.

PRESS AND HOLD F2 for 10 seconds to put the board in ADDRESS PROGRAMMING MODE. (This can be done anywhere on the layout but the power to the track must be ON. This will NOT affect any MultiFunction Decoder (Engine) on the layout.)
After roughly 10 seconds the board lights will flash rapidly (~ 2 times a second). This tells you that the board is ready to accept a new address.

For this to work you must have the throttle set to the CURRENT board address and you are able to control the lights On/Off from the throttle. If not, either reset the board back to Address 3 or set your DCC throttle to the assigned board address.

Using the SWITCH function on your throttle, select the new address you want to program – then press either CLOSED or THROWN. The lights will go out indicating the new address has been saved. Using your throttle, EXIT switch mode and set the throttle (Loco) number of the new address you just programmed. Then use F0 and F3 to test for correct operations – the lights go on!

- This process has no effect on any engine decoder (Multifunction) on the layout.
- This will NOT reprogram any of your switches (UNLESS you simultaneously put your Accessory Decoder into programming mode – We’re not sure why anyone would do that?)
- If you use an address that is already assigned to a SWITCH – don’t worry! When you press CLOSED/THROWN you will hear that switch operate but only for that one instance of programming this decoder. Thereafter the decoder knows it’s not a switch and will ignore any switch commands and likewise, your switch will ignore commands sent to this board. Pretty clever!

THE OLD FASHION WAY (CLASSIC DECODER ADDRESS PROGRAMMING

This LED Light Board can be programmed using any standard NMRA DCC compliant system. We can’t give you every combination of steps here because of the wide variety of manufacturers since each has its own specifications and limits. For example, NMRA extended addressing can go to 10,000+ but the Digitrax® throttle only allows up to 9983.

As you would with your engine decoder, hook up the light board (or put the car with it installed on the programming track) and program as you normally would. CV8: is RESET. This is a good thing to remember.

When in “native” DCC programming mode this LED Light Board will both Short and Long addresses. Just bear in mind not to set it to an address that your DCC system and hand controller do not support.

From time to time we stumble across occasional strange behavior in mixed system environments. For the most reliable (and we think) simple operation, use the built-in in address programming mode (not programming tracks) and work your addressed to be organized within the 2048 address limit.

PERFORMANCE and INSTALLATION
The N Scale LED Light Board is designed to operate at about 50% brightness. On my layout I run at about 30%. That is, the best visual effect for the train cars is 30-50%. The circuit will still protect the LEDs if you operate at 100%. However, if you decide to build a really long train all with lighted cars the cumulative effect of the current drain will affect other action (engines) on the layout. For planning purposes, 100ma (milliamp) or less per car is about average. Therefore, 10 cars would draw about 1.0 amp with all cars lights on at 100%. We design the board so you could run the lights brighter but for both appearance and current drain it’s better to run at half or less rated capacity.

The N Scale board will safely operate at HO voltages at about 16V. It should not be operated at G scale voltages of 18-20v. We have other boards that are designed for O and G scale.

We have had the best results with KATO® passenger cars largely because they come with wheel pickups. One of the reasons we made these boards is that the rest of the KATO® lighting system is not as good. With KATO® we have found that the best hook up is to solder the wires to the very end of each of the two long copper strips that make contact with the wheel pickups. We tried to use a variation of the copper strip that slips inside and makes contact with the longer metal strips – it “sort of” works. Depending on the version of the board you purchased, you may have as many as 8 capacitors that are designed to reduce the flicker effect that comes from the physical “noisy” pickup and the wheels. In testing we found that this was still not enough to overcome a bad connection to the long metal strip. Soldering the two board wires directly to the long metal pickup improved the overall performance dramatically.

The width of the board is 12mm. In some passenger cars you may have a better fit at about 11mm. For example, this was the case for the Amtrak Skylight car. It’s perfectly ok to sand down the edge of the board up to a total of about 1mm. Use your good judgement on this. The underside of the board is ground (GND), and you can see that it starts a little bit away from the edge of the board. I know it’s hard to see but wiggle the board under a light to see the reflective difference. Consider up the edge of the GND a safe zone for filing and sanding. I use a piece of 100 grit paper on a flat surface and slide the edge of the board over it. The PCB material is fairly soft so don’t go overboard!

These boards are NOT designed to be shortened lengthwise. We have two lengths available for N Scale; 124mm (4 7/8”) and 144mm (5 5/8”). If this doesn’t fit your requirement, contact us to see if we can include a custom sized version in one of our manufacturing runs.

That’s it! Have fun and please send us feedback or special requests.

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