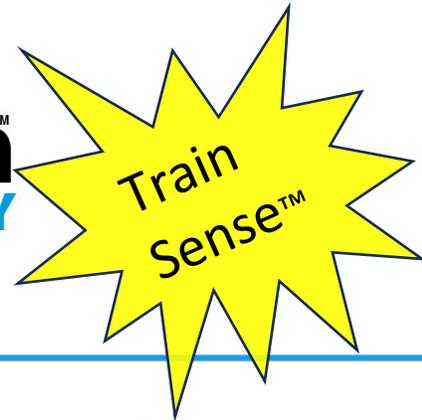




Model Train™ TECHNOLOGY

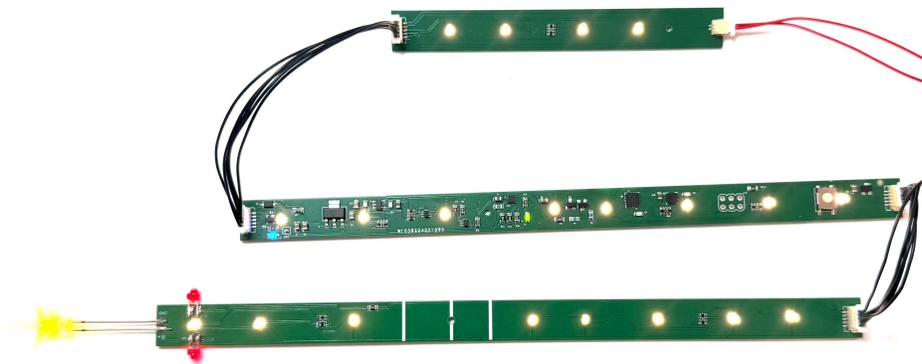


PASSENGER CAR LIGHTING with DCC DECODER and TRAIN SENSE™ OPERATIONS MANUAL

SERIES TS



Version 1.8a



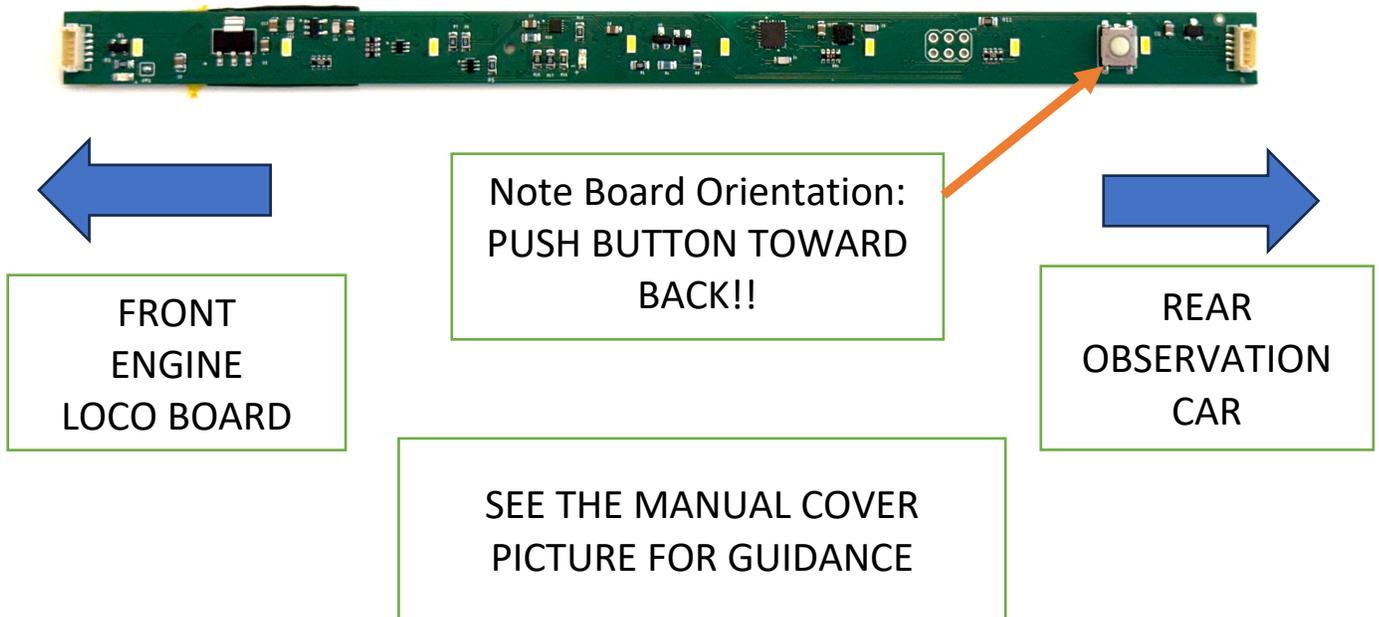
This Yankee Flyer Lighting kit consists of three boards:
One for the Loco, Main cabin and Rear Observation car.

Motion Sensing Light Activation Automatically!

WARNING

The MIDDLE board (with all the electronics) is the control board and MUST be connected to the LOCO board as shown below. (Grab the right side of the board with your right hand; the button should be near your thumb)

IF YOU CONNECT THE LOCO BOARD 5 PIN CONNECTOR TO THE BACK OF THE MAIN BOARD (NEAR THE PUSHBUTTON) AND CONNECT TO DCC POWER, IT IS 100% CERTAIN THAT YOU WILL SHORT THE MAIN BOARD AND IT WILL HAVE TO BE REPLACED.



OVERVIEW

In 2018 we invented an LED light board for use with N and HO scale passenger cars and cabooses that includes an onboard DCC decoder. That was the product that launched our business.

This version of the lighting system was specifically designed for the Yankee Flyer.

One of the key challenges with lighting system for all passenger cars is keeping the lights on over dirty track and turnouts and avoiding flicker. That was a particularly difficult challenge for the Yankee Flyer because only the first of the three cars has track power wheel pickups. In the past we have used high-capacity capacitors we call SuperCaps to address this. However, for this application capacitors would not be enough.

As a breakthrough for our entire line of light boards and first introduced in this lighting system for the Yankee Flyer, we have added a postage-stamp sized lithium battery that keeps the lights on for a full 8 seconds without dimming. A trickle recharging circuit keeps the battery ready and does not affect DCC.

Also included is our full motion sensing system called **Train Sense™**.

Train Sense™ senses the train movement and turns the lights on and off automatically. And there is a lot more! You can configure the light level at each of three stages: ***At Rest***, ***In Motion*** and at ***Arrival***. Further, you can set a timer to activate the ***Arrival*** light and then a second timer that subsequently turns off the lights after the timer expires. There is a

FADE option so the lights can fade through each stage rather than switch immediately on and off.

You can still control the lights with your DCC controller.

Key Features:

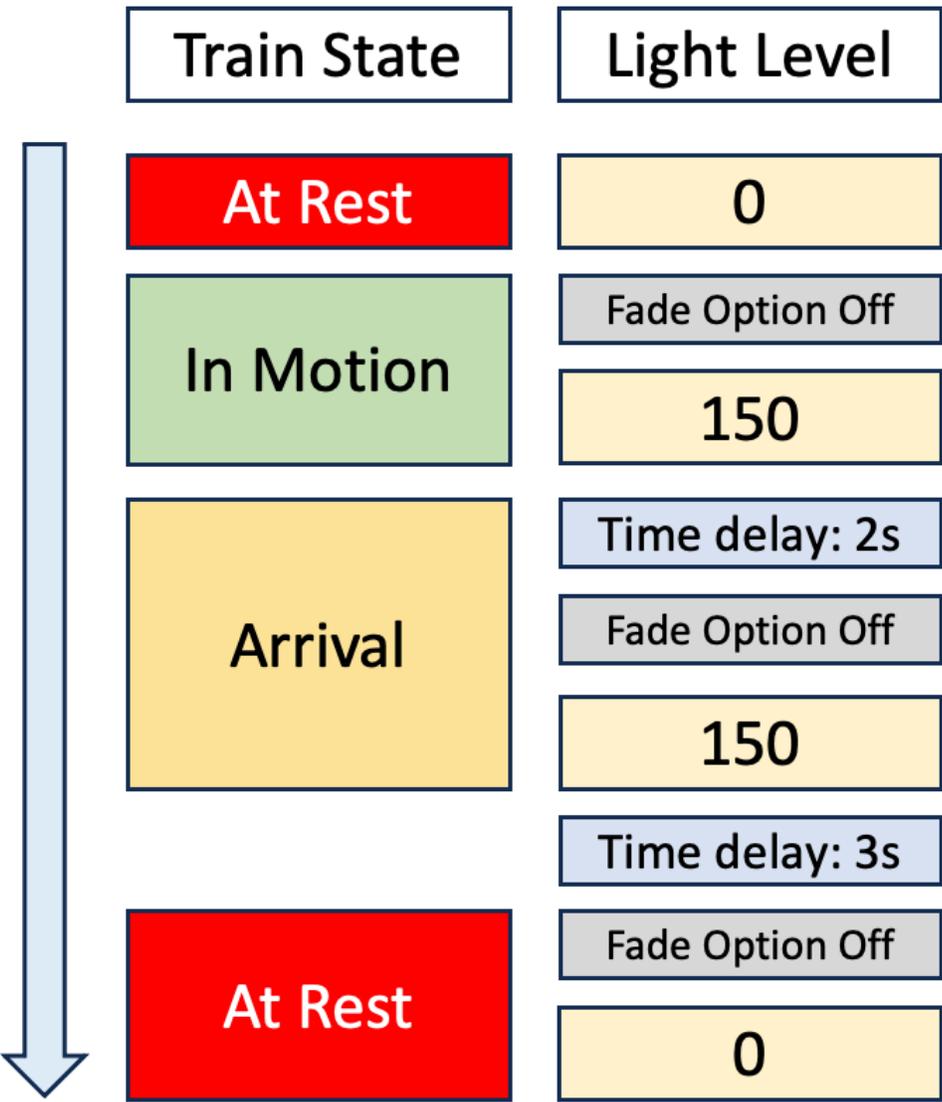
- DCC controllable LED Lighting
- Backup lithium self-charging battery.
- **Train Sense™** motion sensing automation
- Side marker lights that turn on and off with the cabin lights.
- A rear facing Observation Car LED that lights in reverse.
- Pre-configure DCC address in sync with Engine (6000)

QUICK START:

1. The lighting default DCC address is 6000, same as the engine.
2. [F0] turns the main cabin lights on and off.
3. By default, Train Sense is inactive [F9] off.
4. To activate Train Sense, [F9] On. (You may have to cycle [F9] to sync the DCC controller to the board.

The next pages show two of the five PRE-SET Behaviors examples of how the system works:

Pre-Set Behavior 1

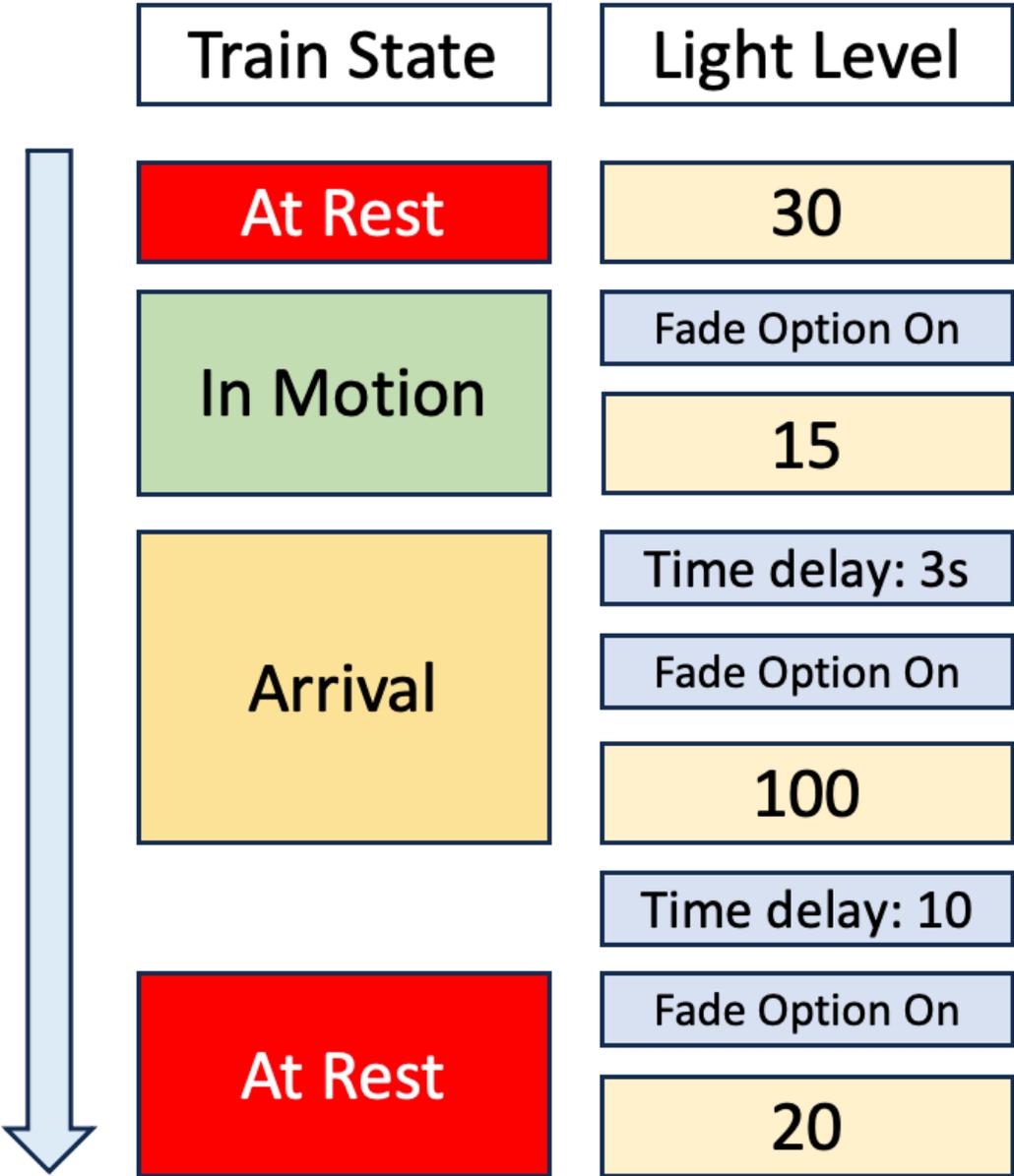


Note: light levels and time can be set from 0 to 255. 100% on is 255.

It is not necessary to set the lights to more than 200. Above that level our eyes cannot distinguish the brightness and it limits the power of the

Here is another option that leaves the lights on a low setting while the cars are at rest, then dims the lights slightly as the train moves. When the train stops, the light come on full so passengers can safely disembark. Finally, after a few seconds the light dim back to the At Rest setting. You can change these setting to whatever you like.

Pre-Set Behavior 4



Here is a list of the five Pre Set Behaviors.



Pre-Set Train Sense® Behaviors

	1	2	3	4	5
Train Sense Start MODE	1	1	1	1	1
At Rest Light	0	0	20	30	100
In Motion Light	150	150	100	15	35
After Arrival Wait	2	2	3	3	1
Arrival Light	150	150	100	100	250
Wait before At Rest Light	3	5	10	10	10
Fade Mode	0	1	1	0	1

There are two ways to activate one of these preset behaviors:

1. Set CV68 to a number between 1 and 5 as per the above chart. When you move the train to the main line, the configuration will be automatically loaded and saved. CV68 will revert back to zero once the preset is configured. Thereafter, you may modify any of the individual settings as per the chart on the next page.
2. Alternately, you can press the onboard pushbutton 1 to 5 times. The lights will flash to confirm the configuration is set.



TRAIN SENSE™ Motion Sensing Settings

		Range
Train Sense Startup (TS or DCC)	CV59	1,0
<i>At Rest</i> Light	CV60	0-255
<i>In Motion</i> Light	CV61	0-255
After <i>Arrival</i> Wait	CV62	0-255
<i>Arrival</i> Light	CV63	0-255
Wait before <i>At Rest</i> Light	CV64	0-255
Fade Mode	CV67	1,0
Pre Set behaviors (0 = off)	CV68	0-5
Main LED brightness	CV47	0-255
Digitrax/ All other DCC	CV46	1,0

F9 - Turns the Train Sense™ function on and off. If you have the fade option on, let the board complete its cycle back to ***At Rest*** before you try to change options. Configuration of the CV's should be performed on a programming track (Digitrax™) or via the programming mode of your DCC Cab (such as with NCE™).

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. Connect your system to your DCC main power supply. Make sure you are not connected to the programming lines. This works with the main track power.

As part of our ongoing inventive spirit we recently we began including a solid-state (non-mechanical) magnetic sensor on the board at the same end as the push button switch. This allows you to use a small magnet to trigger the reset from the OUTSIDE of the car once the board is installed. Now, you don't have to take the car apart in the rare case that you need to perform a reset.

And now you know what that funny looking refrigerator magnet is for! Simply hold the magnet above the board about 2" max for 5-8 seconds. Once the light blinks once, move the magnet away to let the board complete it's reset cycle (4 flashes confirm it is done).

Pressing the onboard button 8 times will activate reset.

OPERATIONS:

FUNCTION KEYS:

- F0 Turn on the lights to the default brightness. If this is a new board, or you performed a RESET, the brightness will be 80%
- F9 Activate/Deactivate Train Sense motion sensing.

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.

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.

Programming on the Main (DCC)

Almost all DCC systems have a way to send “write only” commands to decoders. This is called Ops Mode for Digitrax and Programming on the Main in NCE – speak. This provides a way to set the MTT Light board CV's without moving the car to a programming track.

PERFORMANCE and INSTALLATION

Our LED Light Boards are designed to operate visually best below 50% brightness. On my layout I run at about 25%. 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, 10-30ma (milliamp) or less per car is about average. 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.

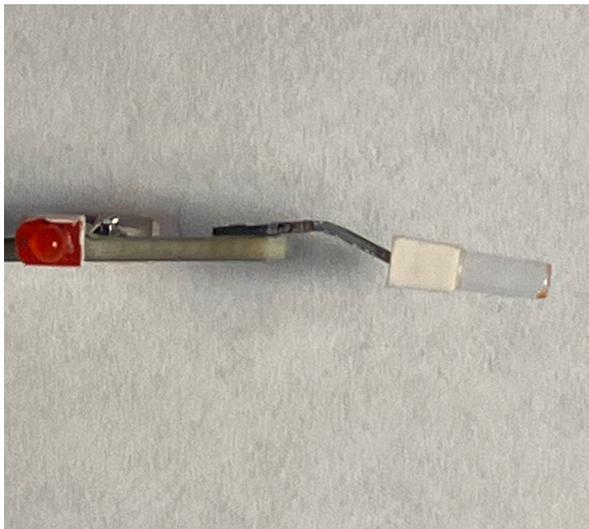
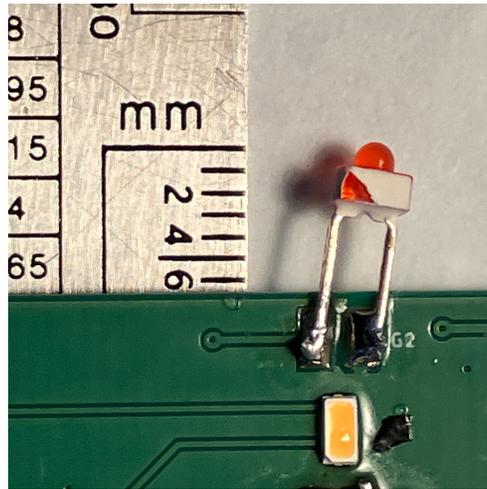
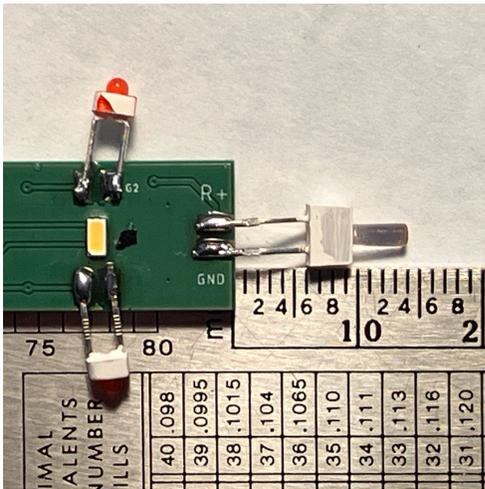


CONFIGURATION VARIABLES (CV) CHART

CV	Behavior	Comments
47	Saved Default Brightness for Main LEDS	Use F0 On, F4 On to activate "Speed" control and F2 to save. Valid value 1-127
48	Saved Default Brightness for REAR LEDS	Use F3 On, F4 On to activate "Speed" control and F2 to save. Valid value 1-127
49	Fade speed interval	Set via CV only
50	RESERVED	
51	F3-sync	Makes AUX pads follow MAINS only. Off=0, On = any non-zero number
54	Fade On/Off	Sets default
7	READ ONLY - Software Version	FYI - in case we need to know which board you have.

INSTALLATION OF REAR LEDS

Note: The red side markers are placed at a slight reward angle to facilitate fitting into the marker shell locations.



Note: the rear facing white LED should be bent slightly so its centerline is aligned with the bottom of the PCB board

LED Polarity: The two leads on LEDs are different in length. The short leg is GND- and the long leg is V++.

ELECTRONICS AND STATIC ELECTRICITY

Static electricity can cause component failure. Scuffing along a carpet and then touching one of the component connectors can cause a static spark. These components are rugged – some designed for the automotive industry. Just be mindful of the risk. The current on the board will not harm you if the board is powered as per the instructions.

Warranty

We warrant our products to be free from defects in workmanship and materials, under normal residential use and conditions, for a period of one (1) year from the original invoice date. Shipping and handling fees are to be paid for by the customer.

Warranty Repairs are subject to inspection of the product to determine the qualification for warranty service and appropriate steps to repair or replace at the sole discretion of the company.

Customer is responsible for ALL shipping costs. Items must be returned in original packaging or similar packaging and condition as the original product was received. Customers are liable for damages as a result of accidental or improper use and inadequate packaging and shipping.

If an item is damaged either in shipping or accidental or abnormal use, customer will be provided a quote for repairs or replacement of the damaged product or parts. Components of a product that malfunctioned through normal use will be repaired under warranty.

LIMITATION OF LIABILITY

UNDER NO CIRCUMSTANCE SHALL COMPANY OR ITS AFFILIATES, PARTNERS, SUPPLIERS OR LICENSORS BE LIABLE FOR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL, SPECIAL OR EXEMPLARY DAMAGES ARISING OUT OF OR IN CONNECTION WITH YOUR USE, OR INABILITY TO USE THE PRODUCT, WHETHER OR NOT THE DAMAGES WERE FORESEEABLE AND WHETHER OR NOT COMPANY WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, COMPANY'S AGGREGATE LIABILITY TO YOU SHALL NOT EXCEED THE AMOUNT OF THE PRODUCT. THE FOREGOING LIMITATION WILL APPLY EVEN IF THE ABOVE STATED REMEDY FAILS OF ITS ESSENTIAL PURPOSE.



Model Train Technology LLC

10524 Moss park Rd. Ste. 204-256

Orlando, Florida 32832

407-242-5436

www.ModelTrainTechnology.com

support@modeltraintechology.com

Version 1.8a

Copyright© 2018-26 Model Train Technology LLC