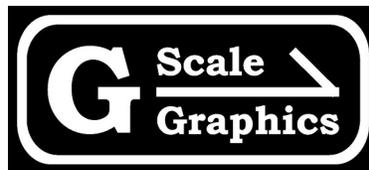


# ***Back 'n Forth Track Throttle***

## **Point to Point Trolley Operation** Operation and Installation Manual



G-Scale Graphics  
5860 Crooked Stick Dr.  
Windsor, CO  
970-581-3567

GScaleGraphics@comcast.net

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## Overview

Back 'n Forth operation is typically used for a point to point trolley line. The trolley runs to one end of the track and stops, waits for a period of time, then runs back in the other direction, stops, waits, etc. Typically, this is an on/off function; i.e. instant starts and stops that can be hard on gears. The **Back 'n Forth Track Throttle (BNFTT)** provides smooth starts and stops. The rate of acceleration is adjustable, along with the run time and wait time before reversing. The **BNFTT** also contains a built in 5 amp track throttle to set the running speed.

All you need to provide is a DC voltage source and diode isolated end blocks. Diodes? What are those for? We supply the diodes. You configure the isolated end blocks as shown below.

The **BNFTT** accelerates to running speed and runs until the run time expires. It then decelerates to a stop. After the wait time expires, track polarity is reversed and the loco accelerates in the other direction, and the process continues. The problem is, most trolleys and locos don't run at the same speed in both directions. So, when running back and forth on a single timer, on each trip the loco will stop a bit shorter on one end and a bit longer on the other. This can easily be a difference of 2-3 feet in only 15 minutes of run time. The **BNFTT** separate times for each direction to solve this problem.

The diode isolated end locks provide a positive electrical stop and a repeatable starting position for each trip. They also provide a safety stop during setup or in case something goes wrong.

When the trolley or loco (and all of its track pickups) cross the gap into the diode block, it loses power and stops. Reversing the polarity of the track power causes the diode to conduct, the trolley runs to the other end and stops past the gap due to the orientation of the diode on that end. The diodes, as shown in the diagram, will work the way most large scale loco motors are wired. For NMR standard locos, the diodes will need to be reversed. If your trolley won't stop past the diodes, they need to be reversed.

The built in track throttle controls the speed of large scale track powered trolley or locomotives. It is used in conjunction with a low cost industrial power supply to provide up to 5 amps at 7-25 volts to your track, which will easily handle your largest locomotives and consists.

PWM (Pulse Width Modulation) output is provided for extra torque during slow speed operation. Output is protected with an internal replaceable 5A fuse.

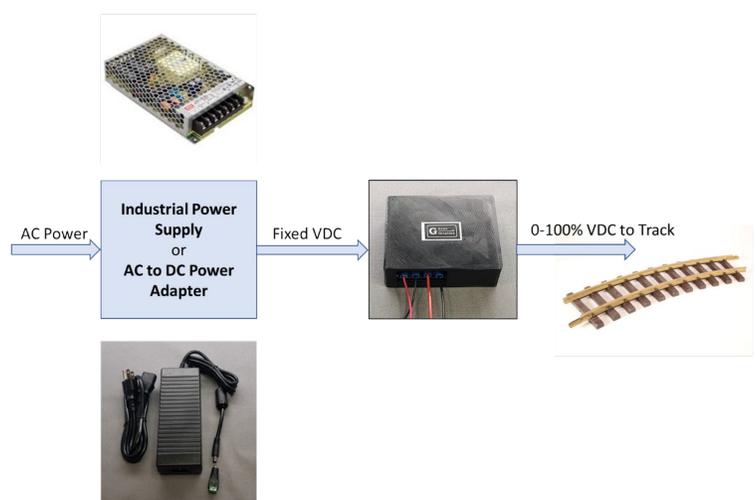
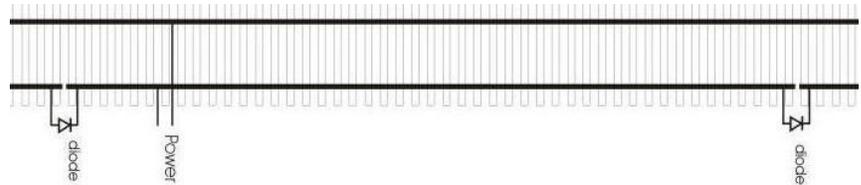
Choose your own DC power supply (purchased separately), up to 25V. Power supply voltage will determine your maximum speed.

We recommend:

**Meanwell RS-150-24 (24V, 6.5A) available from multiple on-line sources for about \$18.**

**Or, our AC to DC Power Adapter (19V, 6.3A)**

Note: Keep in mind that most locomotives only require less than 1 amp while running. A power supply capable of 3-5 amps is usually more than enough for most applications. More amps won't make it run any better. It just blows the fuse faster (and sometimes the wiring in your train) when you get a short (as in a derailment).



# Installation

## Wiring

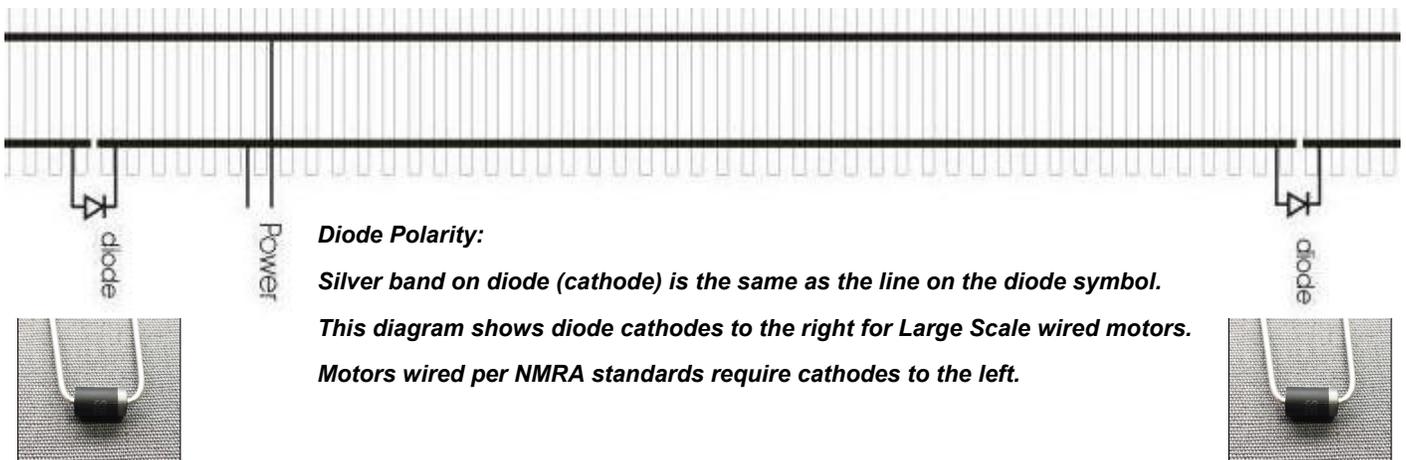
Connections to an industrial power supply should be done using spade or ring lugs crimped onto the wire ends. Wire to wire connections can be done with wire nuts or solder joints. You may be required to supply your own AC cord for the industrial power supply. The optional AC to DC Power Adapter has everything you need.

Remove the snap on cover to access the wiring terminals. Connect your power supply to the 7-25V terminals, observing polarity. The track output has no polarity. Spade lugs work best, but you can also use tinned wire.

Wiring between your power supply and the Auto Reversing Track Throttle should be at least 20 AWG. Output wiring to your track, the bigger the better to reduce voltage drops on long wire runs.

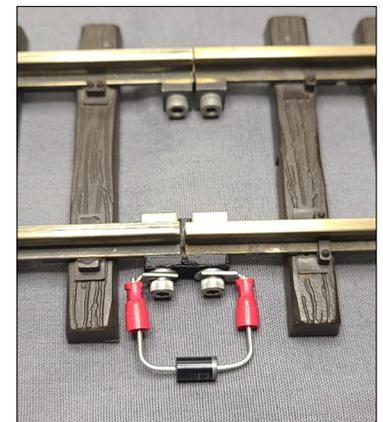
Quick disconnect cables on the power and track will allow you to easily bring the control in between running sessions if it isn't in a fully protected weather shelter.

## Diode Installation



Each end of your point to point track needs an isolated power block. A regular rail joiner (with continuity) on one side and an isolated rail joiner on the other side, with a diode installed across it as shown in the diagram. The easiest way to install the diodes is to use spade lugs under the screws of the rail joiner. You can also solder the diode directly to the rail, but this requires quite a bit of heat, which may damage both the plastic ties and the diode if not done properly. The diodes, as shown in the diagram, will work the way most large scale loco motors are wired. For NMRA standard locos, the diodes will need to be reversed. If your trolley won't stop past the diodes, they need to be reversed.

The length of the end blocks need to be long enough for the trolley to completely enter. If running a train, one end will only need to accommodate the locomotive with track pickups (loco enters block first), but the other end the entire train (train cars enter the block first).



*Diode with spade lugs installed across a Split Jaw isolated rail clamp.*

## Track

Ideally, your track should be level. However, since the **BNFTT** has independent run timers for each direction, you can compensate for the difference in speed in each direction on a grade.

## Setup

The **BNFTT** has a built in 5 amp throttle and 5 adjustments and one switch.

### Adjustments

SPEED controls the running speed.

ACCEL controls the rate of acceleration and deceleration.

RUN1 and Run2 control the run time in each direction. Adjust the pot next to the LED that is ON. Adjustable from 0 secs to 2 mins 40 secs. Switch SW1 sets the range of adjustment based on track length.

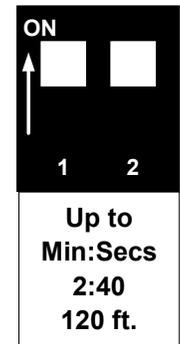
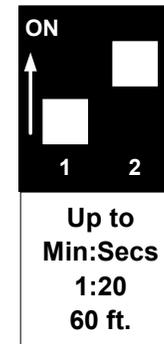
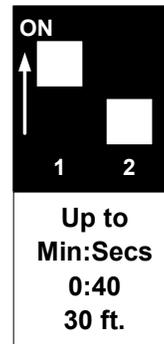
WAIT controls the wait time, adjustable from 0 to 63 secs.

### Procedure

1. The length of your track will determine the run time. The 2 position DIP switch sets the run time range. Choose the appropriate setting for your track. This will give you the best control over the RUN time adjustment.

2. Preset the adjustments: CCW (Counter Clockwise)

- WAIT: Full CCW (about 5 secs for setup)
- RUN1 and Run2: Mid
- ACCEL: CW (fastest)
- SPEED: Mid



3. Power up and observe the trolley run, setting SPEED as desired.

4. Adjust ACCEL for desired accel/decel rates. How smooth your loco accelerates is largely determined by the loco itself. Some may still have a jerky start, even though the throttle is being applied at a steady rate.

5. Adjust RUN time until you get a smooth stop at the end of the track. If it doesn't stop, you will need to reverse the diodes. The Yellow LED is ON next to the RUN pot that controls the current direction.

6. Adjust WAIT time to desired time; 0 to 63 secs, CW to increase.

Initial time stopped in the end block will be determined by the delays during accel/decel waiting for the required voltage to actually move the loco. i.e The track voltage will start increasing from zero volts, but the loco won't actually start moving until X volts. The also occurs during decel. A delay from X volts down to zero, then the WAIT timer starts. Adjust WAIT for additional time if needed.

### LED Logic

Watching the Green LED during setup, can help you understand what is going on.

During Run Time: Constant ON

During Accel or Decel Time: Blinks at a Fast rate. The actual rate is dependent on the ACCEL setting.

During Wait Time: Blinks at a Slow rate, once per second.



## Auto Reversing Track Throttle Specifications

### Mechanical

Physical Size: 3.6" X 2.9" X 1.2"H. 3D printed PETG enclosure with snap on cover.

Wiring: Barrier Strip for Power In, Track Out,  
accepts 12-22 AWG #6 terminal lugs or tinned 22 to 10 AWG wire.

### Electrical

Power Input from an external DC Power Supply: 7 to 25 VDC

Must be a filtered regulated DC power supply. Not a hobby power pack, or a simple transformer.

DC Track Output

5 amps max

PWM (Pulse Width Modulated), 20KHZ

Max amplitude: Input voltage minus driver loss

Control

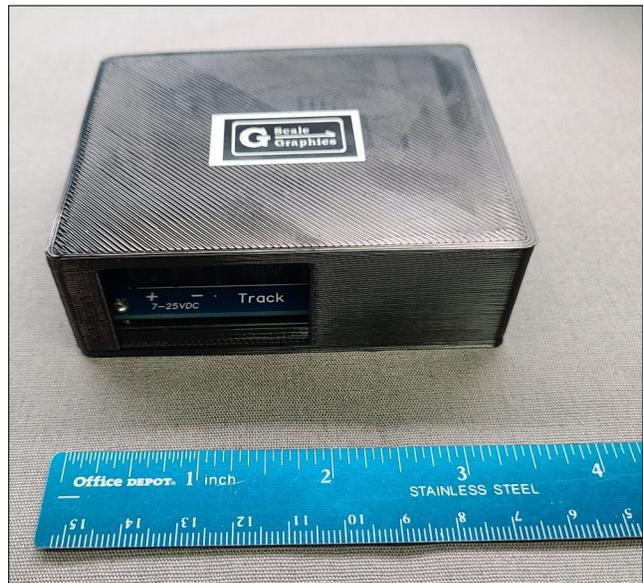
Single turn trim potentiometers

2 position DIP switch

Fuse

5A, ATC or ATO fast blow Automotive fuse

### Environmental



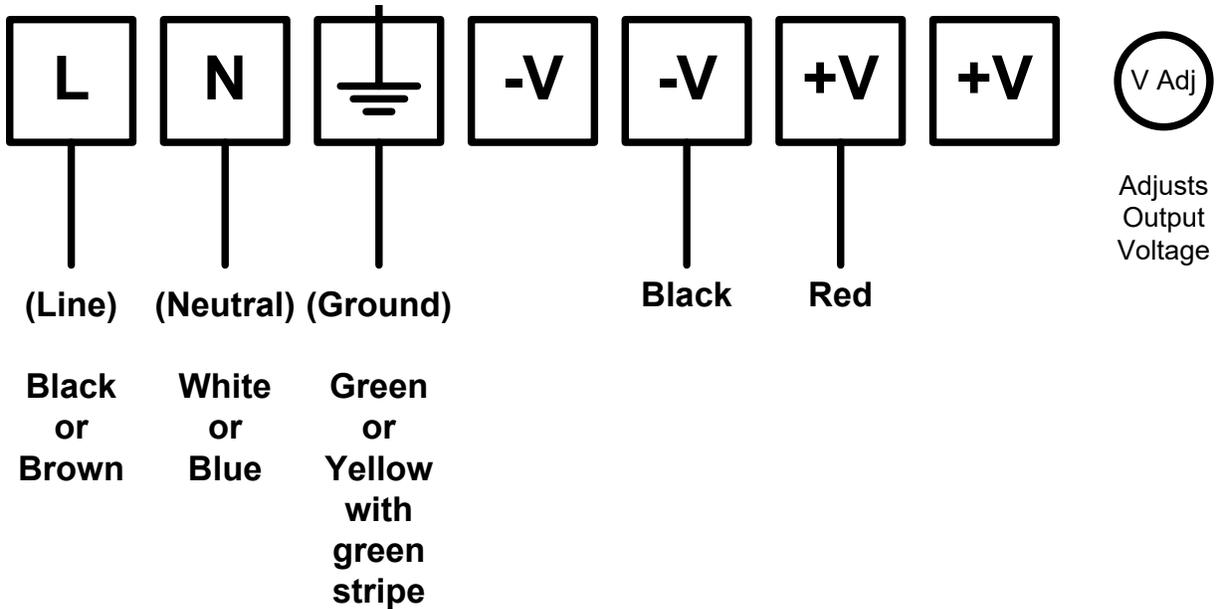
Control must be protected from the weather. The box is not weather proof.

## Meanwell Power Supplies

You will need to provide or purchase your own AC power cord and connect it to your Meanwell power supply. Any 3-wire power cord will work. Set the power input switch on the side of the power supply for 115 VAC U.S.

Output voltage should be 24 VDC maximum for use with the G-Scale Graphics Trackside R/C or other Track Throttles. But no adjustment should be necessary as received.

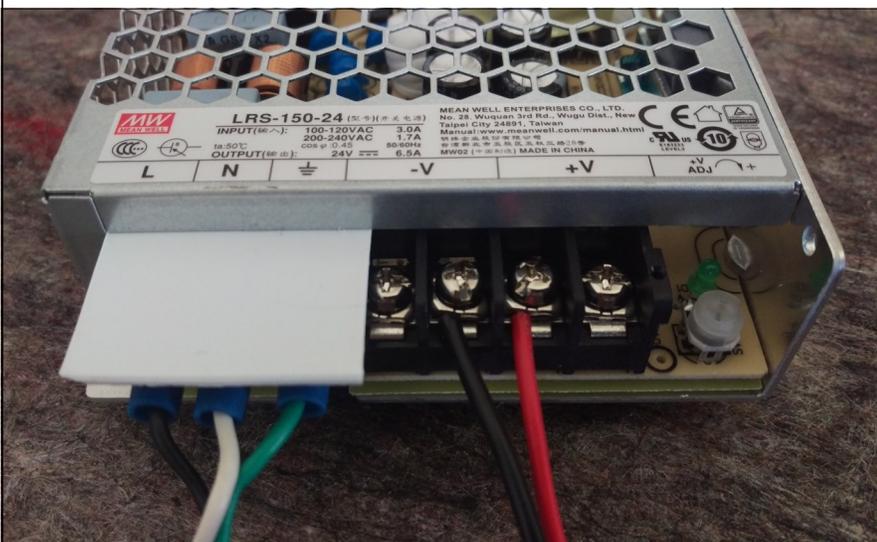
### Meanwell Power Supply



**115 VAC  
Input**

**VDC Output(s) to Track Throttle(s)**

(Set switch on side of power supply for 115 VAC in U.S.)



Crimp some spade connectors on the wire ends for a nice neat connection. The AC input terminals on your power supply may be exposed, so you may want to insert a piece of styrene over them for added safety.

