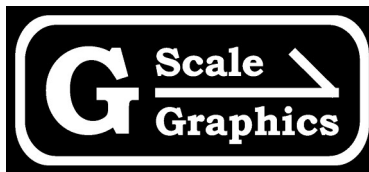# *Auto Reversing Track Throttle*

Point to Point

Trolley Operation

Operation and Installation Manual

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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. There are a number of ways to implement this function with controlled acceleration and deceleration at the end stops, but that comes with increased electronics cost and more complexity in terms of extra wiring, sensors and programming.

The easiest method to implement Back 'n Forth is using isolated diode sections at each end of the track and a reversing relay with abrupt starts and stops. When the trolley or loco (and all of its track pickups) cross the gap, 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 NMRA standard locos, the diodes will need to be reversed. If your trolley won't stop past the diodes, they need to be reversed.
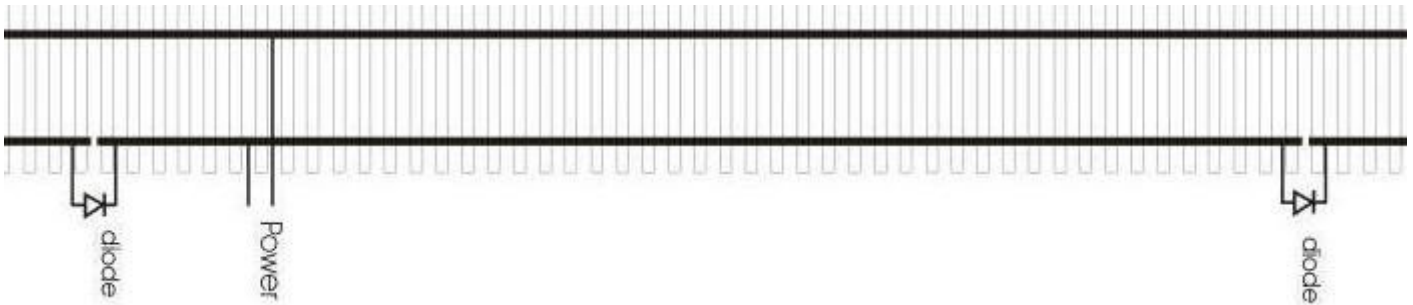
The **G-Scale Graphics Auto Reversing Track Throttle** has a built in throttle to control speed and 4 timers to control the back 'n forth run times and station stop times.

The 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 10 amps at 7-28 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 10A fuse.

Choose your own DC power supply (purchased separately), up to 28V. 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.

Note: Keep in mind that most locomotives only require about 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).
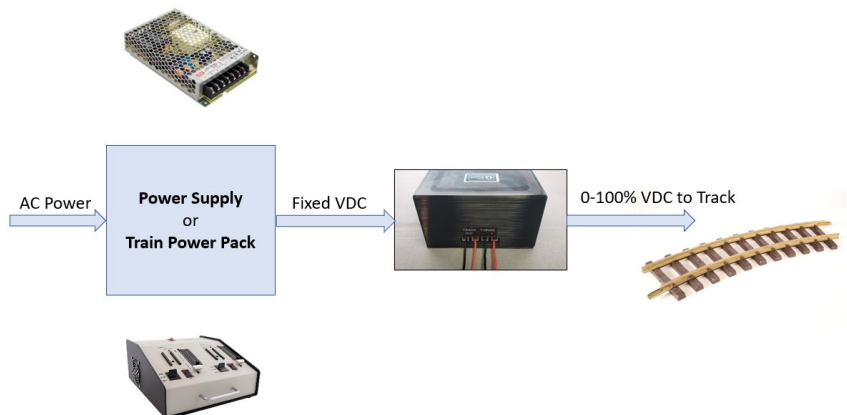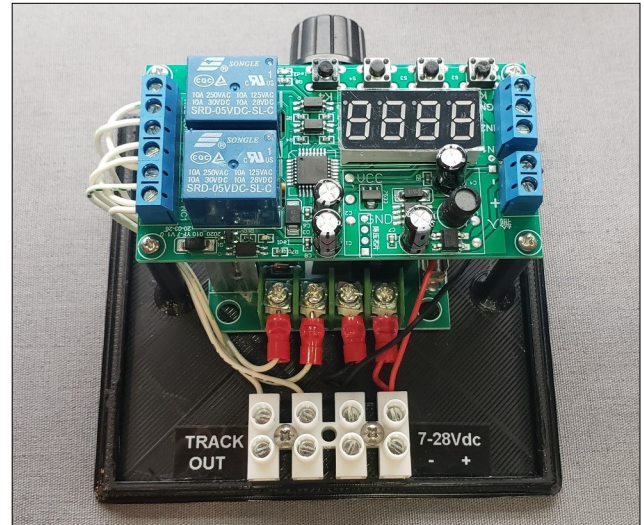
Installation

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 power supply.

Remove the snap on cover to access the wiring terminals. Connect your power supply to the 7-28V terminals, observing polarity. The track output has no polarity. Insert stripped and tinned wires into the terminals.

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.

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. You can also use an LGB1015K module, which allows you to connect the diode using screw terminals. In the photo, you will see the diode across 1A and 1B, and a jumper wire across 2A and 2B.

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. It your trolley won't stop past the diodes, they need to be reversed.
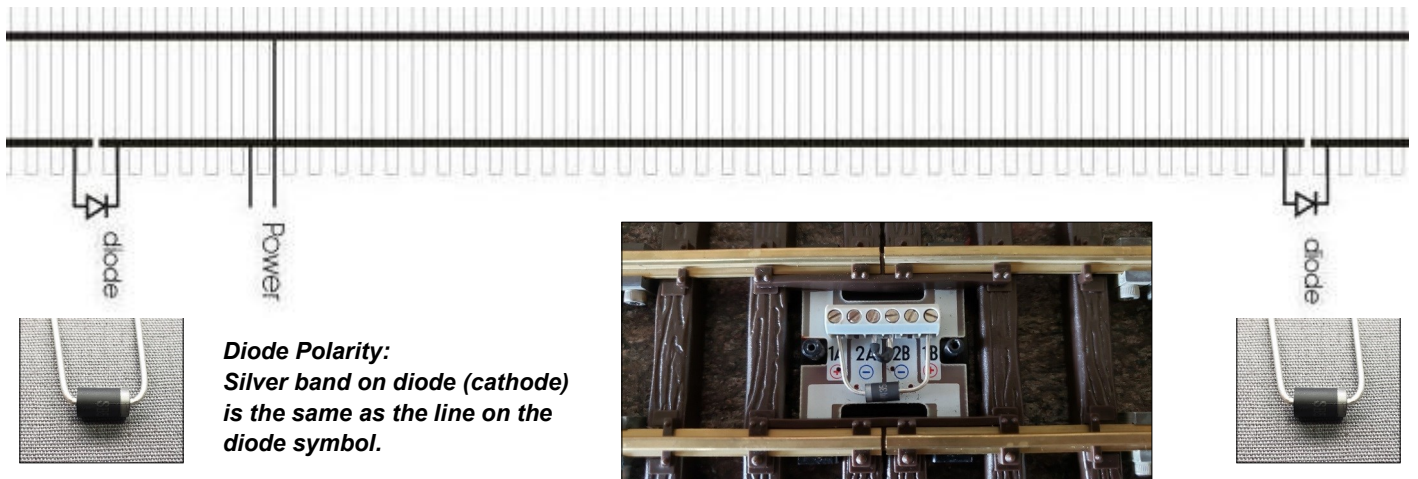
Diode Polarity:
Silver band on diode (cathode)
**is the same as the line on the**
diode symbol.

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, but the other end the entire train.

Setup

The Auto Reversing Track Throttle uses four programable timers

- Timer A sets the run time in the first direction

- Timer B sets the wait time at the first stop

- Timer C sets the run time in other direction

- Timer D sets the wait time at the other stop

With the trolley sitting at one end stop, it will leave the station when the track polarity is correct. It then runs for A seconds to get to the other end. When it passes the diode, it stops. After B seconds, track polarity is reversed, and the trolley runs for C seconds to the other end. When it passes the diode, it stops, and waits for D seconds. The process is repeated.
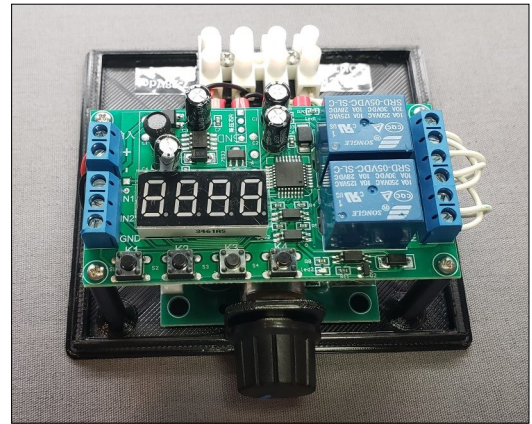
While simple timers are the easiest way to achieve back 'n forth operation, it should be noted that both starts and stops are abrupt, which could cause gear damage at higher speeds or with long heavy trains. But as long as you use slow prototypical speeds and light weight trolleys, this isn't a problem.

1) Power up and observe the trolley run, setting speed as desired. You may have to wait for the timers before the trolley starts.

2) Set timers A and C for times you estimate to be longer than needed, to insure the trolley makes it all the way to the end before stopping. Then time the actual run time from end to end and set the timers for that time plus a couple of seconds to insure it runs past the diode every time.

3) Then you can set timers B and D for the desired wait time at the stations.

Programming the Timers

The timer has many different operating modes, but only one of them is used for our back 'n forth operation (P48). The digital display makes setting up the time delays easy.

Turn power on. Timer A starts counting down.

Enter Programming Mode

Press and hold the K1 key to enter programming mode. P - 48 will be displayed. If not on 48, use the K2, K3 keys to change it.

Run Time A

Press K1. Axxx will be displayed, where xxx is the number of seconds currently set for timer A. use the K2, K3 keys to change it.

Wait Time B

Press K1. Bxxx will be displayed, where xxx is the number of seconds currently set for timer B. use the K2, K3 keys to change it.

Run Time C

Press K1. Cxxx will be displayed, where xxx is the number of seconds currently set for timer C. use the K2, K3 keys to change it.

Wait Time D

Press K1. Dxxx will be displayed, where xxx is the number of seconds currently set for timer D. use the K2, K3 keys to change it.

Exit Programming Mode

Press K1. - - - - will be displayed. Press and hold K1 again to repeat above sequence, or cycle power to return to run mode with new settings.

The K4 key toggles the numbers in the display on/off in run mode, and moves the decimal point in programming mode.

Auto Reversing Track Throttle Specifications

<u>Mechanical</u>

    Physical Size: 4.4" X 4.0" X 2.4"H. Knob extends beyond that. Snap on cover.

    Wiring: Terminal strips accept tinned wire, 22 to 10 AWG wire.

    Display: 4 digit, 7 segment LED, with decimal point. 1.3"W X 0.5" H

<u>Electrical</u>

    Power Input from an external DC Power Supply: 7 to 28 VDC

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

    DC Track Output

        10 amps max

        PWM (Pulse Width Modulated), 10KHZ

        Max amplitude: Input voltage minus driver loss

    Control

        Single turn rotary speed setting potentiometer, 0 to 100% of input voltage, CCW to CW, 300 degs,

    Timer Display Format

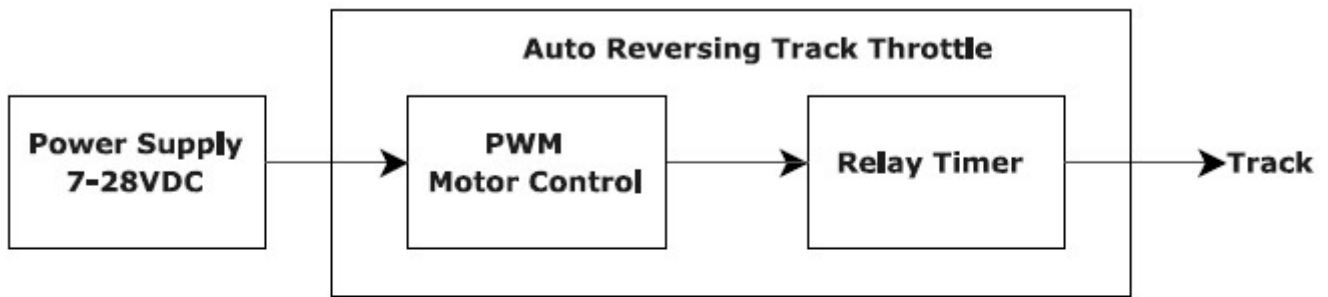|	
XXX (no decimal point) :	001 to 999 seconds
XXX.	001 to 999 minutes
XX.X	00.1 to 99.9 seconds

    Fuse

        10A, 5mm X 20mm

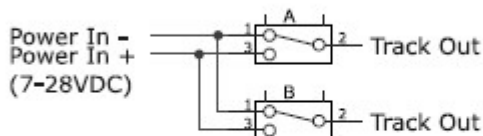<u>Environmental</u>

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

Auto Reversing Track Throttle

| Power Supply 7-28VDC | → | PWM Motor Control | → | Relay Timer | →Track |

Block Diagram

Relay Timer

NC2   NO2   COM2   NC1   NO1   COM1   -   +

PWM

M-   M+   P-   P+

Wiring Block

Power In + (7-28VDC)
Power In -

Track Out
Track Out

Wiring Diagram

Power In –
Power In +
(7-28VDC)

A

1   Track Out
3   2

B

1   Track Out
3   2

Relay Schematic

Wire List

NO1 to NO2
NC1 to NC2
Power In+ to P+ (Red)
Power In- to P- (Blk)
Power In+ to +
Power In- to –
M+ to NC1
M- to NO1
Track Out to COM1
Track Out to COM2
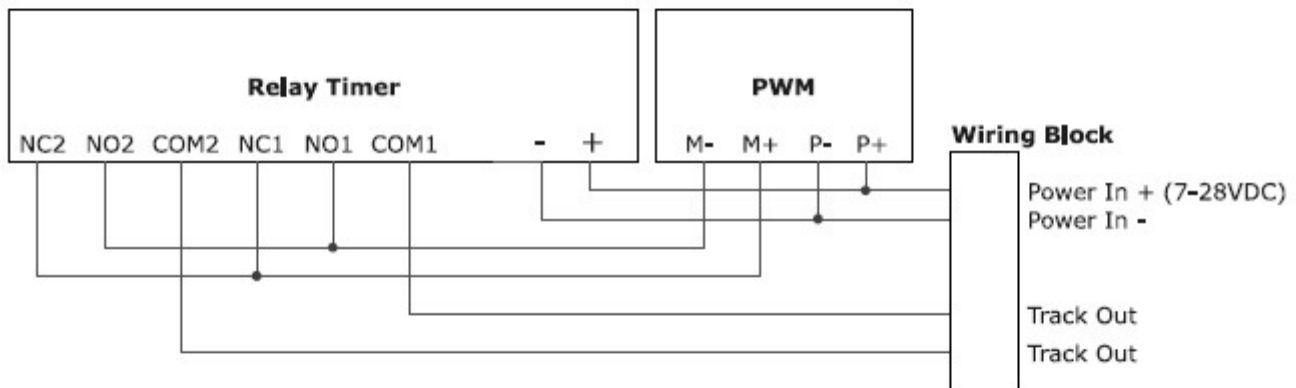
Programming –

P48: Auto reverse with delay
Axxx: Run time direction A
Bxxx: Wait time at A
Cxxx: Run time direction B
Dxxx: Wait time at B