



TTX began development of the Power Shield concept in 1993 in response to the need of the pre DCC Command Control System like Onboard & Dynatrol. The design was modified to work with DCC and has been continually improved to make Power Shield the leader in DCC power protection & regulation. Accordingly, the new Power Shield have three new exclusive features: Overvoltage protection, EZ Programming jumpers **and now Turnout Control for the PSRev**. Power Shields are designed by Larry Maier and are manufactured by NCE Corp. to TTX specifications.

Tony's Power Shield Breakers: **PSOne** controls **One** power district, **PSTwo** controls **Two** power districts and **PSFour** controls **Four** power districts. All provide over-current and **exclusive over voltage protection**, which sectionalizes the connected track area and prevents shutting down other parts of your layout when the track is shorted.

Tony's Power Shield Reverser (PSRev) unit provides auto-reversing for return loops, reversing Y's and turntables. In addition, it provides the same short circuit protection as **PS'S**

For simplicity, the layout shown has only two mainline track sections, Section 1 and Section 2. Many layouts have more than two mainline (non-reversing) track sections, each of which would be protected with a breaker. These breakers prevent shutdown of the other parts of the layout when a short occurs within one section. Note that between adjacent mainline sections, DCC1 and DCC2 must be kept on the same rail, to prevent shorting the DCC power unit (and tripping the breakers) as the train passes from one section to the next.

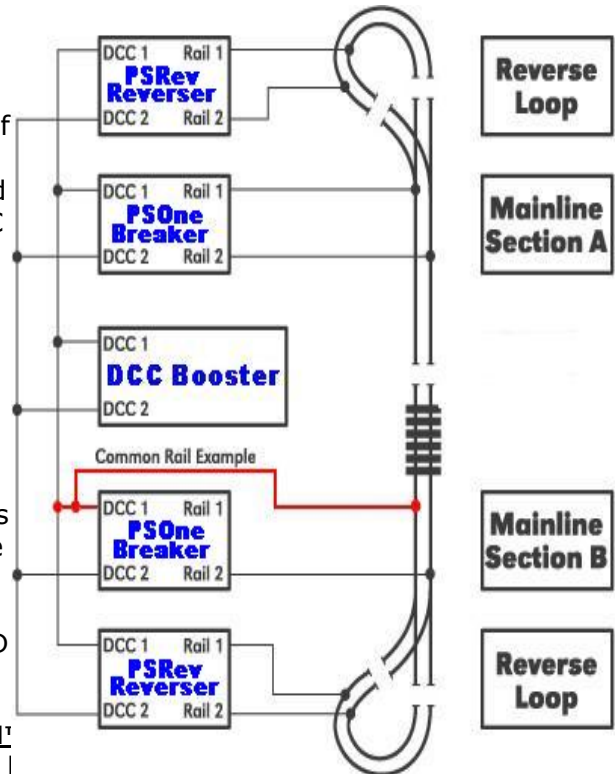
The layout shown also has only two reversing sections. A large layout might have more, and reversers can be added as needed. Note that the reverser provides the breaker function (to isolate faults) within its track section, as well as track reversal.

So on this example layout, a fault on any section of the layout would be isolated from all other sections. Track reversal is provided as traffic moves around the two reverse loops. All this is provided from a simple DCC power unit (needs no built-in reverse function).

The Intelligent Breaker and Reverser are solid-state power for silent, reliable operation and long life. Both provide on-board LED indication of trip (and indication of track reversal in the case of the reverser). with provision for remote LED indication as well.

If you have any doubts, this is why you should use Power Shield!

- **Enjoyable Uninterrupted Operating:** Power Shield™ keeps the locos can stay on the track.
- **Locomotive or System Protection:** Power Shield™ eliminates the violent voltage and current spikes caused by hard shorts that can melt equipment.
- **Track Power On/Off:** Power Shield can be used to manually switch track power.
- **Fault Isolators:** When Power Shield™ trips, you know where the problem is.
- **Booster Protection:** Although these units have built in protection, the protection circuitry may eventually fail.



Why Power Shield's are the best DCC Circuit Breakers and Reversers ?

- | | | |
|------------------------------|-----------------------------------|---------------------------------|
| • 8 Amp, All Scales, | • Over Voltage Protection | • Multiple Input / Outputs |
| • Automatic/Manual Reset. | • Easy Mount Design at District | • EZ Programming Jumpers |
| • Works with Reverse Blocks. | • On / Off Reverse, Status Lights | • Solid State No Relays |
| • No Portals Required | • No Special Pickups Required | • Works With All Types of Locos |

Power Shields are designed so all input/output connections and jumpers can be soldered directly to the appropriate holes on the circuit board. The holes can accept up to 16 AWG wire. If you are using heavier buss wire, then solder a short length of 16 AWG wire to the board and solder-splice this to your heavier buss wire.

If your Power Sections and Reverse blocks are greater than 10 Ft. long be sure to have at least 2 sets of track feeders for that section. Insufficient feeders will cause a voltage drop.

When setting up gaps for reverse sections, we recommended that the gaps be staggered about 1/8 ". Perfectly aligned gaps may reduce the current needed for **PSRev** to reverse properly.

If your train is longer than your reverse block and has metal wheels. You need to cut additional gaps into the reverse section. Simply cut another set of gaps at both ends of the reverse sections in side of the original gap. The distance between these gaps and the original gaps should about 1/2"

Note that one end of the reverse section will be aligned with normal polarity track power while the opposite or other end will have a polarity mismatch and require the reverser to act.

Test your **PSRev** installation prior to running a train as follows.

Observe that your DCC booster is not shorted.

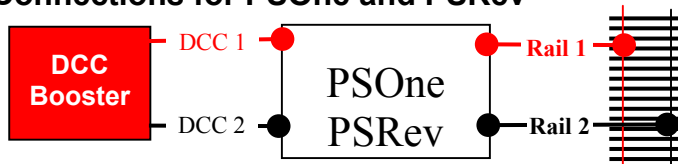
Use a suitable metal object to separately short each of the four gaps that form the reverse section and observe the LED on the **PSRev**.

Shorting the two rail gaps where the polarity is aligned will produce NO LED Indication from the **PSRev**.

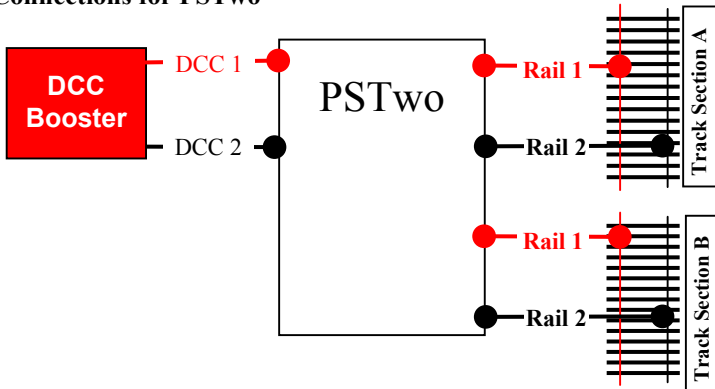
Shorting either rail gap where the polarity is mismatched will cause the LED to rapidly flash. You can also short both rails in the reverse section and the LED will stay on until short is removed.

If you are using Power Shield Breakers and Reversers together on a layout, and locomotives hesitate when crossing a reverse gap, then increase the **Trip Current** in combination with the **Response Time** on the **PSOne**, **PSTwo** or **PSFour** to the next level or until the **PSRev** operates correctly

Connections for PSOne and PSRev



Connections for PSTwo



Quick Start

All connections involve two inputs from the DCC booster, or the main line track buss and two outputs to the isolated track section or reverse block.

PSOne, PSTwo, PSFour & PSRev come ready to operate without utilizing the programmable options described on page 3 & 4.

Tony's Train Xchange Pinewood Plaza 5710 West 14th Street, Denver, CO 80202
Toll Free: 800-978-3472 Fax: 802-878-5550 e-mail: info@tonystrains.com Web: www.tonystrains.com

We Offer and Support More DCC Products Than Anyone!

PSRev: Installation & Operation Information

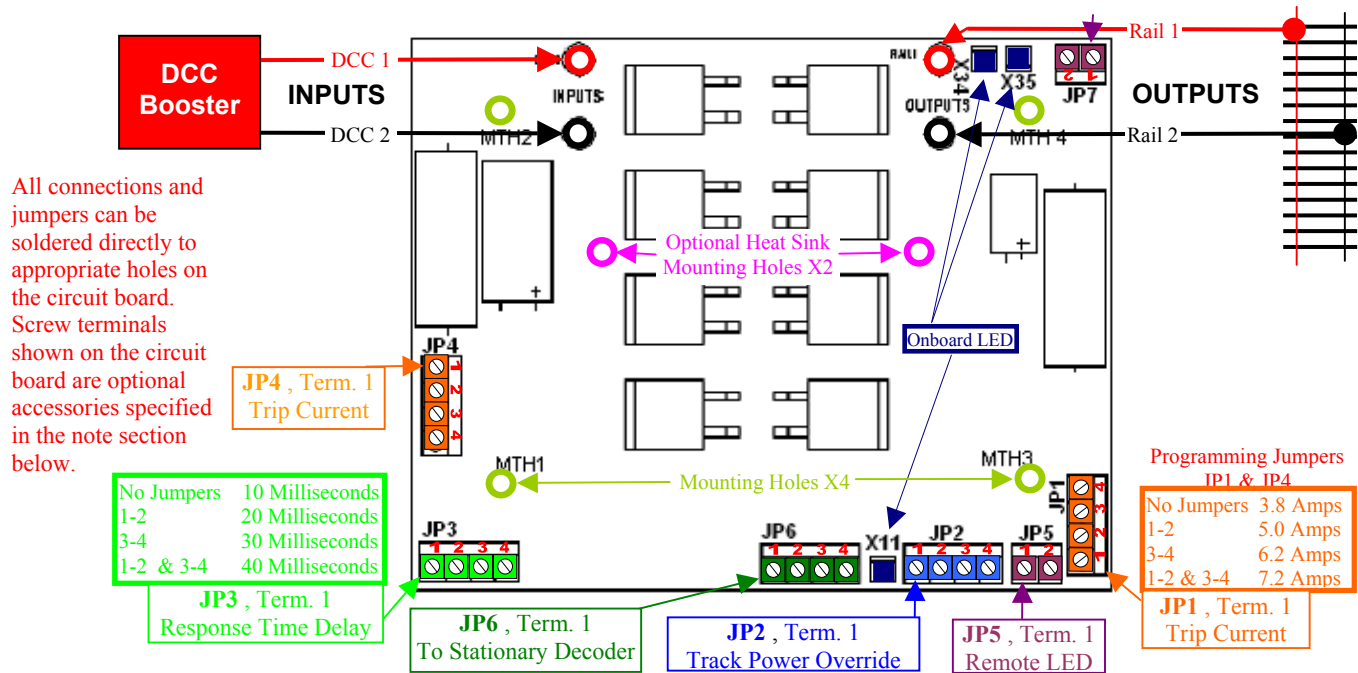
PS Rev comes ready to operate on most layouts without utilizing the programmable options described below.

No external power supply is required.

Connection: (Input Max 24 volts DCC) Please review *User Guidelines* (opposite page) before installation. REV 12-19-02 Page 3

Input: PS Rev, Connect DCC power to "DCC1" and "DCC2" inputs (see below). Either DCC lead may go to either input.

Output: PS Rev, Connect the "RAIL1" and "RAIL2" outputs to the isolated track section. Either RAIL output may be connected to either track rail.



JP1 and JP4 (Trip Current)

Sets the trip current for the (PS Rev) breaker functions. **JP1** and **JP4** must always use the same jumper configuration for the PS Rev.. See programmable trip current jumper settings in tables above.

JP2 (Track Power Override or Manual Reset)

JP2 Terminals 1 and 2 control track power. Connect 1-2 to turn OFF track power, while an open circuit from 1-2 turns on track power. Terminals 3 and 4 are auto/manual reset. An open circuit from 3-4 allows the breaker to function automatically turning track power ON after a fault is corrected. Connecting 3-4 will cause the breaker function to require a manual reset. Once the breaker has tripped, track power will not turn ON after the fault is corrected until terminals 3-4 are open circuit again. **If the section powered by the Power Shield contains over 15 sound systems or stationary decoders, or if the section has a large number of incandescent lamps (passenger cars, etc.), then the manual reset may be required to allow a clean turn on after a fault is corrected.**

JP3 (Response Time)

JP3 sets the time delay between the occurrence of a fault and the initiation of the breaker function. Certain loads such as incandescent lamps, stationary decoders, and sound systems have a high inrush current when turned on. The breaker waits the programmed delay before turning OFF track power. The time delay allows the breaker function to discriminate between fault conditions and high inrush current track loads. Most layouts can use the 10 millisecond setting without problems. Increase the delay if you have trouble turning ON a particular track section. Some boosters have a relatively fast response time. If your booster shuts down before the breaker trips during a short circuit, then use the shortest (10 ms) time delay. See programmable time delay jumper settings in table above.

JP5 & JP7 (Remote LEDs)

JP5 is for connecting a remote LED to display the operating status of the Power Shield. Terminal 2 connects to the anode and terminal 1 connects to the cathode (arrow points from 2 to 1). The remote LED operates in parallel with the LED on the circuit board.

JP7 is for connecting a remote LED to display that there is output power to track.

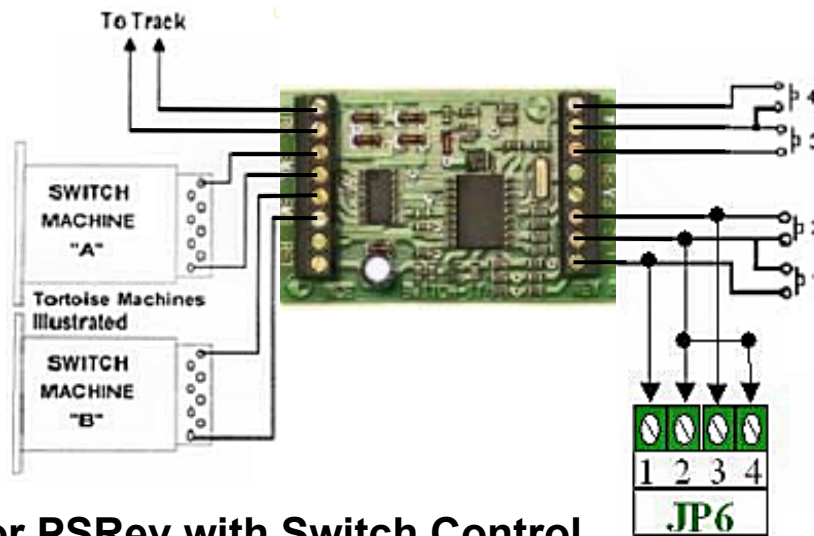
Status: (Onboard LED Indicators)

(X11 LED) PSRev Initial direction - LED off, Reverse direction - LED flashing, Breaker tripped - LED on.

(X34 & X35 LEDs) Indicate that there is input power to both DCC1 and DCC2 inputs

JP6 (Stationary Decoder Connector)

JP6 is for connecting the PSREV to a stationary decoder to automatically throw the exiting turnout in a reverse loop, or wye.



Installation for PSRev with Switch Control

The PSRev output to the Switch-It works best with the newer released Switch-It (Rev. B). There is a compatibility problem when using the earlier Switch-It (Rev. A).

To Operate Switch-It Switch A

Connect PS1-JP6-1 to Switch-It Terminal 1.
 Connect PS1-JP6-2 to PS1-JP6-4 and to Switch-It Center Terminal (located between 1 and 2).
 Connect PS1-JP6-3 to Switch-It Terminal 2.

To Operate Switch-It Switch B

Connect PS1-JP6-1 to Switch-It Terminal 3.
 Connect PS1-JP6-2 to PS1-JP6-4 and to Switch-It Center Terminal (located between 3 and 4).
 Connect PS1-JP6-3 to Switch-It Terminal 4.

For Either Switch Configuration

Connect PS1 DCC1 and one Switch-It TRK to one side of booster.
 Connect PS1 DCC2 and remaining Switch-It TRK to remaining booster output.

Connect PS1 Rail1 and Rail2 to reverse loop.

Connect your Tortoise Switch Machine to Switch-It SWA if you connected the PS1 to Switch-It Terminals 1 and 2.
 Connect your Tortoise Switch Machine to Switch-It SWB if you connected the PS1 to Switch-It Terminals 3 and 4.

Set the Accessory Address of the Switch-It according to the standard Switch-It directions.

If the Tortoise sets the switch in the wrong direction when the PS1 reverses, then reverse the connections to the Tortoise Switch Motor.

You may still use manual control switches with the Switch-It. Simply connect your momentary contact switches in parallel with the PS1 connections to the Switch-It. The control from the PS1 looks to the Switch-It like another set of momentary contact manual switches.

You may control the switch with your command station using accessory commands just as if the PS1 were not connected. The PS1 will always route the switch correctly when the train leaves the reversing loop.

Make sure that there is enough distance between the insulating track joints of the reverse loop and the switch that the switch can execute its full movement before the train arrives at the switch. Short distances may require a slow order.

The track between the switch and the reverse loop insulated rail joints should be supplied by the same booster source as the DCC1 and DCC2 side of the PS1. If you have a switched frog switch, make sure that the frog is insulated close to the switch, otherwise, the PS1 may cause the removal of power on the entry track to the reverse loop when it throws the switch.

Notes

Power Shield's are rated for up to 8 amps operating current. If your layout requires operation above 6 amps continuous current for longer than 10 minutes, then contact Tony's for the optional heat sink package. Optional items with Digikey part numbers are; Heat Sink, 345-1055-ND, Four Position Term Block, ED1503-ND, Or Two Position , ED1501-ND. Terminal blocks may be used to provide screw in connections for JP(solder- in) jumpers specified above.

Tony's Train Xchange Pinewood Plaza 57 River Rd. Box 1023, Essex Jct., VT. 05452
 Toll Free: 800-978-3472 Fax: 802-878-5550 e-mail: info@tonystrains.com Web: www.tonystrains.com
We Offer and Support More DCC Products Than Anyone!