

POWERHOUSE™

-- the finest in Digital Command Control --

PRODUCT MANUAL FOR PB-105 FIVE AMP POWER STATION

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PRODUCT MANUAL FOR PB-105 5 AMP POWER STATION

PREFACE

This manual provides information pertaining to the installation and operation of the PB-105 Power Station only.

COMPONENTS

The PB-105 comes supplied as follows:

- 1 - black box labeled Five Amp Booster in the upper left corner.
- 1 - 7 foot cable with modular telephone plugs on both ends. Each plug has four gold-plated contacts. This is the control bus cable. For the technically inclined, this is a 4-wire cable with RJ-H connectors.
- 1 - green connector
- 1 - PB-105 Product Manual.

CONNECTIONS, CONTROLS and INDICATORS



Starting at the left side of the front panel, each terminal, socket, switch and indicator is explained below:

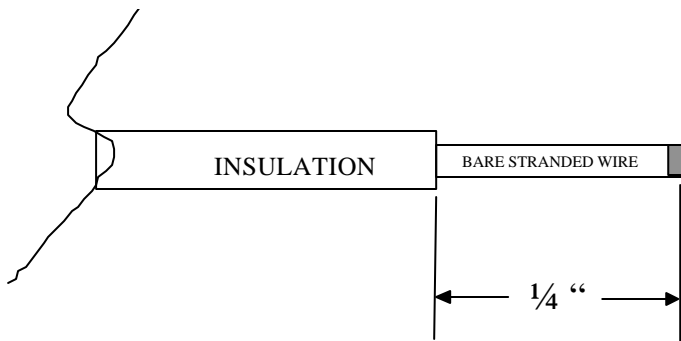
POWER/TRACK connector

POWER TERMINALS :

Input power from an outside power source goes into the PB-105 via the left most two screw terminals of the green connector. Recommended input power for the PB-105 is 14-18 volts AC or 18-24 volts DC. The supply must be capable of supplying about 5 to 6 Amps (80-100VA) to get full output from the booster. You may use a power supply that can supply less current but may experience “under voltage lockout” if your locomotives draw more power than the transformer can supply. If the input voltage falls below about 9 volts AC (13VDC) the status light will begin blinking long-short-long-short and shut down the booster for 2-3 seconds.

The absolute maximum input voltage is 19.2 Volts AC or 28 volts DC. Do not exceed these ratings! Always measure the transformer voltage before connecting it to your PB-105. A booster that has been ‘over voltage’d’ will almost certainly result in booster failure and void the warranty (we can tell if this has happened).

The screw terminals of the green connector are designed to accept wires up to #12 AWG (2mm). Insulation should be stripped back 1/4 inch (6mm). Only stranded wire should be used. Do *not* tin the wires to prevent fraying. If solid wire is used for track power, make a splice joint to stranded wire at some convenient place. Only stranded wire should enter the terminal for reliable contact.



If you wish to purchase additional green connectors you may use Digi-Key part number ED1962 or 277-1163. They are available from Digi-Key at 1-800-344-4539.

IMPORTANT NOTE: If you have more than one PB-205a, PB105, Powerhouse-Pro, or any Digitrax power booster in your system we *highly* recommend grounding ALL the power boosters together at a central earth ground point such as a cold water pipe. You can use one of the cover mounting screws as the ground point on your PB-205a. Failure to do this may result in voltages at power district boundaries that exceed the specifications of DCC decoders.

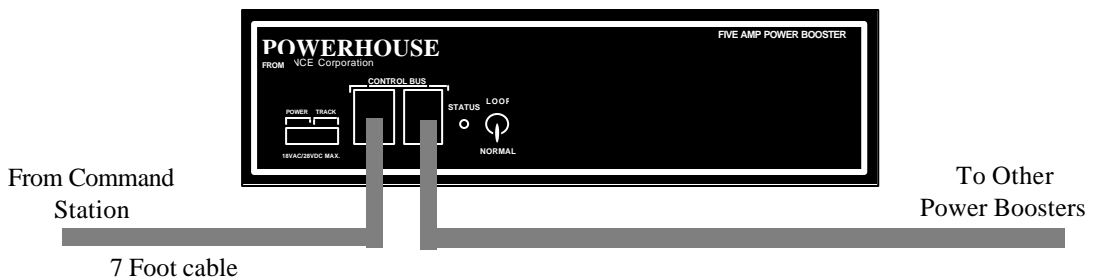
TRACK TERMINALS:

Wires from these terminals go to the track. If more than one booster is connected to the layout, be sure the left track terminal on all boosters is consistently wired to the same rail. This will ensure you have the same “phase” as you cross power district boundaries. In a reverse loop power district, it doesn’t matter which terminal is wired to what rail since the booster will automatically reverse polarity when required. The LOOP/NORMAL discussion will describe this in more detail. Always use wire of sufficient gauge (#16 minimum) to connect to the layout. Power “drops” of #24 or #22 wire to a larger wire bus under the track are fine as long as the length of each drop to the main bus is less than 12”. Use of a smaller bus will prevent the booster from detecting a short circuit and may be a fire hazard.

The voltage to the track is dependent on two factors: the power source input voltage and the setting of the internal voltage adjustment, as discussed above. The DCC track voltage is factory adjusted to the NMRA recommended 14.25 (+/- 0.1) volts for N, HO, S and O Scales. We do not recommend using a 5 Amp booster with O-Scale as most O-Scale locomotives have stall currents in the area of 8 Amps (Weaver, Red Caboose, P&D). For O-Scale usage we recommend our PB110 ten Amp power booster.

CONTROL BUS SOCKETS

The control bus sockets on the front of the PB-105 are paired to allow wiring the control signal coming from the command station to “daisy chain” through the booster.



Use the supplied 7 foot cable to connect the PB-105 to your command station's CONTROL BUS socket. The remaining (unused) socket on the PB-105 can be used to connect to other Boosters in daisy chain fashion. Use only the 4-wire RJ-H cable for this purpose. Longer cables may be used if more distance is needed between power stations. The last power station at the end of the daisy chain will have one empty socket. The PB-105 will place a nominal 10mA load on the command station control bus.

LOOP/NORMAL SWITCH

In the "NORMAL" position, the power station is intended for use with normal trackage not reverse loops. If a short circuit is detected, the power station will simply shut down for about 2-3 seconds and will then automatically reset. In the "LOOP" position, the power station should be wired to a reverse loop power district. The power station will then sense an impending short circuit as metal wheels arrive at or depart from the reverse loop. In "reverse" loop mode, the power station will automatically reverse track polarity and the train proceeds without hesitation. Remember, train direction is not controlled by track polarity when using DCC. Digital packet commands to the decoder control motor direction -- and the packets have not changed. Neat, eh? To use the PB-105 as a reverse loop controller it is necessary that the power booster connected to the mainline be of 5 Amps or more. Otherwise the mainline booster will just shutdown when the locomotive crosses the gaps into the reverse loop. **YOU NEED TWO BOOSTERS TO MAKE USE OF THE AUTOMATIC REVERSE LOOP FEATURE.**

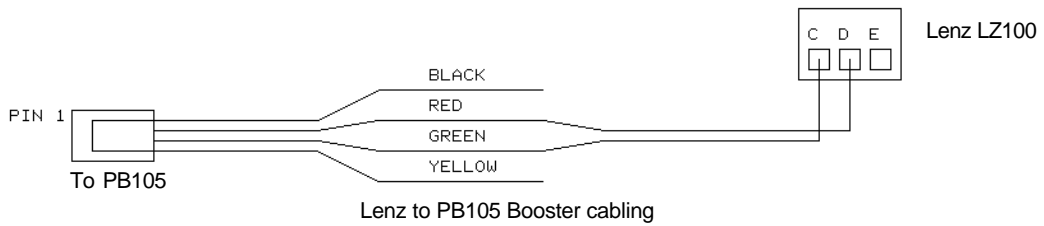
STATUS LIGHT

This light will illuminate light steadily under normal operations. Flashing indicates an abnormal or fault condition. Here is a description of the various conditions indicated by the status light.

- ⇒ **Steady on** - Track power is on and operations are normal.
- ⇒ **Rapid flash** - No DCC signal from command station (control bus cable is unplugged, programming track in use, etc.)
- ⇒ **Slower steady flash** - Short Circuit (over current shutdown). The booster will shut down for 2-3 seconds or until short or load of over 5.1 Amps is removed.
- ⇒ **Long-Short-Long-Short flash** - The input voltage is too low. This indication also sometimes alternates with the Short Circuit flash if you have a transformer of less than 5 Amps. The booster will shut down for 2-3 seconds or until voltage problem is corrected. The minimum input voltage is 18 volts DC or about 12.5 volts AC to achieve the full NMRA recommended 14.25 DCC volts to the track.
- ⇒ **Strobe once per second** - The booster has overheated. This happens when the internal temperature on the circuit board reaches 70 degrees Celsius (158 degrees Fahrenheit). The booster will shut down for 20 seconds or until the internal temperature drops to about 60 degrees Celsius.

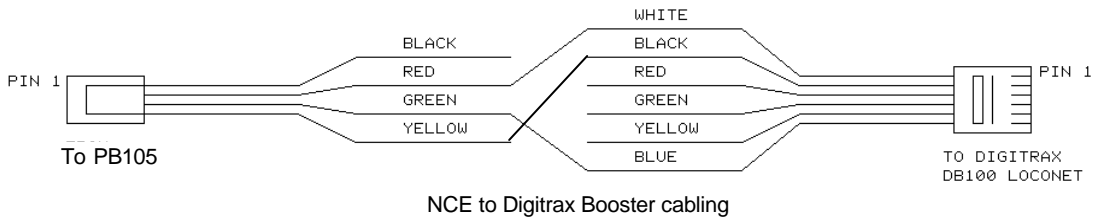
CONNECTING THE PB-105 TO OTHER SYSTEMS

WIRING TO A LENZ COMMAND STATION



This wiring diagram is provided for the operators that have switched from an Existing LENZ system to NCE™. Lenz does not provide a ground point.

WIRING TO A DIGITRAX SYSTEM

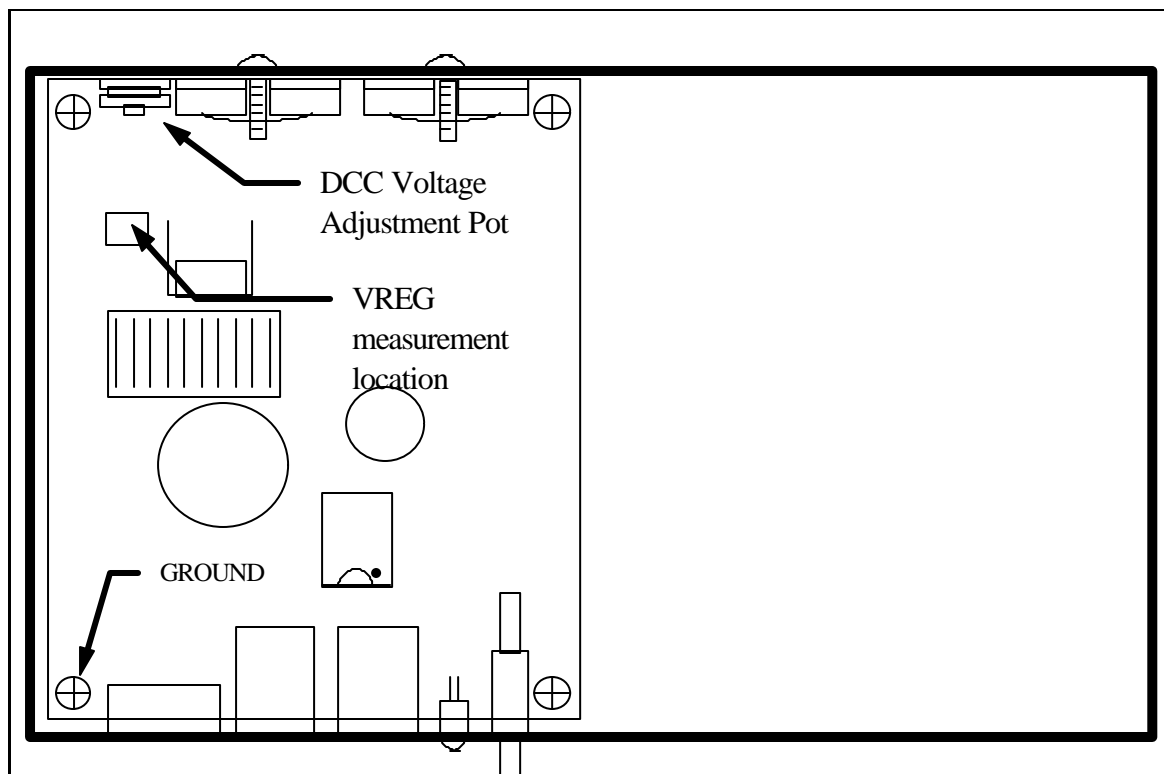


This wiring diagram is provided for the operators that wish to add and NCE power booster to their existing DIGITRAX system NCE. This cable splicing is required to the first DB100/DB150 only. Always leave the “Ground to Sync” Jumper installed.

Don't forget to ground the PB-105 chassis to the chassis of the DB100/DB150.

TRACK VOLTAGE ADJUSTMENT

The track voltage is adjustable from 9.5 to 18 volts. Adjustment requires opening the case of the booster and turning the blue adjustment potentiometer(s) as shown below.



Adjusting the DCC output voltage:

- 1) Set voltmeter to DC volts
- 2) Touch minus (black) lead of meter to the indicated mounting screw
- 3) Touch plus (red) lead of meter to the rectangular silver circuit board pad marked VREG
- 4) Turn DCC voltage adjustment pot to desired output voltage
- 5) Adjust all boosters to the same voltage. Otherwise you will see a speed variation when you cross power district boundaries

NOTE 1: Adjust the voltage with no appreciable load on track. The output voltage will rise slightly as more current is drawn to compensate for the drop in the output MOSFETs and associated wiring.

NOTE 2: If you have a means of measuring the track voltage (a typical "True RMS" reading meter will *NOT* be able to read the track voltage) the voltage can be adjusted through a hole in the back of the PB-105 chassis without opening the cover.

NOTE 3: We do not recommend setting the track voltage above 16 volts. It is very hard on any lights you may have installed in locomotives.