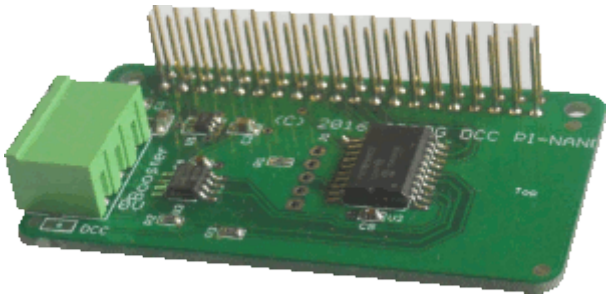
SPROG DCC

# *Pi-Nano*

# *DCC Booster Interface for Raspberry Pi*

# *User Guide*

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Introduction ..... 3
Requirements ..... 3
Features ..... 3
Specification/Operating Conditions ..... 3
Getting Started ..... 4
Install the Operating System ..... 4
Connect the Pi-Nano to your Raspberry Pi ..... 4
Connect the Raspberry Pi Power Supply ..... 5
Connecting a Booster ..... 5
Connecting to the Raspberry Pi Access Point ..... 6
Accessing the Raspberry Pi Desktop ..... 6
GPIO Pass-Through Connector ..... 7
Determining the Pi-Nano Firmware Version ..... 7
The SPROG Console ..... 7
Updates to the Pi-Nano Firmware ..... 7
Useful Links ..... 9

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# Introduction

Pi-Nano is a DCC booster interface for connection to a Raspberry Pi single board computer. Pi-Nano is supported by DecoderPro and PanelPro, both part of the JMRI project (http://jmri.sourceforge.net/).

Pi-Nano needs no external power supply, being powered from the RAspbery Pi. A low level DCC output allows for easy connection to standard DCC boosters.

## *Requirements*

- Raspberry Pi
  - Pi 3 model B or Pi 2 model B recommended
- Raspberry Pi power supply
- Operating system and software on SD card

## *Features*

- Easy to use graphical interface with DecoderPro/PanelPro
- Supports WiThrottle and EngineDriver Android apps
  - Pi 3 Model B
  - Pi 2 Model B with WiFi adapter
  - Pi 2 Model B via wired network connection to wireless router

## *Specification/Operating Conditions*

| Parameter | Minimum | Nominal | Maximum | Units | Note |
|---|---|---|---|---|---|
| **DCC Booster Output Voltage** | | 10 V | | V | 1 |

*Table 1 Specification/Operating Conditions*

Notes:

1. The booster output is derived from the Raspberry Pi 5 V supply via voltage doubler circuit.

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# Getting Started

The following steps are required to install Pi-Nano before you can use it for the first time:

## *Install the Operating System*

Create an SD card image of the Raspberry Pi operating system and required software for your chosen application. Instructions for this are available from the SPROG DCC website download page:

SPROG DCC download page

You can follow the instructions to create your image, or purchase a pre-configured SD cards from SPROG DCC.

It is strongly recommended that you make a back up of your SD card, using a tool such as win32diskimager

## *Connect the Pi-Nano to your Raspberry Pi*

Always shutdown the Raspberry Pi and remove the power connection before connecting or disconnecting the Pi-Nano.

The Pi-Nano should be plugged onto the 40 pin GPIO header, being careful to align the pins correctly.

If you wish to remove the Pi-Nano, do so carefully to avoid bending the connector pins on the Raspberry Pi.

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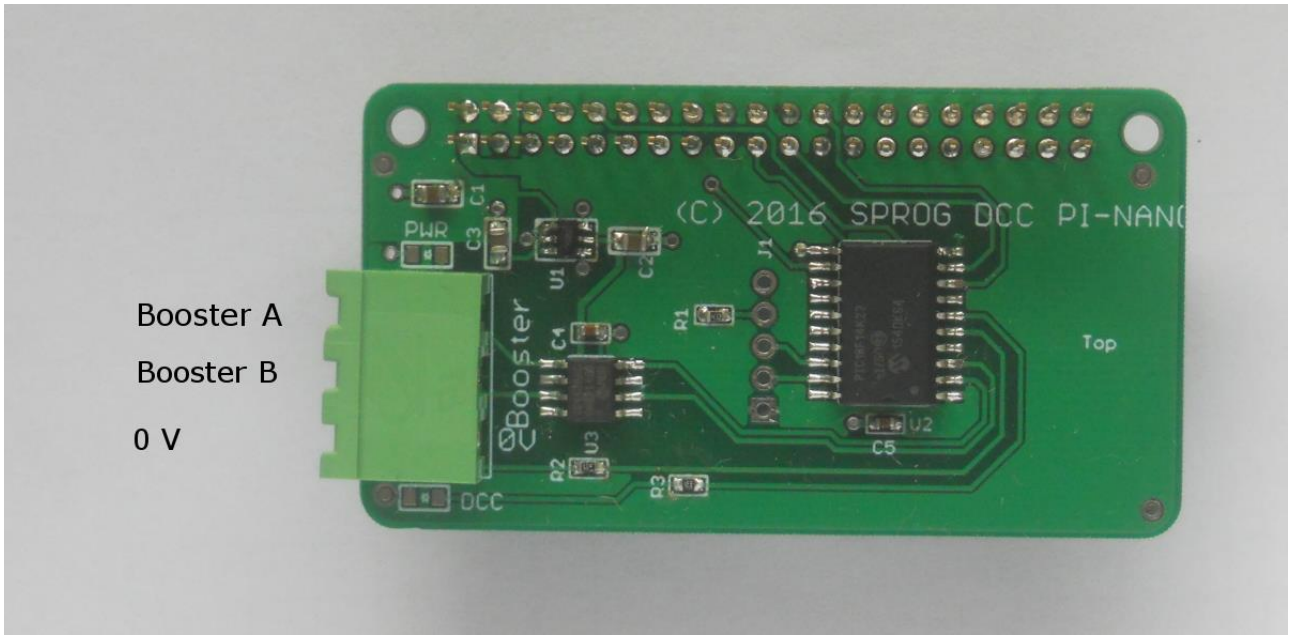
## *Connect the Raspberry Pi Power Supply*

Use a suitable power supply appropriate for your Raspberry Pi and any peripherals that may be attached and powered from the USB ports.

## *Connecting a Booster*

Boosters are connected to two of the three poles of the Booster terminal block. A 2-pole plug is provided with the Pi-Nano for this purpose.




Consult your booster documentation for specific connection requirements.

Booster A and Booster B form a differential connection (much like the track signal from a booster, but at much lower power). This is referred to as a bi-polar signal in the NMRA RP-9.1.2 “Power Station Interface” document.

Non-isolated boosters that require a 0 V reference should be connected to one of Booster A or Booster B and the 0 V connection. This is referred to as a uni-polar signal in the NMRA RP-9.1.2 “Power Station Interface” document.

To divide the layout into power districts you may connect multiple boosters to the booster output terminals. Take care to connect all boosters with the same polarity.

Please consider the SPROG DCC SBOOST II, a 2.5A booster that is designed specifically for use with the SPROG family. The SBOOST II should be connected to the Booster A and B terminals.

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## *Connecting to the Raspberry Pi Access Point*

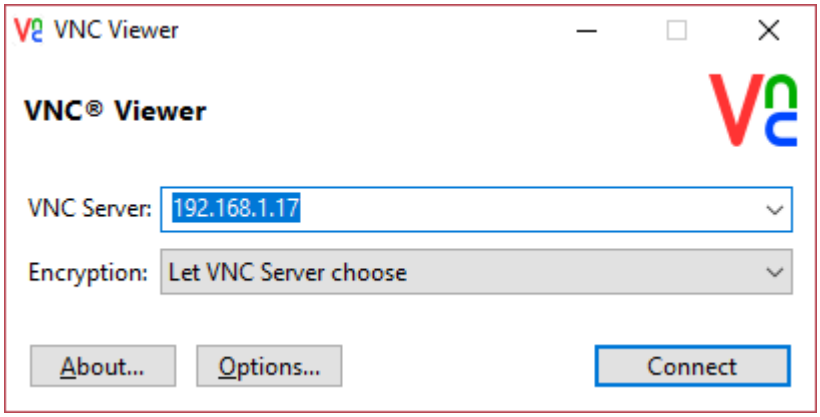
If you are using an SD card purchased from SPROG DCC, or have followed our instructions to create one, with a Raspberry Pi 2 and WiFi dongle or a Raspberry Pi 3 with built in WiFi, then the default WiFi password is ‘pi-sprog’.

## *Accessing the Raspberry Pi Desktop*

We recommend using remote access software from a host PC or other suitable device. SPROG DCC software images are pre-configured to disable the default desktop and run VNC Server.

We recommend VNC viewer, or similar, on your PC.

For wired network connections you will need to determine the IP address of the Raspberry Pi that is assigned by your router then connect to that IP address in VNC viewer, e.g.,




The default vnc username and password for SPROG DCC software images are ‘pi’ and ‘raspberry’, respectively

For wireless connection you must first connect to the access point using the wireless setup on your PC, just as you would to connect to a wireless router. The default IP address to connect to the SPROG DCC images is 192.168.6.1

If you prefer not to use remote access you can attach an LCD screen or HDMI monitor, along with a USB keyboard and mouse. You can log in to the Raspberry Pi and then start the desktop by running ‘startx’.

You can run ‘raspi-config’ to enable the desktop automatically at login.

**! Using a screen directly attached to the Raspberry Pi will display the default desktop :0 and you will not see the DecoderPro GUI that was launched on desktop :1 when the Raspberry Pi booted.**

You will need to do further configuration to force DecoderPro to start on the default desktop.

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***More details TBD….***

## *GPIO Pass-Through Connector*

The Pi-Nano passes all Raspberry Pi GPIO pins through to a 40-pin header that allows further accessory boards (“hats”) to be connected. There are, however, some restrictions on using these pins.

The UART Rx and Tx pins (pins 8 and 10) are used by the Pi-Nano. No further connection should be made to these pins.

The SPI pins (pins 19, 21, 23 and 24) are connected on the Pi-Nano and reserved for possible future use. In the meantime, with the current firmware, they are connected to digital inputs and may safely be used.

## *Determining the Pi-Nano Firmware Version*

Please download the SPROG IIv3 User Guide from the SPROG DCC website. The procedure for obtaining the firmware is very similar to that described for the SPROG IIv3.

## *The SPROG Console*

Please download the SPROG IIv3 User Guide from the SPROG DCC website. The procedure for using the SPROG console for the Pi-Nano is very similar to that described for the SPROG IIv3.

## *Updates to the Pi-Nano Firmware*

Please download the SPROG IIv3 User Guide from the SPROG DCC website. The procedure for updating the Pi-Nano firmware is very similar to that described for the SPROG IIv3.

At the time of writing no firmware updates are available and you should not attempt to use this option.

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## Troubleshooting

Before reporting any problems please check the Pi-Nano homepage for any bug reports or updates.

If you have problems operating DecoderPro throttles, for instance, please use the SPROG console (found under the SPROG menu in DecoderPro), recreate the problem and send the output of the command monitor to sprog@sprog-dcc.co.uk (or, for North American customers sprog@bbmgroup.com ) with a description of the problem.

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## Useful Links

SPROG homepage http://www.sprog-dcc.co.uk for the latest information, updates, downloads, etc., for Pi-Nano.

North American distributor for Pi-Nano http://www.bbmgroup.com/sprog

SPROG DCC Yahoo group http://groups.yahoo.com/group/sprog-dcc for latest news and discussion of DecoderPro.

Java Model railroad Interface http://jmri.sourceforge.net for DecoderPro.

JMRI Yahoo group http://groups.yahoo.com/group/jmriusers for latest news and discussion of DecoderPro.

Raspberry Pi Forums https://www.raspberrypi.org/forums/ Where you will find far more knowledge on all things Raspberry Pi than we are able to offer!

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