

The new Pi-SPROG 3 v2 or Plus with a Raspberry Pi 4B is supplied with a pre-built software image to run the Pi and Pi-SPROG automatically. Pi-SPROG 3 v2 & Plus are part of the Generation 5 functionality, using new Pi-SPROG 3 “Plus” hardware with new firmware, and require the latest versions of JMRI; currently v4.26 or later is supplied. Please also read the 3v2 or Plus sections in the **Sprog3Plus UserGuide** available in the image and online at <http://sprog.us> fully before setting up your Pi-SPROG.

Hardware setup

Attach the supplied standoffs to the Pi-SPROG board and fit the Pi-SPROG onto the Raspberry Pi 4 model B (or 3B+), aligning the connectors carefully (supplied assembled in our Pi-SPROG “Full” Packages), and then insert the microSD card into the Pi. Connect the power to both the Pi and SPROG (order is not critical) and wait for the Pi to boot up.

Note that our currently supplied image is for the Raspberry Pi 3 Model B+ or Model 4B only.

The image includes the most recent (at time of writing) Raspberry Pi OS configuration (“Bullseye”), supporting built in Wi-Fi, and all the software needed to run. It is set up so that it will run when powered up with no user action required.

If you need a prebuilt image for other versions please ask, as we may be able to build it for you.

Software Image Configuration

The Pi hostname is set to **sprog-pi4**, and the IP address is **192.168.6.1**, its own local network broadcasting over Wi-Fi.

The **Pi Wi-Fi** will broadcast a new Wi-Fi network as **sprog-pi4**, and the Wi-Fi requires the password **pi-sprog** to connect.

Command Station

This image runs when power is applied, booting up automatically, and starting Wi-Fi, PanelPro and the WiThrottle Server. JMRI PanelPro is run in ‘Command Station’ mode, suitable for running a layout.

JMRI will advertise the WiThrottle Server on the preset IP address, **192.168.6.1**, port **12090**

Apple devices running WiThrottle, and Android devices running Engine Driver can connect and set up throttles, etc.

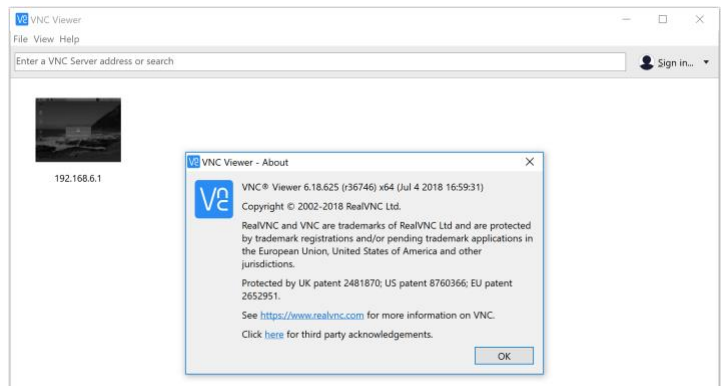
Remote Wi-Fi throttles (up to a maximum of 9) can be used with no further action.

A VNC server is automatically started on the Pi, allowing remote access.

From a PC or Mac, connect your Wi-Fi to the **sprog-pi4** network, and then launch a VNC Viewer.

(we recommend RealVNC which is the same VNC version supplied on the Raspberry Pi, and can be downloaded free of charge from www.realvnc.com).

Connect to the Pi as **192.168.6.1:5900** (the Port number) user **pi**, and password **sprog-pi**

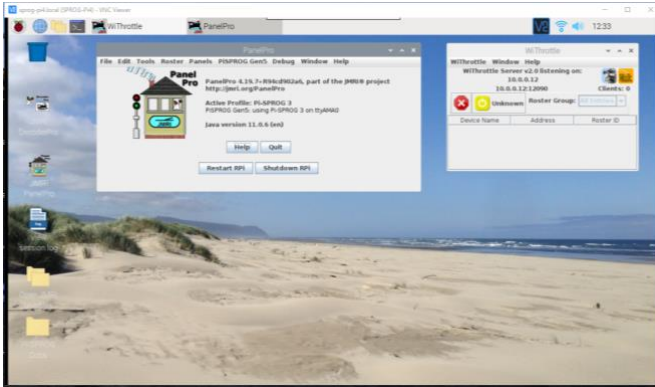


JMRI PanelPro is run on the VNC remotely accessible desktop and can be seen if needed by using the VNC connection, but no such connection is required to run trains via Wi-Fi throttles. This software image also supports an HDMI display supporting standard TV resolution and USB keyboard attached to the Pi, and so the display will also show on a locally connected HDMI screen.

The Pi-SPROG is connected to the Pi as `/dev/ttyAMA0` and this should not need to be changed.

It is recommended that you load your Roster before starting to run trains – see below for Roster details.

Programmer with local display and keyboard



This image can also be run as a Programmer using DecoderPro and you need to see the screen to interact for programming. By default we set DecoderPro as Programmer and PanelPro as Command Station.

To program or read a decoder, connect via local display or VNC as described above.

The desktop icon for DecoderPro starts up the Programmer profile settings, with the Command Station mode turned off for usual Programming operation. DecoderPro initially shows the Roster (empty in the image as supplied) on screen, while in PanelPro the Roster can be accessed from the menus.

In the PanelPro window shown in this screenshot, you now have the option to run as either Programmer mode or Command Station mode. From the 'PiSPROG Gen5' menu pick the Mode Switcher to change this setting if you wish. See the **Sprog3Plus UserGuide** for details for the two Plus channels.

Load a Roster

As supplied, there are no entries in the PanelPro or DecoderPro Roster, and so you can add new locos as usual, or import an existing roster from another computer. Both DecoderPro and PanelPro share the same roster, stored in the JMRI_UserFiles folder.

The easiest way to put a roster onto the Pi is to use a USB memory stick. **Export** the Roster from your source DecoderPro or PanelPro onto the USB memory, and then in the Pi **Import** the roster to DecoderPro or PanelPro.

You can also access the JMRI_UserFiles across the network by accessing [\\sprog-pi4.local](http://\sprog-pi4.local) with password **sprog-pi** and transfer the roster folder that way. In that case start DecoderPro, and from the Actions menu, select 'Recreate Roster Index'. This should show all locos from the imported Roster directory in your Window, (you may need to Restart DecoderPro to see the list, and sometimes to reset the line spacing by adjusting the font size for it to be readable. For other methods to transfer or link rosters see information in the JMRI help pages.

Display Settings

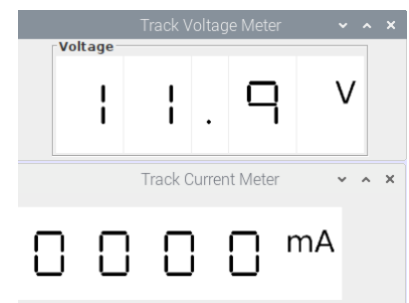
If a local display is connected, it will mirror the VNC display, assuming that your monitor is compatible with the currently set resolution. The default resolution is set to be compatible with most external displays or computer screens, but you can change it in the Pi Preferences if your available system requires different settings.

New Features in Pi-SPROG 3 with JMRI 4.20 and later

The new firmware and JMRI software now provide on-screen Track Voltage and Current readings. With Node Variable 10, Multimeter Mode, set to 1 in the Pi-SPROG 3 then it will send regular voltage and current measurements.

The previous SPROG Console is replaced by features in the Node Manager and the Console, and the Command Station Monitor shows slot activity.

See the **Sprog3Plus UserGuide** for full details.



Shutdown

It is important to shut down your Pi before turning off the power. Connect to the desktop and select Logout>Shutdown

Support

If you have any questions, problems or suggestions, please contact us at support@bbmgroup.com, and we will be happy to help.

Backups and Updates

We will be making updated editions of the JMRI and Raspberry Pi images as new versions are released, and will be happy to supply you with a new version at any time, should you need it. Please order online at <http://sprog.us/shop.html>.

It is highly recommended that you make a backup of your Pi image in case of any unexpected errors or erasure. You could do this upon first running, or after you have set up your preferences, loaded your Roster etc.

You will need an 8GB (or larger) microSD card, Class 10 performance, and a USB adapter for SD cards.

With the Raspberry Pi running, connect via VNC (or local display if that is what you are using).

Stop PanelPro or DecoderPro and any other programs that you are running.

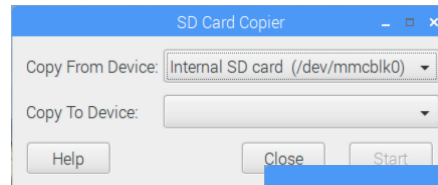
Plug in the USB adapter and the microSD card. The system will recognize it, and offer to open it in the File Manager. Select **Cancel**.

From the Raspberry menu, select **Accessories**, then **SD Card Copier**

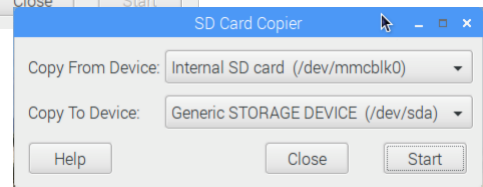


The Internal SD card can now be copied onto the new external card, which typically takes about 15 minutes.

Click in the **Copy from Device** and **Copy to Device** dropdowns to get your device to show up



Then click Start, then Yes, and the copy will proceed.



Once copied, we recommend that you shut down, turn off the power, and try out running from the new card to be sure that it did copy correctly. Take out the original card from the internal slot, insert the new one and see that you can operate as expected.

Upgrade

To upgrade JMRI including DecoderPro and PanelPro to a newer version, the easiest method is to download the new Linux version from JMRI or from our website at sprog.us/install and put it onto a USB stick.

Then with your Pi running, open a File Manager window. It will – by default – open onto home/Pi, and there amongst several other items you will see a folder named JMRI (Note: uppercase JMRI is the program, and lowercase .jmri is where all your settings are, which you need to keep). Right click JMRI and send it to the Trash.

Then plug the USB stick into your Raspberry Pi, and this time do Open with File Manager.

The distributed software is a compressed 'archive' image, and the Raspberry Pi can process that.

Double-click the JMRI-xxxxxxx.tgz object, and the Archive tool will open, and slowly open the archive file.

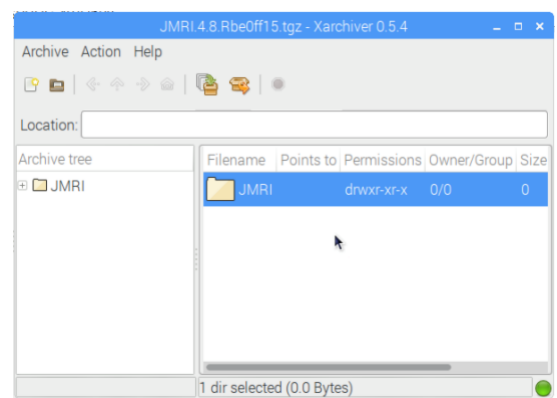
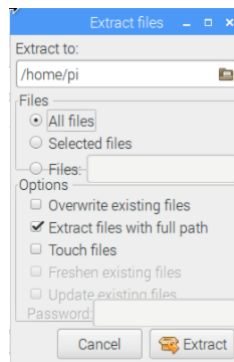
Click The Extract icon,



/home/pi

destination,

and "All files" option, and Extract.



Now by double-clicking the Desktop DecoderPro icon, your new version of JMRI software will be in use. Check that your connection is still correct, as from time to time there are changes that can affect that. From the Menu, open the SPROG Node Manager and you will see the SPROG Firmware Version shown.

Use more than one Pi-SPROG with separate Wi-Fi networks

You need to do the following steps; this is complex, and so follow these steps carefully.

Change the Pi Hostname:

Click the Raspberry logo and Select Preferences->Raspberry Pi Configuration

Change the Hostname to a new name. This will be the name for VNC, etc. in future.

Edit the fixed IP address:

Open a command line terminal window and type

```
sudo nano /etc/dhcpd.conf
```

(This editor needs cursor keys to move the pointer (mouse looks like it works, but it doesn't)).

Find the line with

```
static ip_address=192.168.6.1/24
```

and change the .6. to .7 (or your choice of another digit).

Write out the file (control-O) and exit the editor.

Configure the DNS for devices that will connect

```
sudo nano /etc/dnsmasq.conf
```

Find the line with

```
dhcp-range and in two places change the .6. to .7.
```

Write out the file (Ctrl-O) , then [Enter], then [Ctrl-X] to exit the editor.

Configure the Wi-Fi for devices that will connect

```
sudo nano /etc/hostapd/hostapd.conf
```

Find the line with

```
ssid=sprog-pi4 and change it to the hostname you changed earlier
```

Write out the file (Ctrl-O), then [Enter], then [Ctrl-X] to exit the editor.

Reboot the Pi and it should now be broadcasting on the new IP address and with the new name.

Switch the Pi Wi-Fi to work on your home network

The RPi Wi-Fi adapter cannot be used as an access point and a Wi-Fi client to another network at the same time.

Follow these steps to change the Wi-Fi to be a client only, and connect to an existing Wi-Fi:

To do this, you will need to have access to your RPi desktop via monitor, keyboard, mouse or connect to wired Ethernet and use a VNC client.

Disable the access point functionality by removing hostapd using:

```
sudo apt-get remove hostapd
```

Then remove the related config by modifying your /etc/dhcpd.conf file:

```
sudo nano /etc/dhcpd.conf
```

Comment-out (add a leading # to) the last three lines in the file:

```
#interface wlan0
```

```
#static ip_address=192.168.6.1/24
```

```
#nohook wpa_supplicant
```

Then save and exit by pressing [Ctrl-O], then [Enter], then [Ctrl-X], and then reboot your RPi.

Configure the Wi-Fi to find your chosen network

Use the Wi-Fi icon in the top bar to select your Wi-Fi network, set the password, etc.

Reboot again with Ethernet cable disconnected (if it was connected).

You should now be able to connect to the Pi as "sprog-pi4.local" from devices on your Wi-Fi network.

If that name is not found, look up its IP address on your router, as it will be auto-allocated.

To reverse this Wi-Fi change

Uncomment those three lines, and sudo apt install hostapd then reboot.