

Building The Fox-in-a-Box (FIAB) Raspberry Pi Telemetry Station



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Bill of Materials

Required

- Raspberry Pi 3 B+ or 4B with power supply and heat sinks, at least 16Gb SD Card
 - (Many kits available on Amazon, Canakit, Adafruit)
For example CanaKit Pi kit and Samsung SD Card) ~\$50
 - Raspberry Pi 3 also works, but needs to be overclocked
 - If mounted in a case, a FAN is recommended
- FunCube Dongle Pro Plus (<http://www.funcubedongle.com>) \$160

Required in Some Form

- Two meter/70cm Antenna, coax connections
 - I use a home built AA2TX Lindenblad
 - A dual-band J-pole works surprisingly well
(<http://arrowantennas.com/osj/j-pole.html>) \$49

Nice To Have

- Preamp (Good with long or higher loss feedlines)
 - I use an AMSAT wide-band preamp with separate 12V power
 - For ease of deployment, a phantom power, wide-band preamp from AirSpy works well
<https://v3.airspy.us/product-category/preamps/page/2/>) \$46
- Raspberry Pi Case
 - With screen, on Amazon
RS Raspberry Pi 7-Inch LCD Touch Screen Case, Black \$15-25
 - Or without screen (for remote access) --same price range
 - Or with a Pi kit

If You Want A Touch Screen

- On Amazon: Raspberry Pi 7" Touchscreen Display \$75

Building a Fox-In-A-Box The Easy Way – A Prebuilt SD Card Image

- See <http://burnsfisher.com/AMSAT/FoxInABox/readme.txt> first
- Assemble the Raspberry Pi hardware according to directions with the kit or online. Do not forget the heat sinks! If you plan to use the touch screen do not attach it until everything else is set up.
- There is a prebuilt OS and code image for a Raspberry Pi 3B+ and 4B available. You can buy an SD card with the image already installed at the AMSAT store.

Alternatively, copy the image file from <http://burnsfisher.com/AMSAT/FoxInABox> to an SD card. **Warning:** It is 5 Gigabytes long and then you unzip it to nearly 16GB.

Building a Fox-In-A-Box The Hard Way – From Scratch

- Assemble the Raspberry Pi hardware according to directions with the kit or online. Do not forget the heat sinks! If you plan to use the touch screen do not attach it yet.
- I suggest that you connect a keyboard, mouse and full size monitor while you set up the system.
- Install the latest Raspbian OS according to directions here: <https://projects.raspberrypi.org/en/projects/raspberry-pi-getting-started/2>
- Install Java and other required packages as well as FoxTelem. See http://www.g0kla.com/foxtelem/foxtelem_on_pi.php under “Dependencies”
 - Note: Things change every release Raspbian release. You must be flexible and creative. Google is your friend.
- Decide on a display/control method. Here are some possibilities:
 - HDMI monitor, USB keyboard and mouse
 - Plug them in. You are done!
 - Touchscreen display
 - Follow the instructions to install the touchscreen display. With the case described above, you must also use software to turn the display upside down (edit /boot/config.txt, add the line `lcd_rotate=2`)
 - VNC (See below)
 - Raspberry Menu/Preferences/Raspberry Pi Configuration
 - Interfaces tab: Check “VNC”
- For more info look at the “readme.txt” from the prebuilt image above

VNC

Unless you only plan to use the FIAB with an attached monitor, keyboard, and mouse, I strongly suggest that you enable VNC, which allows you to display the Pi on the screen of any computer. It works very efficiently and is free with some (not very onerous) restrictions. I have accessed an FIAB in Hawaii from my QTH in New Hampshire with only a minor, non-troublesome delay. Install VNC Viewer on your “other” computer from <https://www.realvnc.com/en/connect/download/viewer/> If you access your FIAB remotely, you will also need a free account from RealVNC. If you are always on your local LAN, that is not required.

Touchscreen

The touchscreen is quite small, and you will have to tweak FoxTelem in order to see the important things. Make the font smaller (in settings) and turn off some of the features in the “Decoder” menu. You still will not see all the data on the satellite tabs.

Starting VNC on the Pi as described above gives you a remote screen the same size as the touchscreen. Using VNC is far easier than using the touchscreen; if you don’t need the touchscreen, don’t use it and you can get a more reasonable screen size on VNC using the “resolution” Raspberry Pi preference setting. It is also possible to create a ‘virtual’ larger screen, but I have not tried it with the touchscreen to discover its pros and cons. See the [g0kla.com](http://www.g0kla.com) URL above under “Headless Operation”, and particularly the add-on by WB1FJ.