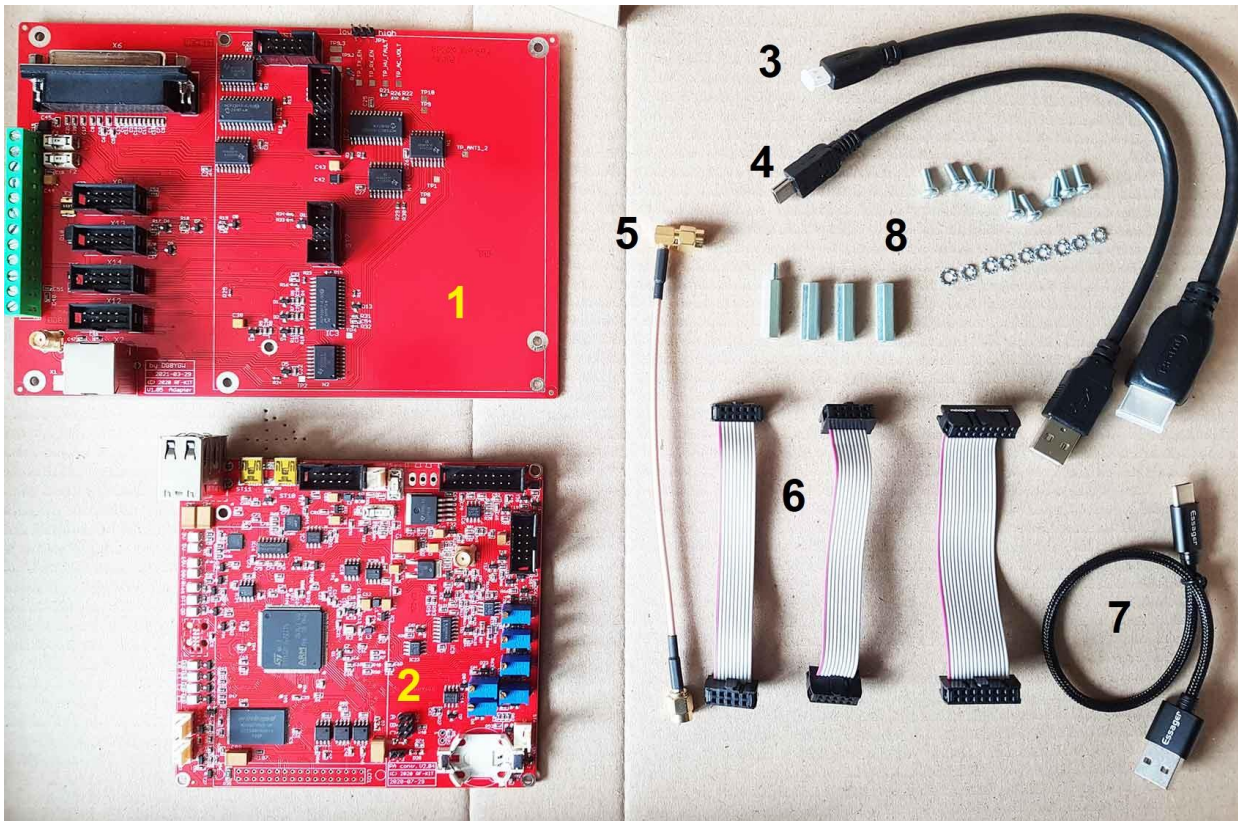# RF2K+ Controller Upgrade Kit

Installation

Preface

Your new controller requires new operating software. Now would be a good time to make the necessary preparations. I recommend you invest in a new Micro SD card retaining the one used together with the original controller & Pi 3. It is unlikely you will need or wish to re-install them but it makes sense to retain the option. Instructions dealing with preparation of the Micro SD card may be found on page 5 of the RF2K-S Assembly manual. The process is quite time consuming but is something you can do while you await arrival of your kit.

Following completion of the physical hardware installation, alignment of the controller analogue circuits will be required. You should follow the detailed instructions provided in the RF2K-S Assembly manual.

The only difference is the adjustment of the power reading where you need to use the potentiometer on your RF2K+ SWR bridge.

We added the potentiometer position for the RF2K+ SWR reading at the end of that document.

The above picture shows the contents of the RF2K+ controller upgrade kit as detailed below:

1. Adapter PCB of similar form factor to the original controller

2. New controller as used in the RF2K-S

3. Micro HDMI® to HDMI cable

4. USB A to Micro USB cable

5. SMA to SMA coax jumper

6. 3 x ribbon cables

7. USB A to USB C cable

8. M3 mounting hardware

Not included are a new 16GB Micro SD and a Raspberry® Pi 4 / 2GB that has to be procured locally

The mounting locations for each of the three female to female stand-offs can be seen in the next pic. The male to female stand-off should not be fitted at this stage. Mount the F-F stand-offs on the adapter board at the locations designated A, B & C using the machine screws and lock washers provided. Take care to avoid my mistake, incorrectly installing the stand-off intended for location B at location X.
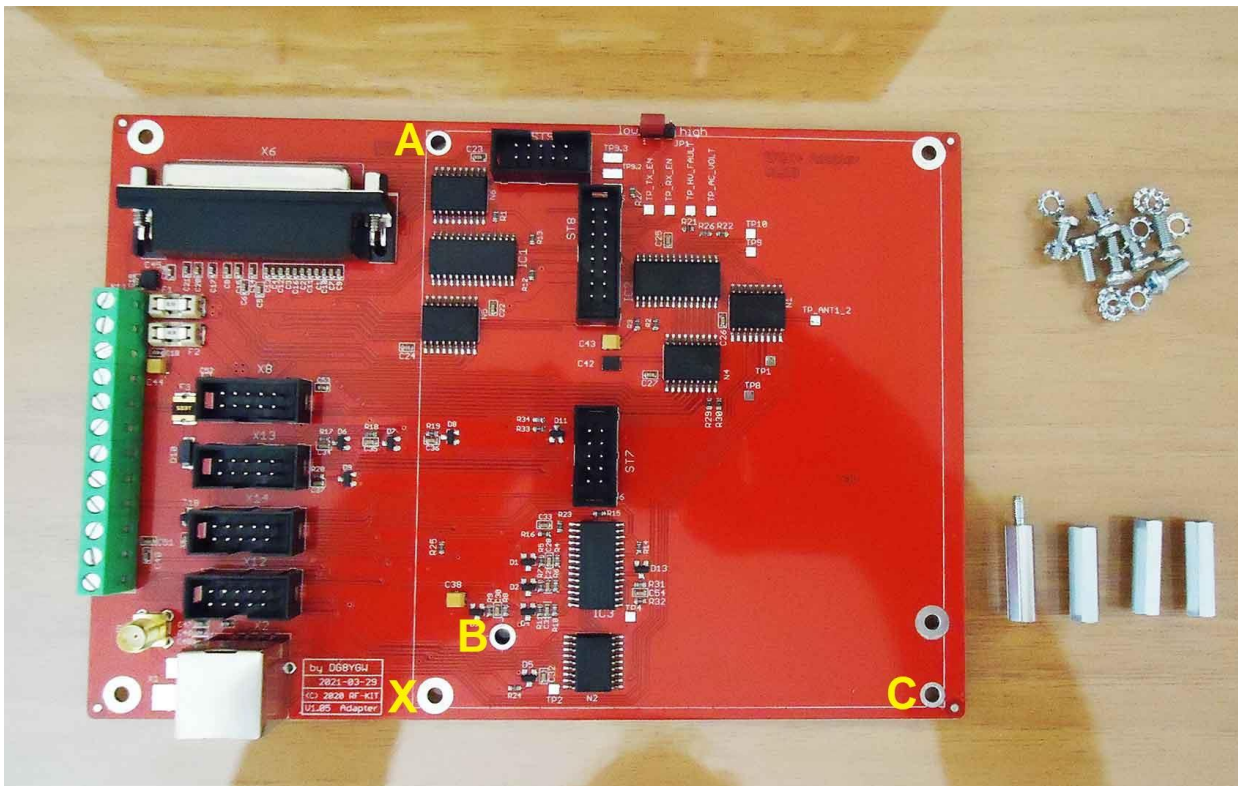
The connector layout to the left of the adapter board mirrors that of the original controller. The auto ATU ribbon mounted D-type will mate directly with the D-type at the top left. The four 10-way ribbon cable box headers beneath the D-type are arranged exactly as on the original controller. As I removed the cables from the original controller I marked them 1, 2, 3 & 4 from top to bottom to ensure there was no mix up when I connected them to the adapter board. The 12-way terminal connector on the left hand edge of the PCB maps terminal for terminal to the similar connector on the original controller. The RJ45 female connector at bottom left interfaces with the RJ45 male cable from the antenna selector PCB. The RF sense cable from the antenna selector PCB will be soldered, as it is on the original controller, to pads to the left of the RJ45. The 3 box headers to the right of mounting holes A & B provide for ribbon cable connections to the new controller PCB.

We are now ready to commence removal of the old controller and the Raspberry Pi® 3 from the RF2K+.
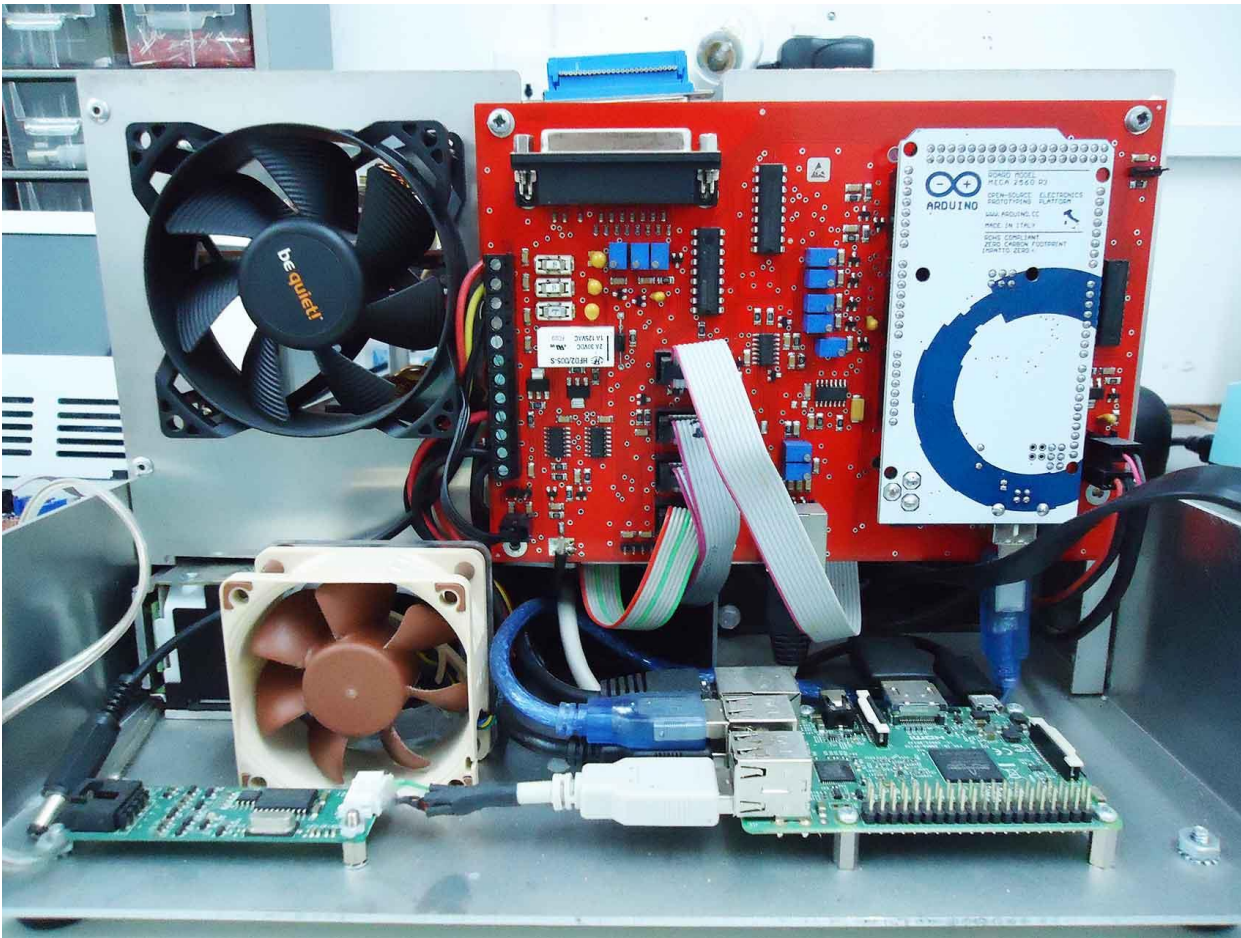
It is best to completely remove the front panel. As can be seen above, mine stands to the left and behind the 2K+. Likely you won't recognise the small PCB at left front of my chassis. My 2K+ is an early pre-kit variant and this is a remnant following replacement of the original touch screen. If your 4 x 10-way ribbon cables are not already numbered now would be a good time to get out a black felt tip to do so. Having got that out of the way you can go ahead to disconnect everything that plugs into the controller you are about to remove. Next, carefully unsolder the RF sense coax from the bottom left of the controller board. Disconnect and completely remove the Pi 3 then remove the four M3 controller retaining screws allowing the controller to pivot away from its mount with the wires to the 12-way terminal connector still attached, as seen in the following pic.
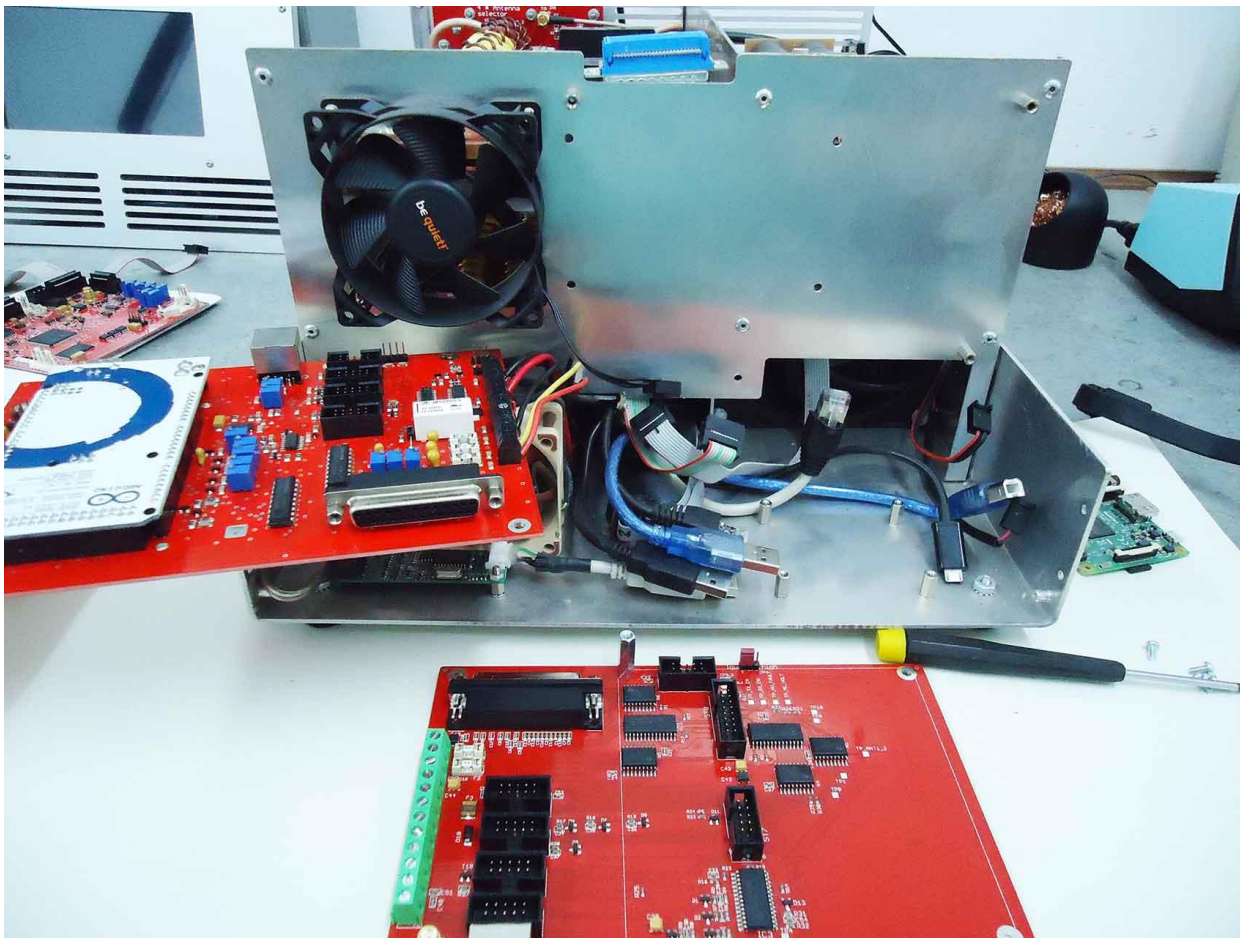
At this stage, I recommend you either carefully mark the wires as you disconnect them from the terminal strip OR do a direct swap taking one wire out at a time, immediately connecting it to the equivalent terminal on the adapter PCB. I chose the latter route but go with whichever way makes you feel comfortable the wires will end up where intended.

The following picture shows the adapter board attached to the mounts vacated by the old controller. The RJ45 connector on the antenna select cable is plugged into its connector with the RF sense coax soldered to its PCB pads just to the left of it. The four numbered 10-way ribbon cables are plugged in to the headers, in the same order as they were on the original controller. The ATU ribbon mounted D-type is mated with the matching connector at the top. My error in placing a stand-off at location X is clearly visible, I had to remove the adapter board then refit it after moving it to location B where it belongs. Our male-female stand-off has now been installed at location D where its male end screws into the associated stand-off supporting the adapter board.

Jumper to set input power protection:

If you have a **3dB** attenuator installed on your pallet you must set the **Jumper to low** to ensure your low drive power trip point is set right.
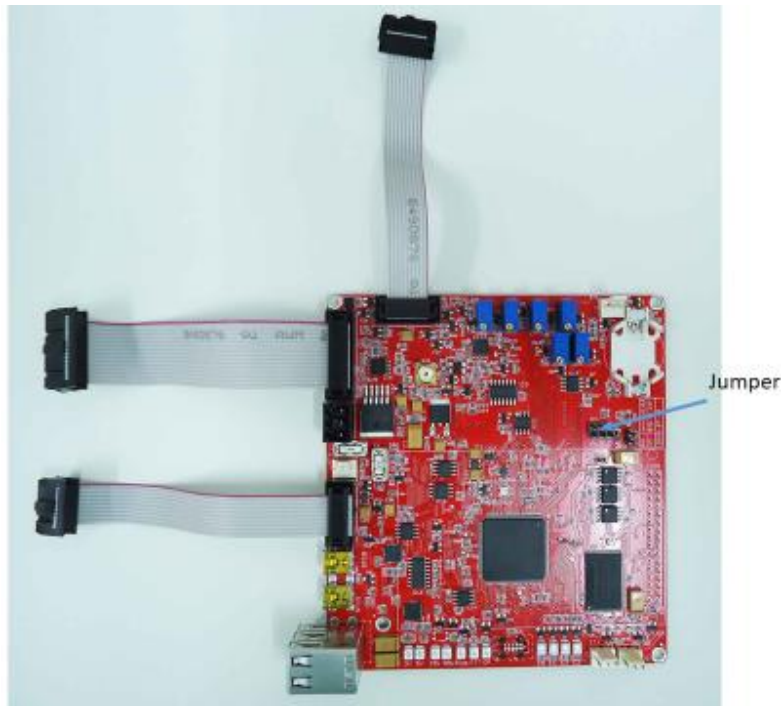
Jumper A on the **controller must be set** as well.

For **13dB** attenuator **Jumper must** be in **high** position and **Jumper A** on the **controller** must be **off**.
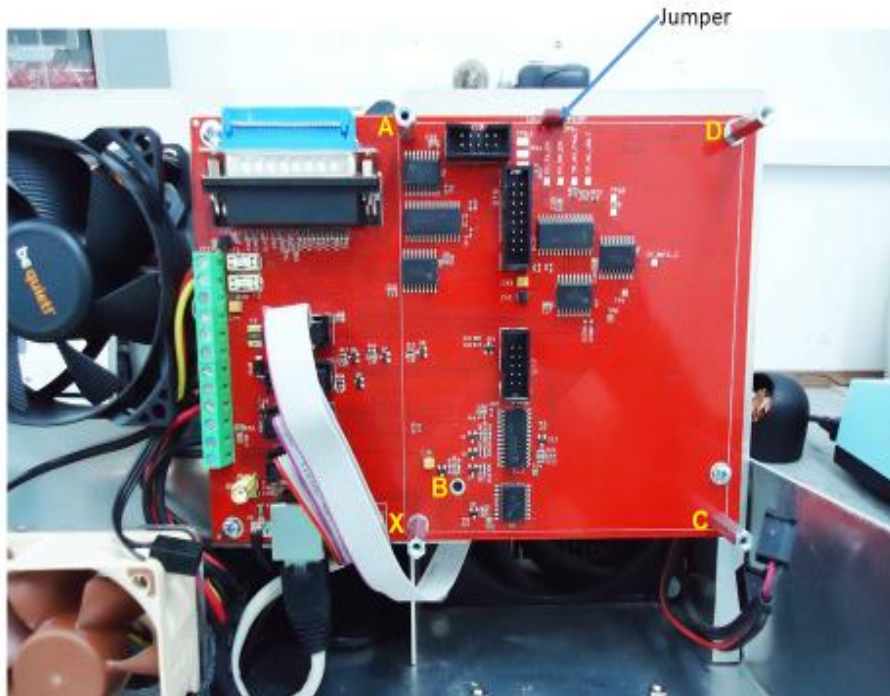
You should now prepare to install the controller PCB by first inserting three ribbon cable connectors as shown below. These will fold under the PCB to connect to their associated box header on the adapter PCB.

With the three ribbon cables appropriately connected to the adapter board the controller may be mounted onto the stand-offs at A, B, C & D using the M3 hardware provided.
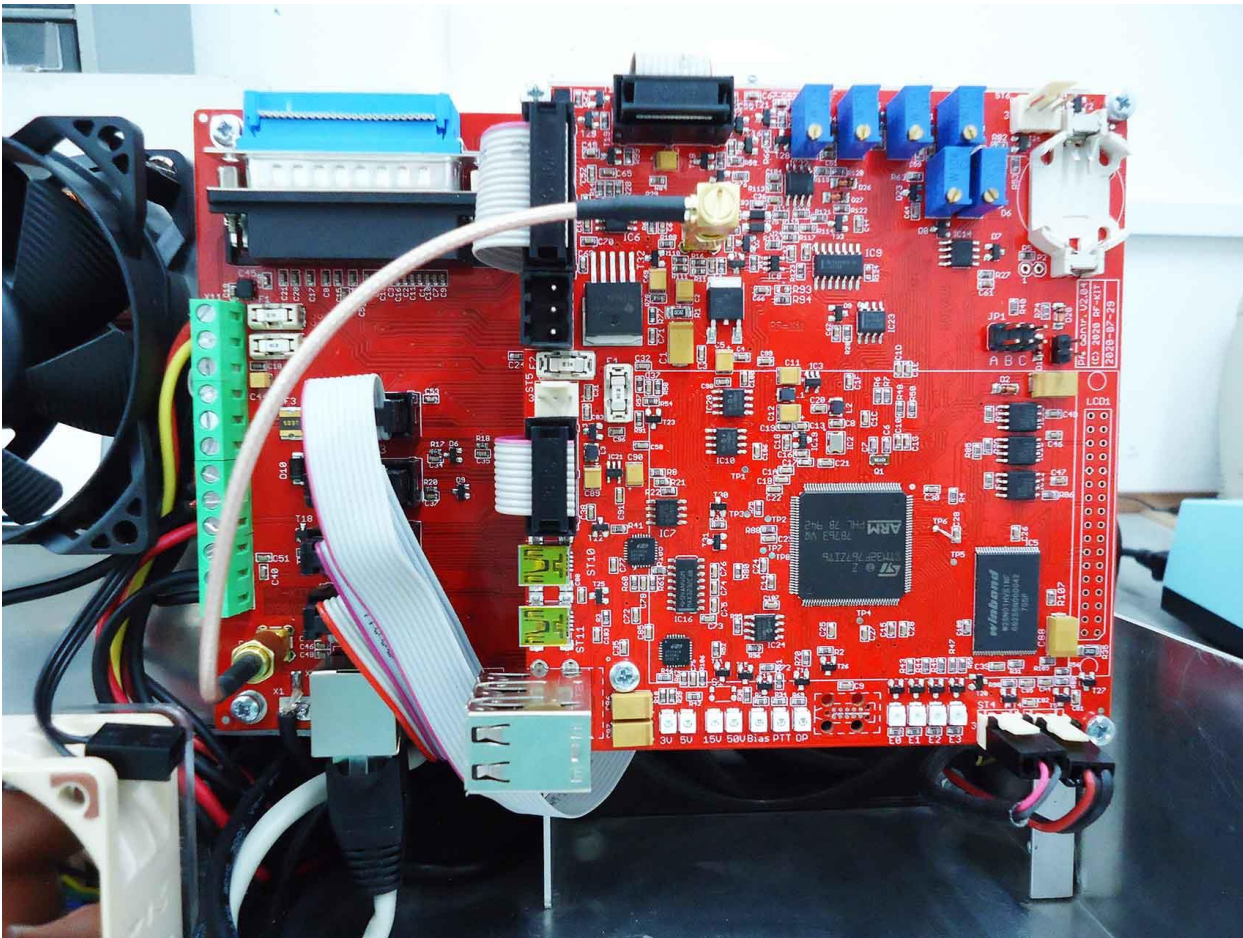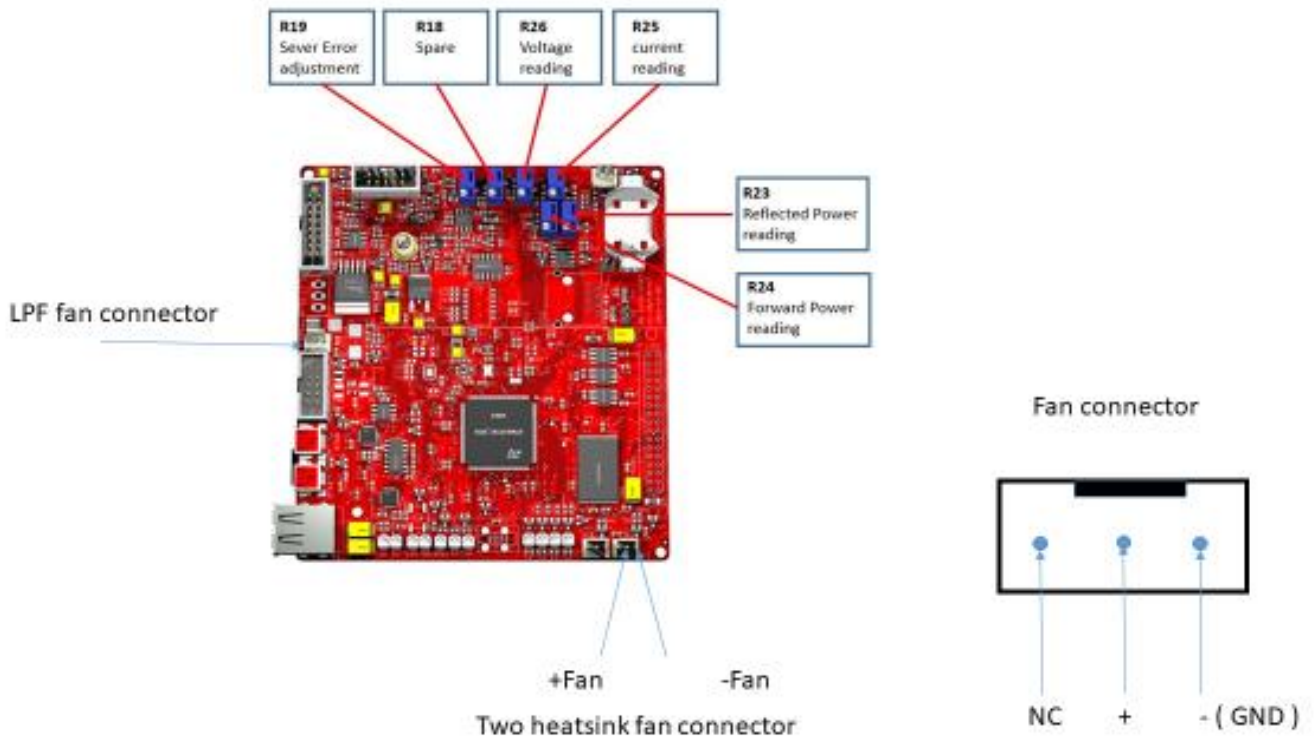
As may be seen above the cables for the pallet fans have been connected to the connectors provided bottom right. At this stage my LPF fan is not connected but will attach to the connector at the left edge middle just above the 10-way ribbon header. The SMA jumper has been installed coupling RF sense from adapter to controller.

Warning !

Fan Connection must be correct else you'll damage the fan driver Transistor.
No warranty for those mistakes

R19
Sever Error adjustment

R18
Spare

R26
Voltage reading

R25
current reading

R23
Reflected Power reading

R24
Forward Power reading

LPF fan connector

+Fan   -Fan

Two heatsink fan connector

Fan connector

NC   +   - (GND)

Next install the Pi 4 at the location previously occupied by the Pi 3 and complete cabling as detailed below.
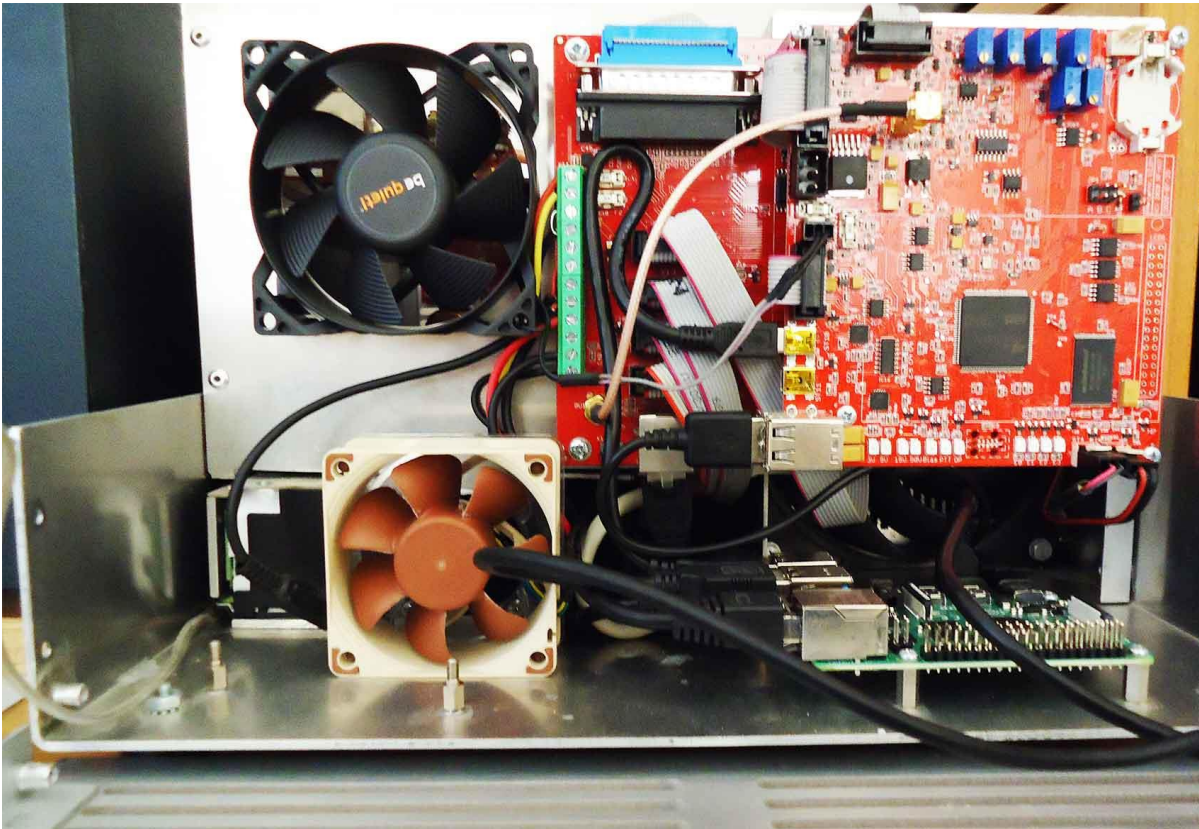
1. The USB A connector on the lead from the USB port on the amplifier rear skirt should be connected to the rear lower USB A port on the Pi 4.

2. The USB A to Micro USB cable provided as part of the kit should connect between the upper rear USB A port of the Pi 4 and the controller Micro USB port located beneath the 10 way box header.

3. Your existing touch screen USB cable connects to the top front USB port of the Pi 4. The lower front USB port is unused.

4. The RJ45 connector on the lead from the associated network port on the amplifier rear skirt plugs into the Pi 4 RJ45 port.

5. The USB A to USB C cable provided connects between the middle of the three   USB A ports and the USB C power in port of the Pi 4.

6. The HDMI to Micro HDMI cable provided connects between the Pi 4 Micro HDMI port and the display HDMI port.

Note:

The cables described in steps 5 & 6 are short to avoid interfering with operation of the front pallet fan. Preparing these cables as illustrated below will allow you to gain maximum flexibility from their limited length and reduce stresses on the connectors at the Pi 4 end. A couple of small tie wraps will be needed. The fold back on the Micro HDMI connector should be over the wide side of the connector.
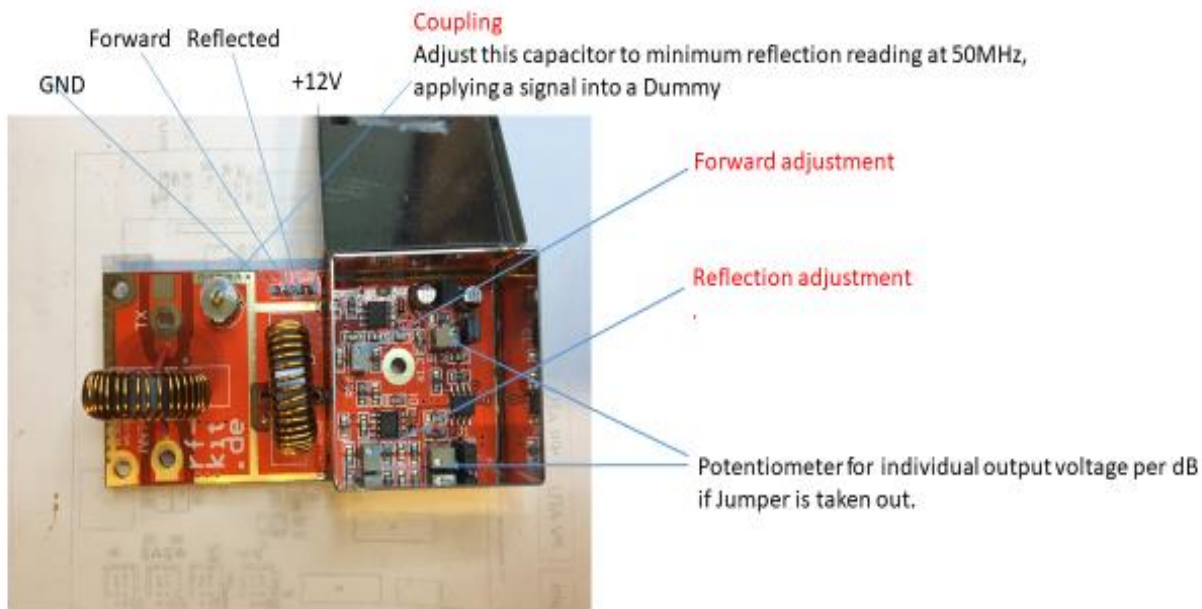

Your hardware installation is now complete. It is time to refer to the RF2K-S Assembly Manual instructions for adjustment of the controller analogue circuits.

RF2K+ SWR Bridge potentiometer and test point locations for power adjustment under Step 12 and Step 14

Adjustment of the RF2K+ SWR Bridge

Important !!!!!

With the new Controller you'll get additional function like 16 external antennas and be able to store Tuner settings for them.
All 16 possible external antennas need to be connected to Antenna 1.

Your external antenna switch must tell the RF2K+ which antenna you switched too through the BCD coded input Pins formally used as BCD Band Data input.

Please ensure you'll disconnect anything connected to the 9-Pin Sub-D when upgrading your RF2K+ with the new Controller. Once upgraded you can make any needed connection using the new Pin assignment .

9-PIN SUBD Pin assignment RF2K+ new Controller

Autoband:

1. A   Output BCD Band Data

2. In/A   Input External Antenna BCD

3. B   Output BCD Band Data

4. In/B   Input External Antenna BCD

5. C   Output BCD Band Data

6. In/C   Input External Antenna BCD

7. D   Output BCD Band Data

8. In/D   Input External Antenna BCD

9. GND

ATU/AUX

1. TKEY/TRX   ATU

2. NC

3. +12V when PA is ON   (output max 500mA)

4. TSTR/TRX   ATU

5. GND

6. Serial TX   (spare)

7. Serial RX   (spare)

8. Ext In1   (spare)

9. Operate   Open Collector to L when map is switched to Operate