G4HUP Panoramic Adaptor Installation – FT450

with thanks to Federico, IW2MVI

1. Build and test the PAT kit – use a 12v supply and you should measure a gain of about +1dB at 70MHz, for the PAT70, or +3dB for the PATV.
2. Remove bottom cover from FT450 - 4 screws on the bottom and 2 per side.
3. Decide how you will route the IF signal out of the 450 – using the middle ventilation slot above the DATA socket, as in Fig 4, results in a short output cable from the PAT PCB, but there are plenty of slots to choose from! See 'SMA mounting', below.
4. The PAT board mounts conveniently on top of one of the screening cans towards on the 450 main board - see Fig 1. From this position, the input, output and the +RxB connection are just short runs.

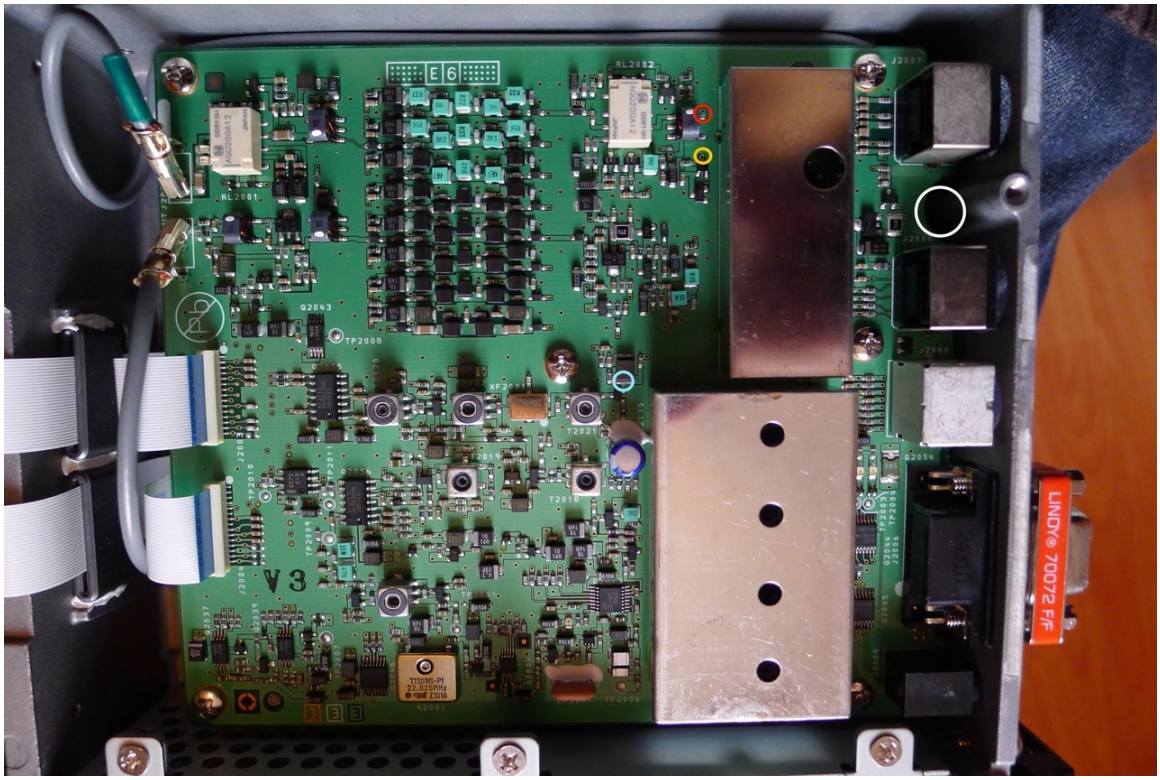

Fig 1 – View of PAT inside FT450, showing connection points. The light blue circle shows the IF Tap point, the red circle shows the 2nd Rx tap point and the yellow circle shows where RxB can be found. The white circle shows where the output coax leads down to the SMA output connector.

5. The PAT board is held in place by double sided tape, so can easily be re-moved should it become necessary – it can be mounted in such a way that it does not obstruct any of the core adjustments around it.
6. Solder the +RxB wire (use very fine wire) to the PAT board before the DS tape is attached, to avoid damaging the tape due to heat.
7. Mount the board in place on the can. For IF Tap, mount on the lower screen in Fig 1, with the PAT input close to the light blue circle. For 2nd Rx

use, mount o the upper can, as shown in Fig 3, with the PAT inpit as close to the red circle point as possible.

8. Connect the other end of the +RxB lead to Q2062 as indicated by the yellow circle in in Figs 1 and 3 below. Check with a voltmeter that you have approx 12V present on Rx, and when you go to Tx it drops to around 0.1V.
9. Use a small diameter coax (ideally RG178 PTFE, as supplied in the installation kits) to connect the PAT output to the rear panel connector as in Fig 1 and Fig 3.
10. The PAT input should ideally be connected to the light blue or red connection points using fine single wire, not coax. This will reduce the capacitive loading on the pick-up point in the radio. If you must use coax, only ground the shield at the PAT end.
11. Connect to your SDR/PC and test!
12. Replace the 450 bottom cover.

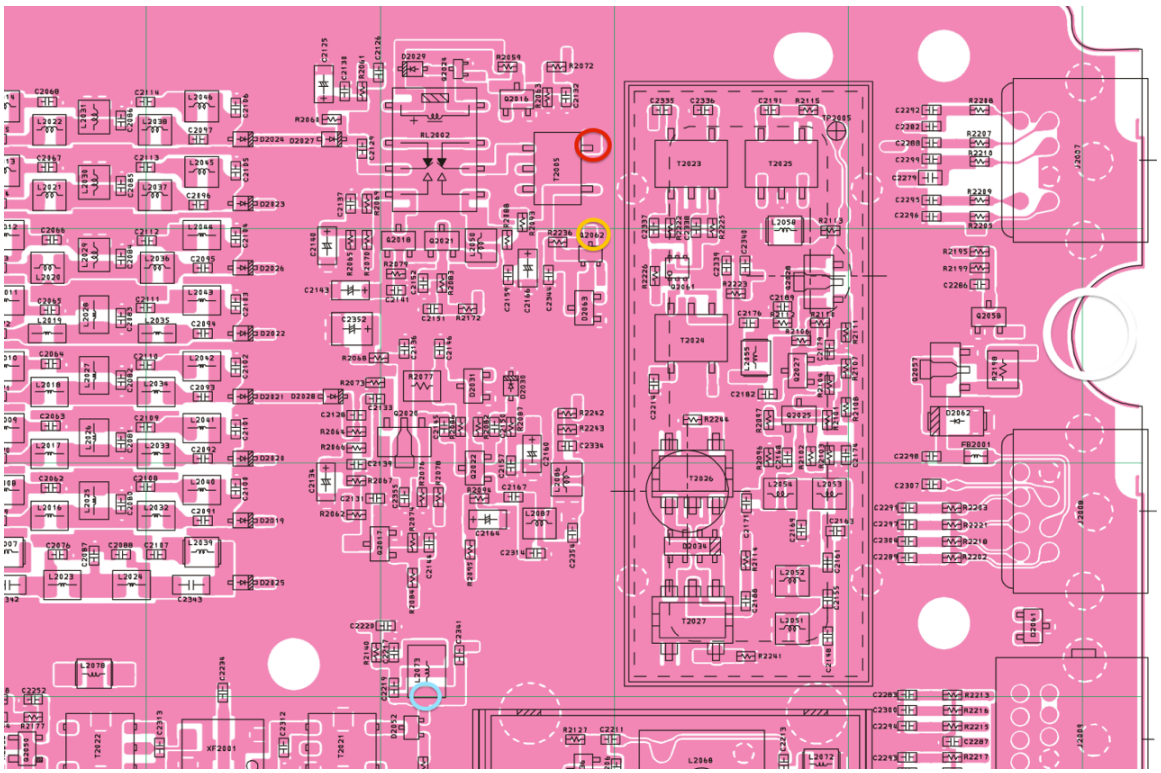

Fig 2 – Part view of the FT450 PCB overlay showing the connection points for the PAT input (light blue circle), and RxB (yellow circle)

Note: Q2062, RxB 12V pickup, is slow to go to 0V. This is no problem during standard operation, but when using internal ATU, that has a fast switch, the PAT remains active briefly. There is a risk that you may pass signals to the SDR at -24dBFS for a short period. This is not a problem with the FCD Pro+, but may cause short term overload in other SDR solutions, such as RTB dongles.

Fig 3 – PCB view showing connection for 2nd Rx function

Note – using the connection points shown in the light blue circle (L2073) in Fig 2 and 3 for the PAT input signal will give you a waterfall display that shows the signals around your tuning point on the radio – ie the normal panoramic adaptor.

Use as an independent receiver

An alternative is to connect the PAT input to the 1st mixer input, (T2005), shown in the red circle in both Figs. This will give you a direct signal output, with no frequency conversion. In other words, you are simply replicating the RF input from the antenna, but with some gain and broad selectivity applied. Provided your SDR will cover the band of interest, then you can run it as an independent second receiver. You can only use a single PAT for one or the other type of operation – but you can fit two PAT;s. For 2nd Rx function you need a PAT V, not the PAT70.

SMA Socket Mounting

These instructions could be used, with suitable modification, to mount any small connector to the rear panel.

The back panel doesn't need to be drilled as a single ventilation slot is just large enough to take the SMA connector and its mounting screws, as in Fig 4

Remove the top cover of the rig. Removing the RF board temporarily improves access, although it is possible to get the pigtail through without doing this.

Fig 4 – View of rear panel with SMA connector in place

Connecting up the PAT

Use a 70mm length of RG178 coax for each of the output connection – follow the instructions below to ensure correct termination at each end.

Use a fine hook-up wire (as supplied in the installation kit) to pick up the RxB power for the PAT, and to connect the PAT input.

Terminating PTFE Coax cables

These instructions could be used, with suitable modification, to correctly terminate any of the PTFE coax cables, such as RG142, RG178, RG188, RG196, RG316, etc. The termination method ensures good quality RF connections up to higher microwave frequencies
Using a scalpel, cut the sheath back at the required length.
With a hot iron, tin the exposed braid fully.
With the scalpel, score around the point where the braid must end.
Use long-nose pliers to bend the end of the coax outside the score line – the braid will crack on the score line and the excess can be slid off the dielectric.
Strip the dielectric to reveal the inner.

Fig 5 shows a correctly terminated cable installed in an FT817 – follow the same principles here.

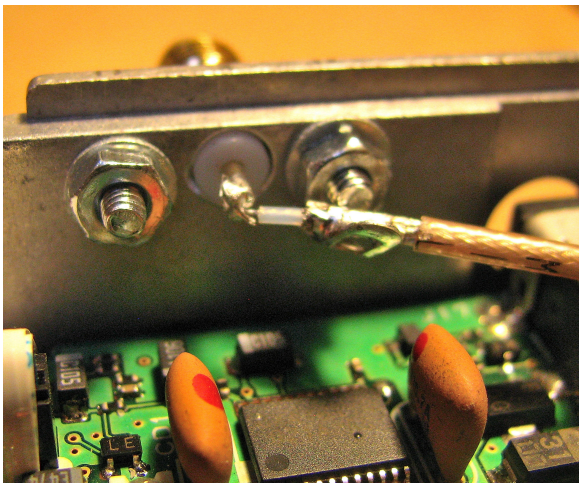

Fig 5 – Correct method of termination for the RG178 cable

Table 1 below shows the measurements recommended for the cable end preparation for the FT450 installation and Fig 6 below gives further clarification.

Cable	FT450 Connection	Sheath	Braid	Dielectric	Inner
Output	PAT	8mm	3.5mm	2mm	3.5mm
Output	SMA	14mm	11mm	1mm	2mm

Table 1 – Cable stripping details for FT450 installation

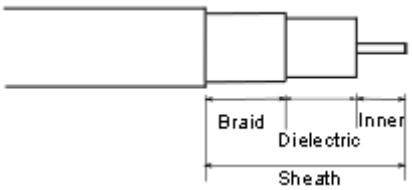

Fig 6 – Cable termination preparation details

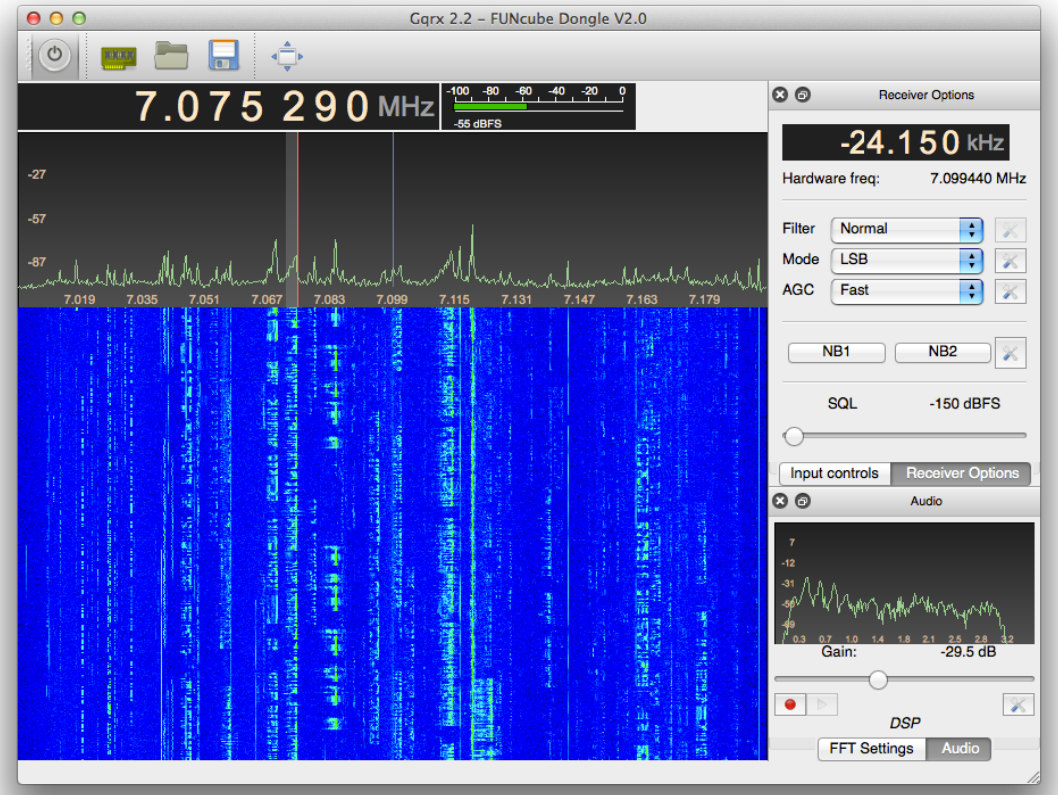

Fig 7 – Sample output of FT450 via PAT, using Funcube Dongle Pro Plus and GQRX

Fig 7 shows the output from the FT450 using the IPO connection point (red circle in Fig 2, 3), where the whole 200kHz of 40m can be viewed. Using the mixer output (light blue circle in Fig 2, 3) will result in a displayed view of approx 30kHz.