hupRF Panoramic Adaptor Installation – FT847

These instructions cover installation of the PAT board in the 1st IF of the FT847 – 45.705MHz– this gives access to all receiver options on the main receiver.

A a satellite capable transceiver, the FT847 uses a separate IF's for transmit and receive, so there is no risk of high level signals into your SDR during transmit.

Basic instructions are given for installing the PAT as an IF Panoramic Adaptor Tap – used in this mode your SDR must be tuned to the 1st IF of the radio, and then your display will track the tuning of your rig – however, the displayed frequency will be that of the IF, not the radio. The usable bandwidth on the SDR will be a bit wider than the IF filter in the rig – typically about 50kHz.

1. Build and test the PAT kit – use an 8v supply and you should measure a gain of approx 1dB at 45MHz.
2. Remove top outer cover from FT847 (5 screws). Remove the top inner cover (12 screws) and carefully unplug the speaker leads from the RF board.
3. The rear ventilation slots are too wide to allow an SMA socket to be secured in place, so it is recommended that a flying lead output connection is used – the Installation kit includes a pre-terminated length of RG178 PTFE coax.
4. The PAT board mounts directly on the RF Unit PCB, at the rear of the space for the speaker- see Fig 1. There is sufficient clearance between the PAT board and the speaker. No internal adjustments or components are obstructed by the mounting position.

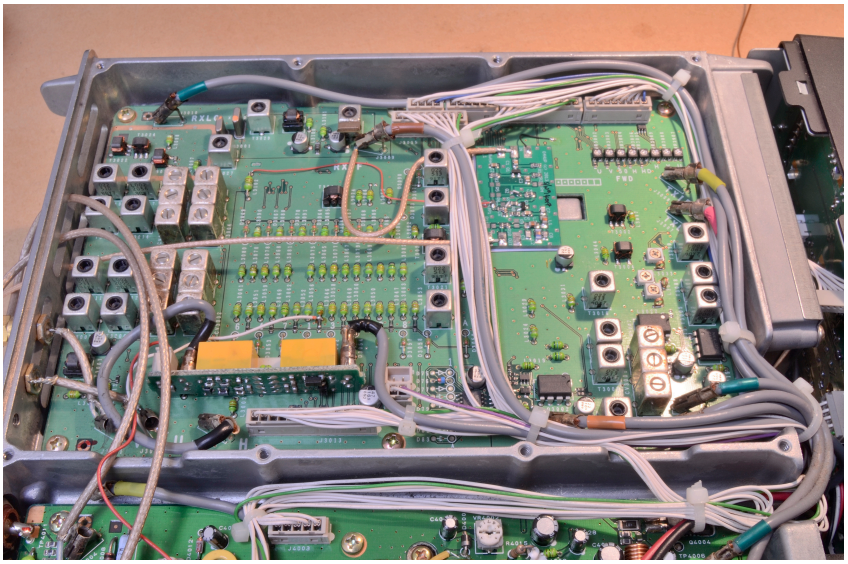

Fig 1 – General view of PAT inside FT847

5. The PAT board is held in place by double sided tape, so can easily be removed should it become necessary. It is recommended to use DS tape to hold a layer of card to the screening can, then a second piece of DS tape to hold the PAT board in place.

6 The RF input to the board comes from the IF output of the RF board, at J3009. This is after the 45MHz IF filter and one IF amplifier stage - see Figs 2 and 3. This is labelled as PAT input 1, and is the correct location for use as an IF Panadaptor.

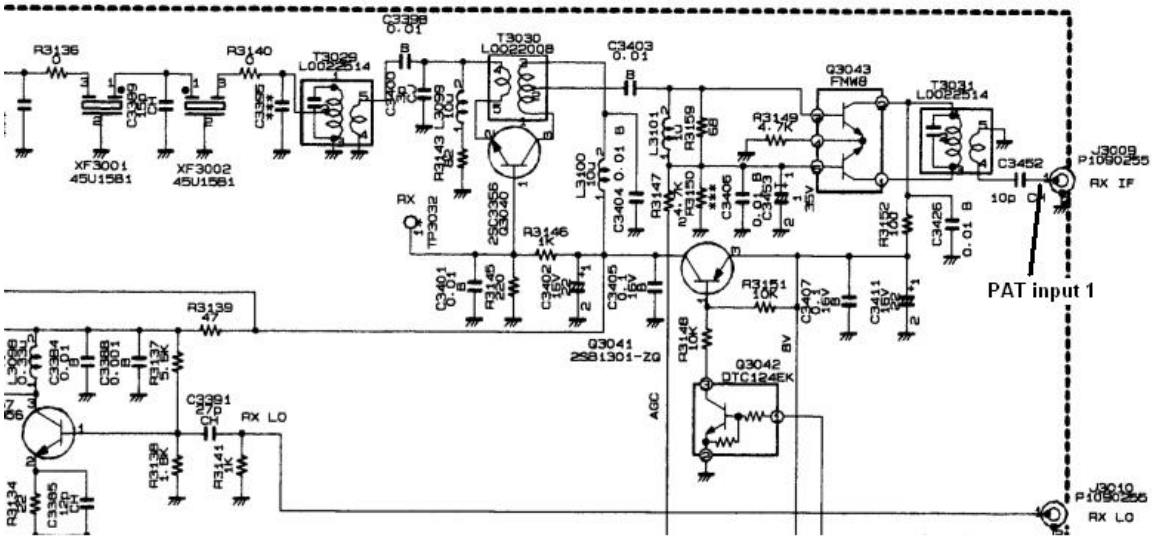

Fig 2 – Panadaptor input connection at J3009

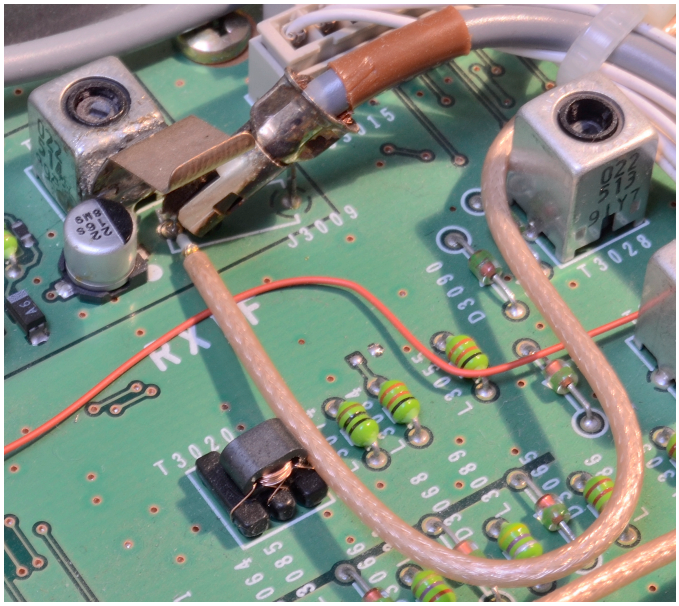

Fig 3 – Coax connection at J3009 for PAT
Note that use of a fine wire is now recommended instead of coax for the input connection

7 Use a length of fine single wire to make the connection between J3009 and the PAT input, and a 200mm length pre-terminated in an SMA plug for the output connection. Dimensions for preparing the ends of the cables are given in Table 1 and Fig 9. Do

not pigtail the ends, but make them off as in Fig 4. See also details at the end of this note. Route both the PAT input and output cables underneath the FT847 wiring forms, to hold them in place.

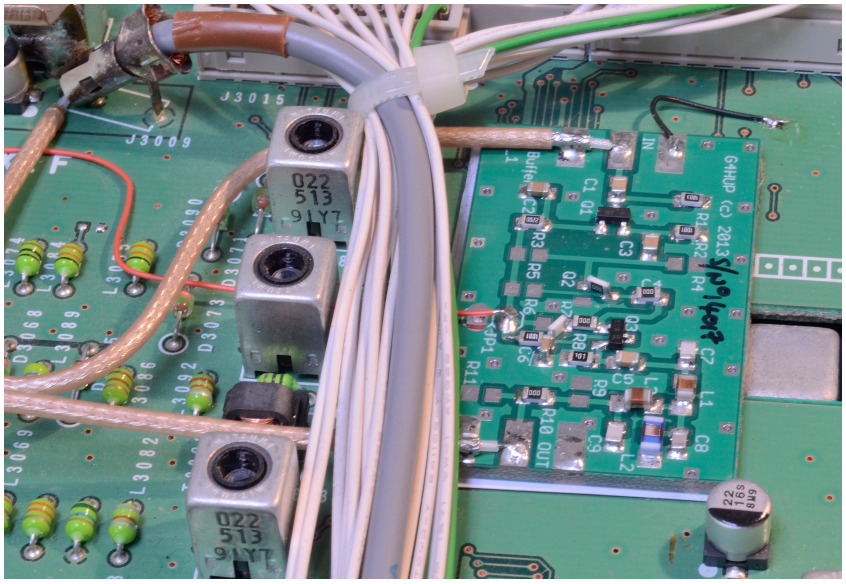

Fig 4 – Close up of PAT board installed, showing coax terminations and 0V connection to RF PCB

8 Note that there is no connection to 0V at the J3009 end of the input coax. 0V for the PAT must be picked up from the ground plane of the RF PCB on which the PAT sits. There are several ground vias close to the PAT board, so scrape a small amount of solder resist off the PCB surface and tin it. Using a short wire (about 20mm or so), connect the ground plane of the PAT board to the RF PCB ground plane.

9 Vcc for PAT is picked up from L3102 – you should measure approx 7.9V. A 90mm length of fine red wire is supplied to make this connection.

10 Replace the speaker and cover, connect and test.

Connection as a Second Receiver Tap – PAT-V

PAT may also be used to take an output before the first mixer, so that your SDR will provide a wider spectrum view of the band that you are using. Note that you will need the broadband PAT-V version for this application if you wish to see the VHF and UHF bands. The Vcc, 0V and output connections are as given above, but the input connection needs to be taken from T3022, as shown in Fig 5 below.

As with the IF tap, mount the PAT as close as possible to the tap point and use a length of single wire between T3022 and the PAT input, rather than the coax shown.

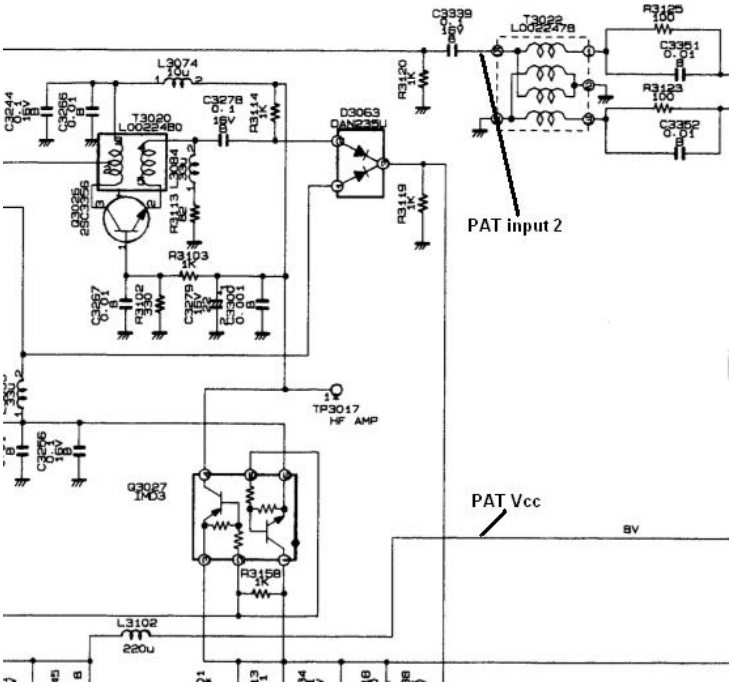

Fig 5 – PAT input for 2nd Rx function – other connections also shown

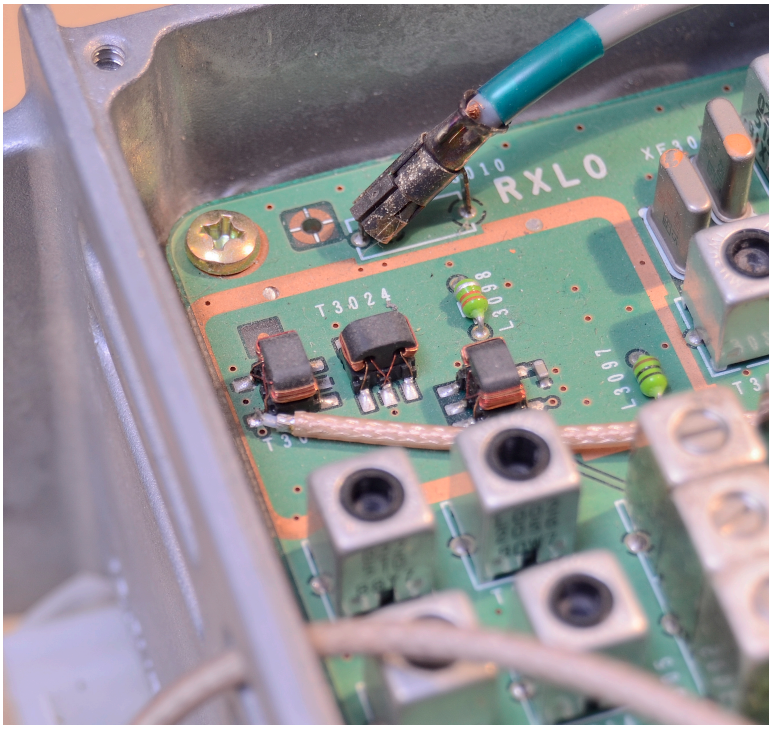

Fig 6 – Connection to T3022 for 2nd Rx function
Use wire, not coax, for the input connection

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 7 shows a correctly terminated cable installed in an FT817, and you can see another example in Fig 4 above.

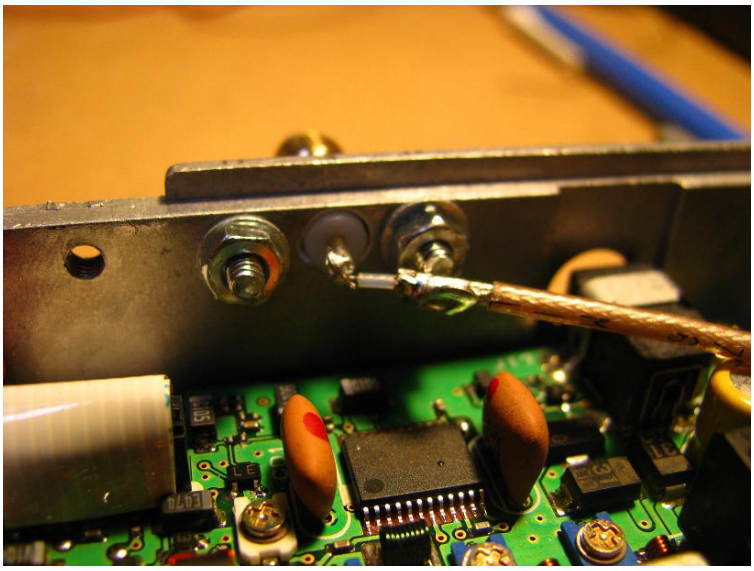

Fig 7 – Correct method of termination for the RG178 cable

Table 1 below shows the measurements recommended for the cable end preparation for the FT847 installation and Fig 8 below gives further clarification.

Cable	FT847 Connection	Sheath	Braid	Dielectric	Inner
Output	PAT	9mm	3.5mm	2mm	3.5mm

Table 1 – Cable stripping details for FT897 installation

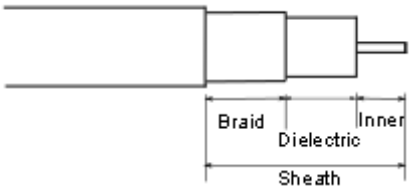

Fig 8 – Cable termination preparation details

PAT in Use

The screen shots given here are to help you identify which connection mode you want to use PAT for. At any one time, you may only invoke one of these options, although you can change from one to the other, but you must go inside the rig each time you want to change.

In both cases the shots are of the 40m band, and are captured using a FunCube Dongle Pro+ with SDR# software.

IF Panoramic Adaptor

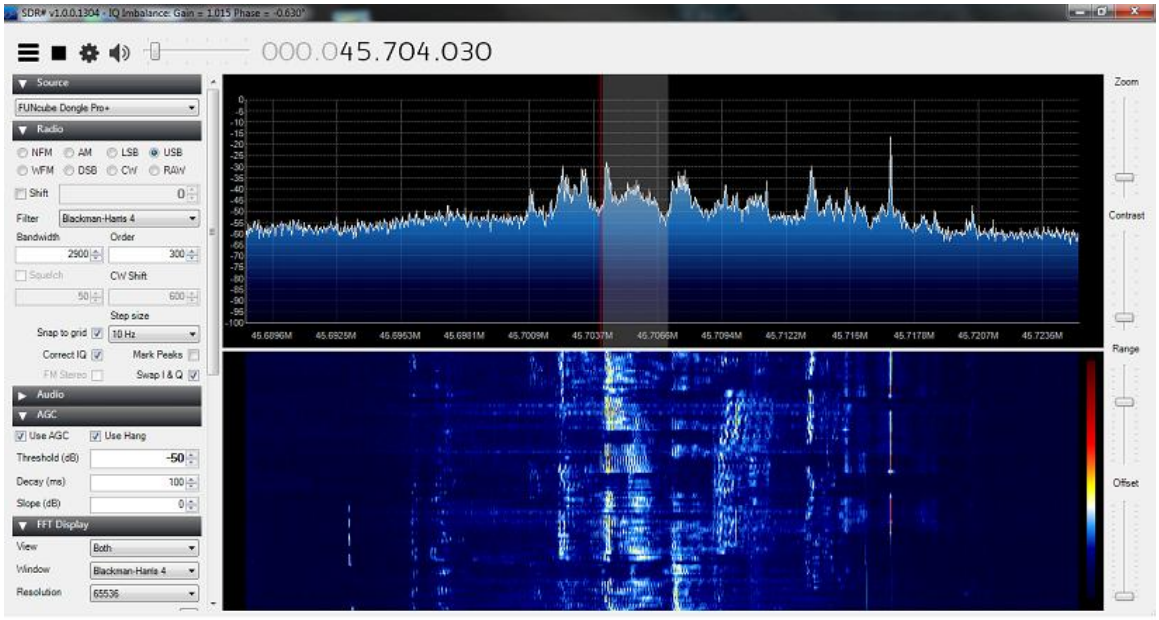

Fig 9 – SDR display with PAT connected as IF Panoramic Adaptor

In Fig 9, the bandwidth of the display is limited by the IF filter – this is what to expect when you use the J3009 connection for the PAT input (PAT input 1). You can see that the noise level is greater towards the centre of the displayed spectrum. Useful indications of signals can be seen out to approx +/- 25kHz of the frequency that the radio is tuned to. The advantage of this mode is that as you tune the radio, the signals move across the display. Once you have set the IF

frequency on your SDR, the signal your radio is tunes to will always be centre screen on the SDR waterfall.

Second Rx Function

Fig 10 shows what to expect when you pick up the PAT input from T3022, before the 1st mixer. A much wider spectrum display is possible, depending on the limits of your SDR solution. In this case, almost the entire 200kHz of 40m are visible, with the CW/data segments to the left and SSB to the right of the shot.

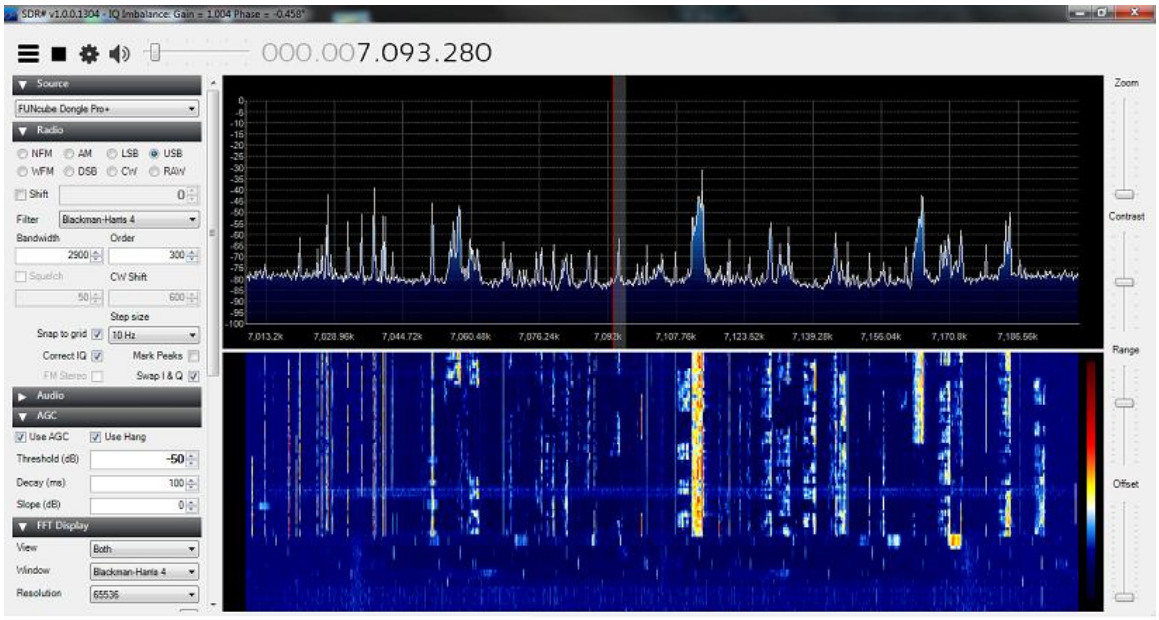

Fig 10 – SDR display with PAT connected as Second Receiver Function

The advantage of this mode is that you have the much greater visibility – by adjusting the SDR controls you can reduce the spectrum to a smaller segment of interest. You can demodulate any signal by clicking on it and using the SDR demodulator function, rather than the FT847.

Disadvantages are that you must remember to change the frequency of the SDR when you change bands on the rig, and as you tune the rig, any signal you are hearing will no longer automatically be at the centre of the SDR display.

Since most radios use block filters, rather than single band filters, you will usually find that one band setting on the radio will allow you to view two or three bands on the SDR, so within reason you can be monitoring different bands on the SDR and the radio.

Be careful about responding to signals you demodulate on the SDR – remember to net the TX first!