Using a PAT as 2nd RX on the TS2000 HF stream

Since the TS2k uses different first IF's for different bands (HF &50MHZ, 144/432MHZ and 1.3GHz) there is no common location where either RF signal, or the 1^{st} IF can be picked up, to give full coverage of all frequency options on the rig. Hence, the 2^{nd} IF at 10.695MHZ, which is the first common point for all bands, has been the recognised place to pick up the IF tap signals.

Increasingly, there is a need for 2^{nd} independent Rx functions – and on this rig that means separate PAT's for each range. The HF and 50MHz range can be covered with one PAT V, while the 144 and 432 bands can be covered with another one. The problem is not so easy at 1.3GHz, as the PAT board has significant loss at that frequency – it may be better here to pick up the 1^{st} IF for 1.3GHz (135MHz).

Installing PAT V for HF/50MHz

The RF Front End architecture is shown in Fig 1. Two IF's are used, but picking up the signals before the mixer avoids the complexity of those.



Connecting a PAT V just before the 1st HF mixer allows the RF signals to be safely extracted to your SDR, and will give coverage of all the HF bands and 50MHz.

You can take full advantage of all of the band pass filters, the pre-amps and attenuators in the rig – by connecting at this point, they will also have their benefit on the signals you see on the SDR display.

The actual connection point can be found from Fig 2 – Kenwood have thoughtfully provided a test point, CN5, which is exactly in the right place. To make a good connection to this will require a short coax cable terminated in a Taiko-Denki TMP plug – these are available from hupRF.



Fig 2 – Rx RF Front End Block Diagram

Fig 2 shows the Rx front end for HF/50MHxz in more detail, with the attenuators, filters and preamps. The PAT signal needs to be picked up between the anodes of D36, D39 and D705, and the input to the mixer - Q7 - 10. This is right where CN5 is positioned, feeding out via a 10nF capacitor, as shown in Fig 3.



Fig 3 – Rx Mixer Schematic

CN5 can be seen at the top of Fig 3. There is a 5.6k resistor in series with the output, which will make a small difference to the signal level received into the SDR. If this is too much, then as an alternative, the signal could be tapped at the junction of L49, C105 and C106.

L49 and C105 are just on the other side of L51 from CN5, and are both on the upper side of the PCB, which makes them easy to access. Other points could be used, but this would mean removing the Tx-Rx1 IF unit PCB from the rig.

In Fig 4, below, you can see the connection point CN5 and also the recommended place to connect the PAT Vcc point (the JP1 pad on the PAT board). Again, R49 is on the upper side of the Tx-Rx1 IF PCB. If you are using the HF Ant RCA socket as your output from the TS2K, then there is no need to connect a DC ground to the Pat – it will get this from the output connection.

If you are using a flying lead for the signal output, then you must also make a DC ground connection to the PAT board.

Although the alternate connection point for the PAT input has not been marked on the diagram, if you move down the page from CN5 you will find L51. Carry on down and you will find L49 and C105. The end of those nearest to L51 is the correct point to connect the PAT and get full input signal.



Fig 4 – Tx-Rx1 IF Unit PCB Layout (P146 Service Manual)

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