

Yaesu FT-847 70mhz Pre-amplifier

By CT1FFU- Tony

I decided to buy a Yaesu FT-847. Using an all mode all band radio, operation becomes much easier and give better accommodation on shack however, I soon got frustrated with its reception as the signals were much weaker then the ones received with my home-made X-verter (dx-70-G4DDK design).

I decided to look on web for a modification and Marc's, PA1O BPF, was a good to start. Marc's article, convinced me with the good results on filter modifications as well as the simplicity of those changes.

After Marc's modification the radio became better, but still not with a satisfying RX performance.

FT-847 has a build in preamp, but it seems to have poor gain at 70mhz ,so I decided to add another preamplifier stage.

I have looked carefully on circuit diagram trying to find the right place to insert a amplifier

which wasn't however easy, but I realise that the band-pass-filter, a Chebyshev, could be rearranged and have the preamplifier inserted there.

Results were clearly better as sensitivity is concerned and in many comparisons with transverter it was easy to see the improvement.

After I published a small article on www.70mhz.org these modifications were reproduced with success by others.

of the FT847 after preamp fit:

Since the radio has some 1.5dB loss on the PA filter and still some more few dB in the subsequent HPF filter on the daughter board the lowest NF achievable is still quite limited by those factors. NF at 70MHz is now about 7dB (note the 15.5dB NF the radio had originally) which makes perfect sense taking in consideration the circa 2.0dB NF of the MMIC from HP: LNA 02186.

Using a lower NF device would bring just a bit better NF but as per the loss limitations described above, without further changes into the radio,

The results are good

and hundreds of boards are now installed world wide on FT847s

Later, as per many requests, I decided to make a KIT available.

This KIT is very easy to install and anyone with a bit of radio/electronics experience can do the job easily.

Laboratory tests made by GI0GDP and CT1BXT shown that once fitted the pre-amp the 70mhz RX achieve similar sensibility as on 50mhz, even without PA1O BPF modification.

About the design:

I decided to use a

Low Noise, Cascadable Silicon Bipolar MMIC Amplifier: **LNA02186**

because of it's 50 ohm impedance; stable amplification, 31dB gain and noise figure, low enough for the application: >2dB nF.

This amplifier uses the typical configuration and bias and is placed in the in the BPF which was rearranged as seen in fig1.

Brief

performance would not get much better than this by improving the preamplifier alone. This 7dB NF could be also expressed as a sensitivity of about 0.1uV for S/N of 6dB at 2.8KHz BW.

Schematics:

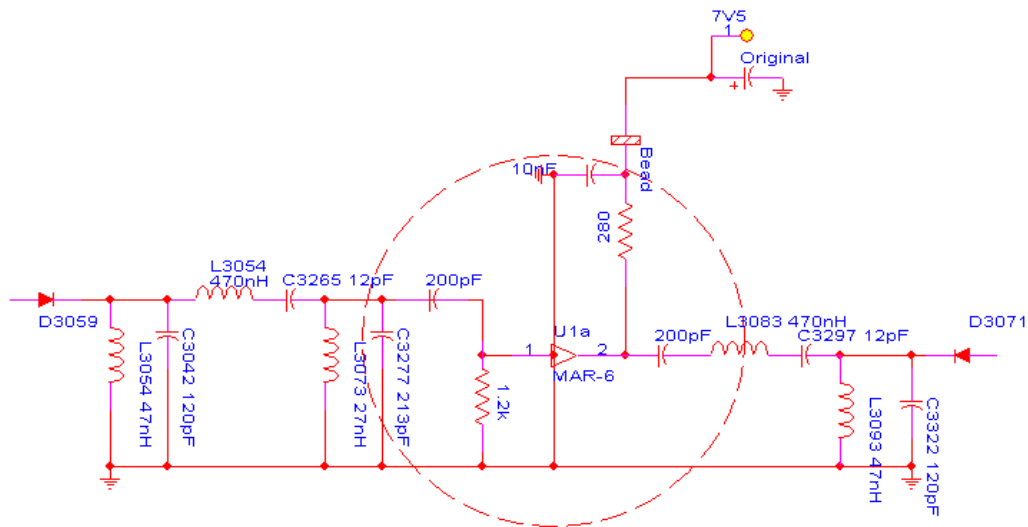
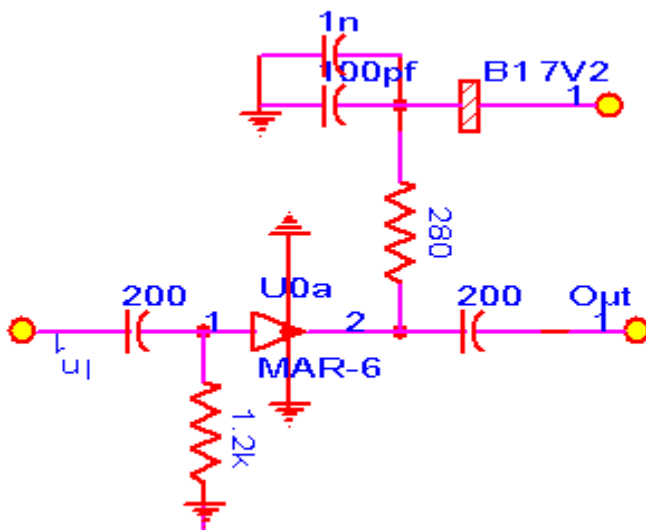
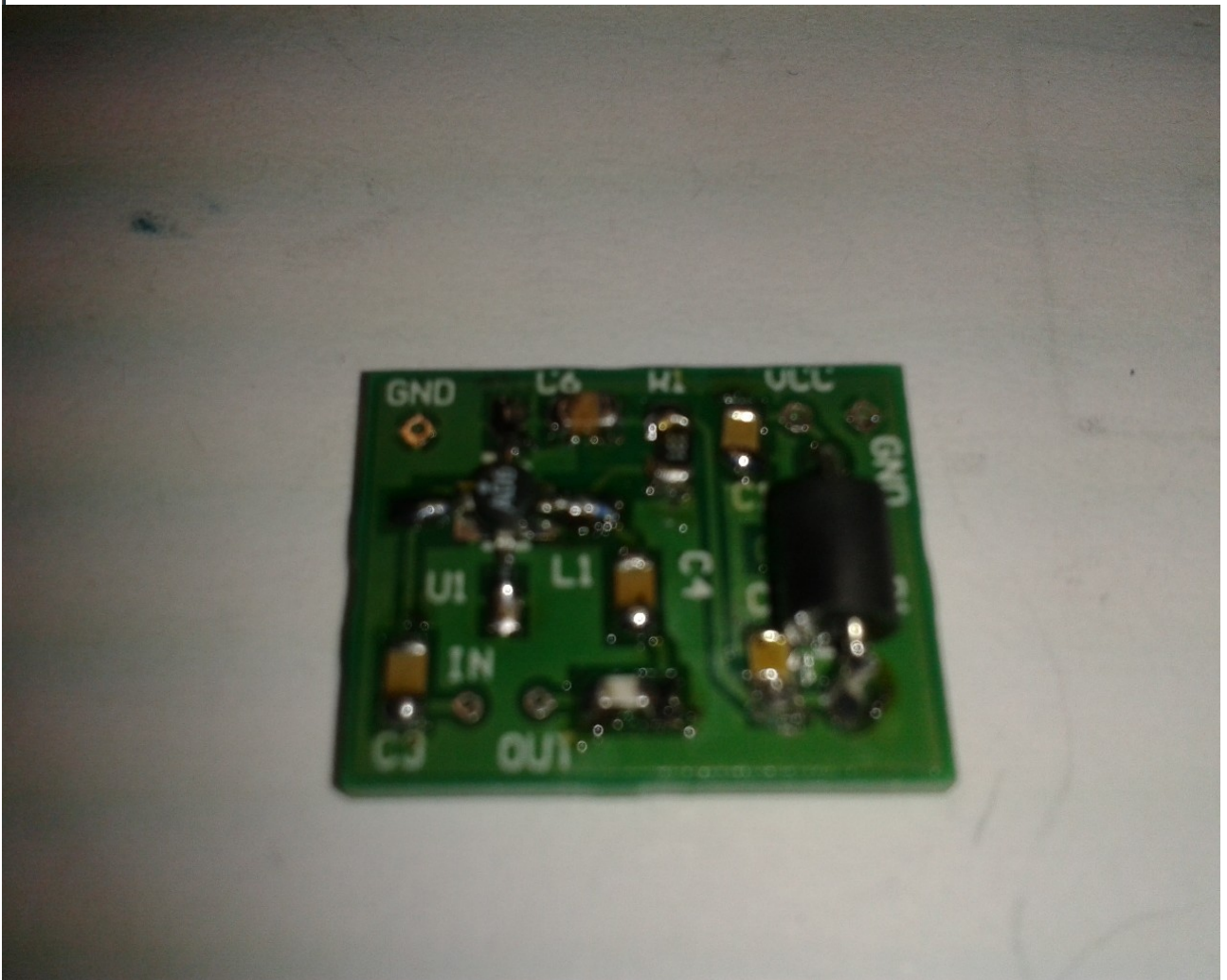


Fig.1 -Values for BPF with PA1O changes done.

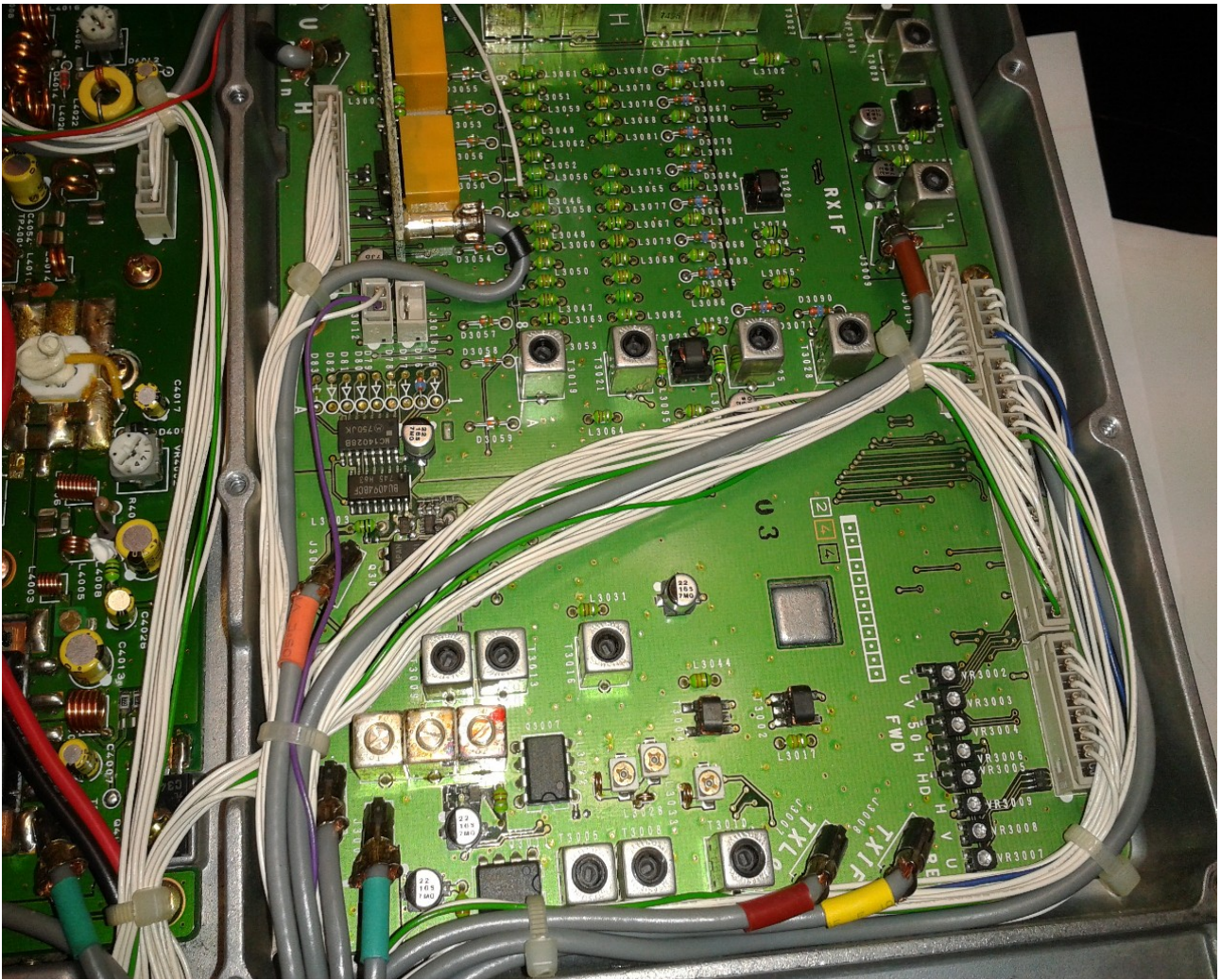
Schematic of the addon Board:



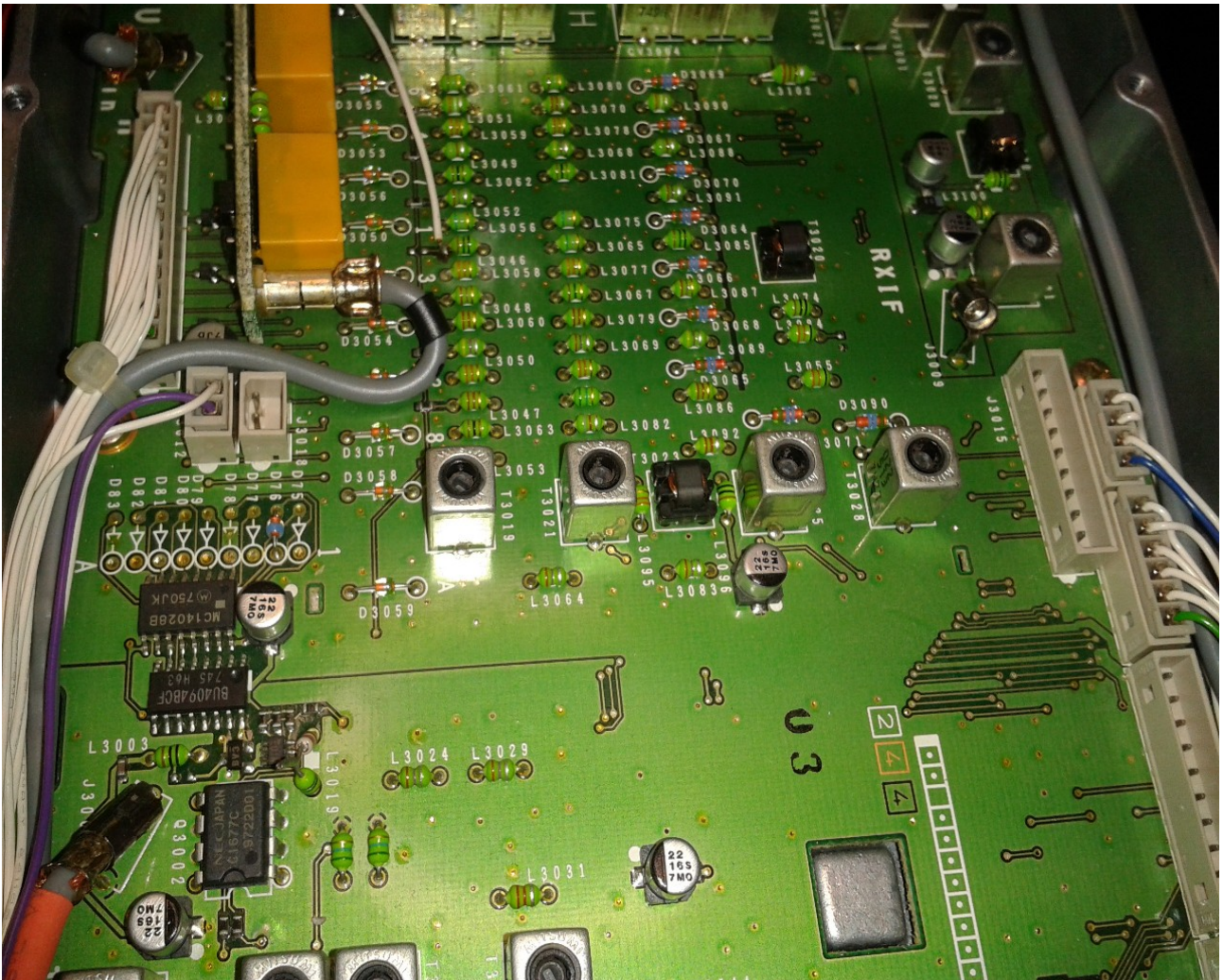
Amplifier design with MAR-6/ LNA02186



General view of board ready build.

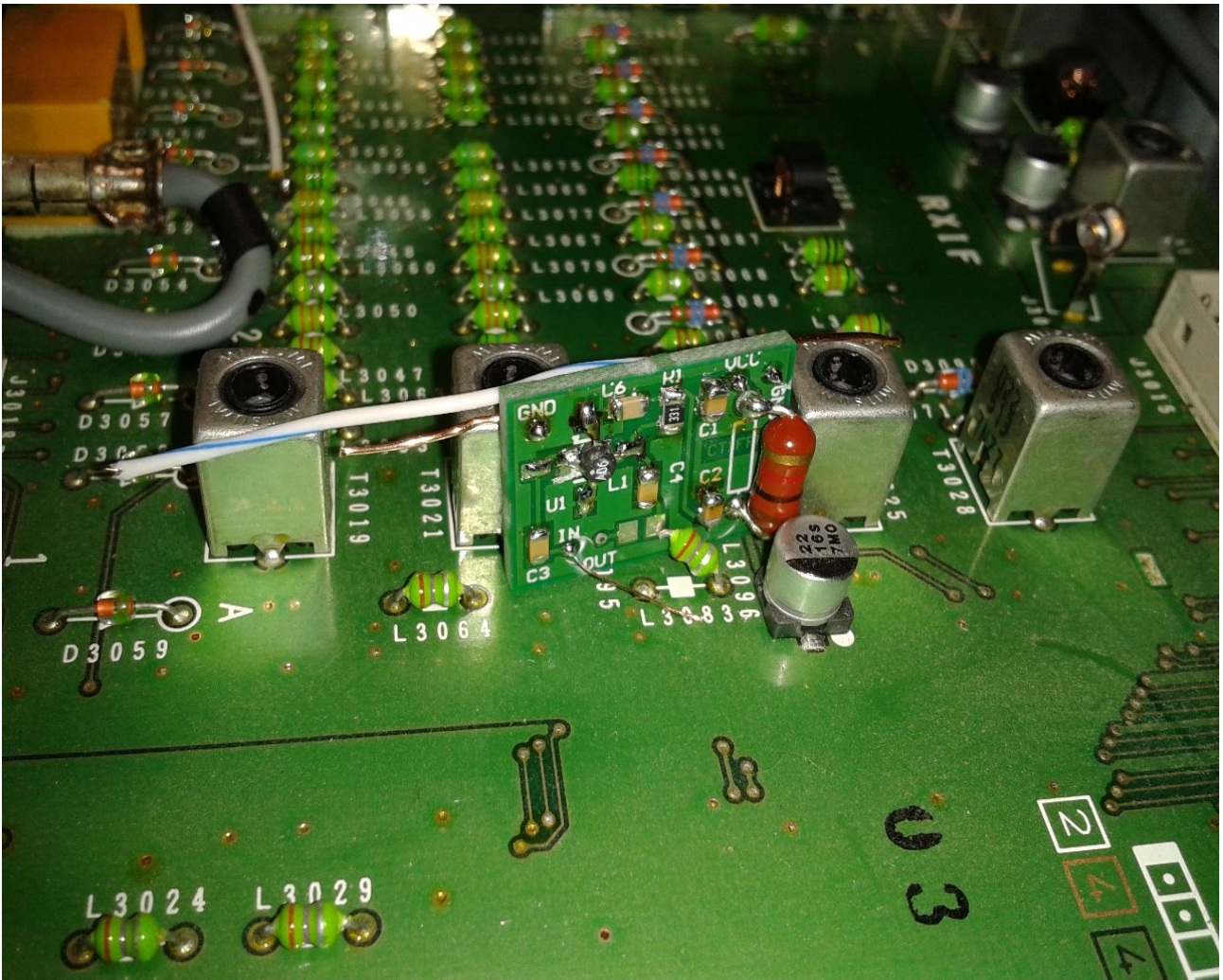


Installation:

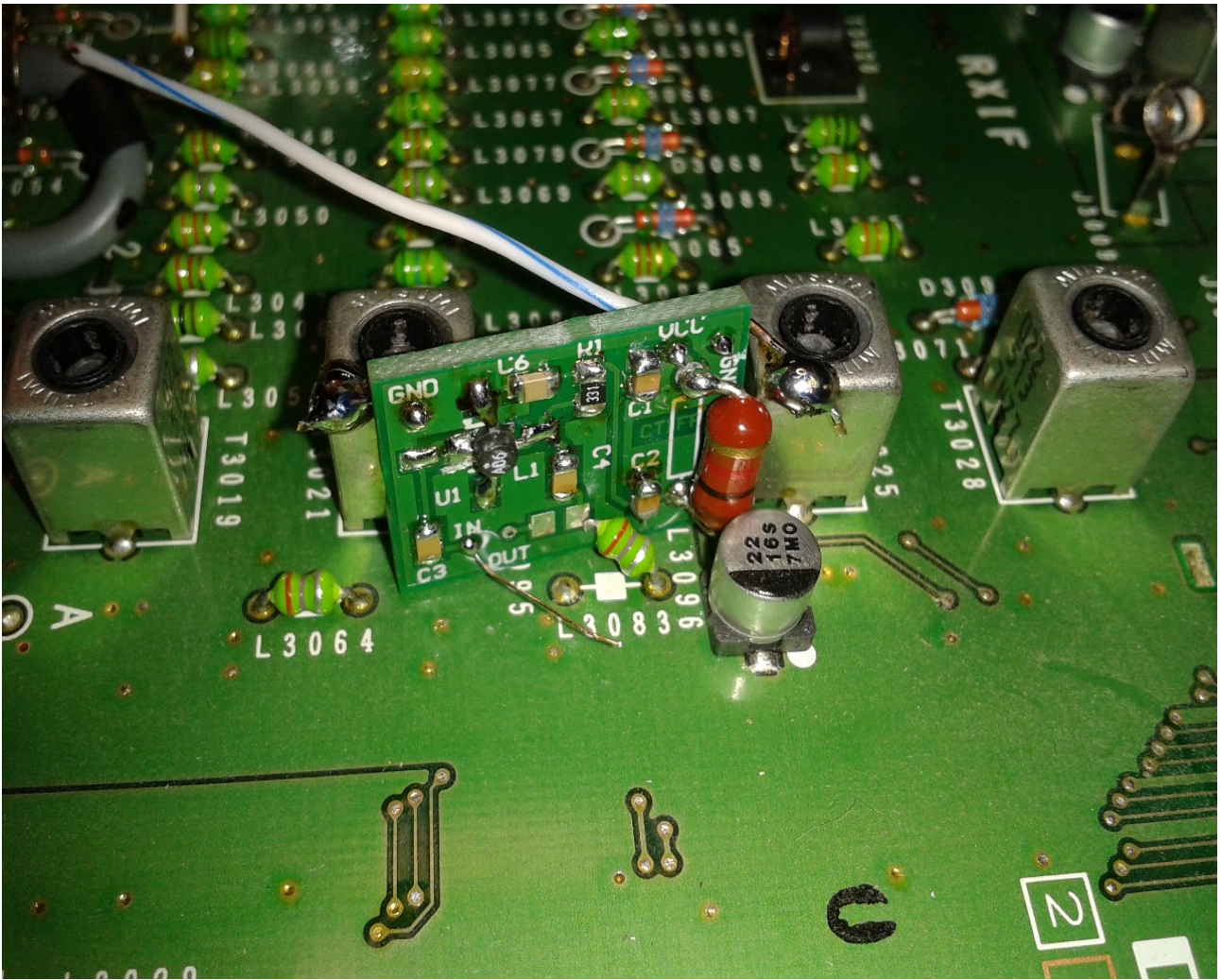


Remove the top and bottom cover of 847 and locate on main top board L3083. Unplug the cables so you can have a clean view over coil L3083.

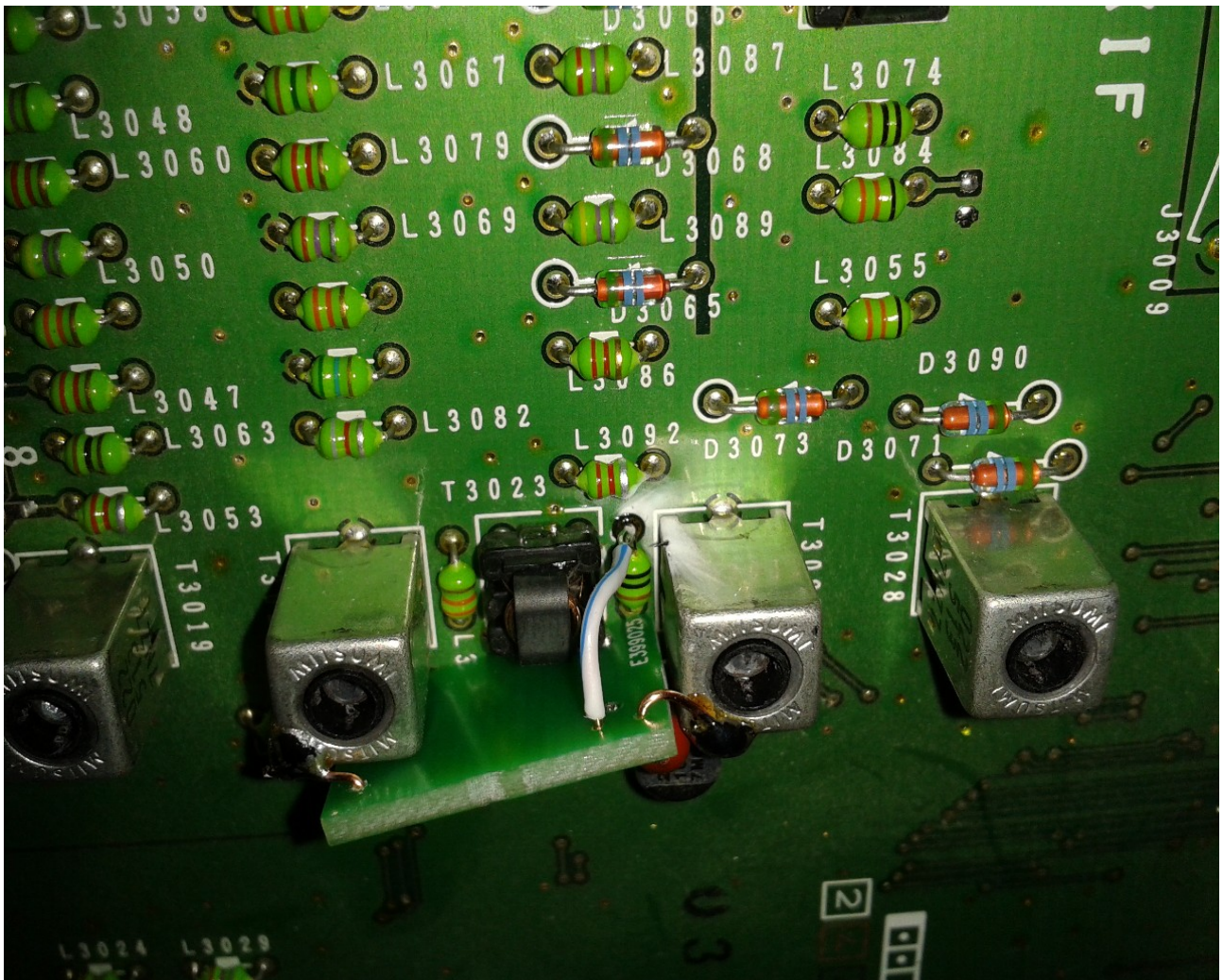
L3083 is on centre of the 4 toko metallic adjustable coils.



Insert the preamp board on place like on picture, elevate the coil with a screw driver so it touches the output terminal on PCB.

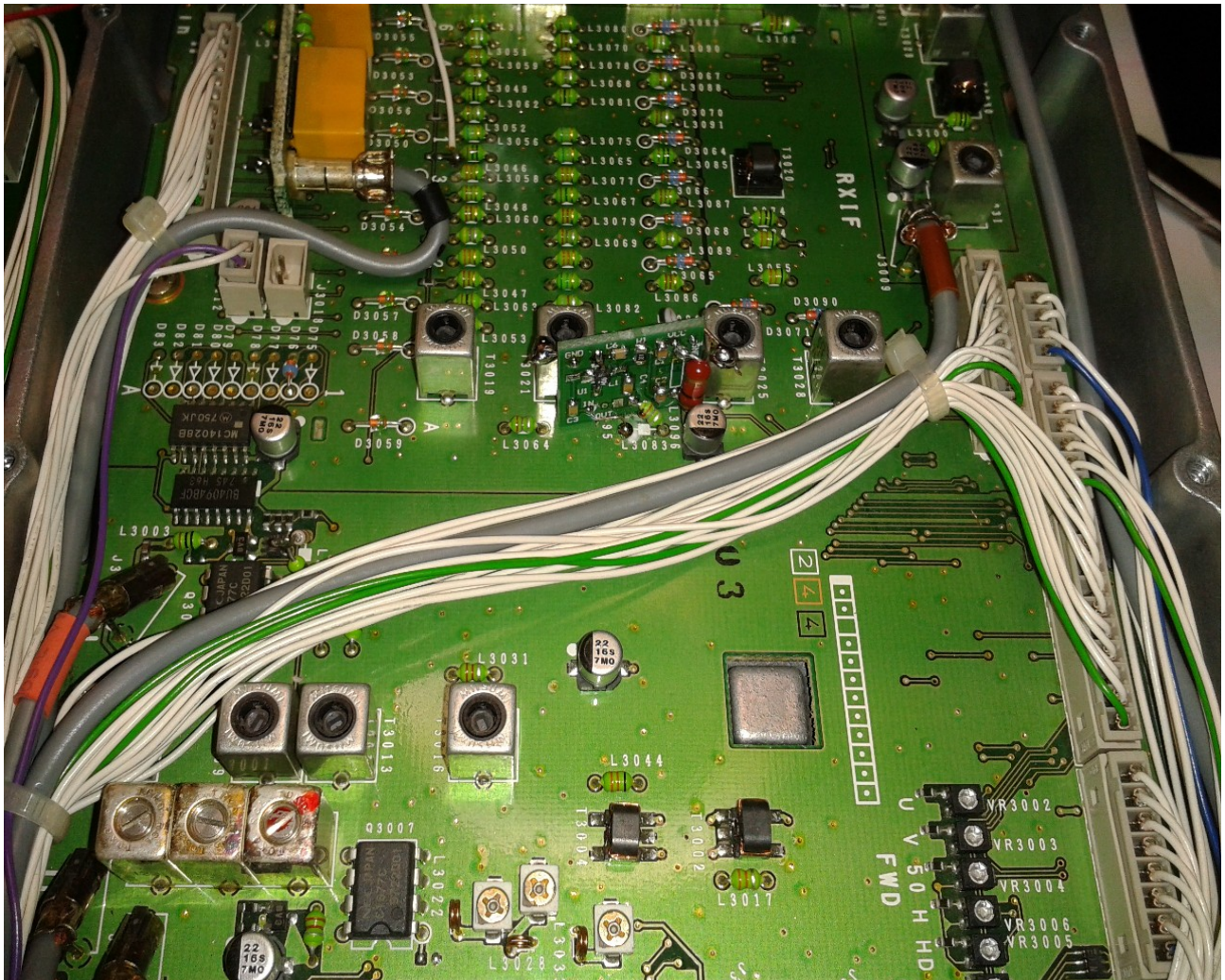


Now with the board on place, solder the ground wires on both sides.
Careful don't make a longer soldering, you might melt the plastic inside the toko
coils.



Now we need the 8V to feed the preamp. We will get it from the resistor terminal on back side of board.

As picture shows, measure the wire and make a solder on the resistor.



Finally, insert the connectors back on place and you can try now the reception of you FT-847.

You will notice a very high gain on the signals you were use to hear: local beacons or familiar neighbour stations will be louder.

You don't need now to use your RF-AMP internal of you FT847.

Many tnx, enjoy 70mhz of you Yaesu FT847

Best 73's CU on 4m
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