

ADX-MINI Tuner Build Manual

for tuner board version 1.2

January 23, 2025

Intro

This tuner was inspired by this YouTube video:

<https://www.youtube.com/watch?v=JwVuvu-C30c>

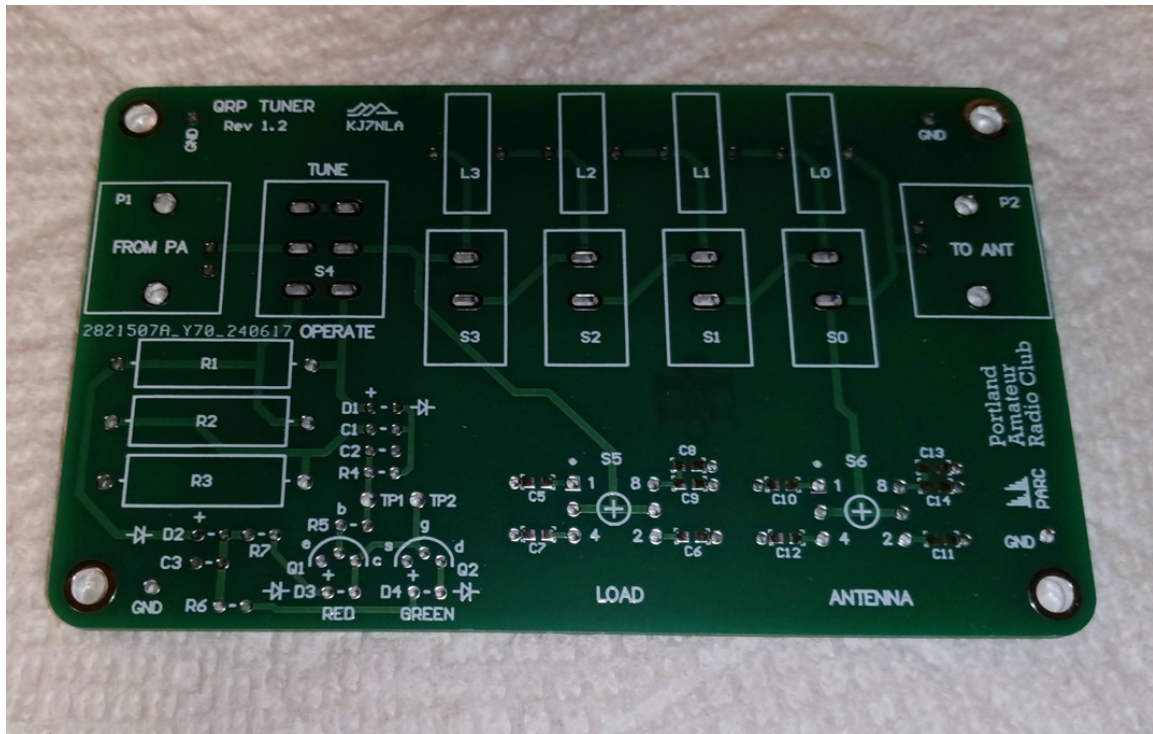
I modified the design by adding a second variable cap to make a Pi-network rather than the simpler L-network.

The difference between this version and the previous version (1.1) is the replacement of the polyvaricon tuning caps with SMT tuning caps selected by a rotary hex switch.

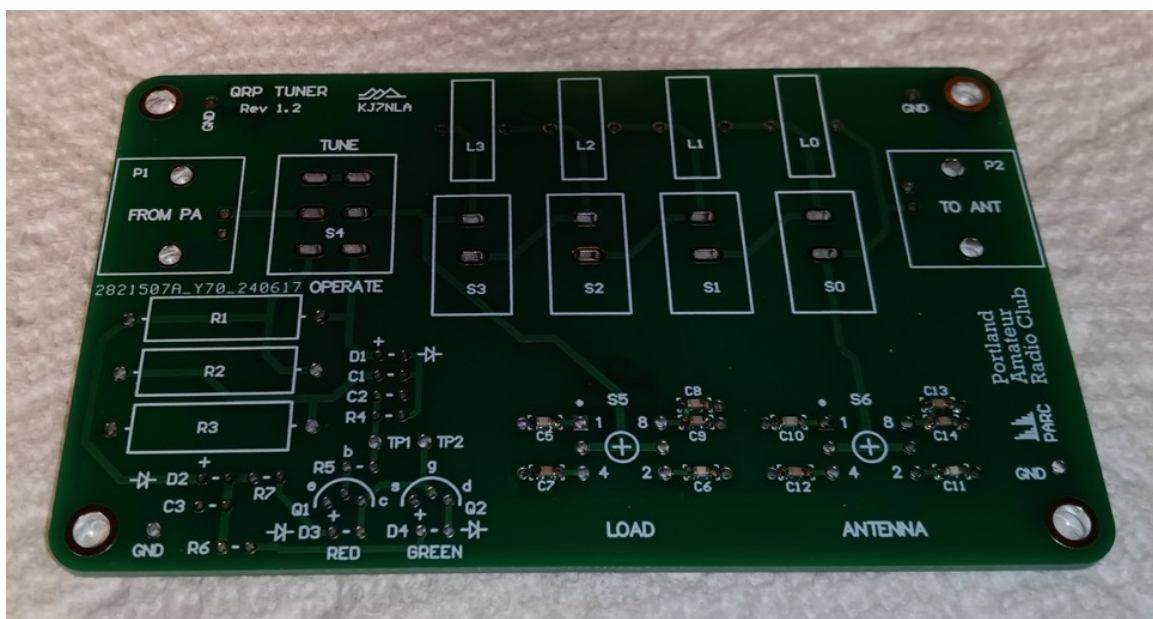
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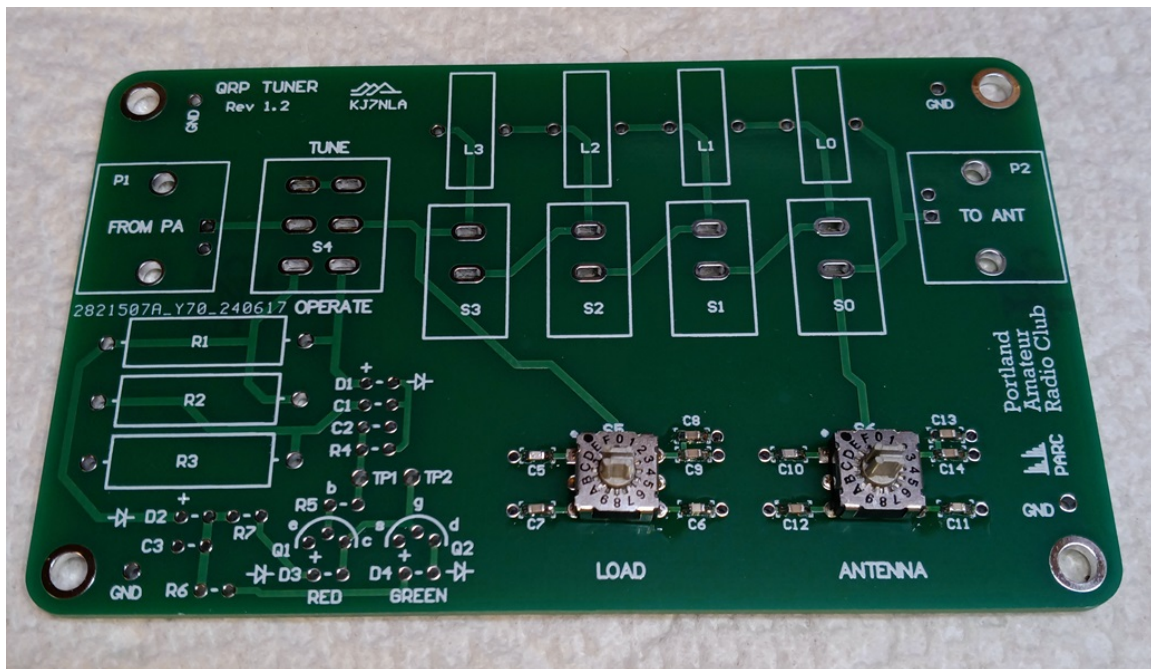
Step 0: Start with the bare board



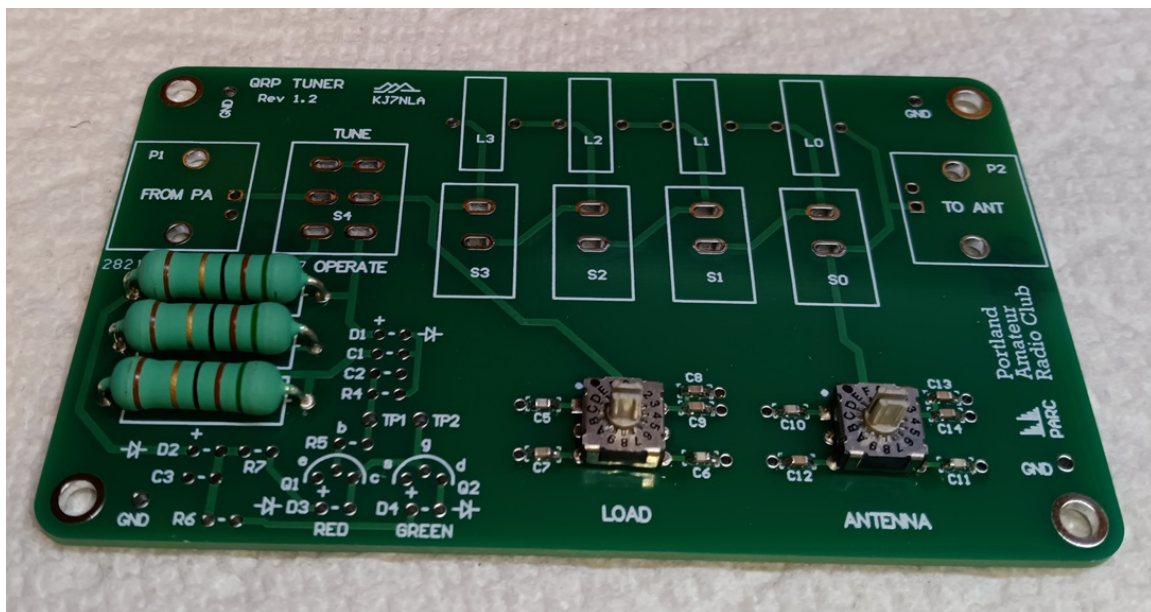
Step 1: Add the SMT tuning caps These are 0603 packages. The method I use for installing these is to tin one pad, place the part and solder the one side, then solder the other side.



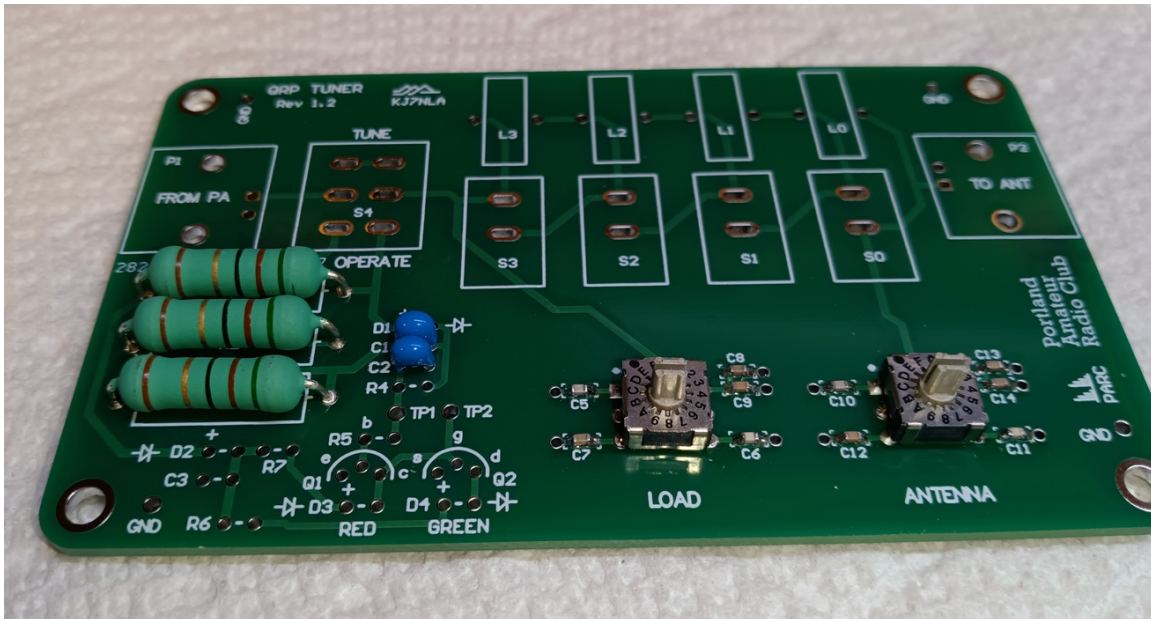
Step 2: Add the rotary switches S5 and S6



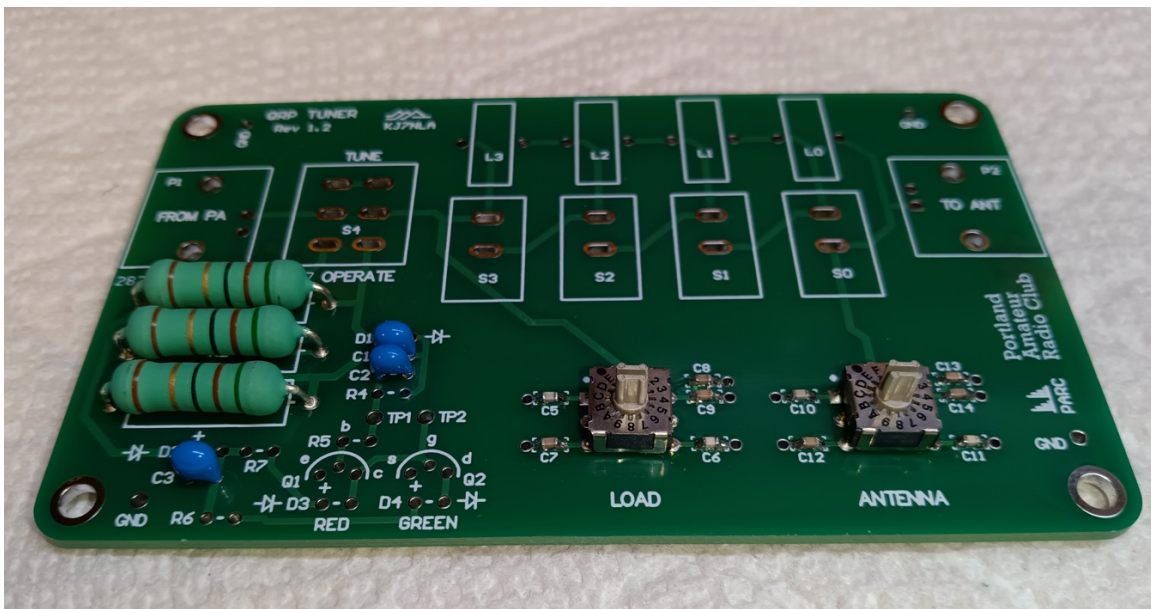
Step 3: Add 50-ohm resistors R1, R2, and R3



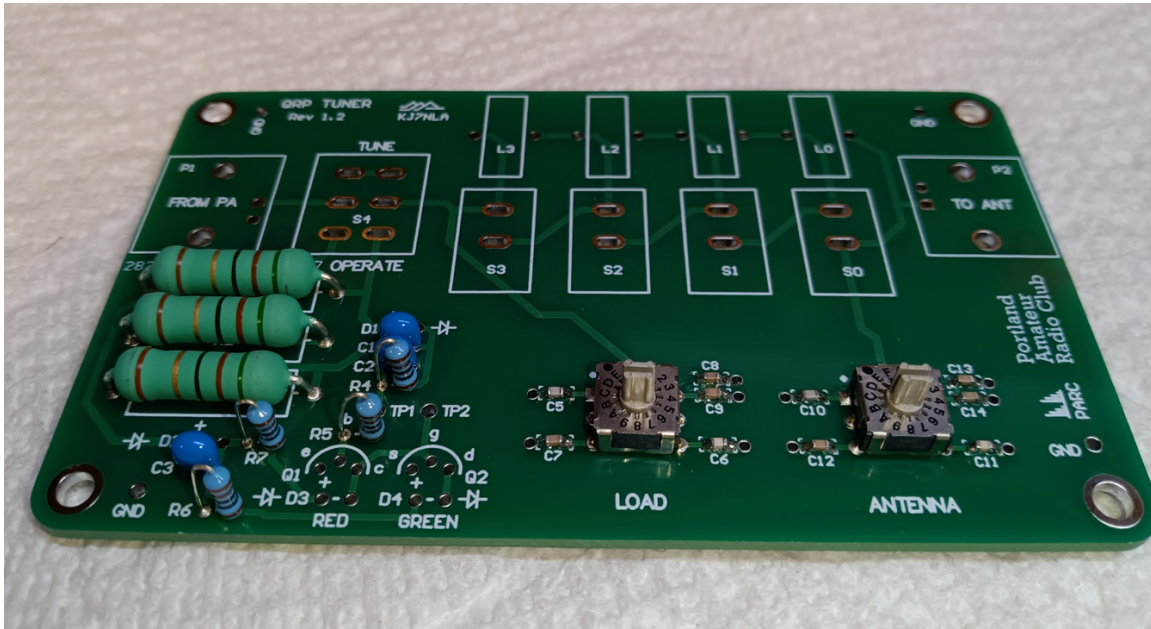
Step 4: Add .01 uF caps C1 and C2



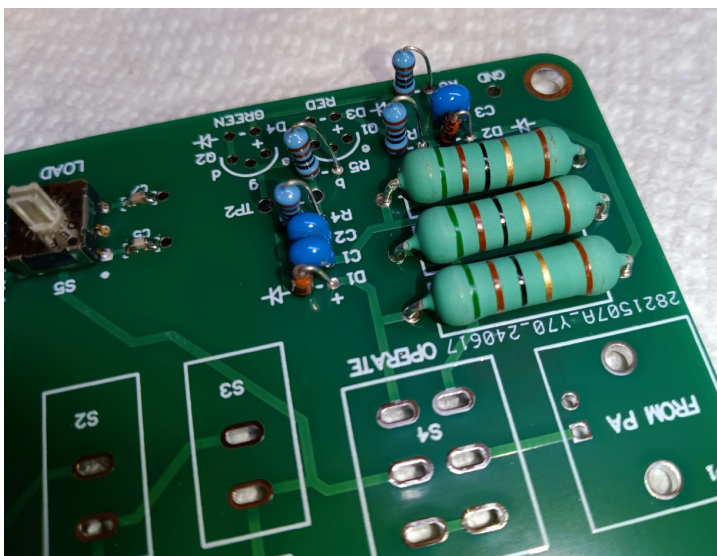
Step 5: Add .1 uF cap C3



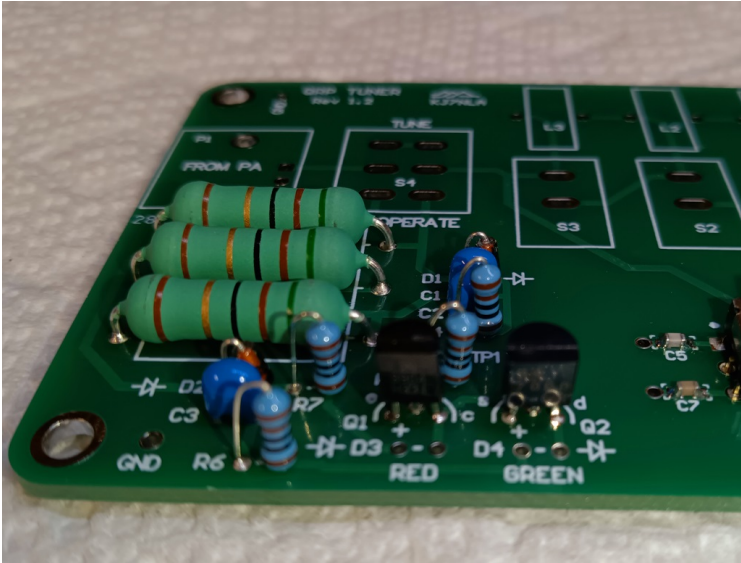
Step 6: Add 1k resistors R4, R5, R6 and R7



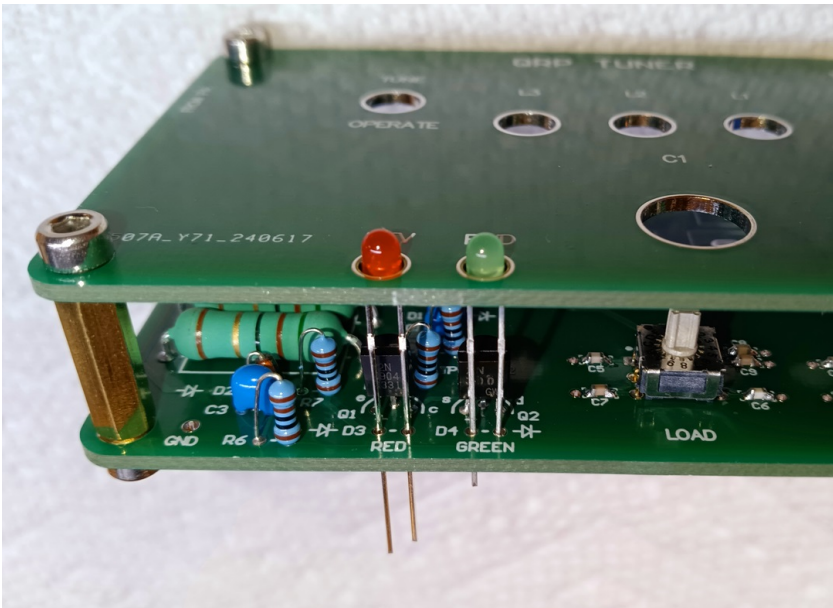
Step 7: Add 1N4148 diodes D1 and D2



Step 8: Add Q1 (2N3904) and Q2 (2N7000)



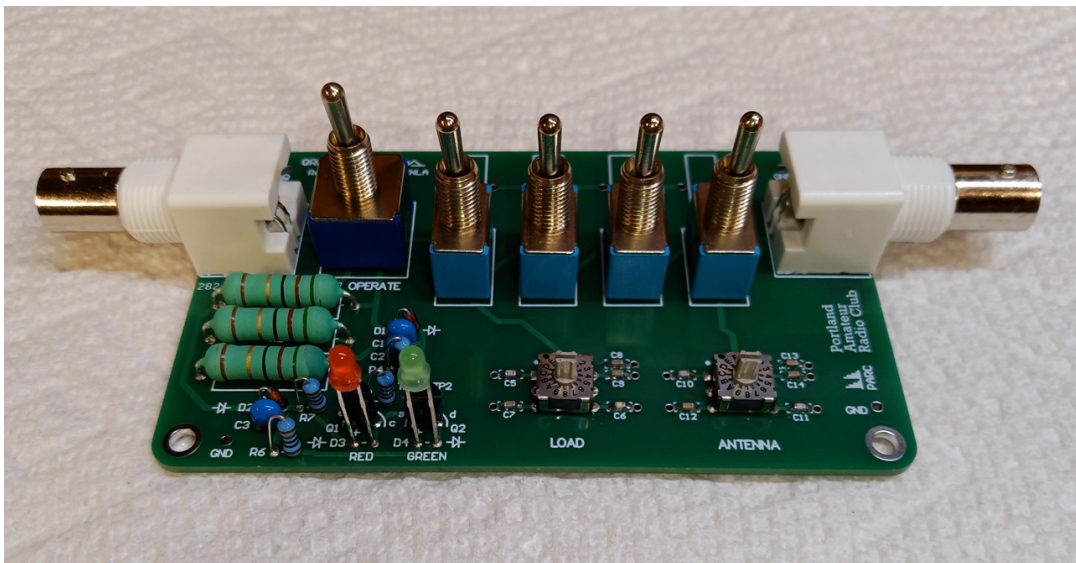
Step 9: Add D3 (red) and D4 (green) Fit with top board installed for correct alignment.



Step 10: Add switches S0, S1, S2, S3, and S6 Fit with top board installed for correct alignment.



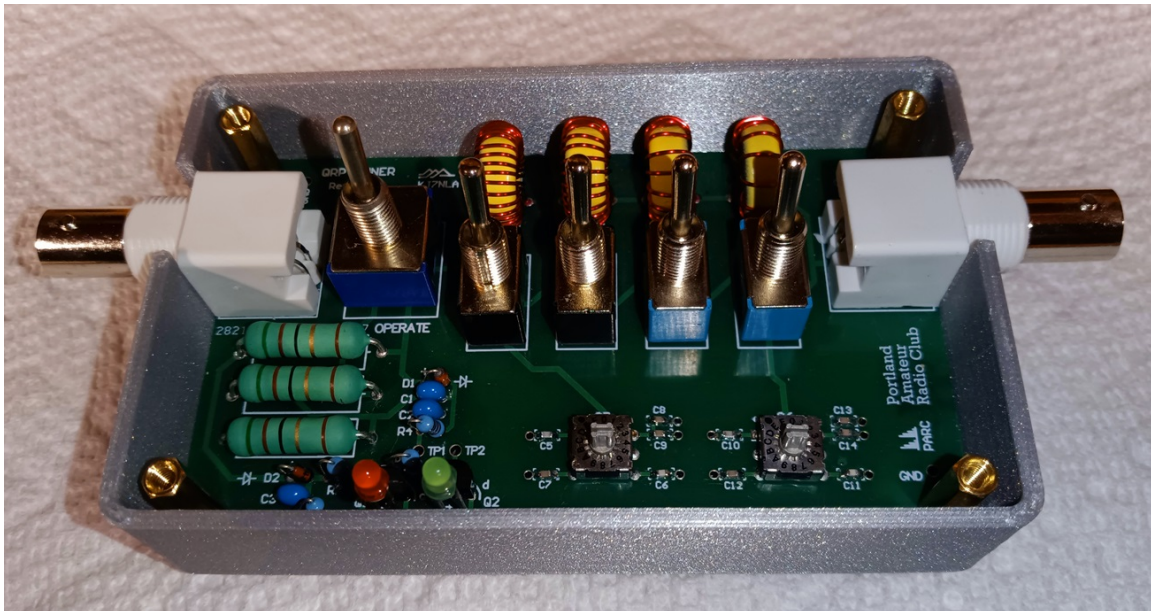
Step 11: Add the BNC connectors P1 and P2



Step 12: Wind the toroids

The number of turns is specified on the schematic diagram.

Step 13: Install the toroids



Step 14: TEST

Step 15: Install the top circuit board



Step 16: (Optional) Install the protective covers

I designed two protective covers:

a) For the BNC connectors the help prevent dirt ingress

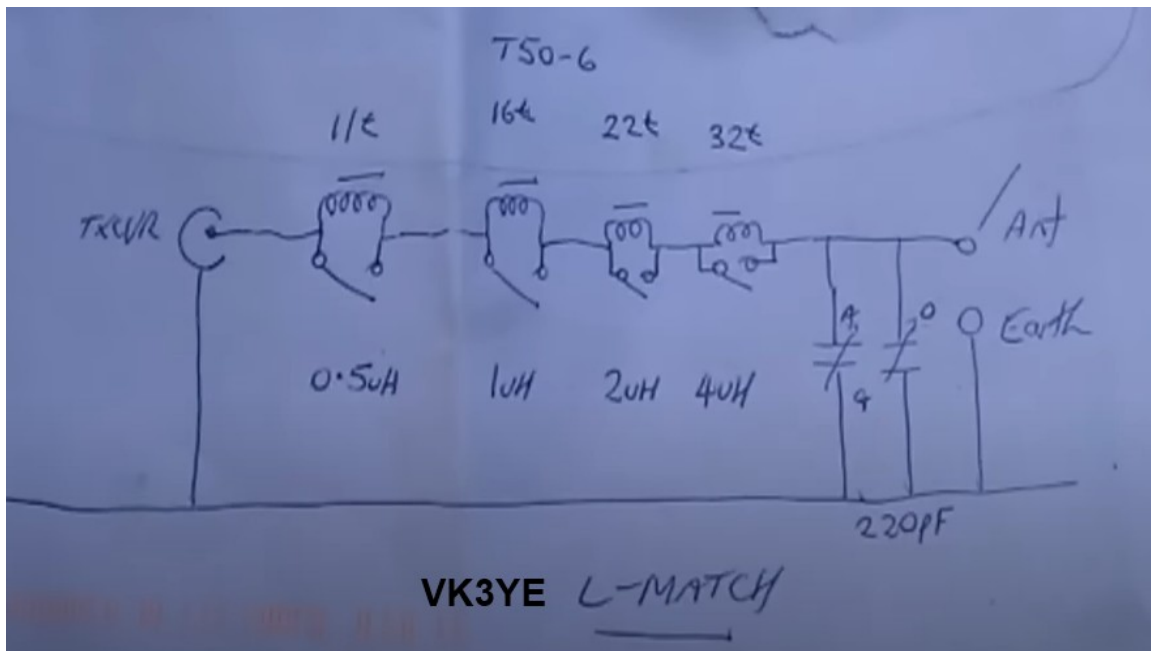


b) A top cover to protect the switches for when you want to transport the tuner in you SOTA/POTA backpack. This is just secured by an elastic bungee cord.

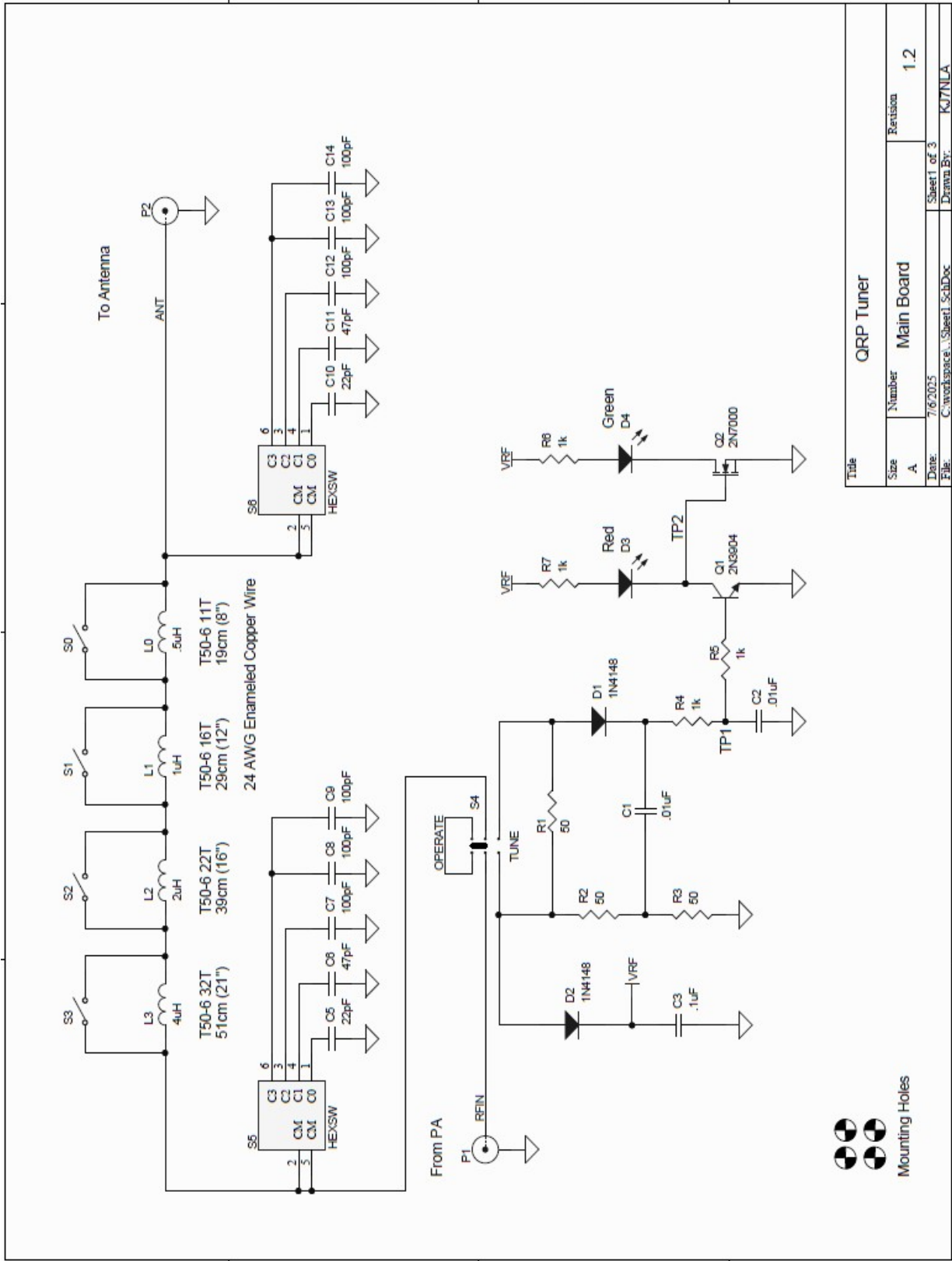


Appendix:

Here are the original L-Match Tuner schematics by VK3YE



Here are the rev 1.2 schematics



User Feedback:

1) Heath NQ7T

I finally got time this weekend to give the tuner a good try. The setup was far from optimal, It was 53' random wire, with a 17' counterpoise. The wires are connected directly to the tuner using a post to BNC adapter. The wire was on bushes and then up as a sloper to a Goture Tenkara fishing pole mast (about 20'). I was also in a challenging location, on the north shore of Annette lake, up by Snoqualmie pass. I was surrounded by 1000 foot walls. I used my IC-705, using just the onboard battery, so just 5w out. Here is what I found:

1. It was tricky to find a tune for the bands I tried (20, 30 and 40). However when I found the right combo, the SWR was 1:1 (didn't even show up on the SWR meter on the radio). One click of the hex switches either way jumped the SWR up to 3:1, so you had to be right on. I took pictures of my "settings" with notes to help me remember. I need to spend a while in the local park here and get things dialed in, so I can be quicker in tuning it in the field.
2. The covers (both BNC and face cover) worked great and held up no problem in my pack. This could easily be part of a robust sub half pound all band antenna system.
3. The knobs for the hex switches could be a bit bigger.
4. robust slider switches might be better for the inductors.

The case could also use a loop or something so it can hang from a mounting point or tree to get it off the ground. I think that would have helped a bit with my efficiency.

These were my spots after trying for about an hour on FT8. I am confident that this is not an issue with the tuner, but a combination of using low power, location, and antenna setup. When I set it up in my local park, I'll be able to get better data and make a good comparison.

Over all I like the tuner, and it worked very well, given its size and weight.

2) Ken K7BXI

I have a couple of questions about the PARC antenna tuner, a nice compact design.

We are tuning a vertical antenna to learn how the tuner works. Also using a KX2 to provide the tune signal.

With the antenna tuned slightly higher frequency, (capacitive) 20 meter band, we can use the tuner to bring it back to SWR 1/1. We can do this using the L1 switch and some antenna C. So far so good. This was done using the KX2 in Tune mode, at 3 watts, showing the SWR on the KX2.

When we switch the tuner in the Tune mode, the red light is on and we can't get the green light to come on, even though the SWR is 1/1.

I'm wondering if we used too much power initially, maybe up to 10 watts.

Also, what signal should we see at TP1 and TP2? I have a Tek scope so can do some measurements as needed.

KJ7NLA Response to KJ7BXI

>> I'm wondering if we used too much power initially..
The most sensitive components are the 2 hex selector switches.
If these are still able to tune to SWR 1:1, then the hex switches must still be OK.

Tune mode uses a resistive bridge circuit. Here's how it should work:
When tuned, the current in R4 should drop to (near) zero and Q1 should turn off (RED LED OFF)

and the voltage at the gate of Q2 should rise and Q2 should turn on (GREEN LED ON)

TP1 is junction of R4 and R5 (the base voltage of Q1)
TP2 is the gate of Q2

73,
Scott KJ7NLA

K7BXI Response to KJ7NLA

Well the good news is we were running too much power for tuning. The voltage at TP1 was too high, so backing the power off to 1 watt or even 0.7watt seems to work fine. Both C switches are also working.

I was able to tune my vertical at 14.560 antenna resonance down to 14.070 operating frequency. And also from 13.210 antenna resonance back up to 14.070 operating frequency. The antenna resonances were measured with a nanoVNA.

The tuner does seem to tune better with a capacitive load, antenna is too short, than if the antenna is too long, Inductive load. But it works in both cases just fine.

I'll write the up with pictures and come up with a tuning procedure that we can test in the field with various rigs.

So, bottom line, this is a cool little tuner once you get the hang of now to use it.

Ken K7BXI

3) Mike NQ7T

I really like this tuner! One thing I changed was I removed the 4uH (32t) coil and replaced it with a 0.25uH (6t) coil. This helps me when I'm tuning an antenna that's close to resonant.

It sounds like your going to be producing more of these tuners - good luck!

73,

Mike, KL7MJ