

The Switched Longwire Tuner

SLT

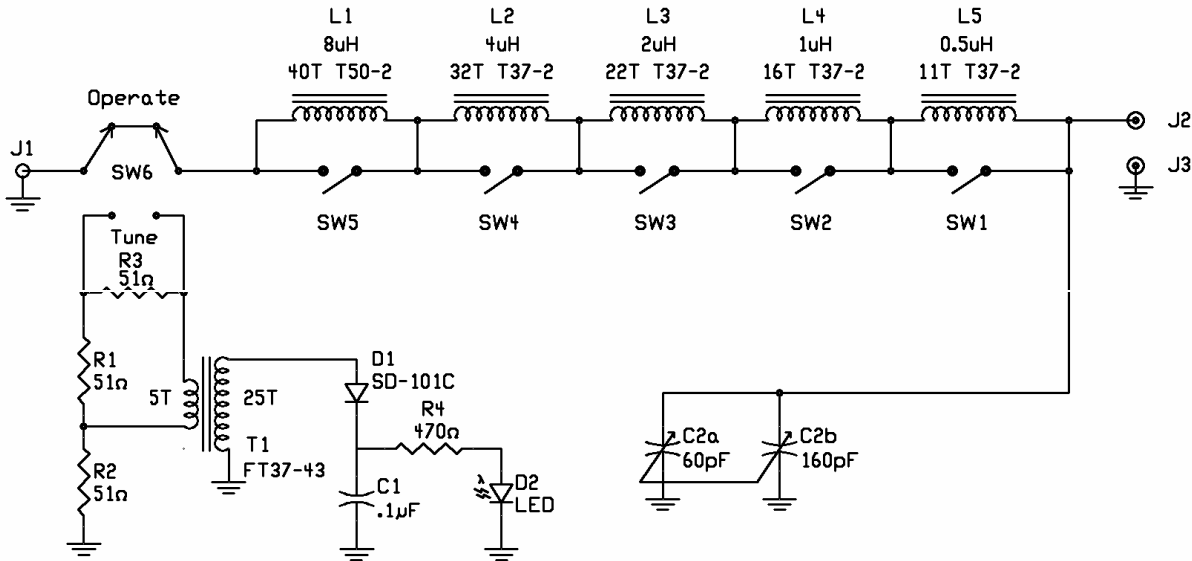


Thank you for purchasing the SLT kit from Hendricks QRP Kits. This kit is a very high quality kit that you will find easy to build, yet when you finish, you will have a quality project that you will find very useful. A long wire tuner is designed to work with a random length of long wire and a counterpoise usually cut for a quarter wave on the band of interest.

I hope that you enjoy building and using your kit. The secret to successful kit building is to follow the directions, select the correct parts, and to check your work very carefully. Good Luck with your kit.

The first step is to check to make sure that you have all of your parts. Use the list below to make sure that you have all of your parts. If you find that you are missing a part, please contact me at ki6ds@dospalos.org, and I will ship a replacement part to you as soon as possible. Or, if you do not access to the internet, please send a letter to:

Hendricks QRP Kits
 862 Frank Ave.
 Dos Palos, CA 93620



Switched Longwire Tuner (SLT)

Check	Component	Description
	C1	.1uF
	C2	Polyvaricon Tuning Cap
	D1	SD-101C Diode
	D2	Super Brite Clear LED (Red)
	J1	BNC
	J2,3	5 Way Binding Post
	L1	40T #28 T50-2 (Large Red Core)
	L2	32T #28 T37-2 (Small Red Core)
	L3	22T #28 T37-2 (Small Red Core)
	L4	16T #28 T37-2 (Small Red Core)
	L5	11T #28 T37-2 (Small Red Core)
	R1,2,3	51 ohm 2W Resistor
	R4	470 ohm 1/4W Resistor
	SW1,2,3,4,5	SPDT Toggle Switch
	SW6	DPDT Toggle Switch
	T1	25T #28 Red Pri./5T #28 Grn Sec. FT37-43
	PCB	
	Case	
	Wire	Red & Green Magnet Wire #28

Preparing The Case:

The case that is provided with your kit is a custom case that will need to be drilled. Drilling a case is easy if you use the proper procedure. First download a copy of the file **SLTTEMPLATE.bmp** from the **qrpkits** website. It is located in the same place that you found this manual. Save the file on your computer and open it with **Microsoft Paint**, which you can find in your accessories section of your computer. Print out a copy of the template on your printer. Cut out the template and tape it to the top of the case. The top of the case is the one with the bent up channels with screw holes in them. The bottom is the U shaped piece.



Top of Case



Bottom of Case

Then bend each end over the ends and secure with tape. I use masking tape, but you may use regular scotch tape if you wish. Make sure that the template is centered on the top of the case. Once you are satisfied, then go ahead and secure it with tape. Now, take a center punch and mark the case every place that there is a + in the layout template, making sure to put the point as close as possible to where the lines cross. Now use a drill press to drill out the holes to the size on the template. When drilling in metal, I like to start with a smaller drill and gradually work my way

up. The 1/8" holes can be drilled in 1 step, but the others should be done in 3 or 4 steps. Once you have the top of the case drilled it is time to start.

Populating the Board:

The circuit board in your kit is a very high quality professional board. It has plated through holes and a silk screen and solder mask. The first thing that we want to do is wind the toroids for the kit. We will wind all of them at the same time.

There are 3 different toroids in your kit, one T-50-2 which is the larger red one, four T37-2 which are the smaller red cores, and one Ft37-43, which is the small all black one. Winding a toroid is very easy and I find it quite relaxing. Let's wind the big one first. You will need to put 40 turns of wire on this one, and leave about 1 inch for the leads to be soldered into the board. Cut a piece of the red wire 28 inches long. Then, take the core in your left hand, the wire in your right hand, and put the wire up through the core and extend it about 1 inch. Hold the wire against the core with your left thumb. Now you have put 1 turn on the core, because every time that the wire passes through the core counts as 1 turn. Next, grab the other end of the wire and wrap around the core and put it through the middle from above. Now you have two turns, and the core should look like Fig. 1.



Figure 1

Continue winding until you have 40 turns on the toroid. Trim the lead to about 1 inch, and you should have a toroid that looks like the one in figure 2.

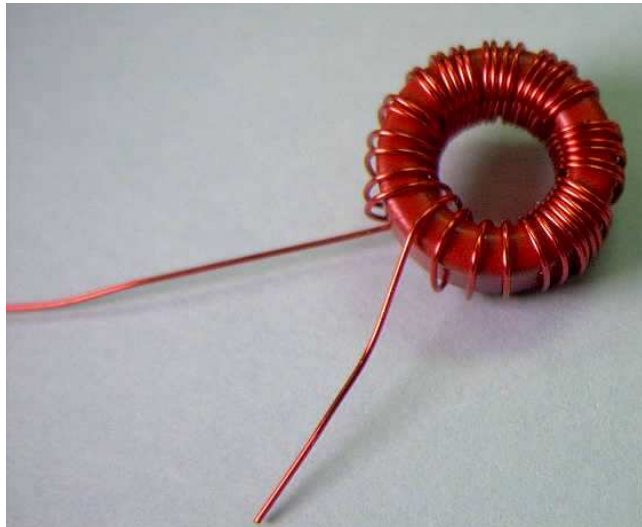


Figure 2

The next step is very important. Take a match and burn back the insulation to the edge of the core on both leads. Then use a piece of fine sandpaper, I like to use 220 grit, and clean the leads until they are bright and shiny. Fig. 3 shows the leads after burning, Fig. 4 shows one lead cleaned. Be sure to clean both leads. Set it aside for now.



Figure 3

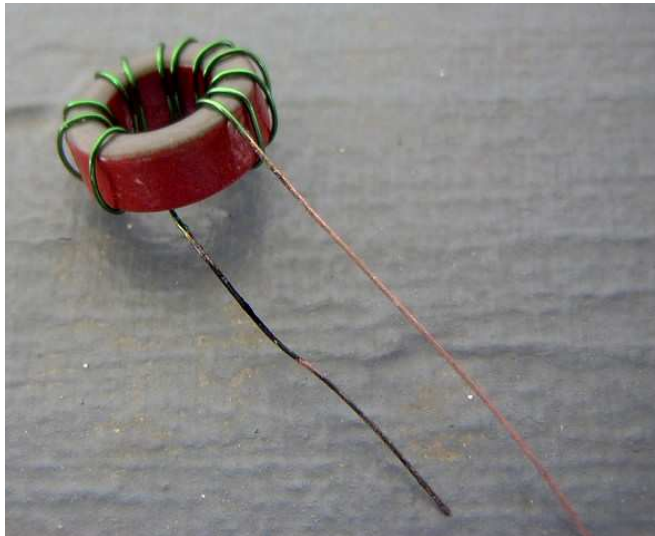


Figure 4

Next we will wind L2. Use a small red toroid as your coil form, and repeat the procedure above, but this time only put 32 turns on the coil. You will need to cut the wire to 18" to start. Don't forget to clean the insulation off the leads, it is very important. When it is finished set it aside.

Wind coil L3. Use a small red toroid, and cut your wire to 13". Wind 22 Turns on the coil. Be sure to clean the insulation off the leads.

Wind coil L4. Use a small red toroid and cut your wire to 11". Wind 16 Turns on the coil. Be sure to clean the insulation off the leads.

Wind coil L5. Use a small red toroid and cut your wire to 8". Wind 11 Turns on the coil. Be sure to clean the insulation off the leads.

Now we are ready to wind our last toroid. This will be a transformer, and is T1 on your parts list. You will need two pieces of wire, one red one that is 16" long, and green one that is precut to 9" for you. Start with the red wire. Wind 25 turns onto the all black toroid. Prepare the leads as before. Now in you will wind the second part of the transformer. Use the green wire to put 5 turns on the core between the leads of the red wire as shown in Fig. 5. Be sure to prepare the leads. Set the core aside for now.

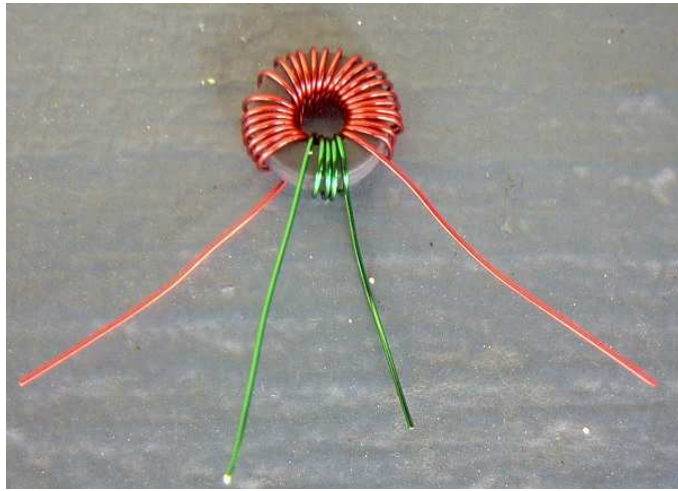


Figure 5

Note: The leads have NOT been prepared. Do not forget to do this.

Now we are ready to build the kit. It is important that you build it in the sequence given in order to be able to get to all parts to solder.

Step 1. Solder in toroids 1 through 5, making sure that you get a good solder joint. Check all joints with a volt – ohm meter for continuity. To do this go to a point that is connected to the toroid lead by a trace on both ends and check for continuity. You should see a dead short.

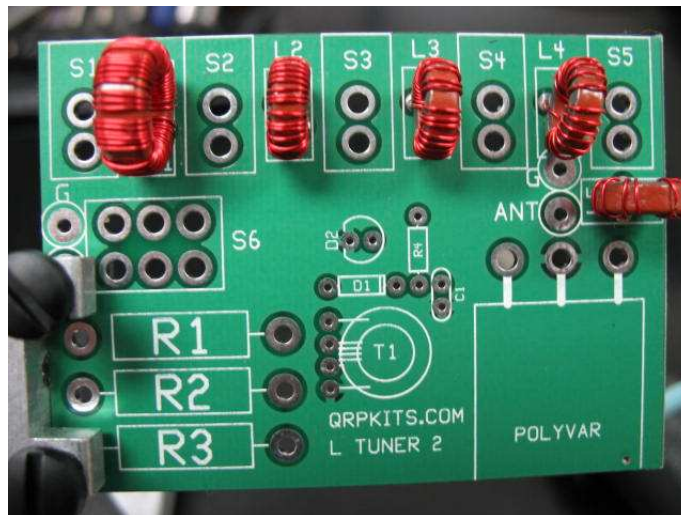


Figure 6 – Toroids 1 – 5 Mounted

Step 2. Take all of the switches and remove all hardware except for the bottom nut. Loosen the nut so that you can slip the pboard between the nut and the base of the switch, about 1/16". This sets the spacing of the board from the top of the case.

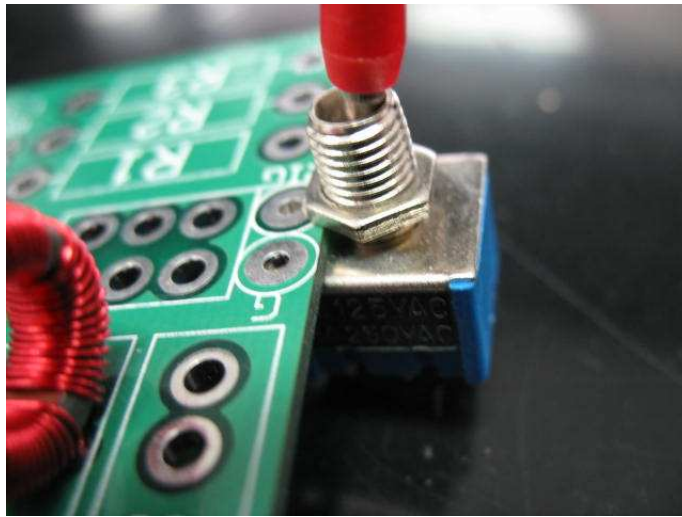


Figure 7 – Setting the depth of the bottom nut on a switch using the board as a gauge.

Step 3. Mount all switches to the board, making sure that the switch is square with the board and seats fully down on the board. Solder 1 connection on a switch and then check for alignment. The DPDT Switch will be a tight fit.

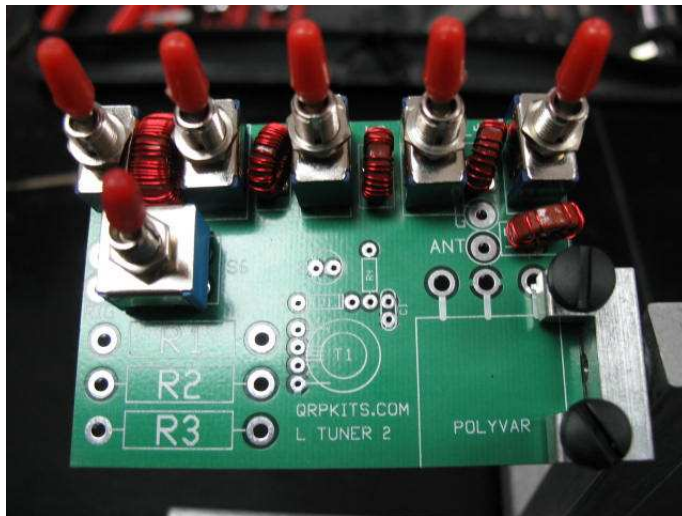


Figure 8 – Switches and Toroids Mounted

Step 4 Find the polyvaricon tuning capacitor and place it on the board. Put the leads of the capacitor through the board but don't solder yet.

Step 5. Mount the board temporarily to the case using 2 nuts on a switch on either end to set the depth. Don't over tighten the nuts, but snug them firmly.

Step 6. Fasten the tuning capacitor to the top of the case with the two screws provided. Don't over tighten



Figure 9 Polyvaricon Mounting

Step 7. Check the leads of the polyvaricon, make sure they are through the hole. The 2 outside leads will barely poke through the board, but they will. Now solder the leads of the capacitor to the board.

Step 8. Take the top of the case off the board. Be careful and don't lose the nuts or screws. Examine the polyvaricon to make sure you have a good solder joint. Also at this time, look on the back of the polyvaricon and you will see 2 half circles of brass. Use a small screw driver and adjust so that both are full circles. You will note that the polyvaricon does not sit flush on the board.



Figure 10 – Note gap between board and polyvaricon

Step 9. Solder the R1, 2, & 3 resistors in as shown.

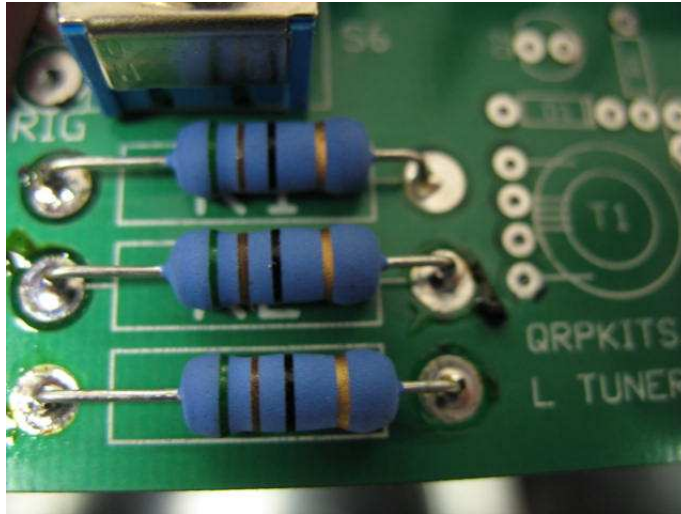
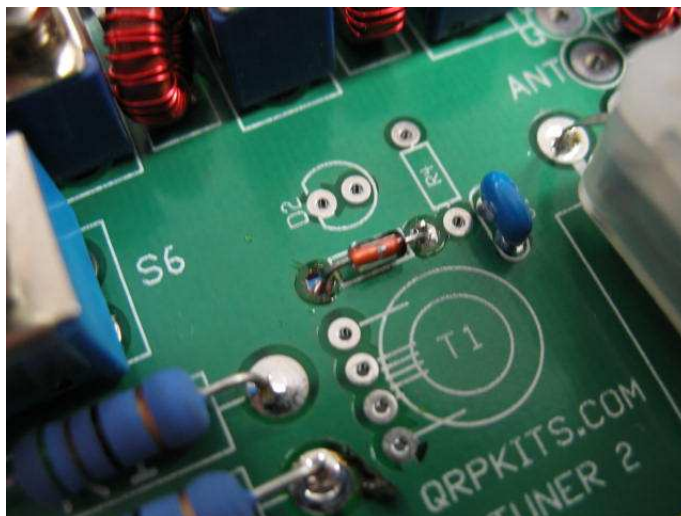


Figure 11

Step 10. Solder D1 in and make sure that the band marking on the diode is placed the same way as the band on the silkscreen of the board.

Step 11. Solder in C1, marked 104, the .1uF capacitor.



**Figure 12 = Board after installation of D1 and C1.
Note that the banded end of D1 goes towards the capacitor, C1.**

Step 12. Solder in R4, 470 ohm yellow-violet-brown.

Step 13. Now we are ready to install the LED and set the height of it above the board so it will fit through the hole in the top of the case. Place the LED in the holes on the board, making sure that you orient the LED so that the flat side matches the flat side on the silkscreen. Next, attach the board assembly to the top of the case. You will only need to tighten the nuts of the 2 outside switches, S1 and S5 to hold the board. With a pair of tweezers or needle nose pliers, fit the LED

through the top of the case. Turn over and solder in the LED from the bottom of the board. Trim off excess leads.

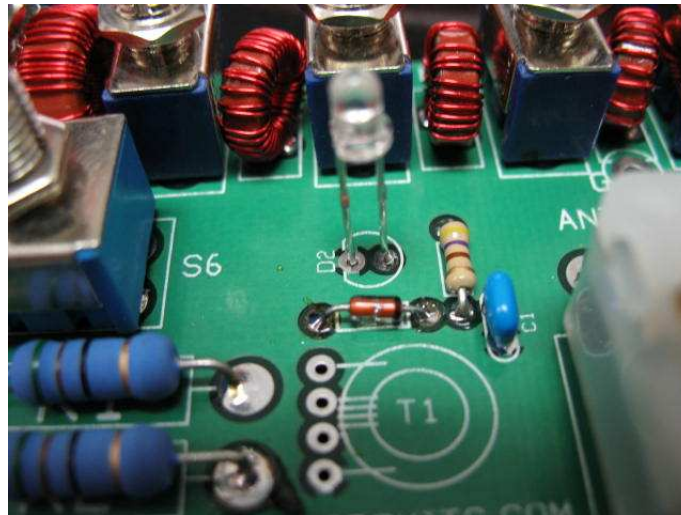


Figure 13 – LED and R4 are now mounted.
Note that the flat side of the LED is on the same side as the DPDT Switch.

Step 14. Mount the transformer T1 that was wound previously. Make sure that you prepare the leads before soldering. The green leads go in the inner 2 holes, the red leads go in the outer 2 holes.

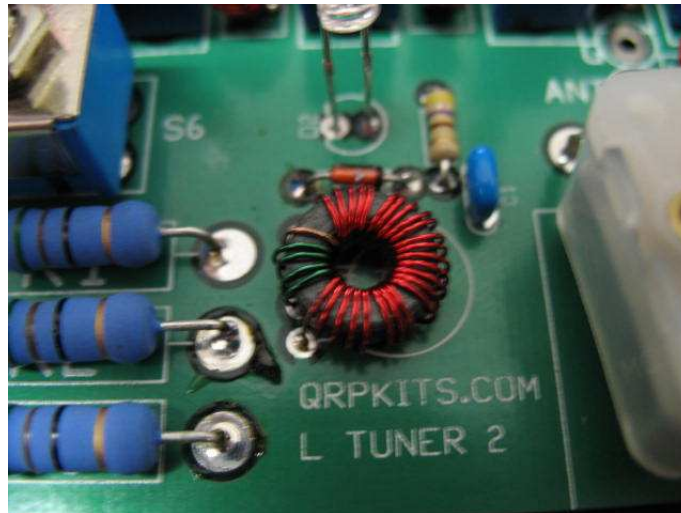


Figure 14 – Mounting T1

If you are going to paint your case, now is the time to do it. I sanded mine with #180 sandpaper, degreased it with acetone or fingernail polish remover and then gave it two coats of primer. I then gave it 2 coats of the final color, a bright John Deer Yellow.



Figure 15 Case Top View



Figure 16 Another View of the Top of the Case

I then cut out the template for the top from the bmp file on the web page, sprayed glue on the back, and then mounted it to the top. I used an exacto knife to trim around the holes.



Figure 17 Case top with mounted label

Now we are ready for final assembly.

Step 14. Mount the board to the top of the case, using all nuts and screws. Be careful to not tighten too tight on the template.

Step 15. Mount the BNC connector in the hole where it goes. Be sure and tighten the nut securely. Next solder a connector wire between the center conductor and the rig connection on the board. Now solder a connector wire between the ground connection and the G on the board near S6.

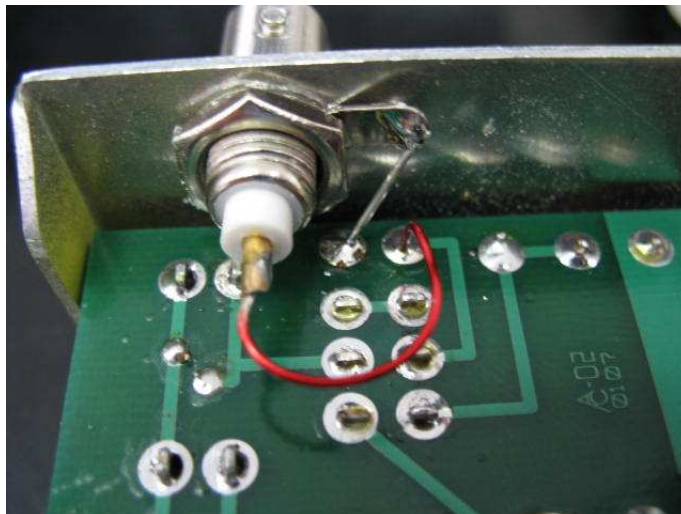


Figure 18 BNC Connections

Step 15. Mount the two 5-Way Binding Posts on the other end of the case. Run a wire from the center conductor to the Ant connection on the board near L5. Run another wire from the center conductor of the other binding post to the G connection near L5.

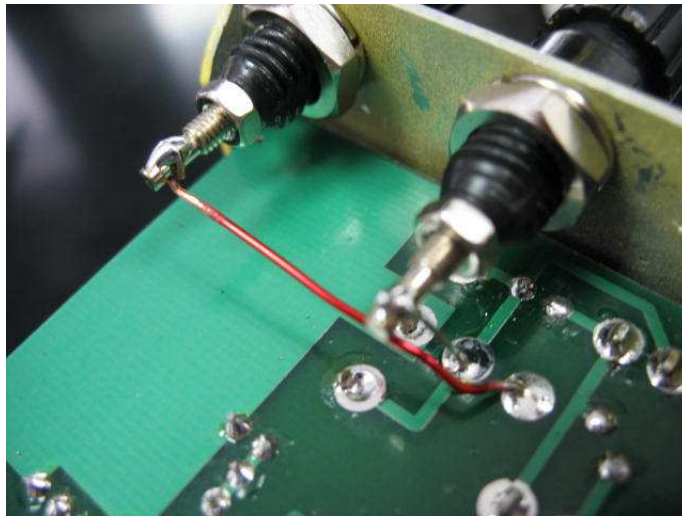


Figure 19 Binding Post Connections

Step 16. Attach the bottom of the case and check for shorts. Make sure that you use the short screw for the switch side of the case.

Here are some pictures of my finished unit. Enjoy.





Operation: I use a piece of wire 51 feet long for my long wire, and a piece 16 feet long for the counter poise. Connect the tuner to your transmitter by using a BNC jumper. Connect the long wire to the binding post in the middle of the case or the upper one in the picture above. Connect the counter poise to the bottom 5 Way post. You want to use as little inductance as possible to get

a match. So start out with all 5 switches on the top row in the out position. This will bypass those coils, eliminating them from the circuit. Next, switch the tune/operate switch to tune. Now put the right hand toggle in the in position. This will be minimum inductance. Put your transmitter in tune or close the key to send a signal. You will be transmitting into a bridge, and you will not harm your finals if you keep it short. While sending a signal, use the tuning capacitor to see if you can get the LED to dim or go out. If you do, you have a match. If not, try switching in more inductance remembering that the inductance increases as you go to to you left. Keep trying adding inductance until you get a match. The LED will dim or go out when you have a good match. Have fun and enjoy