

# The SLT+

Switched Long wire Tuner  
Hendricks kits [QRPKITS.com](http://QRPKITS.com)

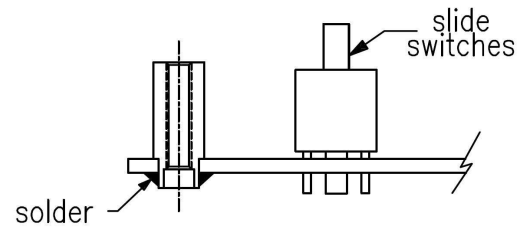
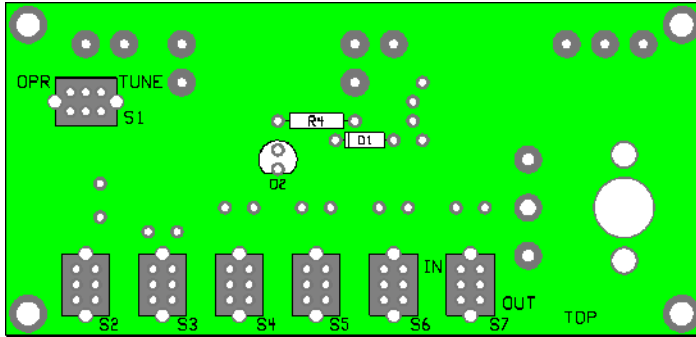


The SLT+ is designed to match the high impedance load of an end feed, half wave antenna wire to a 50 ohm transmitter using manually switched inductors and a variable capacitor configured in a “L” matching network. Six inductors in BCD weighted values allows for selecting inductor values from 0.5 uHy to 23.5 uHy in 0.5 uHy steps. A resistive SWR bridge with LED indicator is built in so an external SWR bridge is not required to find the match. This tuner and end feed antennas are ideal for field operation of QRP rigs.

Parts list:		
Quantity	Designation	Value/ description
1	Circuit board	
7	S1-8	DPDT slide switches
3	R1,R2,R3	51 ohm, 2W resistors
1	R4	470 ohm 1/4W resistor
1	D1	SD101 diode
1	LED	Clear, ultra bright LED
1	T1	FT37-43 ferrite core (black)
2	L1 ,L2	T50-2 RED toroid core (large)
4	L3,4,5,6	T37-2 RED toroid core (small)
1	C1/C2	Poly-variable tuning cap
1 set		Knob, 3 screws, and nylon spacer for poly-varicon.
8 feet		Red #28 magnet wire
9"		Green #28 magnet wire
1		Red 5 way binding post
1		Black 5 way binding post
1		BNC jack
4		3/16" Swage board standoff, #2
4		1/4" #2 flat head screws
1		Case
		Set of decals

## Construction:

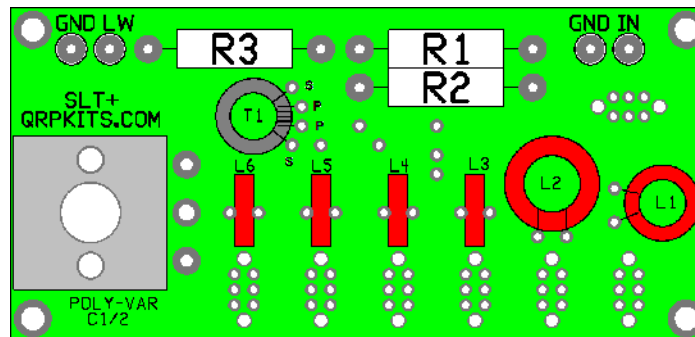
Parts are mounted to both the top and bottom side of the circuit board. We will start with the top side.



Install standoffs on topside of the board, and solder on bottom side.

1. Install the four (4) 0.187" Swag standoffs into the four mounting holes in the corners of the board. These are inserted from the **TOP SIDE** of the board. Run a bead of solder around the outside edge of the standoffs sticking out the **BOTTOM** of the board to attach them to the solder pad around them. You will need a fairly high wattage iron to do this.
2. Install the seven (7) DPDT slide switches on the top side of the board.
3. Install R4, 470 ohm resistor (Yellow, Violet, Brown, Gold)
4. Install D1, SD101 glass diode
5. Install the LED. Be sure to match up the flat on one side of the LED package with the flat side of the LED outline on the board. Do not mount the LED flush to the board. With the board flipped over so that you can solder the leads, let the top of the LED touch your work bench so that it is the same height as the top of the switch levers.

## Bottom side of board:



1. Wind and install T1. Wind the 25 turn secondary first (16" of red wire) on the BLACK T37-43 ferrite core. Then wind the 5 turn (9" of green wire) primary in the gap between the secondary turns. See illustration on next page. The leads from the secondary winding go into the top and bottom holes labeled "S" in the diagram and the primary winding leads into the middle holes labeled "P" Be sure to tin the wire ends before trying to solder the wires to the pads on the board. The insulation can be melted through with a hot soldering iron with a blob of solder on the tip and rubbing the wire until the insulation melts. Or, the insulation can be burnt off with a match or lighter, then cleaned up with some fine grit sandpaper or emery cloth.
2. Install R1, R2 and R3 the 51 ohm (Green, Brown, Black, Gold) 2 watt resistors
3. Wind and install L1 and L2. (See table next page for number of turns) These both mount flat to the board. L1 will overhang the edge of the board slightly.
4. Wind and install L3 to L6. These mount vertically on the board.

5. Install the variable capacitor and secure to the board with the two mounting screws. Set the trimmers on the bottom of the cap to minimum setting. (fully unmeshed)

Winding	Table	
L1/L2	T50-2	40 turns (28")
L3	T37-2	32 turns (18")
L4	T37-2	22 turns (13")
L5	T37-2	16 turns (11")
L6	T37-2	11 turns (8")

Remember that one turn is each time the wire passes through the center of the core. Evenly space turns around core. Be sure to tin wire ends before soldering to board.



*Illustration 1: T1 winding*

This completes assembly of the board.

### Preparing the case:

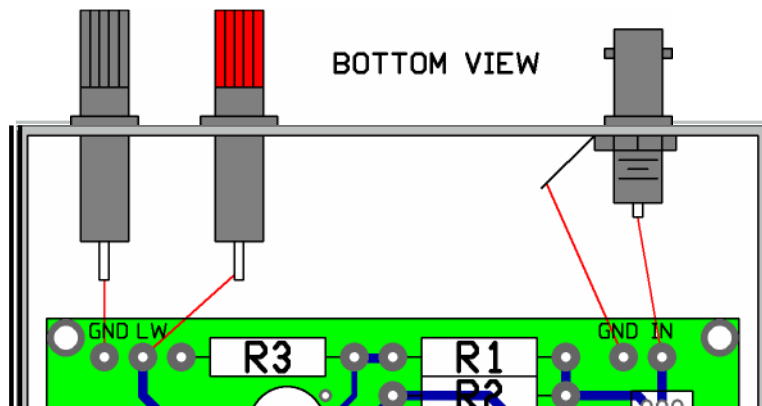
If you like, you can paint the case the color of your choice.

Apply the decals to the case as shown in the picture on page 1 of the manual.

Install the BNC jack and binding posts to the side of the case.

Drop the circuit board into the top of the case and mount using four (4) #2 screws into the standoffs from the top of the case.

Using the resistor lead clippings, jumper the connections from the board to the BNC jack and binding posts.



Pad labeled "IN" goes to the center pin of the BNC jack. Pad labeled "GND" goes to the ground lug on the BNC jack

Pad labeled "LW" goes to RED binding post. Pad labeled "GND" goes to the BLACK binding post

Put bottom cover on case.

Install the nylon spacer and screw onto the tuning capacitor to form a shaft for the knob. A drop of nail polish or super glue on the threads where the screw goes into the cap will help it from becoming loose. Put the knob on the shaft and your are done!

## Using the SLT+

For best results, random wire lengths should be avoided. Ideally, the wire length should be about 10% shorter than a 1/2 wave on the band you wish to operate on. An exact 1/2 wave length antenna has a fairly high impedance on the end, which the SLT+ may not be able to match. Making the wire slightly shorter reduces the impedance to something the SLT+ will have an easier time matching. For bands which are harmonically related, a single length of wire will work on these bands. For example, a 1/2 wire on 40 will work as a full wave on 20.

A counter pose wire is recommended. Using a counter pose wire will eliminate any hand capacitance effects which can change the tuning when you remove your hand from the tuner box or rig. The counter pose wire would connect to the ground (black) binding post. Ideally, a 1/4 wave length wire would be used, but good results can be obtained with shorter wires. Lay this wire on the ground and if possible, in a direction opposite the active antenna wire.

The table below shows the approximate value of inductance and capacitance needed to match a wire on different bands. Preset the switches to these values for the band in use and tweak from there. Place the TUNE / OPER switch in the TUNE position to active the SWR bridge. Adjust the tuning capacitor and inductance in order to make the LED dim as much as possible or make it go out all together (best match). Once the match is found, switch back to the OPER (operate) position and start making QSOs!

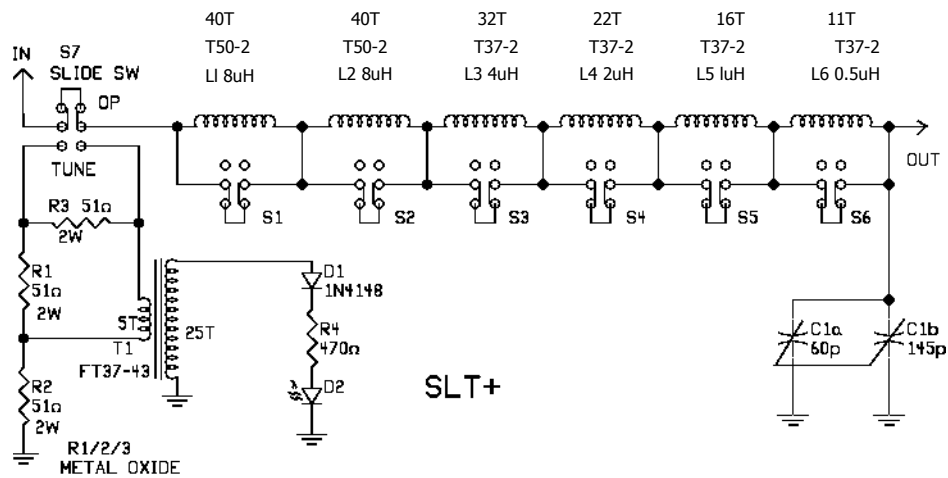
80 M	40 M	30 M	20 M	15 M	10 M
22 uH	12 uH	8 uH	5.5 uH	4 uH	3 uH
100 p	50 p	30 p	25 p	15 p	10 p
Inductor values for switches in "IN" position.					
S1	S2	S3	S4	S5	S6
8 uH	8 uH	4 uH	2 uH	1 uH	0.5 uH

## Getting a wire up into the trees:

One of the big advantages of an end feed antenna is the ease and speed it can be erected, compared to dipoles, since only one end of the wire needs to be thrown into the tree. You don't have to find two trees the right distance apart and nothing in between them which would make stretching a wire between them difficult.

The simplest way to get a wire over a tree branch well up off the ground is to use a plastic water or soda bottle 1/3d to 1/2 full of water as a throwing weight. The shape of the bottle is such that it is easy to hold and it slips down between tree branches without snagging or wrapping around branches and getting snagged. Nylon "Mason line" is used as a leader. Simply put one end of the mason line into the top of the bottle and replace the cap. Loosely lay out the line on the ground in such a manner that it will not snag on stuff which might be on the ground. An underhand toss of the bottle is generally the best way to throw it. With a little practice, you should be able to get it at least 20 feet up.

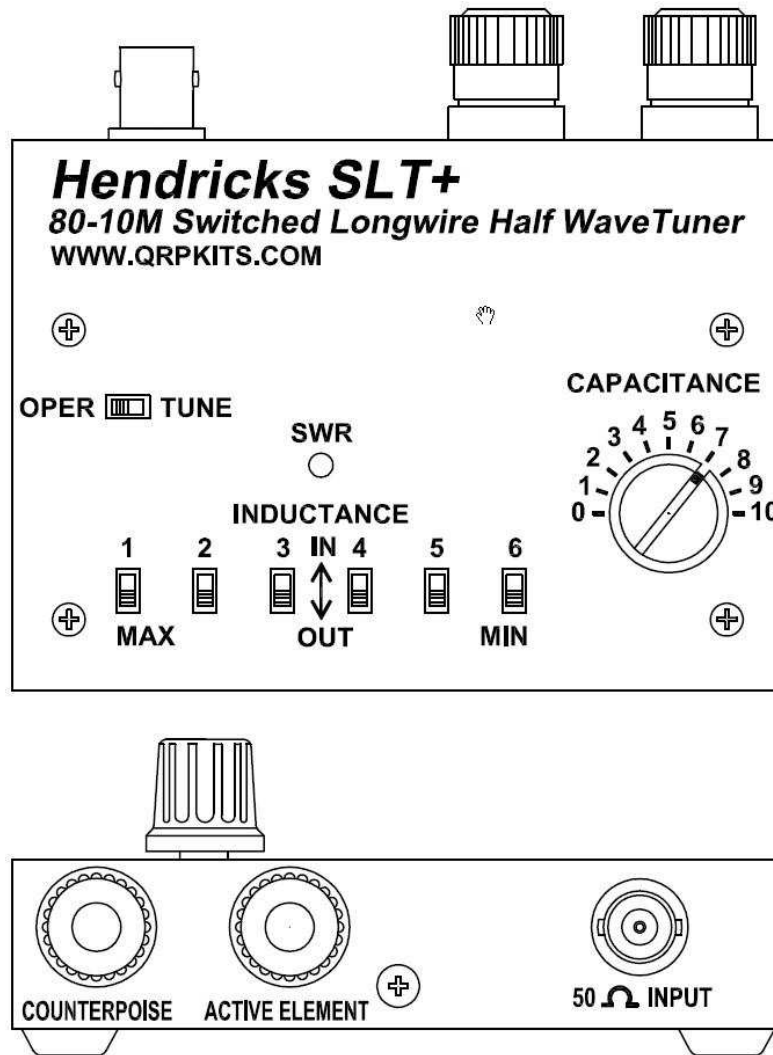
How the wire is configured depends greatly with what you have to work with in terms of support trees. The simplest configuration is an inverted "V" where the wire runs from the tuner, up to a tree branch and back down towards the ground. An "L" configuration is somewhat better for DX, especially if you can get the part of the wire from the tuner up to the tree as vertical and as long as possible. If the wire is run fairly close and parallel to ground, this is good for close in contacts.



Antenna approximations for CW portion of the bands							
Band	80m	40m	30m	20m	17m	15m	10m
Active Ele.	124 ft.	63 ft.	44 ft.	31.5 ft.	24.5 ft.	21 ft.	15.5 ft.
Counterpoise	69 ft.	35 ft.	24 ft.	17.5 ft.	13.5 ft.	11.5 ft.	8.5 ft.
Inductance	S 1,2,3,4	S 1,3	S 1	S 3,5,6	S 3	S 3	S 4,5

Counterpoise should be 180° from active element direction  
 For best results, use as little inductance as possible, to obtain a match.  
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If you desire, print this out, seal with clear packaging tape, and apply to the bottom of the tuner with two-sided tape for a reminder.



## Hendricks SLT + Decal Installation

The decals are applied the same as model decals. Cut around each group of text or symbols you wish to apply, leave a border. It doesn't have to be perfect as the background film is transparent. Apply the decals before you mount anything to the cover. Use the above 1:1 picture to get the correct spacing around the holes, as it is very easy to do a great decal installation and have a portion covered up with a knob. Use the cross in the center of the capacitance group, and center it in the hole

**Thoroughly clean the surface of the panel to remove any oils or contamination.**

Trim around the decal, leaving about 1/16" space around the printing. After trimming place the decal in a bowl of lukewarm water, with a small drop of dish soap to reduce the surface tension, for 10-15 seconds. Handle carefully to avoid tearing. Start to slide the decal off to the side of the backing paper, and place the unsupported edge of the decal close to the final location. Hold the edge of the decal against the panel, with your finger, and slide the paper out from under the decal. You can slide the decal around to the right position, as it will float slightly on the film of water. Use a knife point or something sharp to do this. When in position, hold the edge of the decal with your finger and gently squeegee excess water out from under the decal with a tissue or paper towel. Work from the center, to both sides. Remove any bubbles by wiping gently to the sides. Do this for each decal, and take your time. Allow to set overnight, or speed drying by placing near a fan for a few of hours. When dry, spray two **light** coats of matte finish, Krylon, clear to seal and protect the decals, and allow to dry in between coats. All decals come with two complete sets, in case you mess one up.