

Pacific Antenna End Fed Half Wave SOTA Tuner for 40m-15m



Description

- A lightweight tuner for endfed halfwave wire antennas
- Two versions: 40-15 Meters or 80 Meters.
- Includes an aluminum case measuring 2 x 2 1/4 x 7/8 inches.
- Weight less than 3 ounces.
- Internal resistive bridge with LED indicator.
- Protects rig from high SWR during tuneup.
- 5 watts continuous and up to 10 watts intermittent.
- Ideal for backpacking and travel.
- Simple to assemble and operate.

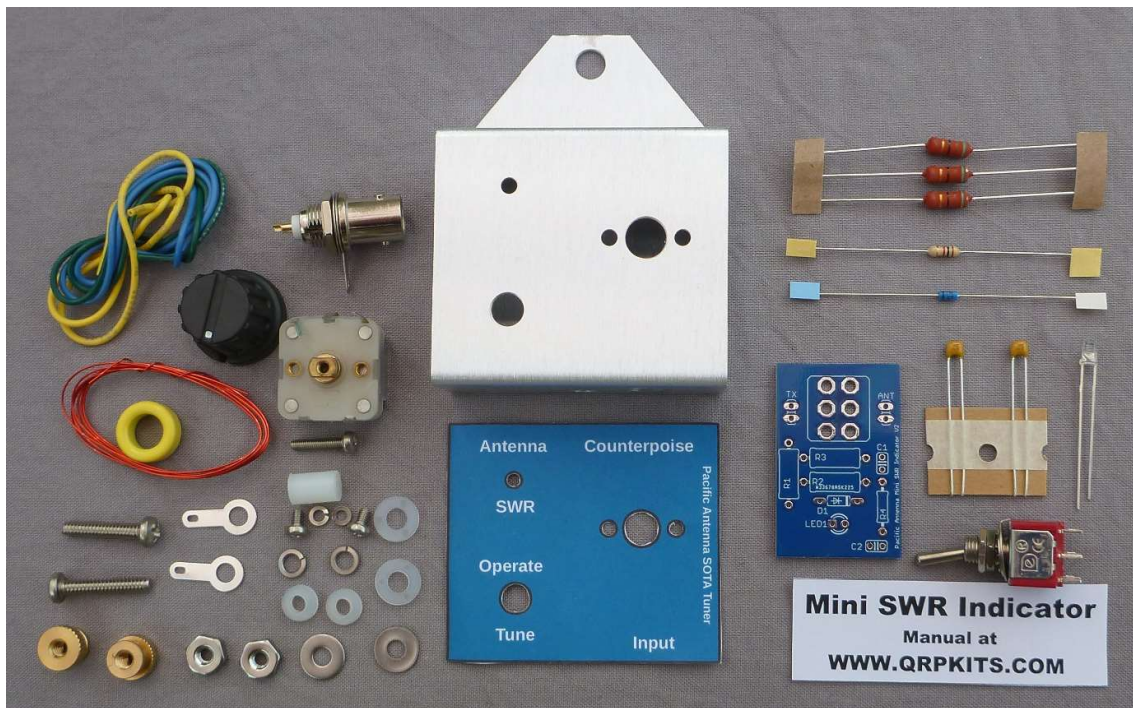
[Pacific Antenna](http://www.qrpkits.com)
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First, familiarize yourself with the parts and inventory the kit using the table and photo below.

Parts List

Check	Installed	Quantity	Component	Description
		1	SWR Indicator Kit	Mini SWR Bridge Kit
		1	T50-6 toroid	Yellow toroid core
		1	Polyvaricon	Variable Capacitor
		1	Polyvaricon shaft screw	2.6 x 12mm Phillips pan head screw
		2	Polyvaricon mounting screw	2.5 x 4mm Phillips screw
		2	Washers for polyvaricon screw	Lockwashers for polyvaricon screws
		1	Polyvaricon shaft	3/8" white Nylon standoff
		2	6-32 x 3/4" SS screw	Stainless phillips pan head screw
		2	#6 SS lock washer	Stainless
		2	#6 SS flat washer	Stainless
		2	6-32 Knurled nut	Brass
		2	#6 nylon step washer	Nylon, white plastic step washer
		2	#8 nylon flat washer	Nylon, white plastic flat washer
		2	#6 solder lug	Solder Lug
		2	6-32 SS nut	Stainless
		2	4-40 screw	1/4" Undercut flat head
		1	BNC	Female, chassis mount
		1	1/4" shaft knob	Black plastic knob, medium
		24"	#26 magnet wire	Red or Green #26
		18"	Hook-up wire	# 24 AWG, three colors, 6" each
		1	SOTA chassis	Aluminum, unfinished
		1	SOTA Panel Overlay	Adhesive Panel Cover

Typical Parts



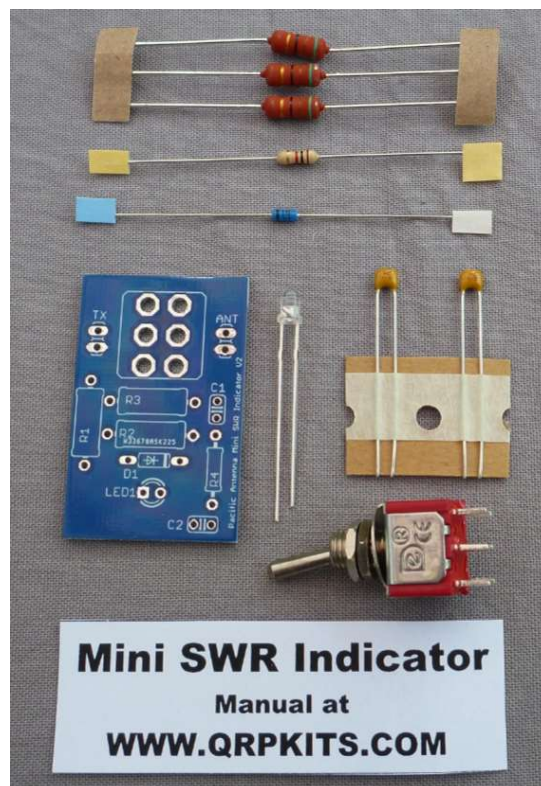
Note that in some cases parts may vary slightly in appearance from those shown.

First, assemble the SWR Indicator Board



Parts

Use the photograph below to help identify the parts in your Mini SWR Indicator kit.



Note that in some cases parts may vary slightly in appearance from those shown.

Mini SWR Indicator Parts List

Use the first column of the table below to check the parts as you inventory them and use the second column to check the parts as you install them.

Check	Installed	Quantity	Part	Value	Description
		3	R1,R2,R3	51 Ohm 2W	GRN-BRN-BLK-GOLD
		1	R4	1K Ohm 1/4W 5%	BRN-BLK-RED-GOLD
		1	D1	1N5711 diode	Schottky Diode
		2	C1, C2	0.01uF Capacitor	Monolythic marked 103
		1	LED1	3mm Red LED	LED 3mm Red, clear body
		1	S1	DPDT Toggle Switch	Metal toggle, red body
		1	PCB	MINI SWR IND	SWR IND Circuit Board

Note: If the board has positions for both D1 and D2, D1 is not installed, only D2. Otherwise, there will only be only one position for a diode labeled D1.

Inserting the Parts

Install the components listed in the table.

For parts such as resistors and diodes, you should pre-form the leads by bending them down at a 90 degree angle.

Match the distance from the body to the holes in the circuit board where the part will be located.

Be sure to double check orientation of the diodes D1, D2 and the LED as they must be installed correctly.

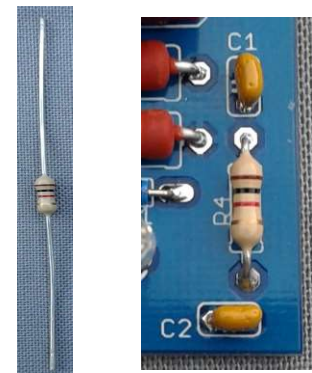
Once each part is installed, bend its leads on the bottom of the board to hold it in place, solder the leads and clip off the excess lead.

Resistors

Install R4

Locate and install the 1K Ohm resistor R4 in the marked location on the board.

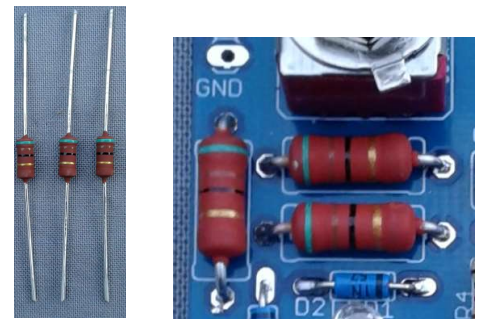
It is the only small, ¼ watt resistor in the kit and is color coded Brown-Black-Red-Gold.



Install R1, R2 and R3

Now locate and install R1, R2 and R3 in the locations marked on the circuit board.

These are larger body, 51 Ohm, 2W resistors with color code Green-Brown-Black-Gold.



Capacitors

Install the capacitors C1 and C2 (marked 103) in the locations indicated on the board.

They do not have any specific orientation.



Diode

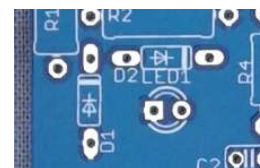
Install the diode. Note that some earlier boards may have a position for both D1 and D2. For those boards, only one diode will be installed at position D2.

Otherwise, there is only one diode position on the board and it will be labeled D1.

Note that the diode has a black band on one end.

The outline on the circuit board also shows a band on one end of the diode location.

Be sure to orient the diode bodies so that the band on the diode matches the outline on the circuit board as shown in the photos here.



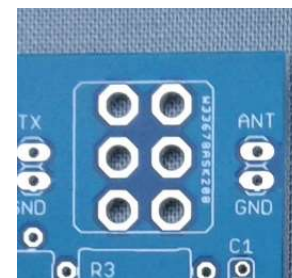
Switch

Install the supplied DPDT switch in position S1 on the board. The orientation does not matter.

Solder 1 pin first and check that the switch is level and seated on the board.

If not, heat the soldered pin while pressing the switch into the board and hold it while the solder solidifies.

Repeat this with a pin on the opposite end of the switch. This will hold the switch in place while the other 4 pins are soldered.



LED

Install the indicator LED.

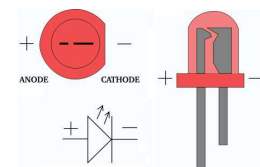
If the SWR Indicator is to be mounted in a case or other enclosure, you will not want to seat the LED on the board.

The LED has specific polarity and must be installed only one way in the board or it will not work.

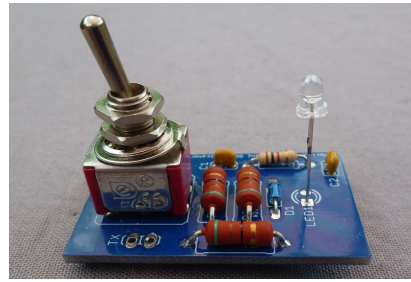
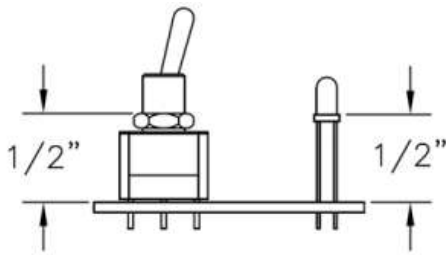
It has one lead that is longer (the anode) and one shorter (the cathode)

The body of the LED will usually have a flat on the same side as the short lead.

The circuit board has a round pad and square pad at the LED location.



To install, insert the LED so that the short lead goes into the square pad on the board and the longer lead into the round pad.



For now, when soldering the LED, leave the leads as long as possible above the board to allow adjustment when you are ready to install it into an enclosure.

A good guide when installing the SWR Indicator into a case is to align the base of the LED with the top of the switch body where the switch sits against the inside of the enclosure panel.

Adjust the height of the LED and the inside nut of the switch, for the correct fit to the chassis so that the LED will just fit through the case when the SWR indicator is installed.

This completes the Mini SWR Indicator Kit assembly.

Initial Tests for Mini SWR

Inspect the board for any bad solder joints, shorts or other problems and correct before use.

Confirm proper orientation of the LED and diodes.

Using a multi-meter in resistance mode, measure the resistance between the TX and GND pads on the board.

With the switch down for Operate mode (toggle lever down toward the resistors), the resistance should indicate open or infinite.

With the switch up for Measure mode, (toggle lever up away from the resistors) the resistance should be approximately 100 Ohms.

Repeat this check on the output pads labeled ANT and GND.

With the switch up in Operate mode, the resistance should indicate open or infinite resistance.

With the switch down in Measure mode the resistance should be approximately 150 Ohms.

Next, check resistance from the TX to the ANT Pads.

With the switch in Operate, you should see a very low resistance, usually less than 1 ohm.

With the switch in the Measure position, you should measure approximately 50 Ohms between TX and ANT.

Set the SWR indicator aside, for now while the remainder of the assembly is done inside the chassis.



Measure



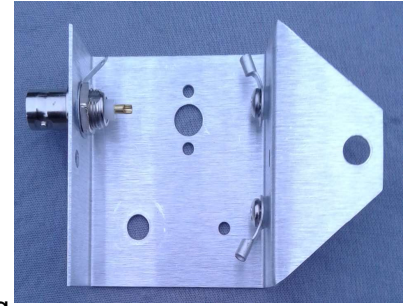
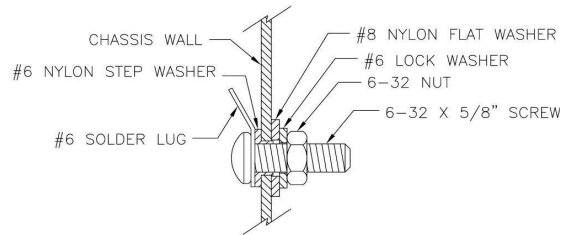
Operate

SOTA Chassis Assembly

Install the connectors and hardware on the chassis.

Assemble the two antenna connections and the bnc connector to the chassis cover.

NOTE: The nylon step washers are used to keep the antenna connections insulated from the chassis.



Position the solder tabs as shown, bent in and angled down slightly, so that the antenna lug does not short against the PEM nut or other internal wiring when the case is assembled.

Check that there is no continuity between the solder tabs and the case at this point. This is to verify that the insulating washers were installed correctly.

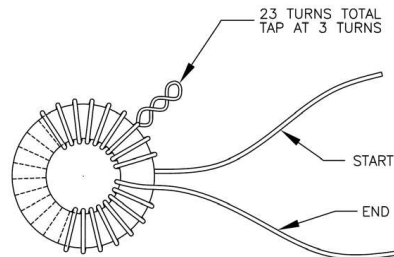
Wind L1

Using the T50-6 yellow toroid and the enclosed magnet wire.

When complete, L1 will have a total of 23 turns, with a tap at 3 turns from the "START" end.

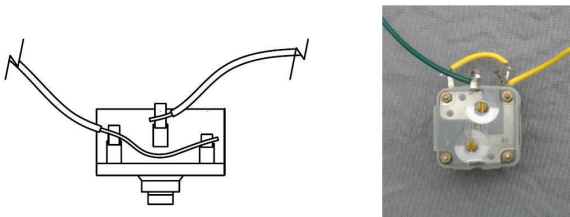
Remember, every time the wire passes through the center of the toroid, counts as one turn.

Strip and tin the leads either by scraping, sanding or using the solder blob technique to remove the insulation.

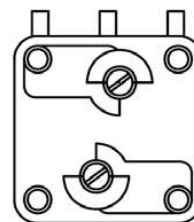


Polyvaricon preparation

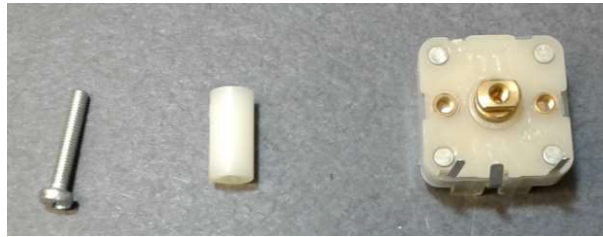
Attach wires to the polyvaricon as shown with 2" pieces of the hook-up wire to put the two sections in parallel.



Adjust the small trimmers on the back of the polyvaricon with a small screwdriver for half engagement as shown here:



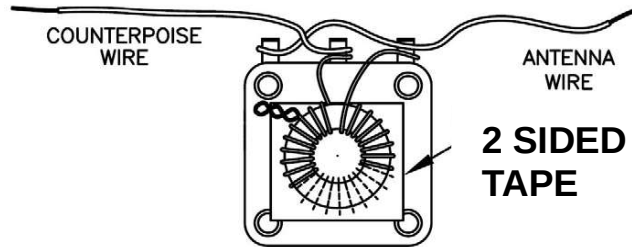
Mount the shaft and center screw provided on the polyvaricon



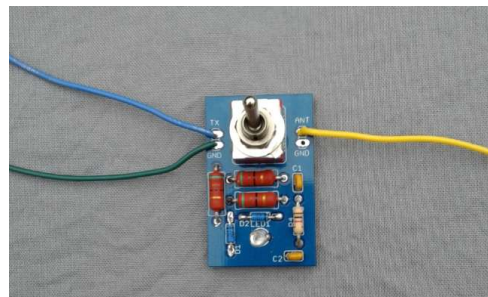
Put a small piece of double sided tape on the back of the poly-varicon to act as a surface to secure the toroid.

Wire only the two ends of the toroid winding to the poly-varicon as shown.

Leave the tap unsoldered for now.



Now, pre-wire the previously assembled SWR indicator as shown with approximately 3" long pieces of hook-up wire.



Final Assembly Steps

Apply the Panel Overlay

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

Trim the panel overlay, if not already done. just to the outside edge of the black frame.

Punch out or cut out the hole for the LED only if not already done.

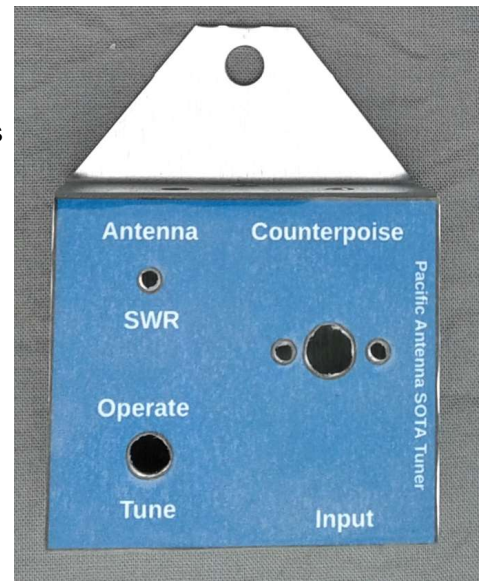
You can go ahead and punch the other holes if a hole punch is available or if not, leave them as is and use the case openings as a guide to trim the other holes once the overlay is adhered to the case.

Peel off the adhesive layer and carefully align and apply the panel overlay to the chassis front.

Use the edges of the case and the LED hole as alignment points for applying the overlay.

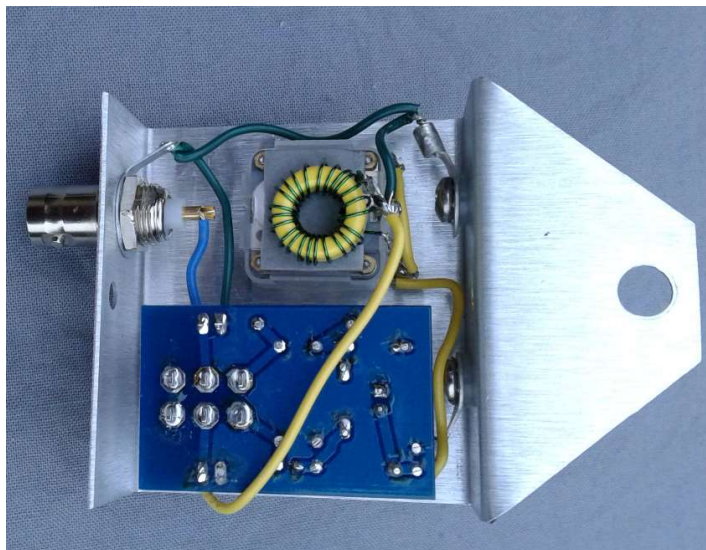
Note: the other case holes are covered by controls and if they are slightly misaligned, it will not show.

Trim the other holes using a razor knife or other tool using the holes in the case as a guide.



Assembling your SOTA Tuner in the case

This photo will assist with making the final connections to complete your SOTA tuner:



Mount the poly-varicon/toroid assembly to the chassis cover with the two 2.5 x 4 mm screws and the supplied lockwashers.

The washers are necessary to provide sufficient clearance for the polyvaricon plates.

Install the pre-wired SWR indicator as shown, and secure it to the chassis with the remaining toggle switch nut.

Solder the wire from the center connection of the poly-varicon to the counterpoise lug.

Solder the wire from the side connection of the poly-varicon to the antenna lug.

Solder the "ANT" wire from the swr indicator to the toroid tap.

Solder the "TX" wire from the swr indicator center connection of the BNC connector.

Solder the "GND" wire from the SWR indicator to the BNC ground lug.

Before proceeding test with the toggle switch in the “OPERATE” position to be sure there is no continuity between the wingnuts and the case.

Solder a wire from the BNC ground lug to the counterpoise ground lug.

Fit the bottom half of the case to the top and secure it with the two flat head 4-40 screws.

Install the knob on the poly-varicon shaft using the knob set screw.

Install the knurled brass nuts onto the screws for the antenna and counterpoise connections.

Congratulations this completes assembly of your SOTA EFHW Tuner!



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Using your SOTA Tuner

Suggested Antenna and Counterpoise Lengths

Band	Antenna Ft.	Counterpoise Ft
15	25	2
17	26	2
20	34	3
30	45	5
40	66	5
80	133	8

Start with a light weight wire approximately 6" longer than the lengths suggested for the band you wish to operate.

Apply a low power signal with the switch in "Tune" position and see if a match can be achieved as indicated by the LED dimming or extinguishing as the tuning knob is turned over its range.

If not, shorten the wire in 2 to 3 inch increments and retest.

Once a match is found, switch to "Operate" and your antenna is ready to use.

Note: The values provided in the table above are suggested starting points, not absolutes and your wire lengths may vary due to many conditions.

Note: Counterpoises of just few feet will work successfully and are all that are usually needed with endfed half wave antennas.

The condition and nature of the ground as well as the angle of elements in respect to ground, can all affect the overall length wire and counterpoise needed to achieve a good match.

We recommend that you test the SOTA tuner and note what works best for your conditions.

How the wire is deployed will depend on what is available for support such as trees and/or structures.

The simplest configuration is an inverted "V", where the active element runs from the antenna connection of the tuner, up to a tree branch, and back down towards the ground.

An "L" configuration for the active element is somewhat better for DX, especially if you can get the part of the wire from the tuner up as vertical as possible.

If the wire is run horizontally and fairly close to the ground, the signal will mostly be directed upward and therefore will be better for close in contacts, especially on the lower frequency bands.

SOTA Tuner Diagram

