

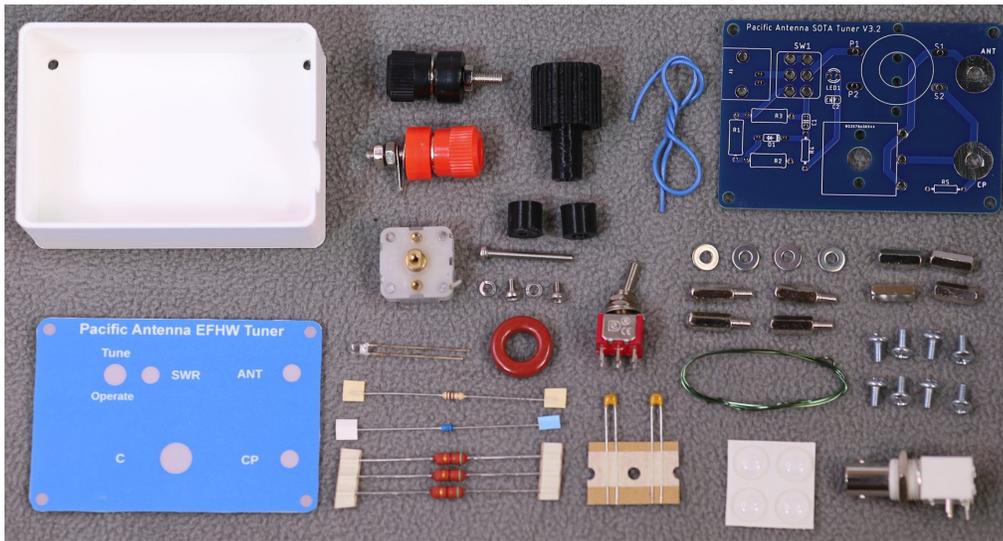
Pacific Antenna End Fed Half Wave Tuner



- A compact and light weight resonant tuner for endfed halfwave antennas
- Size: 85 x 60 x 30mm - 3.4 x 2.4 x 1.1 Inches
- Weighs just 3.8 ounces
- Covers all bands from 40 to 15 meters
- Includes an internal resistive SWR bridge with LED indicator
- Protects rig from high SWR during tuneup
- Simply adjust tuning until LED dims
- Handles 10 watts continuous and 15 watts intermittent modes
- Ideal for portable operation such as SOTA, POTA, backpacking and travel
- Assembles easily with all connections on the circuit board

Pacific Antenna
www.qrpkits.com

First, familiarize yourself with the parts and inventory the kit using the table and photo below.



Note that parts may vary in appearance from those shown.

Check	Quantity	Component	Description	Info
	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, Blue body
	2	C1, C2	0.01uF Capacitor	Monolythic marked 103
	1	LED1	Red LED, 5MM	LED 5mm Red body
	1	S1	DPDT Toggle Switch	Metal toggle, red body
	1	Polyvaricon	Variable Capacitor	
	1	Polyvaricon shaft screw	M 2.5 x 25mm Phillips screw	
	2	Polyvaricon mounting screws	M 2.5 x 4mm Phillips screw	
	4	Washers for polyvaricon screws	M 2.5 Lockwashers	M2.5 polyvaricon washers
	1	Polyvaricon Knob	Knob for polyvaricon	Printed knob
	8	Screws M3 x 6	M3 x 6mm JT phillips head	M3 x 6 JT screws for case
	4	M3 Flat Washers	Washers for front panel screws	Flat M3 washers
	1	BNC	Board mount BNC,	~12mm height
	1	EFHW Tuner Case	Plastic case	Printed case
	1	EFHW Panel with overlay	Plastic panel with overlay	Panel and adhesive cover
	1	Circuit board	EFHW Tuner V3.2 or later	PCB
	4	M3 F-F Hex Standoffs	M3 x 12mm F-F	F-F Standoffs, 12mm
	4	M3 M-F Hex Standoffs	M3 x 12mm M-F	M-M Standoffs, 12mm
	1	Binding Post, RED	Red Binding Post	Red Binding Post
	1	Binding Post, BLACK	Black Binding Post	Black Binding Post
	2	Binding Post Spacers	Spacers for binding posts	Printed spacers
	1	Toroid for T1	T68-2 (Red)	
	24"	24AWG magnet wire	Red or Green #24AWG	2 feet #24 wire
	6"	Hook-up wire, solid	# 24 or #22 AWG for primary	6" solid hookup wire
	4	Case feet	Rubber feet for bottom of case	
	1	Kit insert	Label for kit	EFHW Tuner label

Prepare the Front Panel

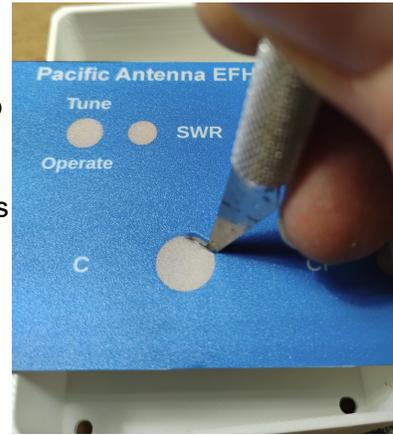
The overlay is supplied already attached to the front panel

It is best to cut out the holes in the overlay by trimming with a sharp Xacto knife or similar using the panel edges of the holes as a guide.

Most of the holes except for the SWR indicator LED will be covered so it is not necessary to trim those perfectly.

Placing the panel on the case bottom as shown will provide space for the Xacto knife blade to go through the panel.

The corner screw holes can just be cut in a cross pattern to allow the screw to fit through since it may be difficult to fully cut out the overlay in those small holes without damaging the overlay.



Standoffs:

Locate and install the 8 standoffs on the circuit board as shown.

Tighten together to hold in place.

A 5mm nut driver or wrench may be helpful for this step.



Wind T1

Using the T68-2 red toroid and the enclosed wire

First, wind 24 turns of the magnet wire on the toroid. 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

Next wind 3 turns of the hookup wire over the middle of the 24 turn winding and strip the ends of these wires using a wire stripper

Then feed the wire ends into the board as shown and solder in place



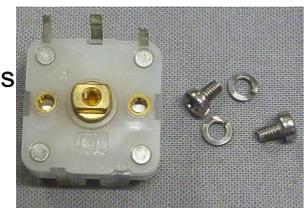
Polyvaricon

Mount the poly-varicon to the bottom of the circuit board with the two 2.5 x 4 mm screws and the supplied lockwashers (4 - 2 for each screw) with the polyvaricon leads going through the board holes.

The extra washers are to ensure the screw does not extend too far and interfere with the polyvaricon capacitor plates

Before final tightening of the screws check that the polyvaricon brass shaft is centered in the circuit board hole. This will prevent it rubbing on the side and affecting tuning smoothness.

Once it is in place and secured with the screws, solder all 3 pins to the board and clip any excess lead.



Assembly Tips

Install the remaining components listed in the table as indicated in the following pages

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 direction specific parts such as the diode D1 and LED 1.

Once components are soldered in place, trim any excess lead close to the board.

Resistors and Diode: Install R1, R2, R3, R4 and D1

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.

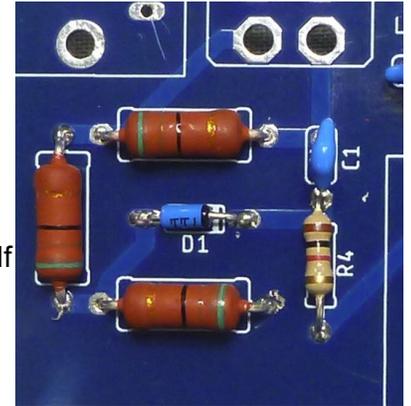
Install R4 a 1/4W resistor with color code Brown_Black-Red-Gold

Note: R5 is an optional resistor for static dissipation from the antenna element. If installed, a value of 1 to 1.5M Ohm is recommended.

Now, install the diode D1

Note: that the D1 has a black band on one end and should match the band shown on the circuit board position.

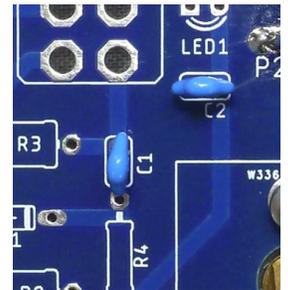
Be sure to orient the diode bodies so that the band on the diode matches the outline on the circuit board as shown in the photos here.



Capacitors: Install C1 and C2

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

They do not have any specific orientation.



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 fully and completely 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 and recheck that it is still seated completely.

If not, reflow each of the two pins while holding down to fully seat on board.

Once these two pins are soldered, it will hold the switch in place while the other 4 pins are soldered.

Remove all of the hardware. Put back a single nut screwed all the way down so it is fully against the top body of the switch. This serves as a spacer to the front panel when it is installed later. Set aside the other nut and flat washer for later. They will be installed on the switch once the front panel is in place.



BNC

Install the board mounted BNC connector in the marked location.

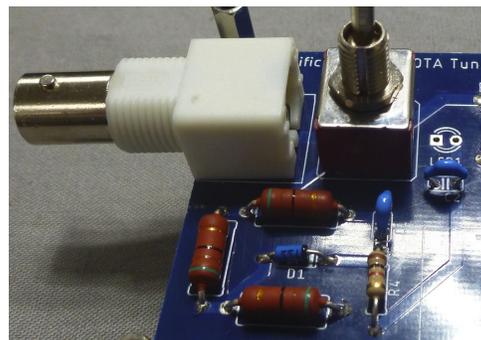
Be sure to fully seat it against the board. It has small feet on the bottom but it is important to be sure those are fully sitting on the PCB when it is soldered in place.

Solder the small pins first and recheck alignment and seating on board. before soldering the large support pins.

Test fit the front panel in place to be sure the BNC is fully seated and that the panel seats on the corner support standoffs.

Check that the square part of the body does not extend past the edge of the circuit board.

If all is good, solder the two large support pins on the BNC one at a time. taking care that it does not lift off the board or move during soldering.



Banana Jacks

Prepare to attach the binding posts to the front panel.

Locate the binding posts and plastic spacers as shown here

You will need to remove all of the hardware from the binding posts.

Insert one of the posts into the front panel so that it sits flush on the top.

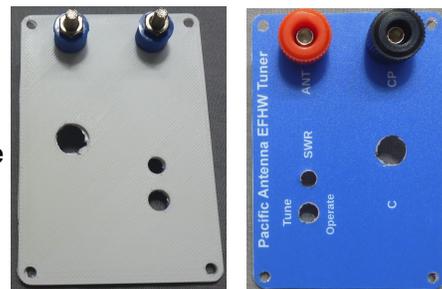
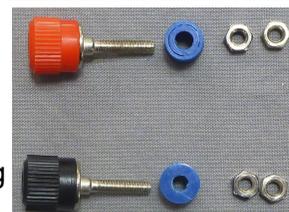
Red is used for the Antenna connection (ANT) and Black for the Counterpoise (CP).

Place the supplied 3D printed spacers over the binding post threaded portion making sure the larger opening end of the spacer goes toward the panel.

Place a washer and nut over the threads and tighten securely but do not overtighten.

It is a good idea to hold the binding post so that it does not spin and damage the front panel overlay during tightening.

Now, test fit the panel on the PCB to be sure it fully seats on the corner posts.



LED

Prepare to install the indicator LED.

Note you will not want to seat the LED on the board. It should be mounted off the board, sufficiently high from the board to fit through the front panel hole.

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 or + lead) and one shorter (the cathode or - lead).

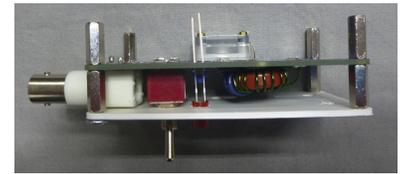


The circuit board has a round pad and square pad at the LED location. The round pad (near the toroid) is for the + lead (longer lead) and the square pad (closest to the switch) is for the shorter – lead.

Insert the LED into the back side of the front panel with the base of the LED seated against the panel and the shorter lead toward the switch location on the panel.

Install the front panel with 2 screws and washers loosely and if needed use tweezers or needle nose pliers to guide the LED leads into the correct board holes.

Only then, turn the panel and assembly over, double check that the LED protrudes through the hole as shown and if so, solder and trim excess.



Final Assembly Steps

Install the remaining panel screws and washers in the other two corners of the top panel. Do not tighten too much as it may damage the front panel overlay. Just past finger tight is sufficient to hold the panel in place.

Install the flat washer and second nut on the switch to secure it to the panel.

Install the other two nuts for the binding posts on the bottom of the PCB and tighten securely.

Loosen the BNC nut (if provided) to allow it to fit down into the u shaped opening.

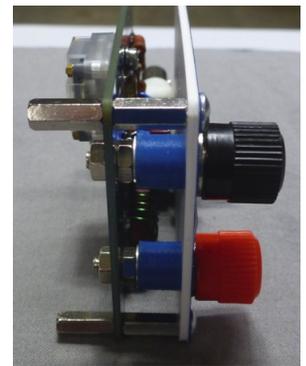
Drop the assembly into the case.

The BNC threaded part should sit very close to the bottom of the opening in the case.

Now install the 4 bottom case screws and rubber feet.

Install the knob on the polyvaricon shaft using the supplied 2.5 x 25mm screw.

Note that the knob is keyed to fit onto the top profile of the polyvaricon and you may need to rotate it back and forth until it seats before tightening the screw to secure it.



Congratulations this completes assembly of your Pacific Antenna EFHW Tuner!



Support
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Using your SOTA Tuner

Suggested Antenna and Counterpoise Lengths

Band	Antenna Ft.	Counterpoise Ft
15	20.0	3
17	24.5	3
20	29.5	5
30	42.5	5
40	61.0	5

Tips

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

Use an antenna analyzer to directly find a match or 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 for best match.

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 as indicated 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.

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

The simplest configuration is where the active element runs from the antenna connection of the tuner, up to a tree branch or other support.

It can be vertical, sloped or horizontal however, the configuration may affect the pattern and tuning to some degree.

An "L" configuration for the active element is a good option 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.

Schematic

