

PICO TUNER ASSEMBLY INSTRUCTIONS

Revision History

18 December 2015

First issued

Pico Tuner Packing List

It's a good idea to check that you have all the parts before you get started:

Item	Number	Comments
PCB	1	
Toroid (yellow)	1	T50-6
60cm 25 swg wire	1	
100pF cap (SMD) on card	1	
4k7 resistor	1	yellow-purple-red
Trimmer 5.5-50pF	1	

If anything is missing, just get in touch for help.

Pico Tuner Instructions

The Pico Tuner kit is easy to make and you will end up with a very useful antenna tuner. The tuner will match the impedance of a typical end fed antenna (around 4,700 Ohms) to 50 Ohms.

Step by step instructions together with lots of photographs will make it easy to build your tuner. It will take around 90 minutes work. As with any construction project, as soon as you feel tired, stop. If you don't mistakes will follow!

For all the assembly work, find a light place to work with plenty of room. A tea tray is useful to work on as the raised sides stop small parts rolling away.

Spotted a mistake or need help?

Please let me know if you need help!

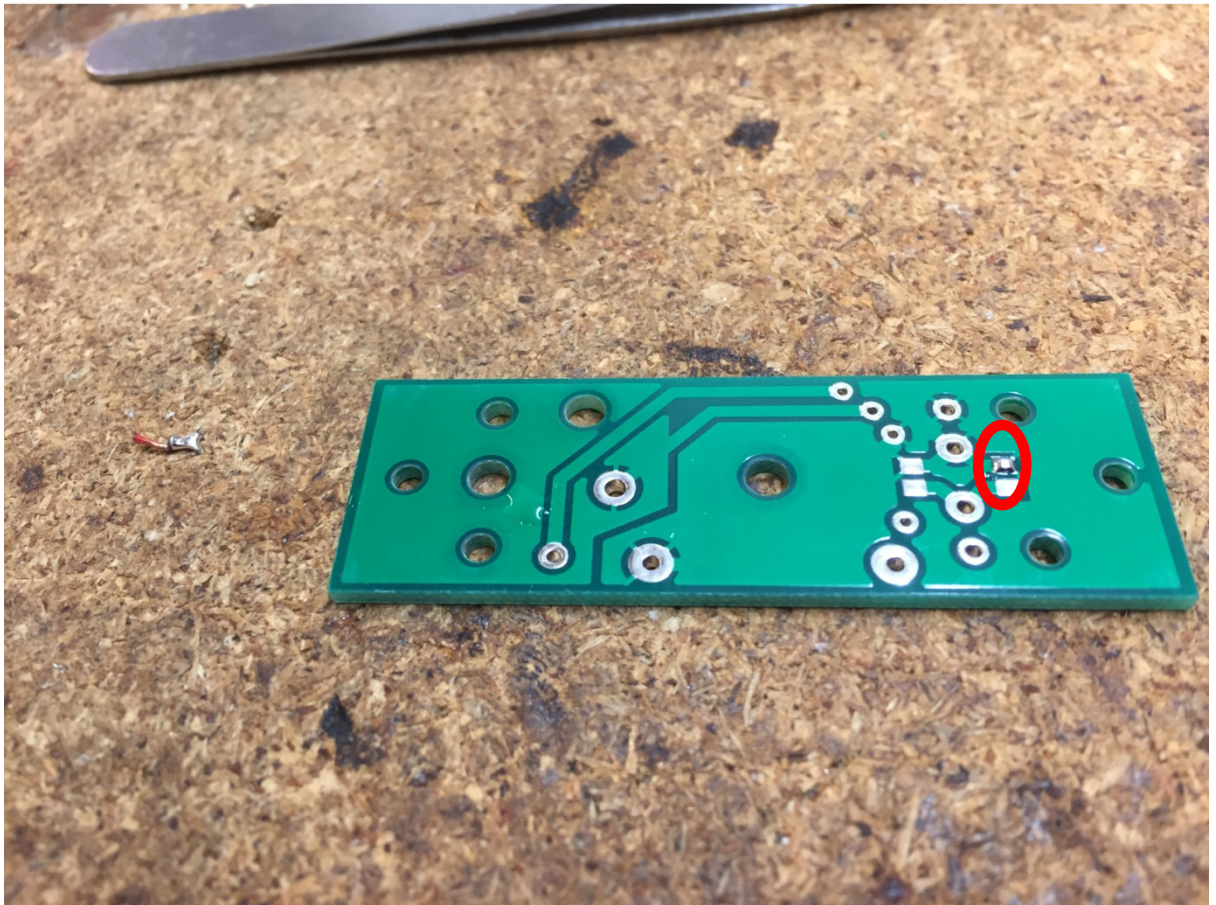
Email Richard@sotabeams.co.uk, telephone +44 (0) 7976 688359

You will need..

1. Small screwdriver (flat blade)
2. Soldering iron and solder
3. Tweezers
4. Long nosed pliers
5. Ruler (cm)
6. Wire cutters
7. Sense of adventure

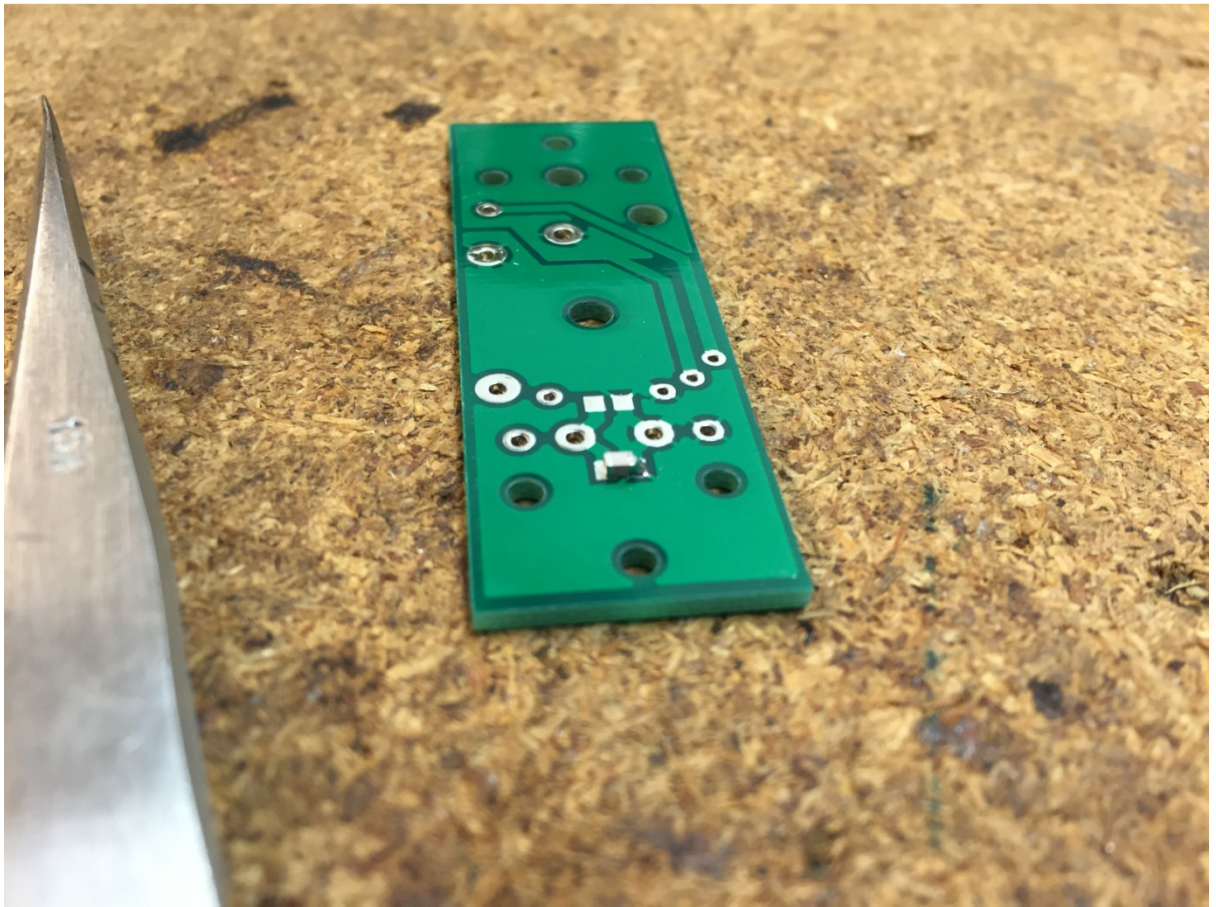
Board Components

- ☐ Carefully remove the SMD capacitor from the back of the card. Using tweezers remove it from its plastic carrier and place it on a white sheet of paper (makes it harder to mislay it).
- ☐ Tin one of the smd pads on the reverse side of the PCB.

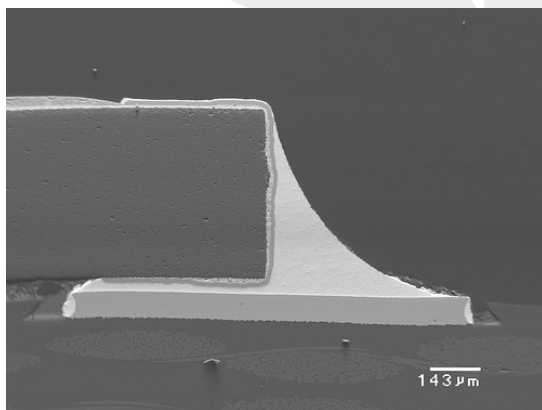


- ☐
- ☐ Holding the capacitor with tweezers tack-solder one end to the tinned pad so that the capacitor lays flat on the PCB and bridges across to the untinned pad.

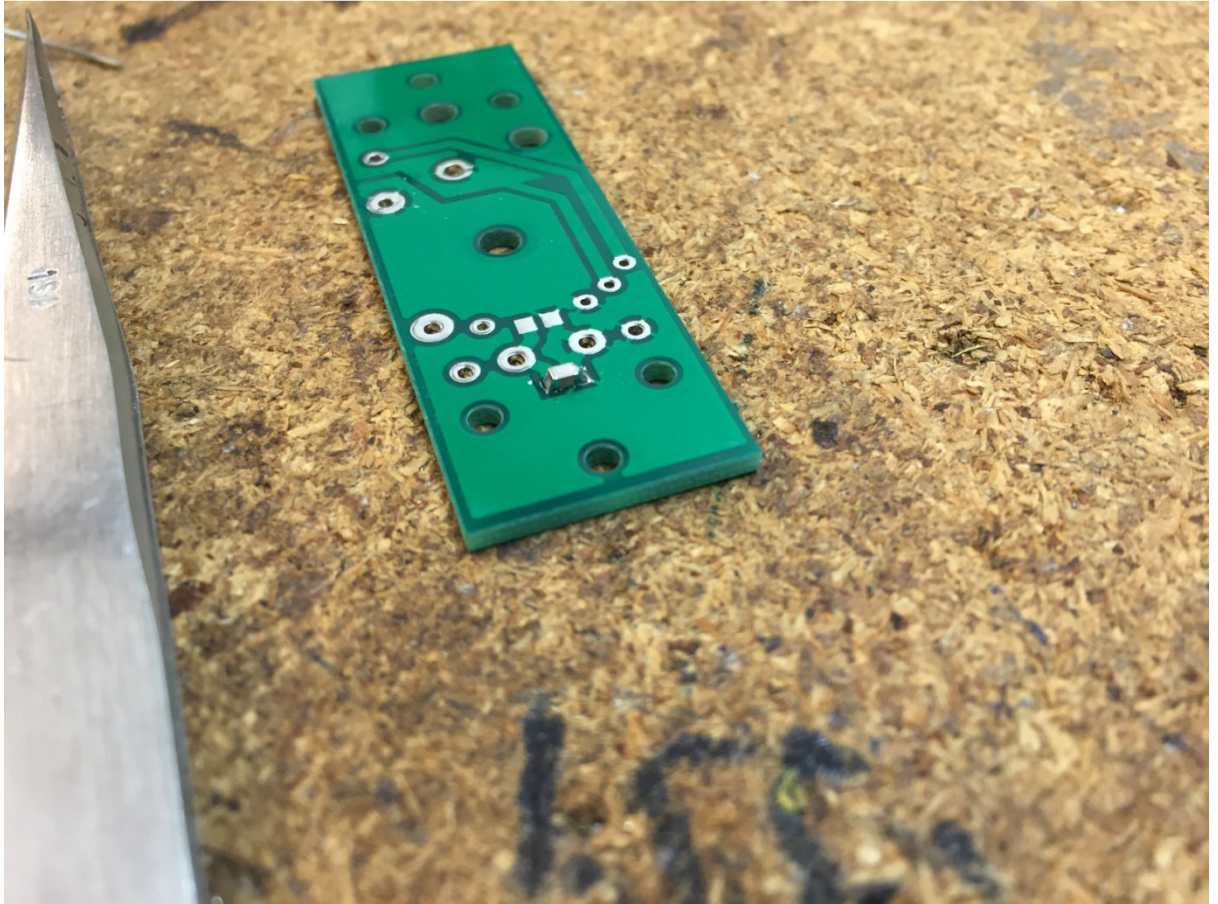
SBTM



- ☐
- ☐ Solder the untinned pad to form a good solder fillet.



- ☐ Resolder the tack soldered pad to give a good fillet.



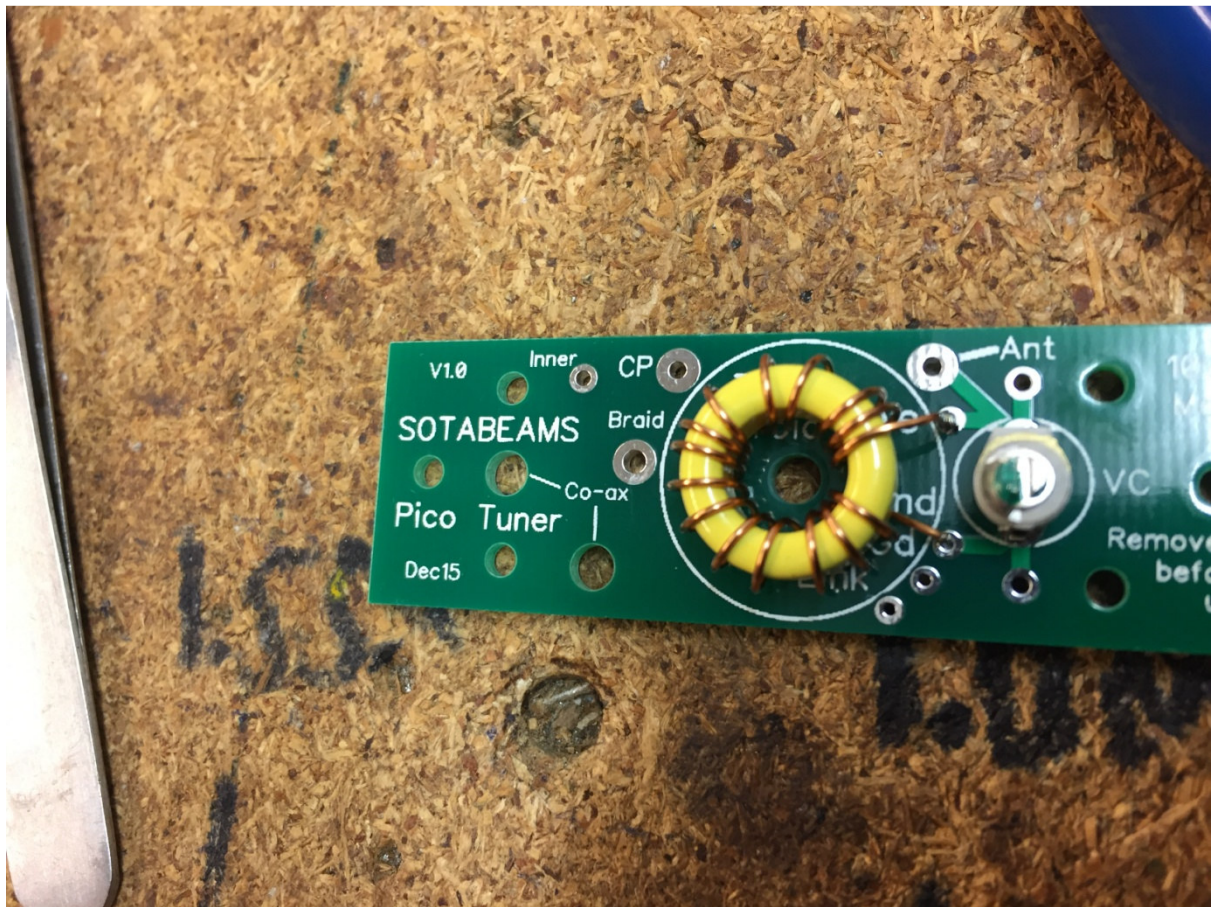
- ☐
- ☐ Take a few deep breaths and have a cup of tea!
- ☐ Install the trimmer capacitor. Note that the flat end of the capacitor is indicated on the silk-screening on the PCB.



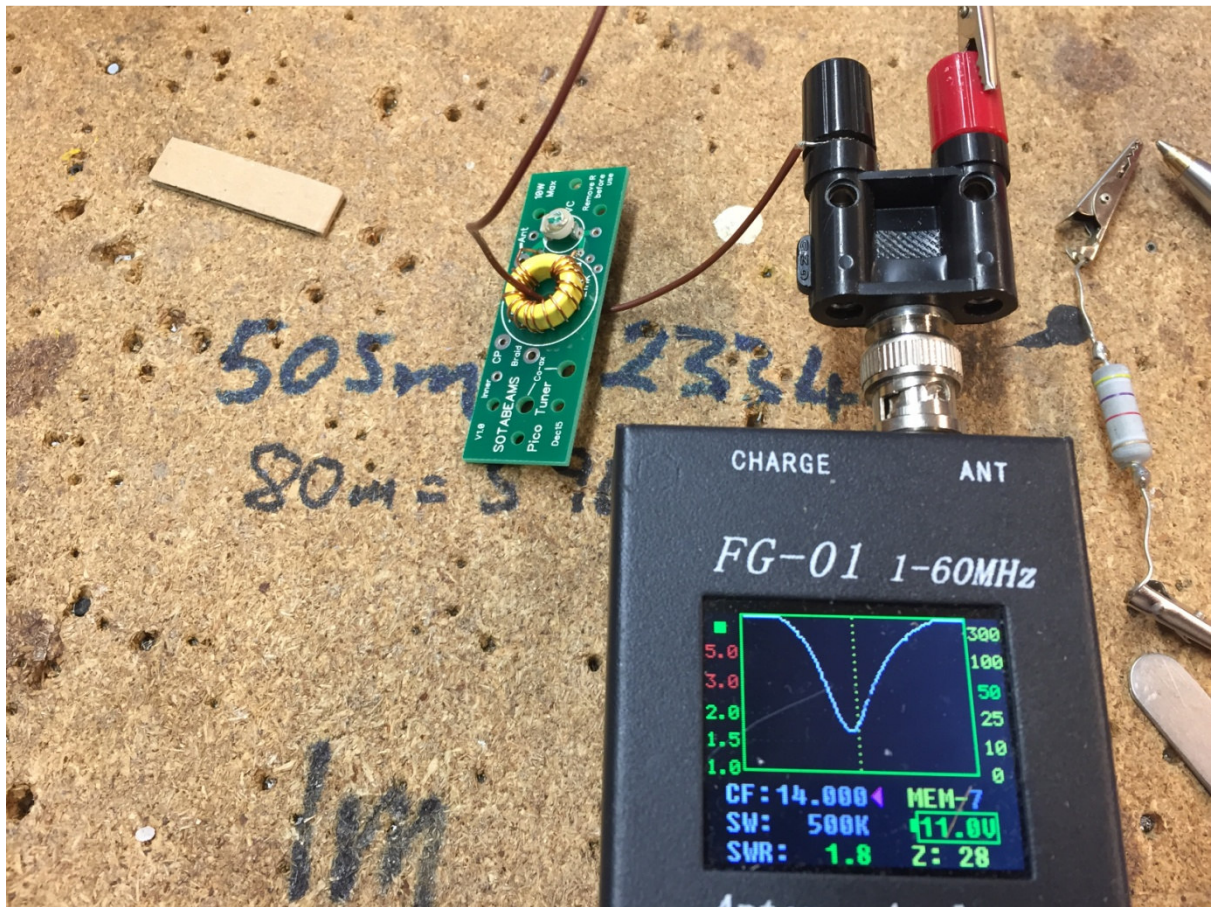
- ☐
- ☐ Wind the antenna winding on the toroid. Each time the wire passes through the middle of the toroid counts as one “turn”. The following table gives suggested numbers of turns (ignore the Link winding column for the moment).

Band (metres)	Antenna winding	Link winding
40	31	3
30	21	3 or 2
20	15	2
17	11	2
15	9	1 or 2
12	8	1
10	7	1

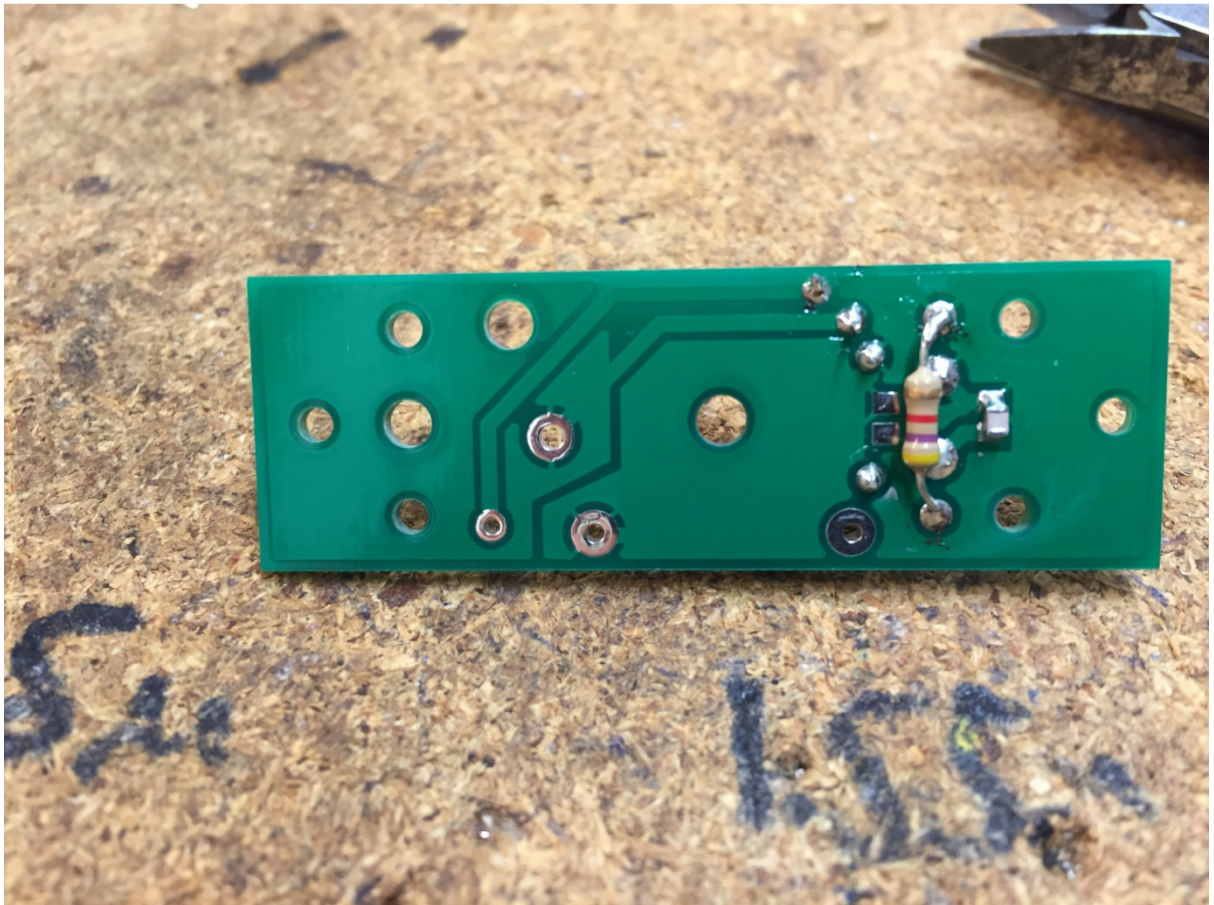
- ☐ Burn off the enamel from the wire using a bead of solder on a hot iron (we use 420 degrees C here). Lightly tin the wires (too much tinning will make them hard to insert through the PCB).
- ☐ Install the toroid (use pads Ae and Gnd). Note: keep the surplus wire, you will need it later to form the link.



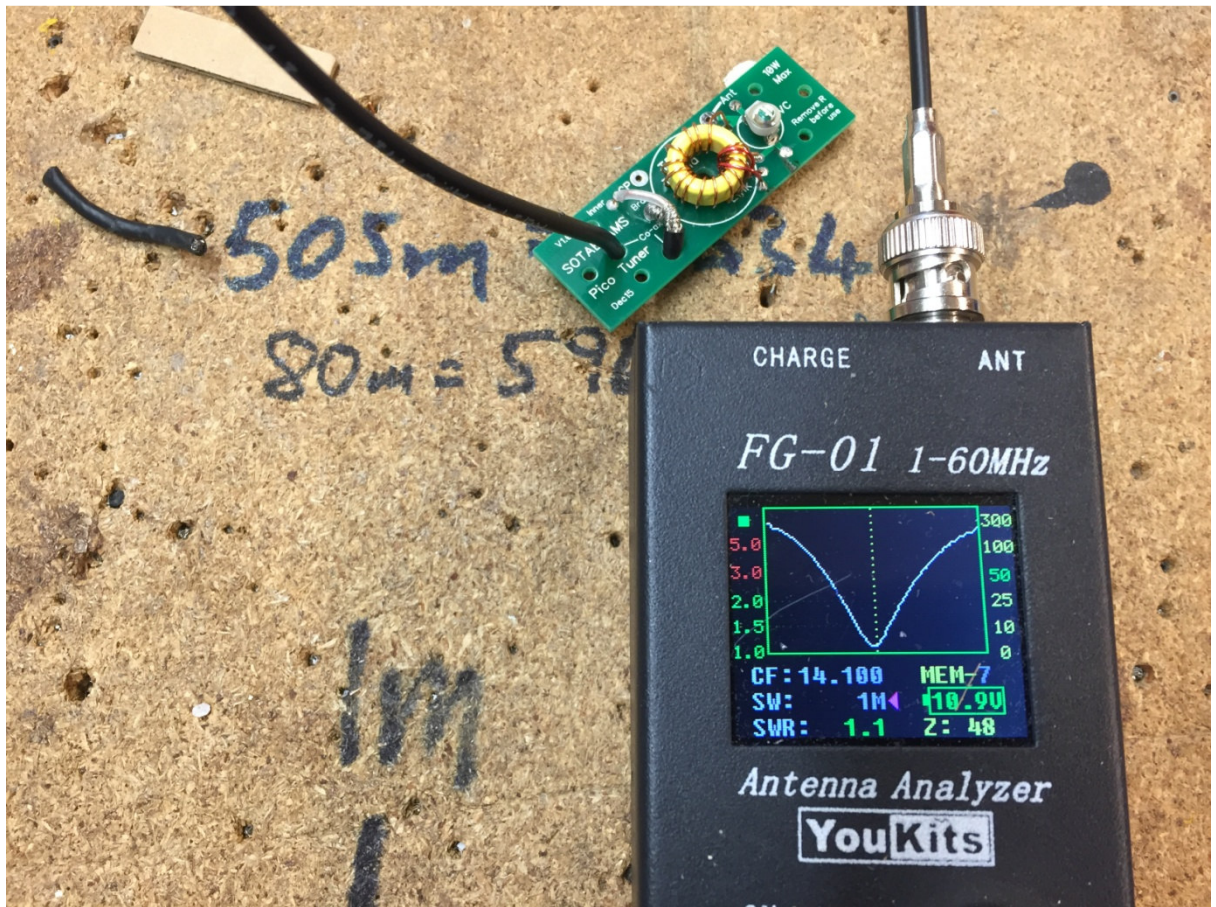
- ☐ ☐ Set the variable capacitor to half-capacitance. Slot vertical as in the photograph above.
- ☐ Thread a short insulated wire through the toroid and connect to an antenna analyser.
American users may find antenna analysers unavailable. In such cases an antenna analyzer is a good substitute.



- ☐
- ☐ Squeeze the turns on the toroid until the dip indicated on your analyser corresponds to your desired operating frequency. Note: the swr indicated is not relevant; all that matters is the frequency of the dip in SWR. Note also that on 7 MHz the dip will be small and in that case a two-turn coupling link may help.
- ☐ Install the 4k7 test resistor (reverse of board underneath the variable capacitor).



- ☐
- ☐ Wind the link over the earthy end of the toroid coil (I have used a different colour of wire in the photo for improved clarity (perhaps). Wind the link in the same direction as the winding on the toroid.
- ☐ Tin and solder the link to the pads marked LkGd and Link. Note that I have left one end of the link rather long so that I can add another turn later if I need to.
- ☐ Install your co-ax cable. The board is sized for RG174. the length that you use depends on how you intend installing the antenna. A few metres is normal. the co-ax threads through the PCB. The pads for the braid and inner are clearly marked. You may well need to thin the braid down a bit to get it through the hole.
- ☐ Connect your antenna analyser to the other end of the co-ax.
- ☐ Adjust the trimmer for best SWR on your desired operating frequency. It is possible that you may need to adjust the number of turns on the link to get a good SWR.
- ☐ Once adjusted, remove the test resistor.



- ☐
- ☐ Fasten the toroid to the PCB using the supplied hardware. Centralise the washer to hold the coil turns in place.

SB™



- ☐
- ☐ Your pico Tuner is now ready to use.

Using you Pico Tuner

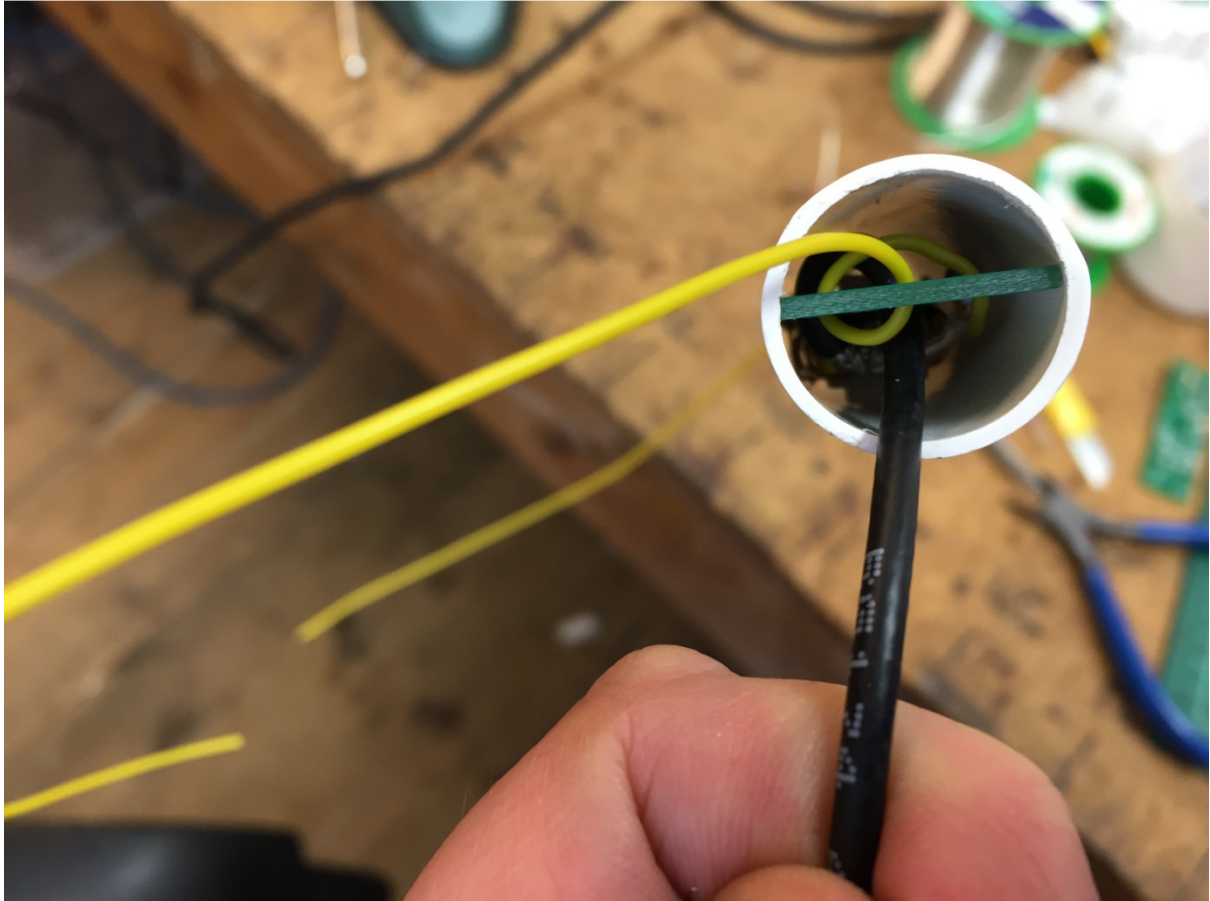
The Pico tuner is designed to be used with a resonant halfwave antenna.

The following table gives some suggested lengths of wire. Once you have made the antenna, the trimmer and wire length can be “fine-tuned” for best SWR.

Band	Antenna m (ft)	Counterpoise m (ft)
40m	20.38 (66.86)	6.79 (22.28)
30m	14.23 (46.69)	4.74 (15.55)
20m	10.24 (33.6)	3.41 (11.19)
17m	8.00 (26.25)	2.67 (8.76)
15m	6.88 (22.57)	2.29 (7.51)
12m	5.84 (19.16)	1.95 (6.4)
10m	5.17 (16.96)	1.72 (5.64)

Your Pico tuner will need to be protected from rain. You can coat it with our Liquid Electrical Tape which does not affect the operation of the circuit (once fully dry). Some other sealants will reduce the Q of the circuit and the acid solvents used may corrode the exposed wire and PCB pads – beware.

Alternatively, the Pico Tuner has been designed to slide into standard 22mm water overflow pipe.



This pipe varies a little in width and some types need to be deformed slightly to allow the board to slide inside. You may need to cut the end off the nylon screw too (easily cut with side-cutters).

Optional Enclosure Kit

Our optional enclosure kit makes a neat job. Just make holes in the end-caps for the wire. Glue the PCB in the tube. Fasten the co-ax with the cable tie. Finally, seal the ends with a bathroom sealant. In this case the choice of sealant is not critical as it is not in contact with bare wires or the board components.



Optional enclosure kit



Circuit Diagram

