SOTABEAMS™
AMATEUR RADIO FOR THE GREAT OUTDOORS

BOXA-SWR

a BOXA-LINE product

The BOXA-SWR is a high performance SWR sensor. It is perfect for the experimenter who wants a sensor for 1 – 50 MHz. It can be used as the sensing element for a digital or analogue SWR meter.

The BOXA-SWR is available as an easy-to-make kit or as a ready-made unit. the BOX-SWR can either be fitted into our neat custom enclosure or mounted in your own enclosure. The BOXA-SWR is conservatively rated at 100 Watts.

Building the BOXA-SWR is easy and fun. It will take less than an hour to build and is suitable for a beginner.

Revison History

25-Nov-2014 First issued

BOXA-SWR Packing List

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

Item	Number	Comments
Enamelled copper wire 24 swg	1	110 cm
100 Ohm 0.6 Watt Resistors 1%	4	colour code brown-black-black-black-brown
Ferrite cores	2	FT50-43
Cermet trimmer pots	2	10k
Coaxial cable RG174 (10cm)	1	10 cm
Signal diodes	2	BAT42
Decoupling capacitors 0.01uF	2	"103"
BNC socket	2	PCB mounted
D-Connector	1	PCB mounted
Printed circuit board	1	
OPTIONAL ENCLOSURE KIT		
Laser cut front panel	1	
Laser cut rear panel	1	
Aluninium enclosure	1	
Panel fixing screws	8	
Self adhesive feet	4	

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

Errata

PCB Version 1.0 has the two potentiometers labelled the wrong way round.

PCB Version 1.0 has the two potentiometers wired in reverse so turning them CCW will increase the output.

BOXA-SWR Instructions

The BOXA-SWR kit is easy to make and you will end up with a very useful SWR bridge.

Step by step instructions together with lots of photographs will make it easy to build your BOXA-SWR. It will take around 60 minutes work.

Spotted a mistake or need help?

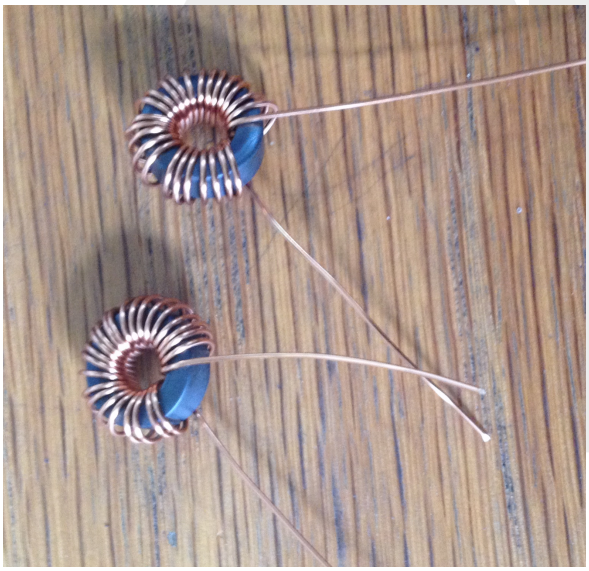
Please let me know!

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

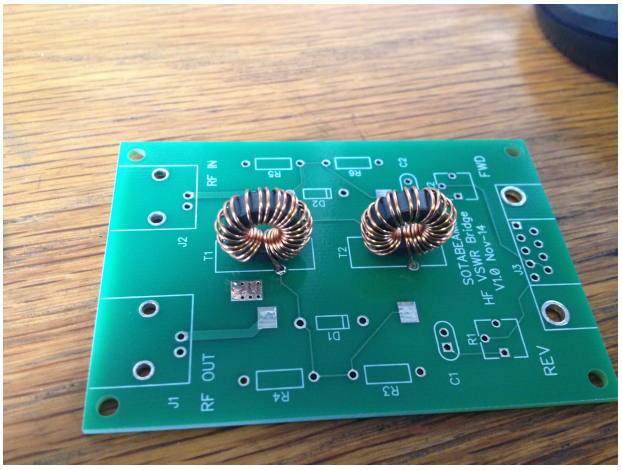
Winding the toroids

1. Cut two 55 cm lengths of enamelled copper wire.

2. Wind 23 turns onto each core as illustrated. Note that the direction of the winding is important as this will allow the cores to sit properly on the PCB.

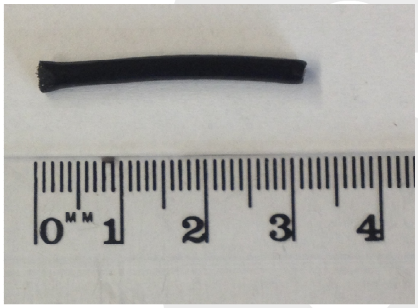


3. Tin the leads for the cores and solder the core into the marked positions on the board (T1 and T2). Note the cores sit vertically.

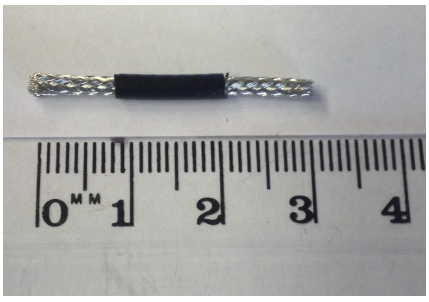


Making the coupling lines

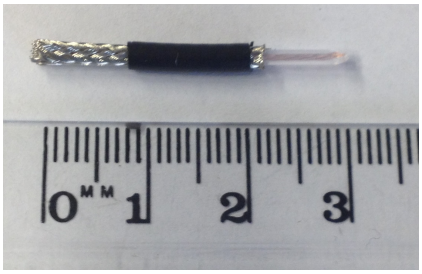
4. Cut 2 x 30 mm lengths of RG-174 coaxial cable.



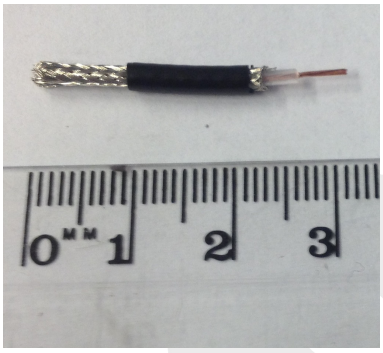
5. Remove 10 mm or the outer jacket of the cable from each end of the cables



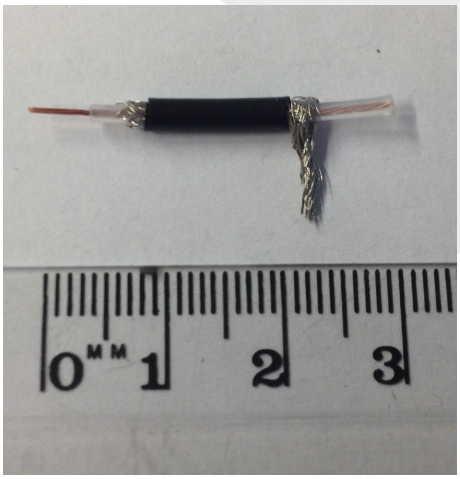
6. Trim the braid back on one end of each cable.



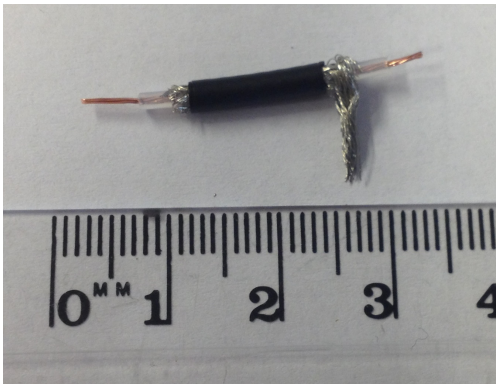
7. On the end where you have trimmed the braid, remove 5mm of the inner insulation and tin the exposed centre core of the co-axial cable.



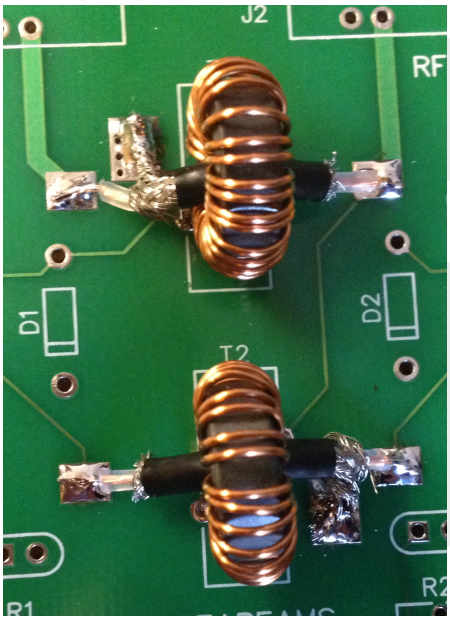
5. On the other end, make a tail of the braid as shown.



6. Remove 5mm of the inner insulation and tin the exposed centre core of the co-axial cable.



7. Install the coaxial cable coupling lines through the toroids on the board as shown. Note that the braid is soldered to the pad that has a number of plated-through holes on it.



Finishing the board

8. Install the four resistors, R3, R4, R5, R6 (100 Ohms)

9. Install the two diodes D1 and D2. Note that the band on the diode must be correctly orientated as indicated by the silk screening on the PCB.

10. Install the two capacitors C1 and C2 (103)

11. Install the two potentiometers R1 and R2 (10k).

Finally…

12. Install the two BNC sockets

13. Install the D connector.

14. Take a few minutes to visually inspect your solder joints. Re-heat any joints that look suspect.

Testing and alignment

Connect a 50 Ohm load to the ANT connector and a low power (5 to 10 Watts) transmitter to the TX connector.

Connect the positive lead of a multi-meter set to 10 VDC range to the Forward power pins on the D type. Connect the negative lead to the ground-plane on the board earth.

Set the FWD potentiometer to ¾ scale clockwise

Set the transmitter to send a carrier (CW/FM/AM) and transmit. You should see a voltage reading of between 0.3 and 1 Volt. Note the reading.

Reverse the connections and adjust the REV potentiometer to give the same reading as measured above. Your BOXA-SWR is now aligned.

Fault finding

The most likely problem on this board is a poor solder joint on the enamelled wire of the toroids so that is the area to check first.

If you get stuck, send me an e-mail for help! Richard@sotabeams.co.uk

Circuit diagram