HF BALUN KIT ASSEMBLY INSTRUCTIONS

Revision History

09 Sep 2014	First issued
16 June 2020	Fix binding post mounting description and add more binding post pictures. Make description of balun diagram clearer.

HF BALUN Packing List

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

Item	Number	Comments
Front panel	1	
Black ABS box	1	Self tapping screws inside box (4 off black)
4mm binding post (red)	1	
4mm binding post (black)	1	
BNC bulkhead socket	1	
Toroid	1	grey
RG-174 cable	65 cm	metres, thin black co-ax (1:1 balun kit only)
cable ties	2	1:1 balun kit only
Tinned copper wire	15 cm	for general wiring (4:1 balun kit only)
Wire enamelled	75 cm	cm for winding toroid (4:1 balun kit only)
Instruction slip	1	web link to download full instructions

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

Assembly Instructions

The HF balun kit is easy to make and you will end up with a very useful and effective balun.

Step by step instructions together with lots of photographs will make it easy to build your balun. It will take around 40 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 us know if you need help! Email support@sotabeams.co.uk

Tools needed

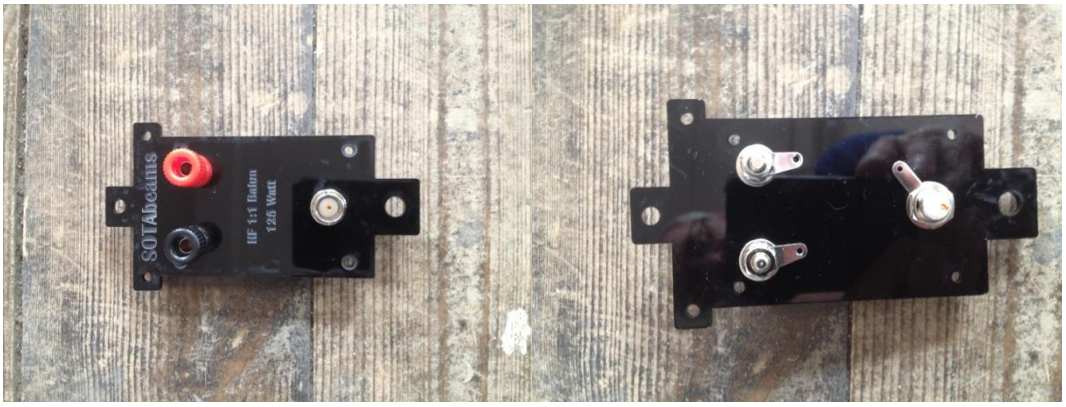
1. Small screwdriver (flat blade)
2. Small screwdriver (cross head)
3. Soldering iron and solder
4. Long nosed pliers
5. craft knife
6. Small spanner
7. Ruler (cm)
8. Wire cutters

Mounting the hardware (estimated 5 minutes)

- ❒ Mount the BNC socket. The serrated washer goes on first, then the solder tag and finally the nut. Do not over tighten the nut as you could crack the front panel.
- ❒ Mount the two 4mm binding posts (one red, one black).
  The red ones should be on the right when viewed from the front.

  Parts mounted above the front panel (left picture): two part plastic ring and insert, a metal washer which screws onto the post, then the top plastic part.
  Parts mounted below the front panel (right picture): single washer, nut, solder tag, nut.

❒ Make sure that you can unscrew the plastic tops of the binding posts. When new they are usually very stiff but they ease off after a couple of uses.



Winding the toroid (estimated 10 minutes)

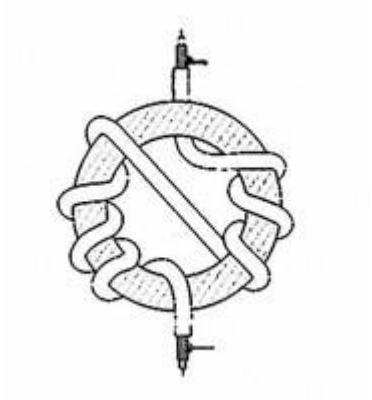
In this session you will wind the toroid. There are instructions here for the 1:1 and 4:1 balun.

1:1 Balun

The toroid is wound using the RG-175 coaxial cable. In both case, every time the winding cable/wire passes through the toroid, that is one turn.

❒ Put one end of the coaxial cable (4cm) through the toroid and fasten with a cable tie. This counts as one turn.

❒ Wind a further six turns then thread through the centre to the other side as shown in the figure below (this figure shows 4 turns on one side and 3 turns on the other).



Winding Technique (ref: http://myantennas.com/wp/tech-info/about-baluns/)

❒ Wind a further 7 turns on the other side of the core.
❒ Fasten the end with a cable tie.

❒ Trim the long end to 4cm length.
❒ Dress both ends of the coaxial cable.

- ❒ Solder the coaxial cable to the solder tags on the binding posts as shown (the inner core of the coaxial cable to the red terminal).

- ❒ Solder the other end of the coaxial cable to the BNC socket as shown.

- ❒ The toroid can now be laid flat onto the faceplate. In our pre-built version we glue the toroid to the faceplate and waterproof the coax connections. This is optional however.
- ❒ Using a multimeter, check that there is not a short between the two binding posts. If there is a short check for problems.

- ❒ Attach the base of the plastic box over the toroid using the four self tapping screws (tight). Note that the lid of the plastic box is not required.
- ❒ Your balun is now ready for use.
- ❒ Optionally you can run a bead of silicone sealant round the joint between the box and the faceplate.

4:1 Balun

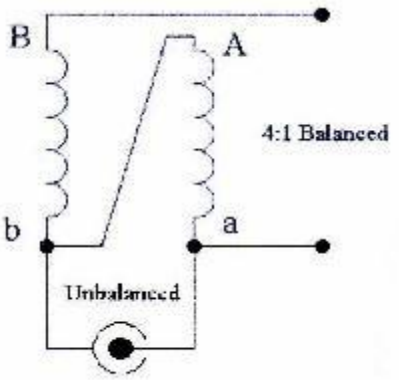
- ❒ Straighten out the enamelled copper wire (gold coloured).
- ❒ Fold it in half and twist the two strands together. We hold the end in a vice to do this.

- ❒ Wind 9 turns onto the toroid.

❒ Tin the ends to remove the enamel and prepare the ends as shown.

❒ Using a mutimeter to identify the windings, arrange them so that **A** and **a** are one wire and **B** and **b** are the other wire.

❒ Referring to the diagram below, connect **A** to **b**.

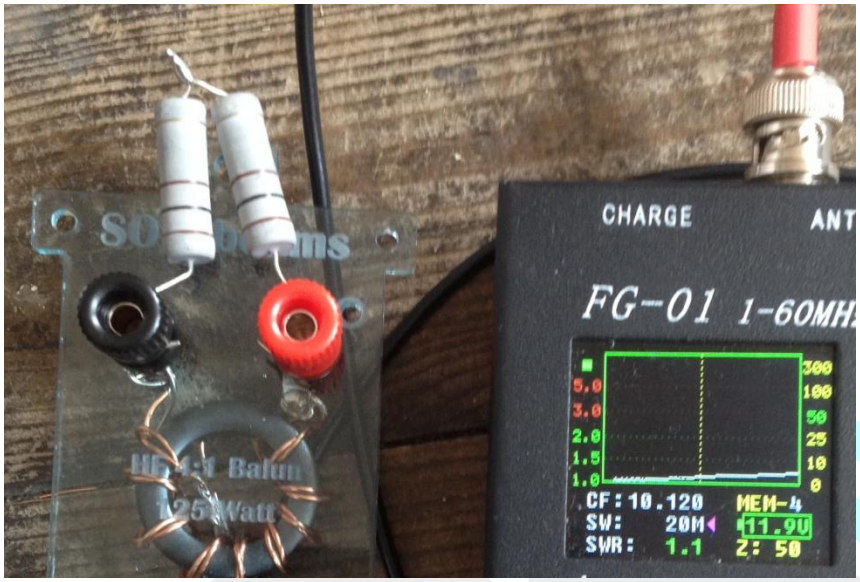


❒ Wire **B** to the red binding post and **a** to the black binding.

❒ Using the tinned copper wire connect the black binding post (**a**) to the centre conductor of the BNC socket.

❒ Use the remaining tinned copper wire to connect the twisted junction between **A** and **b** to the ground tag on the BNC socket.

❒ You can test your balun by connecting a 200 Ohm resistor across the binding posts and looking at the SWR at the BNC socket. The SWR should be better than 1.2:1 across the HF spectrum.



- ❒ Attach the base of the plastic box over the toroid using the four self tapping screws (tight). Note that the lid of the plastic box is not required.
- ❒ Your balun is now ready for use.
- ❒ Optionally you can run a bead of silicone sealant round the joint between the box and the faceplate.

Useful additional information

Not sure what cm means? Cm stands for centimetre. This is a measure of length used in most parts of the World. The following table gives conversions.

Centimeters To Inches Conversion Table

Cm	Inch	Cm	Inch	Cm	Inch	Cm	Inch
1	0.393700787	26	10.23622046	51	20.07874014	76	29.92125981
2	0.787401574	27	10.62992125	52	20.47244092	77	30.3149606
3	1.181102361	28	11.02362204	53	20.86614171	78	30.70866139
4	1.574803148	29	11.41732282	54	21.2598425	79	31.10236217
5	1.968503935	30	11.81102361	55	21.65354329	80	31.49606296
6	2.362204722	31	12.2047244	56	22.04724407	81	31.88976375
7	2.755905509	32	12.59842518	57	22.44094486	82	32.28346453
8	3.149606296	33	12.99212597	58	22.83464565	83	32.67716532
9	3.543307083	34	13.38582676	59	23.22834643	84	33.07086611
10	3.93700787	35	13.77952755	60	23.62204722	85	33.4645669
11	4.330708657	36	14.17322833	61	24.01574801	86	33.85826768
12	4.724409444	37	14.56692912	62	24.40944879	87	34.25196847
13	5.118110231	38	14.96062991	63	24.80314958	88	34.64566926
14	5.511811018	39	15.35433069	64	25.19685037	89	35.03937004
15	5.905511805	40	15.74803148	65	25.59055116	90	35.43307083
16	6.299212592	41	16.14173227	66	25.98425194	100	39.3700787
17	6.692913379	42	16.53543305	67	26.37795273	125	49.21259838
18	7.086614166	43	16.92913384	68	26.77165352	150	59.05511805
19	7.480314953	44	17.32283463	69	27.1653543	175	68.89763773
20	7.87401574	45	17.71653542	70	27.55905509	200	78.7401574
21	8.267716527	46	18.1102362	71	27.95275588	250	98.42519675
22	8.661417314	47	18.50393699	72	28.34645666	300	118.1102361
23	9.055118101	48	18.89763778	73	28.74015745	500	196.8503935
24	9.448818888	49	19.29133856	74	29.13385824	750	295.2755903
25	9.842519675	50	19.68503935	75	29.52755903	1000	393.700787