

Spiderbeam Balun Construction Guide



BALUN CONSTRUCTION GUIDE Ver. 1.0

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The components of the Balun Kit are in a plastic bag.
Most of the components are inside the plastic case of the balun.
The aluminum U-profile and the RG-142 Teflon Coax Cable are just in the bag.

PLEASE BE CAREFUL WHEN OPENING THE LID OF THE BALUN CASE!

The 4 “fasteners” securing the lid of the case are not screws. They do not have threads. These are fasteners which are fastened, or unfastened by turning them 90° with a screwdriver.

BEFORE beginning to assemble the balun, please check that you have received all of the components.

The following tools are required for assembly:

- A sharp knife
- A soldering iron (60w or more)
- Two 10mm wrenches (spanners)
- 5.5mm wrench (spanner) (for the M3-nuts)
- Flathead Screwdriver
- Sharp pointed object such as a nail (for preparing the coax shield - see text)
- Ohm meter.

You will also need some solder and 4 small wire ties (not included in the kit).

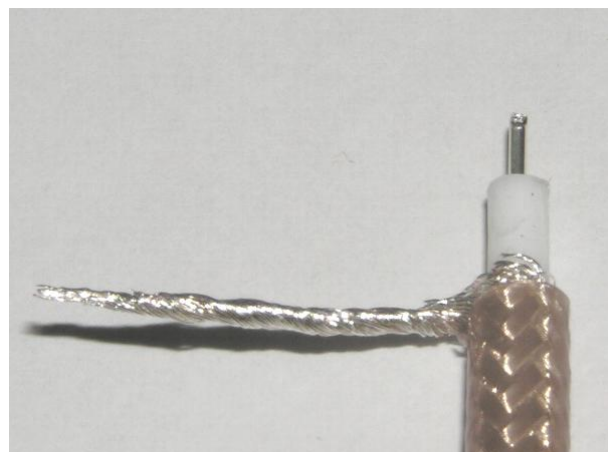
Step 1: Preparing the RG-142 Coax Cable

- Using a sharp knife, CAREFULLY cut and remove 20mm (½ in.) of insulation from one end of the coax cable. TAKE CARE NOT TO CUT INTO THE SHIELD.

Note: The cable has a double shielding. By pressing down on the tip of the coax, the outer and inner shield separate a little from each other. Then you can carefully remove the outer shield and **save it for later use**. The inner shield is braided copper wire and is the one we will work with first.



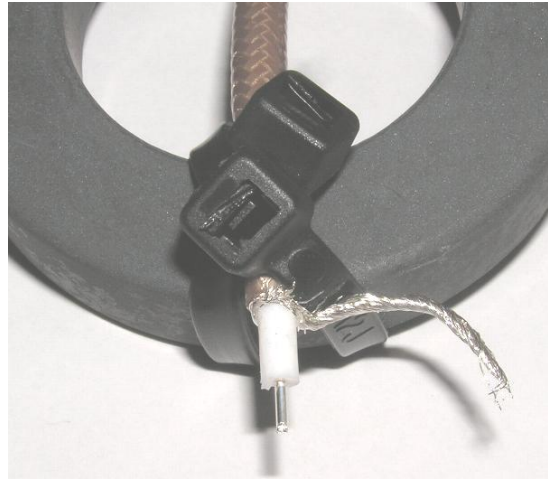
- Using a sharp pointed object such as a nail with a sharp point, carefully separate the strands of wires of the shield as far as you can.
- Twist the wires of the shield into a single stranded wire, as shown in the photo on the right. →
- Using wire cutters, cut off 100 (¼ in.) from the tip of the inner conductor.
- Using a sharp knife, CAREFULLY cut and remove 5mm (⅛ in.) of insulation from the inner conductor, as shown in the photo on the right. →



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Step 2: Fastening the Coax to the Toroid

- Lay the prepared end of the coax cable on the toroid, such that the outer shield ends at the outer edge of the toroid, as shown in the picture on the right.
- Secure the coax to the toroid using two wire ties “criss-crossed” through the toroid and over the cable – as shown in the photo on the right. →



Step 3: Winding the Coax onto the Toroid

- Wrap 6 turns of coax tightly onto the right half of the toroid, such that it terminates just before the top of the toroid.

Note: the cable must really be pulled tight, otherwise it will be too short when you are finished.

- At about 1 o'clock on the toroid (see picture below), bend the coax back towards the prepared end, pass through and under the toroid, as shown in the picture.
- Tightly wrap 6 more turns on the left half of toroid, terminating at 12 o'clock on the toroid.
- Secure this end of the coax with 2 criss-crossed wire ties, as shown in the picture.
- Carefully cut and remove the outer insulation, leaving about 10mm (.4 in.) near the toroid (see picture below).
- Separate the inner and outer shield as in Step 1 above. **Save the outer shield.**
- Twist the inner shield into a single stranded wire as in the picture.
- Using a sharp knife, carefully remove all but 10mm (0.4 in.) of the insulation of the inner conductor of the coax, as shown in the picture.



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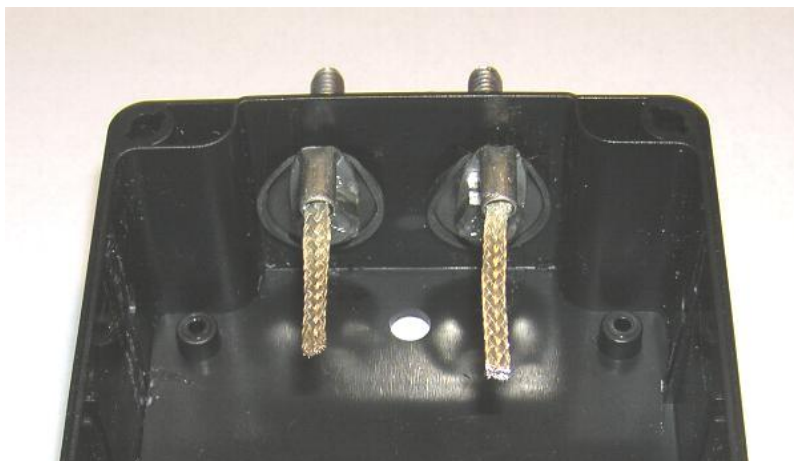
Step 4: Preparing the Cable Lugs

- Locate the longer piece of outer shield which you just removed from the coax cable.
- Cut this piece of shield in half (two pieces of equal length).
- Solder each connection with a soldering iron (60w or more).
- When completed they look like this: →



Step 5: Mounting the two top Cable Lugs

- WAIT long enough that the two cable solder lugs have cooled off to room temperature.
- Insert an M6x30mm stainless steel bolt through a cable lug, as shown in the picture.
- Then push an M6 stainless steel washer over the bolt, as shown in the picture. →
- Finally, push an M6 rubber washer over the bolt, as shown in the picture on the right. →
- Prepare the second cable lug and bolt, just like the first one.
- Mount the cable lugs to the case by inserting them (from the inside) through one of the top holes of the case, with the cable on top (as seen when looking at the open case).

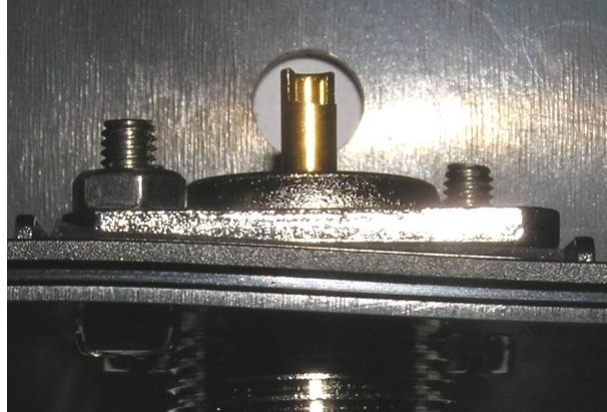
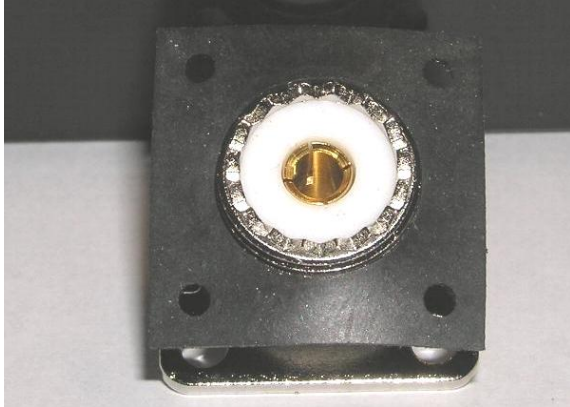


- Secure each bolt using first an M6 stainless steel washer, and then an M6 stainless steel nut.
- Tighten the bolts using two 10mm wrenches (spanners).

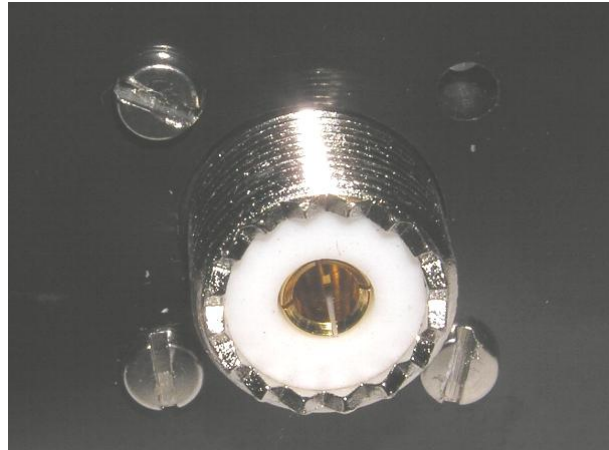
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Step 6: Mounting the SO-239 Coax Connector

- Begin by sliding a rubber gasket over the top of the SO-239 coax connector as seen in the picture (below left).



- Insert the SO-239 (from the inside) through the plastic case, taking care that the longer side of the center lug is on the bottom of the case (this makes it easier to solder to). See picture above, right.
- From the outside, insert three M3x10mm stainless steel screws through holes in the case and SO-239 connector. Do not insert the top right screw yet.
- Secure the 3 screws with stainless steel M3 nuts, using a flathead screwdriver and 5.5mm wrench (spanner). Note: if you do not have a 5.5mm wrench, you may substitute a pair of pliers.



Step 7: Mounting the U-Rail to the Plastic Case

- Insert two stainless steel M6x16mm bolts through the U-Rail, and then mount it against the back side of the plastic case, by pushing the two bolts through the two holes in the bottom of the case.
- From inside the plastic case, first slide an M6 rubber washer over each bolt, then an M6 stainless steel washer, and finally an M6 stainless steel nut.
- Tighten the nuts with an M10 wrench (spanner).



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Step 8: Mounting the Balun inside the Case

- Insert the balun into the case, with the short stub of coax facing the SO-239.
- Look carefully at the two pictures picture below.
- Keeping the center cut of the coax in the center of the case, cut off the ends of the coax such that they are nearly flush with the inside of the plastic case. Leave about 2mm of space between the ends and the inside wall of the case.



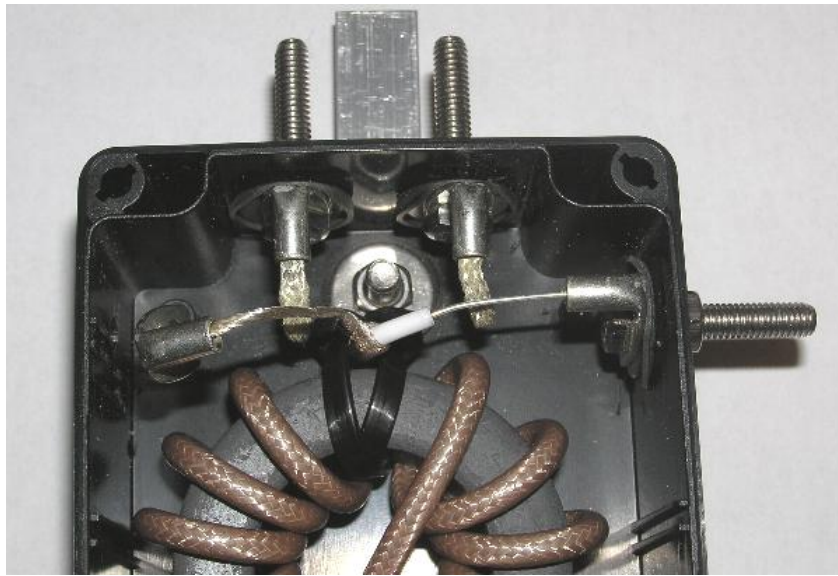
- Now remove the balun again.
- Solder the remaining two M6 cable lugs onto the ends of the coax, with the ends (solder connections) of the cable lugs on top. See picture below.
- Solder the ground lug to the shield on the other end of the coax. See picture below.



The finished balun will look like this.

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- Wait again for all solder connections to cool off before continuing.
- After it has cooled, place the balun inside of the case again with the cable lug of the shield on the top left.
- First secure the center conductor side (right side) by inserting a M6x30mm stainless steel bolt through the hole of the lug – and stop. Do not push it through the hole yet.
- On the other side of the lug, slide a stainless steel M6 washer over the bolt, and then slide an M6 rubber washer over the bolt.
- Now insert the bolt into the hole in the plastic case and push it all the way through.
- Secure the bolt using a stainless steel M6 washer and stainless steel M6 nut.
- Finally, tighten the bolt very tight using two 10mm wrenches (spanners).



- Now mount the solder lug on the shield side of the coax exactly the same way.

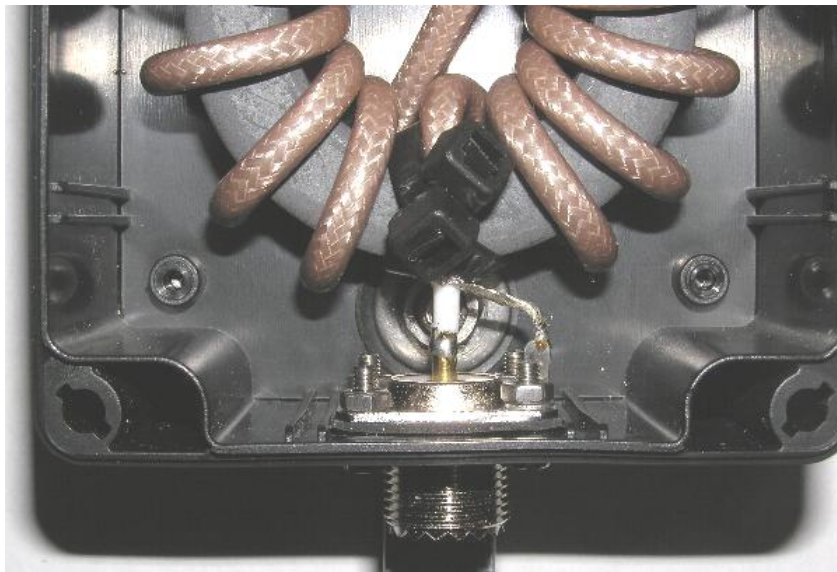


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Step 9: Connecting the top Connections to the Balun

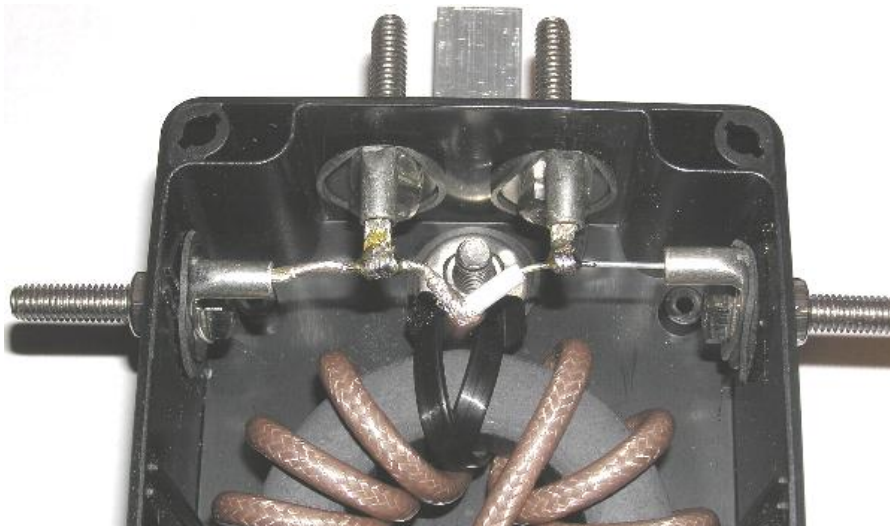
BE VERY CAREFUL WHEN SOLDERING THE FOLLOWING CONNECTIONS; PAY ATTENTION THAT YOU DO NOT OVERHEAT AND DAMAGE THE PLASTIC CASE.

- Start with the bottom side of the coax first. Solder the inner conductor of the coax to the middle connection of the SO-239 coax connector.
- Now insert the 4th stainless steel M3x10mm screw through the upper right case hole and through the remaining hole in the SO-239 coax connector.
- Slip the solder lug (connected to the coax shield) over the screw.
- Secure the connection using a stainless steel M3 nut.
- Again, tighten with a screwdriver and 5.5mm wrench (or pliers).



- Now connect the two short subs of shield coming from the top connection bolts to the two sides of the coax and solder the connections with a 60w soldering iron.

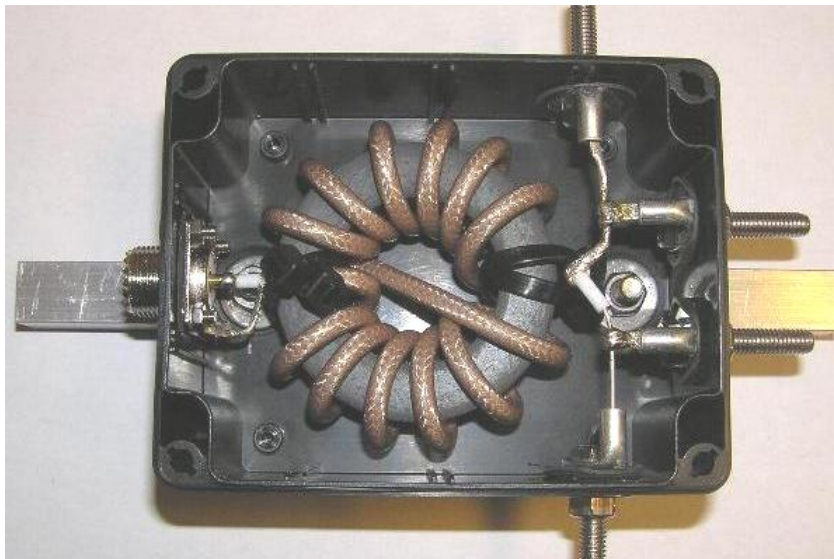
CAUTION: Leave a little slack in the wires. Do not put tension on the toroid.



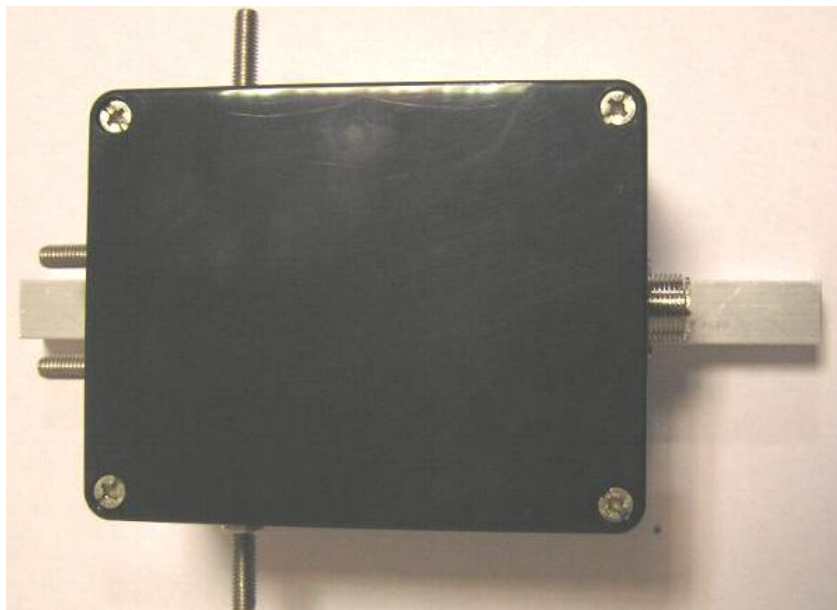
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Step 10: Testing the Balun

- Check ALL mechanical connections to assure they are tight.
- Carefully inspect ALL solder joints to assure they are soldered and look good.
- Using an Ohm meter, check for continuity between the center conductor of the SO-239 and the top-right connector and the right side connector.
- Using an Ohm meter, check for continuity between the case of SO-239 and the top-left connector and the left side connector.
- Using an Ohm meter, measure across the SO-239 connector and confirm that there is no short. (It should be open, measuring infinite Ohms).



- Secure the lid to the case, using its 4 fasteners (turn each $\frac{1}{4}$ turn clockwise).



END