



W4KGH HF Multiband Antenna Matchbox Kit Assembly Instructions

This kit produces an inexpensive, multiband, end fed HF antenna matchbox as shown in the photo above. An end fed wire antenna makes it great for portable use, but it does present a problem. An end fed antenna presents high impedance at the feed point, creating a significant mismatch with the usual transceiver impedance of 50 ohms. Most tuners cannot handle the large mismatch without using a matching transformer.

The main component of the matchbox is a trifilar wound, 9:1 UNUN (unbalanced to unbalanced) toroid matching transformer that will match the high input impedance of an end fed antenna into the range where most antenna tuners can produce good performance. The matchbox handles 150 watts of power. ***I highly recommend an antenna tuner to achieve satisfactory SWR using this matchbox.*** Some internal tuners may work. Others have had success without an external tuner when using 50 feet of antenna wire and a short counterpoise of around 16 feet.

Parts List

- | | |
|---|--|
| 2 | 6-32 x 7/16" Phillips flat head machine screws |
| 2 | 6-32 K-lock nuts |
| 1 | 8-32 x 1 1/8" eye bolt with nut |
| 1 | 8-32 K-lock nut |
| 2 | 10-24 x 3/4" Phillips truss head machine screws |
| 2 | 10-24 K-lock nuts |
| 2 | 10-24 wing nuts |
| 1 | #6 ring wire lug |
| 2 | #10 ring wire lug |
| 3 | 20" pieces #22 solid hookup wire, 1 each red, green, black |
| 1 | 4" piece #22 solid hookup wire, green |

- 1 T-130-2 powdered iron toroid (red)
- 1 SO-239 panel mount coax connector
- 1 Pre-drilled 3.3 x 3.3 x 1.25 Polycase ABS plastic box
- 1 ABS box cover with label
- 4 Black matching cover screws
- Optional: Silicone RTV sealant for weatherproofing

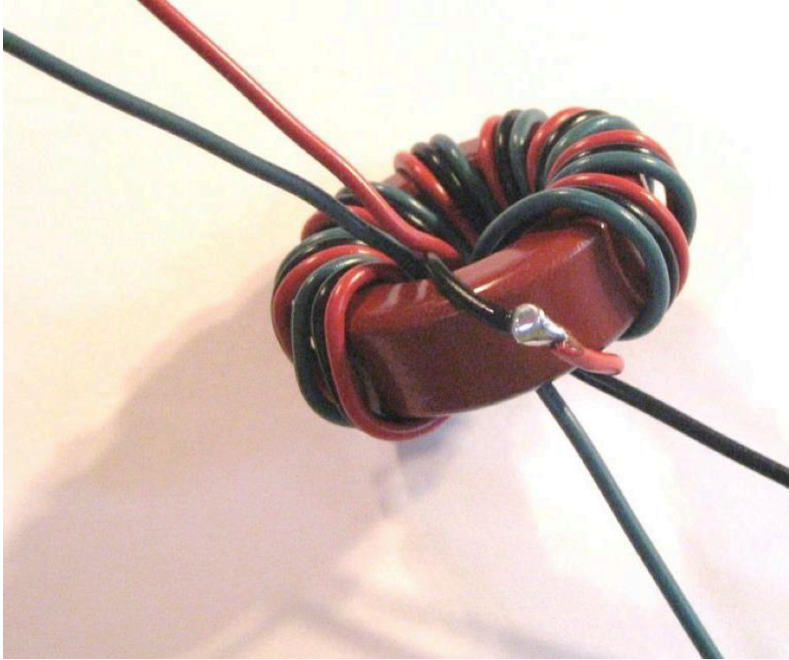
Assembly Instructions

Toroid Winding

The heart of the matchbox is the toroid matching transformer, so we start there. Arrange the three 20" pieces of wire in green-black-red order. I recommend that you use a small piece of tape at each end to keep the wires somewhat in place while winding. Feed about 2 ½ to 3" of wire through the toroid from the bottom and wrap 9 turns around the core proceeding clockwise. (You count turns by counting the number of times the wire goes through the center of the toroid.) Be sure to keep the wires in the proper order. When you're finished, the transformer should look like the photograph.



Now, cut and strip the *left black wire* then the *right red wire*, crimp them together and solder them. When you are done, it should look like the photo. This ties the black and red windings together.



A few more steps and we'll have the transformer configured and ready to install in the box. Refer to the photo of the finished transformer for the next steps. (Note that the photo shows no ring lug at the end of the short green wire. This kit has a #10 lug at the end. Just follow my instructions You can also refer to the other photos.)

Cut the *left red wire* about 1 ½" from the toroid and strip about 3/16" insulation from the end. Crimp and solder a #10 ring wire lug on it. This will be connected later to the antenna connection bolt on the left side of the box.

Now cut the *left green wire* and the *right black wire* 1 ½" from the toroid and strip 3/16" of insulation from both. Twist them together tightly and solder them at the end. This will be connected later to the center conductor of the SO-239 connector.

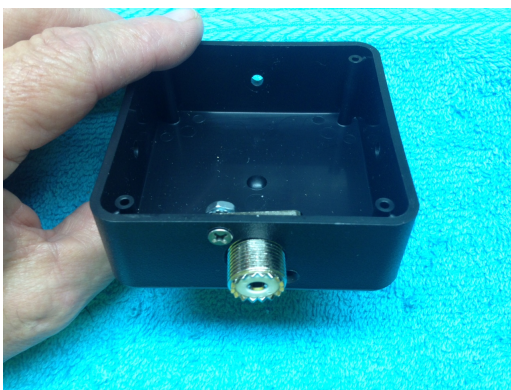
Finally, cut the *right green wire* 1 ½" from the toroid and strip 3/16" of insulation from the end. Cut the short (4") piece of green wire to about 2" long and strip 3/16" off both ends. Connect the short green wire to the left green wire and crimp and solder a #6 ring wire lug on them. This will connect to the ground connection of the SO-239 connector. Crimp a #10 ring wire lug to the other end of the short wire. This will connect to the ground connection bolt of the right side of the box.

Here's what the completed transformer should look like.

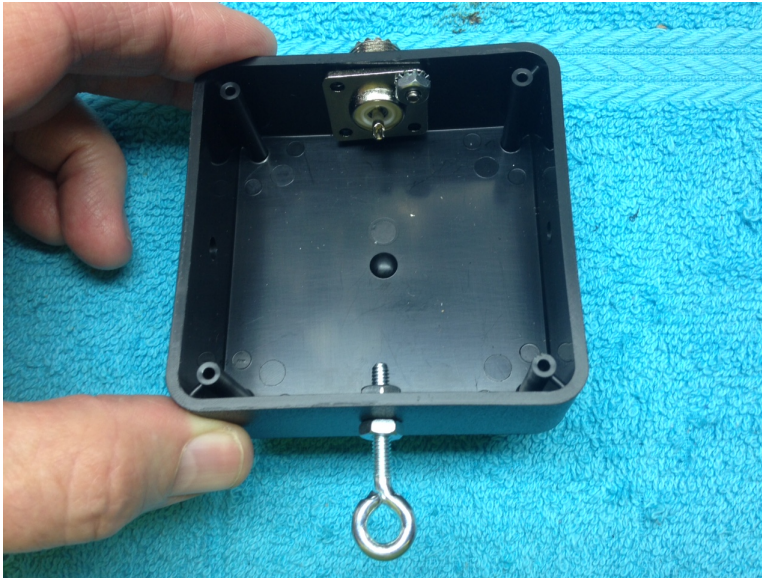


Set the transformer aside for a minute. We're going to get the box ready.

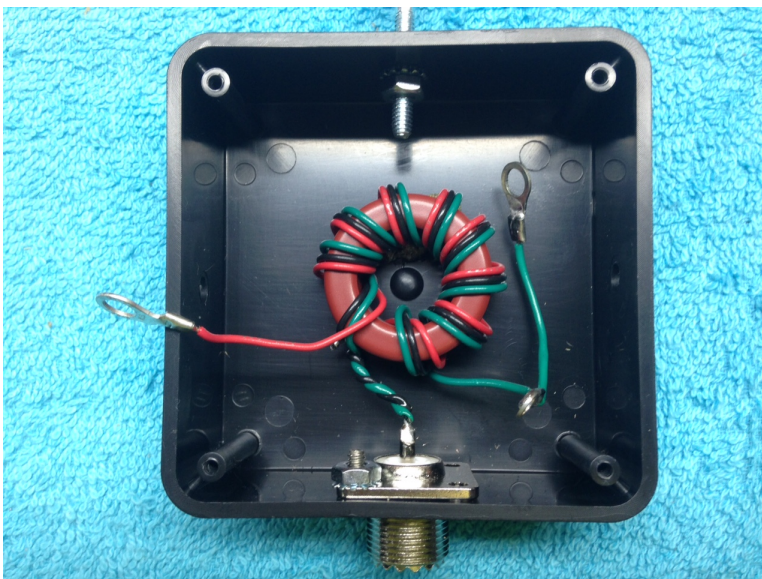
Install the SO-239 connector in the large hole in the bottom of the box. Be sure the cutout in the center conductor is facing up so you can solder to it. Place one 6-32 flat head Phillips machine screw in the top left mounting hole and put a 6-32 K-lock nut on it. Do Not Tighten this yet.



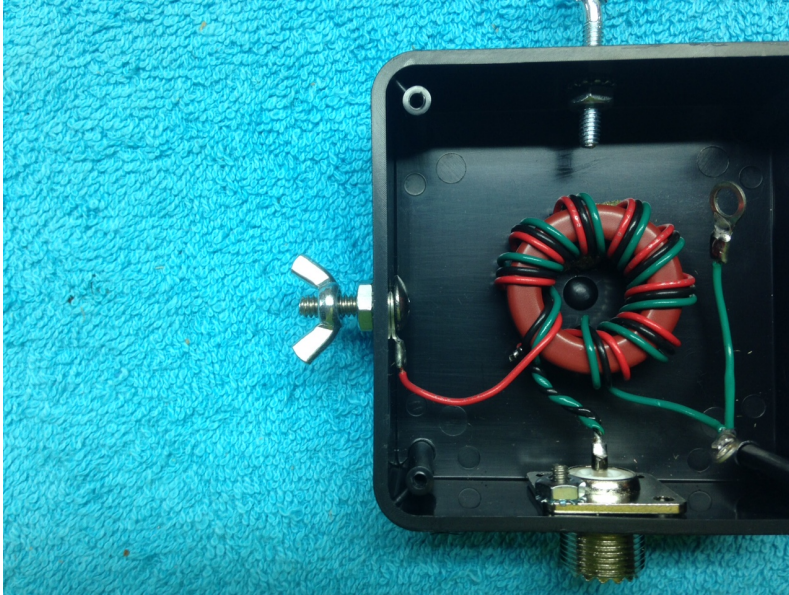
Install the eye bolt at the opposite end of the box. You can adjust the plain nut to be about halfway up the thread, then install the 8-32 K-lock nut on the inside of the box. Tighten this securely.



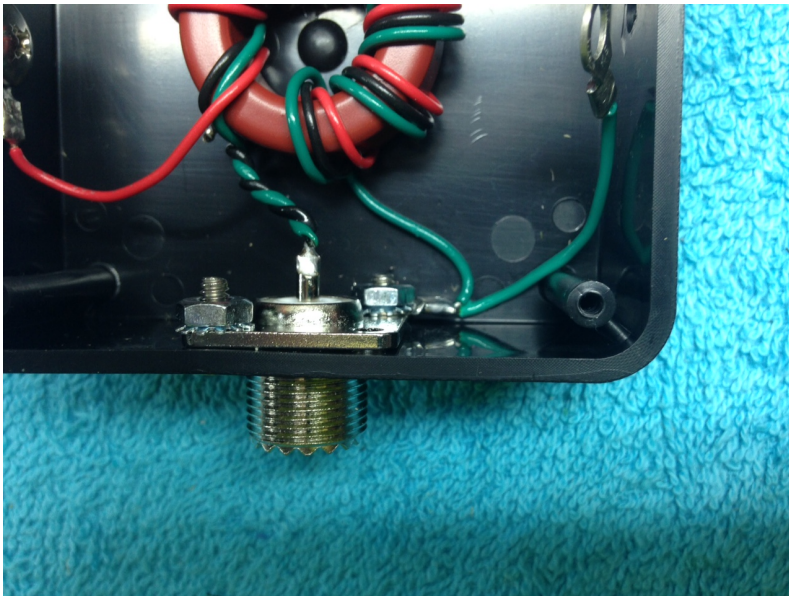
Place the transformer in the box with the black/green connection resting in the cutout of the SO-239 connector as shown, then solder it. (This will take a lot of heat, so be careful not to distort the plastic of the connector. Use light pressure, just enough to get the connection hot so the center connector doesn't move.)



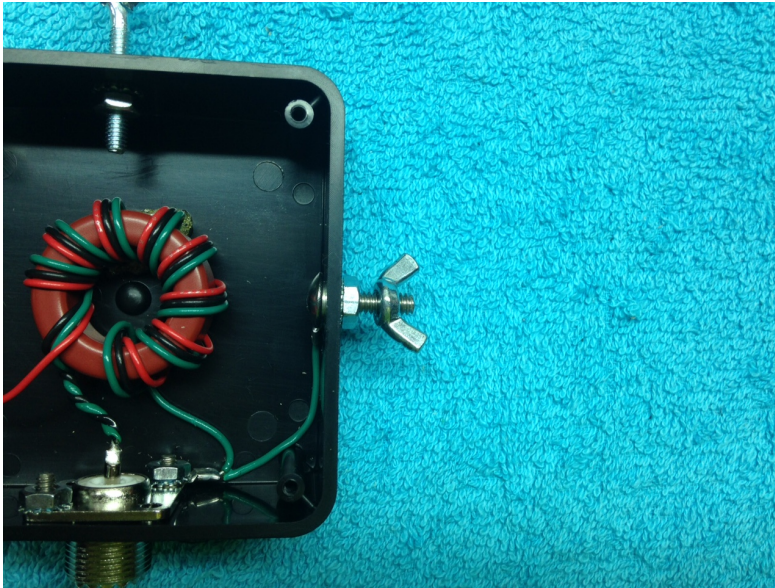
Route the red wire to the left and install the 10-24 Phillips truss head bolt through the ring lug and the hole in the box. Secure it with a 10-24 K-lock nut and tighten. Install the wing nut on the bolt.



Install the other 6-32 Phillips flat head screw through the bottom right hole of the SO-239 connector, place the green wire with the #6 ring lug on the screw and secure with a 6-32 K-lock nut. Tighten both screws on the SO-239 connector until the heads are flush on the outside of the box (be careful not to distort the plastic—you can use too much torque).



Finally, route the short green wire to the right and install the 10-24 Phillips truss head bolt through the ring lug and the hole in the box. Secure it with a 10-24 K-lock nut and tighten. Install the wing nut on the bolt.



Secure the toroid to the bottom of the box using a dab of RTV silicone, Gorilla glue (what I use), or any other waterproof cement.

(Optional step: Weatherproofing. Use RTV silicone or household bathroom type silicone sealant around the nuts and bolt heads on the inside of the box. Also put some all around the SO-239 connector. You can seal the box by putting sealant around the lid before securing it.)

Congratulations! Finished! Put the lid on the box and install the four black screws in the corners.

Refer to the instruction booklet for details on how to use the matchbox.