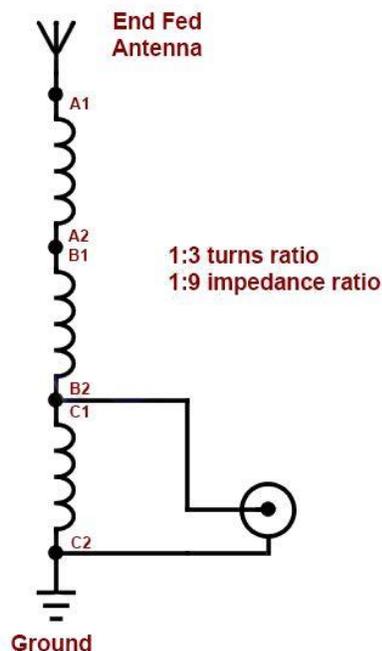


Instructions for W4KGH End Fed HF Matchbox Antenna EFMBA-1

Thanks for purchasing from **W4KGH Antennas & Accessories**. This document contains important information and helpful tips on installing and using the **EFMBA-1 End Fed HF Matchbox Antenna**. This antenna can be used in areas where CC&Rs or HOAs restrict the construction of antennas, for temporary/portable setups, EMCOMM, or in any case where a conventional installation isn't possible. The matchbox will provide HF coverage from 160 meters to 6 meters when used with an external tuner (recommended). In many cases, internal tuners on newer rigs will have little trouble matching up.

Technical Details

The matchbox comprises a 9:1 UNUN (unbalanced to unbalanced) matching transformer wound on a low-loss powdered iron toroid (see schematic).



It is designed to match the high impedance of a non-resonant end fed antenna into a range where most antenna tuners and some internal tuners can produce good performance. As designed, the matchbox can handle up to 150 watts PEP.

Antenna Wire Lengths

The following are the recommended wire lengths in feet to cover 160 – 10 meters. These are the lengths recommended by Balun Designs for their 9:1 UNUN and I thank them for the information. Those in bold are the best overall lengths to use.

| | | | | | | | | | |
|----|----|----|------|------|--------------|-----|-----|-----|-----|
| 53 | 59 | 72 | 88.5 | 98.5 | 124.5 | 135 | 146 | 162 | 175 |
|----|----|----|------|------|--------------|-----|-----|-----|-----|

I supply 55 feet of antenna wire with the deluxe model, but you will probably have to experiment to get the optimum length for your particular site. One thing that can change the feed point impedance drastically is to install the antenna as an inverted L. This will introduce top loading and you will have to figure out the best length to compensate for that (it will be shorter). Other configurations will introduce different loading scenarios.

Here are some other lengths that are based on calculations for optimum long wire antennas. If you can't get things to work with the above numbers, try these. These have been calculated to avoid multiples of 1/2 wavelengths on the major bands. (See <http://www.hamuniverse.com/randomwireantennalengths.html>)

| | | | | | | |
|----|----|----|-----|-----|-----|-----|
| 58 | 71 | 84 | 107 | 119 | 148 | 203 |
|----|----|----|-----|-----|-----|-----|

As an alternative, you might want to try this recommendation (see QST, March 1936, p. 32, "An Unorthodox Antenna"): an 84' long end fed and a 17' long counterpoise (6.5' for 20m).

If you are only interested in operating 40 through 10 meters, you can try 36, 44, or 49 feet. Note that any of these lengths are going to be long on 6 meters.

Installation Notes

There are several methods of installing the antenna and some are better than others. How you do it will depend upon your site topography and any restrictions or unusual conditions. What I give you here are suggestions based on what has worked for others. Feel free to experiment. What worked for someone else may not suit your particular situation. The antenna will work under just about any conditions, but bear in mind that it's a compromise and will probably not perform as well as an antenna designed for single band use. Providing you have a length of coax at least 16 feet long to feed it (some recommend 25 feet), you can dangle the wire out a window, throw it up in a tree or stretch it out and tie it off to any convenient fixture. If you can tune it up, it will radiate.

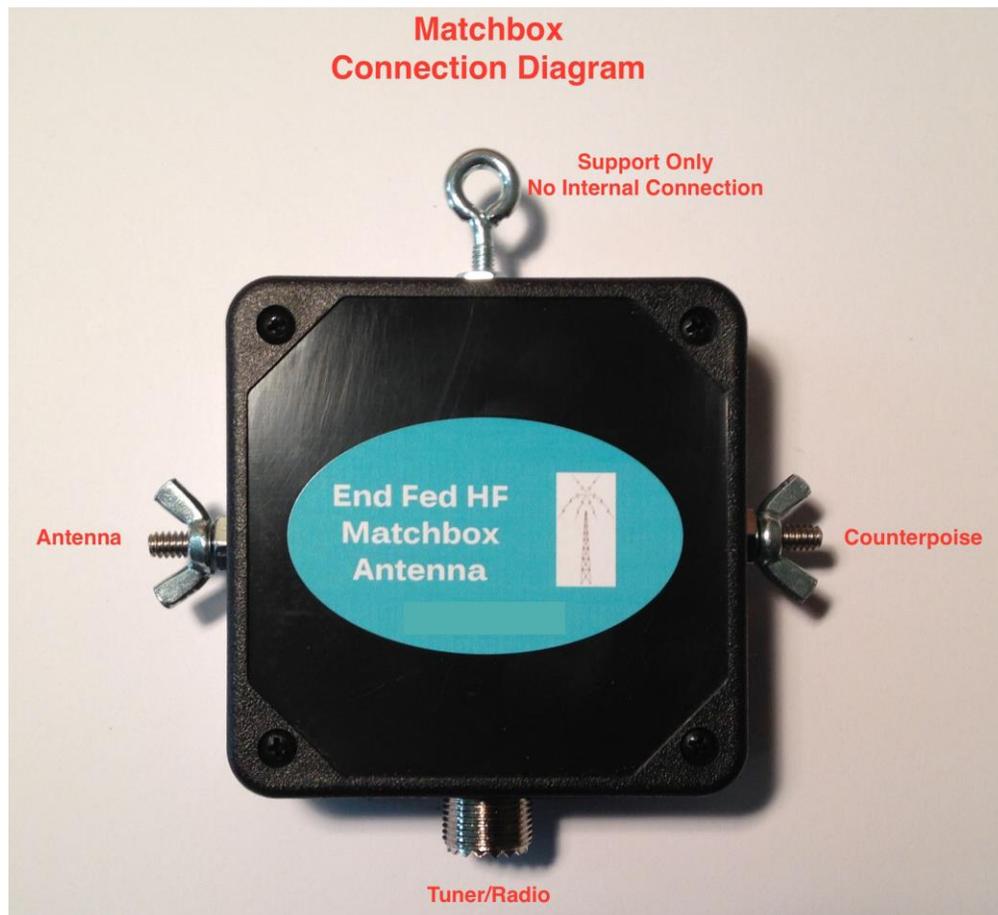
My configuration consists of 124.5 feet of wire installed in a modified (it's not perfectly straight on one leg) inverted V with the apex up about 16 feet and both ends near ground level. My counterpoise stud is connected to a ground rod just outside my basement window, where the matchbox hangs. I have a feed-through panel and approx. 10 feet of coax from there to my rig. I don't operate 160m, but antenna analyzer shows 1.3:1 on that band, and my tuner has no problem tuning up on any of the remaining bands.

While the 9:1 UNUN *should* bring the impedance down enough for a 3:1 SWR or less, an external antenna tuner is recommended for optimum performance and flexibility. Your local site topography, ground conductivity, the presence of electrical transmission lines, buildings, fences, etc. will all have an effect on the SWR at various frequencies. A tuner can help compensate for these factors.

One of the problems that some hams encounter when the coax is used as the counterpoise, is “RF in the shack.” If your mic bites your lips or computers start rebooting on your desk, for example, this is the cause. This problem can be solved by the installation of a 1:1 choke balun at or near the place where the coax enters your shack. Don’t install it close to the UNUN, as the choke will prevent the coax from functioning as a counterpoise.

Please note: The box is not weather proof. I try to keep the price as low as possible, and the extra labor and materials to do this would push the price up. If you plan to hang it out in the elements, put some silicone caulking compound or RTV sealant around the nuts and screw heads on the inside, and on the outside around the SO-239 connector where it exits the box. Remove the lid and put a good bit of sealant around the lip of the lid, screw it back down and you’re good to go. It is a good idea to drill two 1/16” weep holes at the low point of the box to drain any condensation that might build up over time. Be sure to use coax sealant at the connector.

Matchbox Connections



Recommended Configurations

Best: Install the antenna as a sloper with the far end up as high as possible and the matchbox closer to the ground. If you have a tall enough tree or other support to install the wire vertically, that's even better. Connect a counterpoise at least 30 feet long to the matchbox and run it either perpendicular to, or in the opposite direction from the antenna wire. Keep the counterpoise elevated at least 12 inches above the ground. Don't ground the counterpoise. You can eliminate the counterpoise wire if you are feeding the matchbox with at least 25 feet of coax. If "RF in the shack" is a problem, install a 1:1 choke balun near where the coax enters your shack. Don't install a choke close to the matchbox feed point if you are relying on the coax as the counterpoise; this will prevent the coax shield from functioning as a counterpoise.

Here is one ham's (Russ, AD0QH) method of hanging the matchbox that I highly recommend. It puts all the strain on the eye bolt.



(Note the weathering of the paper label. This is why all new models have laser-engraved labels.)

You can get the wire rope thimble and clamp set at any Home Depot for around \$2.00 or order online: <http://www.homedepot.com/p/Lehigh-3-32-in-1-8-in-Wire-Rope-Thimble-and-Clamp-Set-7300S-24/100152727>

Good: (According to Balun Designs. I haven't tried this.) Install as sloper per above. Connect the counterpoise stud to a radial field of 8 wires or more, each 10 – 20 feet long. More wires will give you better efficiency and longer length isn't necessary.

Functional: Attach the counterpoise stud to a good ground rod right at the feed point of the antenna.