

Running the Ground Plane Inside the Hull

As discussed in a previous article, having a good antenna is only part of a well-performing radio installation. A solid power supply and a good grounding system are equally important. Let's look some more at the Grounding system. The sea-water ground plate was discussed in the All Hands On Tech article in *** of Currents.

The internal portion of the ground system needs to connect three components:

- radio receiver/transmitter (the main amplifier that generates the RF)
- antenna tuner
- antenna counterpoise (this could be your external ground plate, a KISS-radial system, or a large copper-covered area inside the hull)

If these components are not all connected with a good ground system, you will have poorer transmission and reception, and are more likely to experience interference with other boat systems.

What do we mean by “good connection”? Well, if we were dealing with DC (direct current), we would just need heavy-gauge (thick) wires. However, your radio components need to exchange high frequency (HF) signals up to 30 MHz. HF energy does not like to travel **inside** conductors; it prefers to travel on the outside surface of conductors (called the 'skin effect'). So, a good HF conductor has lots of surface area.

Copper foil strips several inches wide are great RF conductors because they provide lots of surface area. Here's a photo showing the foil strip running between our radio and the antenna tuner. Bundled up and lying on top of the foil are the coax (HF signal) and control cables. They don't need to be touching, but having them run close to the ground foil reduces interference caused by or received by the radio.



Your antenna tuner should be located as close as practical to your antenna. In our case it is in the aft lazarette, and we made a mounting system for it shown here. You'll also note that the foil can be folded and bent as needed to conform to the curved hull. Sections can be soldered together using a small butane torch or a high wattage soldering gun.



Here's the tuner, mounted. Note the tinned copper braid connecting the copper foil to the ground connection on the tuner. As with any connection involving HF, if you can provide more surface area than a plain wire, the connection will perform better.

You can get copper braid by disassembling a length of coax cable – use the outer braid. It solders nicely to the foil.



In the larger photo, you can also see the fiberglass mat that has been epoxied over the foil, to give it abrasion and corrosion protection.

Braid is also handy where the foil needs to continue past a bulkhead – rather than trying to roll up and stuff the foil through a hole, you can bridge the foil on either side of the bulkhead with one or two short lengths of braid, as shown here.



Here are the bronze bolts connecting to the external ground plane immersed in sea water. One can directly connect the ground foil to the bolts (by sandwiching the foil between two lock washers), or if galvanic corrosion protection is needed, then a galvanic isolator can connect the bolts to the ground plane.

Here's the galvanic isolator mounted on top of the bolts (hidden by the isolator), and soldered to the ground foil.



So, that's how to efficiently connect a good ground between the radio, the antenna tuner, and the counterpoise.