



DIY

Worthwhile projects you can build on your own



G5RV antenna

Let's build one of amateur radio's most popular, yet one of the most maligned multi-band HF antennas, the G5RV. While relatively simple in materials and design, it can be a rather finicky antenna, due to its vertical radiator. The design used here is taken from [Tom Rauch W8JI](#), a very respected authority on amateur antennas.

This G5RV design is intended to support the 80-, 40-, 20-, and 15-meter bands, but requires a tuner, due to excessively low DC resistances at resonance. Some hams report that they can use their G5RV without a tuner on some bands, but I find that to be more the exception, rather than the rule. While the overall construction of a G5RV is simple, near the end of this article, you'll see that it's the installation that's probably the most difficult.

Parts list

- 40 feet 300-ohm [window line](#)
- 24 feet RG-8X coaxial cable, SO-239 connector on one end
- 110 feet 14 AWG insulated stranded wire
- 3 [dogbone insulators](#)
- 9" of 4-inch [Triplewall pipe](#) or PVC
- Zip ties, small heat shrink tubing, short paracord



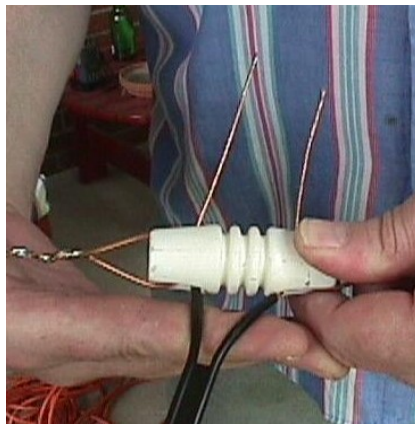
dogbone insulator



300-ohm window line

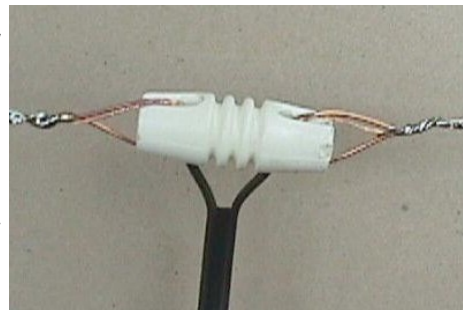
Installing the antenna center

Cut the 110 feet of stranded wire in half, then strip four to five inches of insulation off one end of each of the two wires. Using a hot (100 watts or higher) soldering iron, tin the ends of the stripped ends about 1/4" each, to keep the strands from unwinding. Thread one of the tinned ends through one hole of a dogbone insulator, then twist-wrap the bare strands exiting the hole around the strands entering the hole, up to the insulation. Solder the wrap in place, then repeat this for the other wire and the other hole.



insert the window line

Separate one end of the window line about six inches, then strip about three inches of insulation off the separated ends and tin the ends about 1/4" each. Thread the window line ends through the two holes of the dogbone insulator, then wrap the bare ends around their corresponding bared 14-gauge strands. Solder the window line bare ends to the bared



completed antenna center

strands of the 14-gauge wire, and that completes the antenna center.

DIY, continued

G5RV antenna



Thread the other end of the 14-gauge wire through another dogbone insulator so that the distance from the antenna center dogbone to the end dogbone is 51 feet. With the insulation intact, tie the wire around itself about eight turns, and cut off the excess. Repeat this for the other 14-gauge wire, and that completes the antenna portion of the construction.

Constructing the choke balun

To minimize common-mode currents on the coax, due to the connection with the vertical radiator, the G5RV requires an *RF isolator*, or current balun. Drill a $\frac{1}{4}$ " hole about two inches from one end of the 4-inch pipe. The RG-8X coaxial cable should have an SO-239 connector on one end, and should be bare on the other end. Thread the coax bare end through the $\frac{1}{4}$ " hole from the inside of the 4-inch pipe, leaving about eight inches of coax dangling out of the end of the tube. Tightly wind the coax around the outside of the tube as closely packed as you can, leaving no gaps between winds, for 19 turns. Mark and drill a second $\frac{1}{4}$ " hole vertically aligned with the first one, where the 19th turn ends. Thread the coax bare end into the hole and out the end of the tube, opposite the end of the SO-239 connector.



SO-239 connector on RG-8X coax



stripped and tinned bare end

For added stress-relief and stability, Zip-tie the coax to the inside of the choke balun with two Zip ties on each end, like in the photo on the right. Strip and tin the bare end of the RG-8X coax, like in the photo on the left. Measure the length of the window line to about 31 feet from the middle of the antenna center dogbone, then cut, strip off about $\frac{1}{2}$ ", and tin the two



completed choke balun

bare window line conductors. *If you plan to mount the G5RV in an inverted-V format, you should cut the window line a little longer, about 34 feet.*

Slip some heat shrink tubing over the insulation of each window line conductor, solder the tinned conductor to one of the tinned coax conductors, then heat-shrink the tubing over the connection. Drill a $\frac{1}{4}$ " hole in the choke balun about an inch from the edge on the window line end, then drill another on the same end, but 180° from the first, again about an inch from the edge. Thread some paracord through these two holes, and then through the window line window closest to the choke balun. Cinch and then tie off the paracord, to relieve the soldered joints from the weight of the choke balun. The antenna-choke pair is now complete.



DIY, continued

G5RV antenna

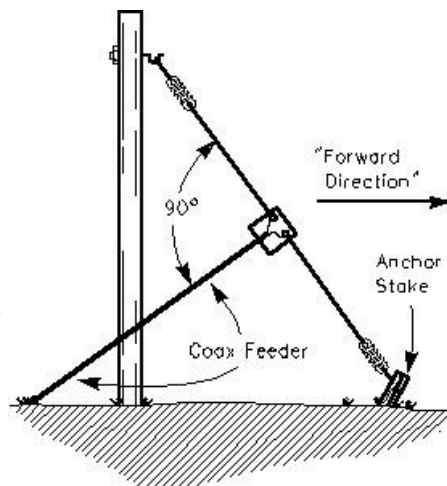


Erecting and using your G5RV antenna

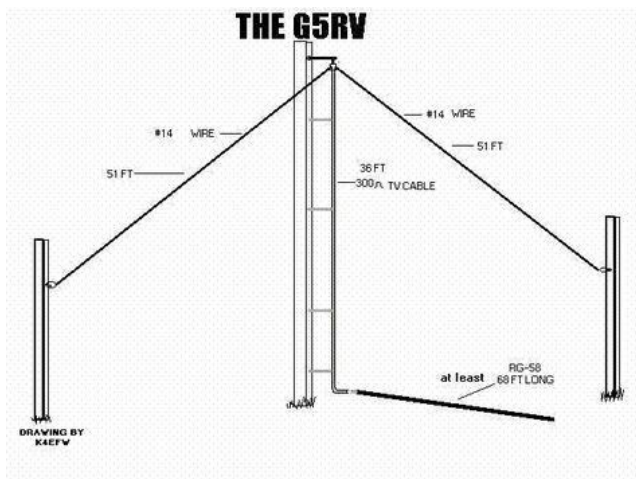
Probably the most difficult part of using a G5RV antenna is the installation. The good news is that you can mount it flat-top, inverted-V, or even sloped. For a sloped installation, try and stretch the window line out so that it's at a right angle to the two wire legs, similar to that of the sloped dipole in the *sloped diagram*. If you go for an inverted-V, try not to let the angle between the two wire legs to fall below 120° from each other. Any way you approach the installation, the two most important rules about mounting a G5RV antenna are 1) get it up high and 2) keep it away from conductors.

Ideally, the very bottom of the choke balun should be at least twelve feet off the ground, which places the flat-top wire legs about 44 in the air, not always easy. Furthermore, no part of the antenna, especially the window line, should be within eight feet of conductive objects, such as gutters, roofs, masts, vegetation, or the dirt. The vertical radiator (window line) has a way of coupling with surrounding metallic and other conductors, which can easily de-tune your antenna (because those objects become part of the antenna system) and shift your resonant frequency.

Will your G5RV work if you can't get it high enough? Yes, but you might find that the vertical radiator has coupled with the ground more than you'd like, resulting in a higher SWR at your resonant frequency and a narrower bandwidth. But even with the best conditions, you need to connect a tuner to your new antenna to provide an impedance match for your bands of choice. Connect your coax from your rig to your tuner, then another from your tuner to the SO-239 connector of the choke balun, and enjoy making contacts on 80 meters, 40 meters, 20 meters, and 15 meters!



sloped diagram



inverted-V diagram

