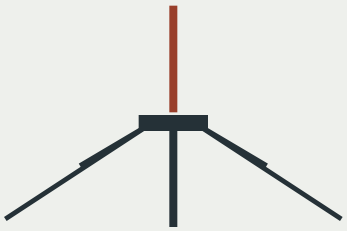
Build a 2-meter ground plane

Project 1 / A four-radial vertical for a 50-ohm amateur radio feed line

For a 146.5 MHz target, start with a 20-inch vertical radiator and four 20½-inch radials. These are starting lengths. The connector, wire diameter, support, and nearby metal affect the final match.

Materials

One four-hole SO-239 chassis connector; five lengths of stiff bare copper wire or brass rod; four small bolts with nuts and lugs; solder and heat source; 50-ohm coax with a matching plug; nonconductive support, ties, eye protection, and an antenna analyzer or suitable VHF SWR meter.



Vertical element □ center contact

Four radials □ connector flange

Coax center □ vertical element

Coax shield □ flange and radials

Assemble and check

1. Solder the vertical element to the center cup. Fasten one radial to each flange hole. Space the four radials evenly, then bend each about 45° below horizontal. Round or cap the tips.

2. With the antenna disconnected, check continuity from radiator to center contact and from each radial to flange. On this design, the center contact should be open to the flange. Support the coax so its weight does not hang from the radio's antenna jack.

3. Set it at its operating height, clear of people and power lines. Sweep around the intended frequency. If the SWR minimum falls below target, shorten the radiator in small increments and measure again. If it falls above target, lengthen or replace the radiator.

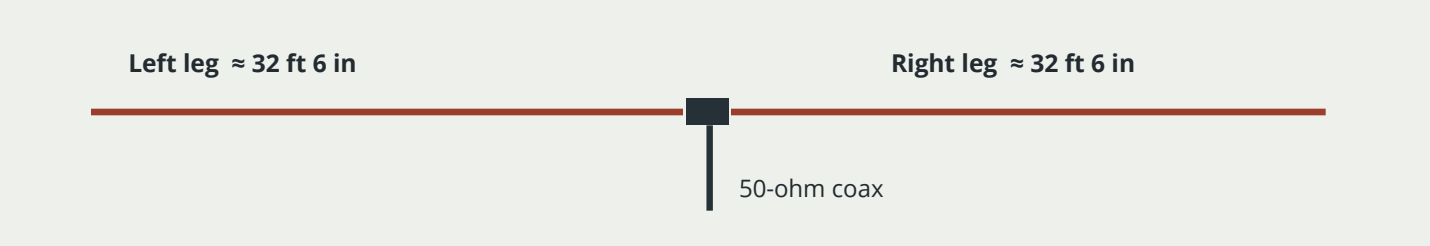
4. Connect the radio only after confirming a suitable match for the transmitter. Start at low power and exchange signal reports on a clear amateur simplex channel.

Design references: ARRL, Ground-plane Antennas for 144, 222 and 440 MHz; U.S. Navy, NEETS Module 10, chapter 4. Use a separate-antenna-capable amateur radio for this project; FRS radios require integral antennas.

Build a 40-meter wire dipole

Project 2 / A center-fed horizontal wire antenna for an HF amateur station

At 7.200 MHz, 468 ÷ 7.200 gives approximately 65 feet of wire in total, or 32 feet 6 inches per leg. Start with two 33-foot pieces so you can fold back and tune the ends. Allow a little additional wire if needed for mechanical attachments.



Build and tune

1. Gather stranded copper antenna wire, a center insulator or 1:1 current balun, two end insulators, nonconductive support cord, and 50-ohm coax. Give each wire its own strain relief before making the electrical connection.

2. Attach one wire to each balanced terminal of the balun, then plug the coax into the unbalanced side. With a simple center insulator, connect one leg to the coax center and the other to the shield, and use a suitable common-mode choke at the feed point.

3. Tie the far ends off with insulators and cord. Choose a location where no wire, mast, or support could reach a power line if it fell. Keep the feed point and wire ends out of reach during transmission. Lower the antenna before adjusting it.

4. At operating height, sweep with an analyzer. A minimum below your target calls for shorter legs. Fold back an equal amount on each end, raise, and measure again. A minimum above target calls for longer legs. Record the final lengths and height for the next setup.

What to record

Target _____ MHz Left leg _____ Right leg _____
Height / shape _____ Measured SWR _____

Design references: ARRL, Single Band Dipoles (arrl.org/single-band-dipoles) and Electrical Safety (arrl.org/electrical-safety). Choose an operating frequency and emission within your own license privileges; evaluate RF exposure for the installation.