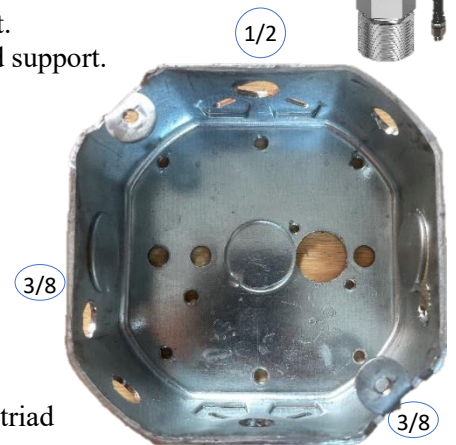
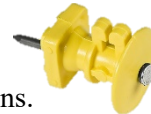
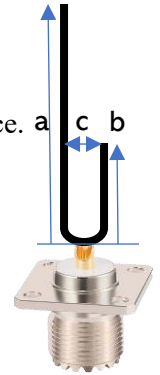


## Ham 144: Making Antennae 4" Electric Mount

Dr. Marc and Rosemary © 240127

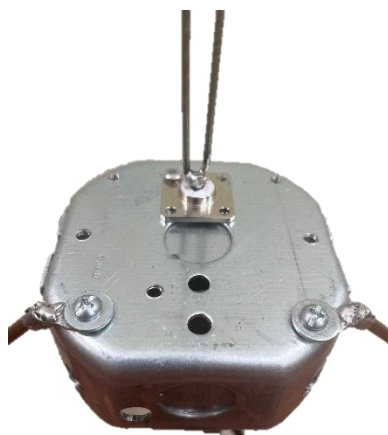
- What is the biggest problem for radio ops, whether in a neighborhood, apartment, or farm? Antenna size and shape.
  - There are more antenna variations than there are hams, but most are marginal in tight spaces. All are trade-offs.
  - Our objective is a local antenna which is environmentally friendly, indoor usable, and easy to build.
  - Metal insulation, roofing or siding is a shield. Move antenna to a spot where it can radiate.
- Mount:** A common denominator bracket works on VHF or HF. It is repurposed, unconventional use.
  - 1: octagon 4" electrical box, with double knockouts and NM clamps (Raco) allows more drilling space.
- VHF Quarter-wave ( $\lambda/4$ ) antenna**
  - 1: Solder to SO-239 panel-mount connector. Drill 5/8" hole near center in back of mount.
  - 2: #6-32x 1/4", bolts. Drill and tap holes to attach the SO239 solder connector.
  - 4: #8-32x 1/2", bolts and washer. Drill and tap holes into the back, near the four corners.
  - 4: 1/8" x 18" brass rods or alternate wire, tubing, or coat-hangar for counterpoise.
  - 4: electrical spade lugs. Crimp to one end of each rod, and solder. Bend to droop down at 45 degrees.
  - 1: 1/8" x 30" brass rod. For quarter wave radiator, 146 MHz (a) is 20.2", 435 MHz (b) is 6.8".
  - Separate (c) by about 10 mm. Solder to SO-239. Make each rod 1" longer, then cut to length.
- COMPACTenna 1:** NMO to SO-239 connector. Substitute for VHF. Remainder is same.
- HF wire antenna**
  - 1: Solder to SO-239 panel-mount connector.
  - ( $\lambda/2 + 1$ ) ft: #12 or #14 stranded copper wire, THWN insulation, For dipole cut in two.
  - 1: #12 spade lug: Crimp to one end of a wire and attach to mount. Solder end of the other wire to SO-239.
  - 2: electric fence end insulators for stress relief on each wire at the mount.
  - 4+: electric fence insulators for standoff support of wire, put about 32" apart.
  - For long wire, multi-band, do not cut in two. Leave the lug connected to end support.
- HF with tunable, loaded inductors**
  - 1: 3/8"-24 to SO-239 antenna adapter. Install in top 1/2" hole.
  - 2: Shark mini-hamstick for the desired band as dipole variations.
  - 1: Shark mini-hamstick for desired band as counterpoise on triad variations.
  - 2: 3/8"-24 nuts.
  - 2: 3/8" star lock washers.
  - 1: M10 or 7/16" flat washer for optional adapter spacer.
  - If directional issue, add 36" rod or wire, between counterpoises, droop 45°.
- Drill 1/2" hole in top end with double knockout. Locate so adapter fits flat.
  - Drill 3/8" hole in sides for return and counterpoise with pattern of dipole or triad
- Counterpoise:** One makes a dipole. Two are generally adequate in tight space. Four gives symmetry.
  - Return and counterpoise should droop 45 degrees toward the earth, for proper coupling.
  - Mount the feed-point preferably about 15' to as low as 6', well within the earth reactive field.
  - Attic, behind curtains, or outside wall under the eave can work great.
- Coax: RG-213/U vs RG-8X**
  - 25+ ft: RG-213 is lower-loss, high-quality, stiff coax. RG-8X is small diameter, but high loss. VHF and above, restrict 8X to about 25'. At lower frequencies, use to over 50'.
  - 2: 3' RG-8X jumper with barrel connector. Aids connection from stiff coax to the radio & antenna.
  - 4+: Mix 31 ferrite snap-on beads. Place about a foot below the SO-239 connection. Ferrite is critical to tune the antenna. Without beads, the coax shield is a counterpoise.
- Antenna analyzer** is necessary to tune the system. Connect with over 10' coax to reduce capacitance.
  - Antenna impedance depends on height, materials, other close objects.
  - Adjust the radiator & return for minimum SWR at desired frequency.
  - To start, pick a length of wire or extend whip about 6". Observe frequency at minimum SWR.
  - To lower frequency, lengthen the whip or wire. To raise frequency, fold wire at end. Tape in place.
  - Set the radiator and return to approximately same length.
  - Making return longer increases bandwidth, as does adding counterpoise. Adjust to change SWR.
  - Repeat adjusting until the SWR is well below 3:1.
  - Connect to your HF transceiver. Select the frequency. Tap [tune] to improve matching.
- You now have an antenna system. Experiment with configurations, counterpoises, and conditions.
- Life is good. Enjoy!



# Octagon Mount and Feed



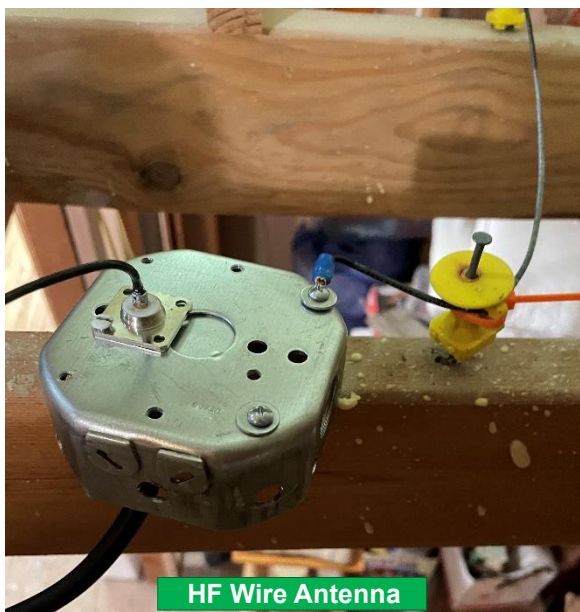
Mount - 4" Octagon



VHF/UHF  $\lambda/4$



VHF/UHF  $\lambda/4$



HF Wire Antenna



CompacTenna



CompacTenna

Lower end of voice		
MHz	$\lambda$ -m	$\lambda/4$ -ft
50 - 54	6	4.9
28.0 - 29.7	10	8.7
14.0 - 14.35	20	17.3
7.0 - 7.3	40	34.2
3.5 - 4.0	75	64.8



Triad Radiator  
Return & Counterpoise



Tunable Loaded Inductor



Antenna adapter 3/8"-24



Return & Counter - 45°

