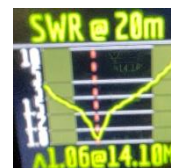
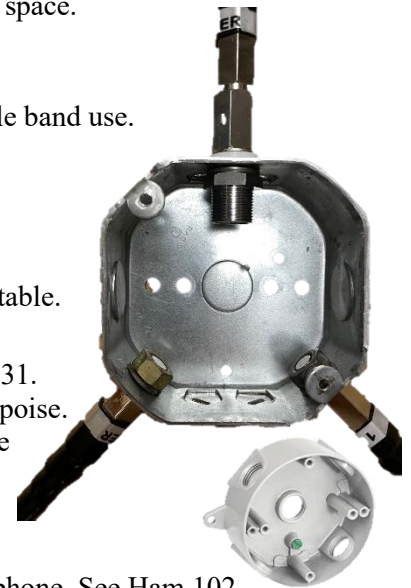
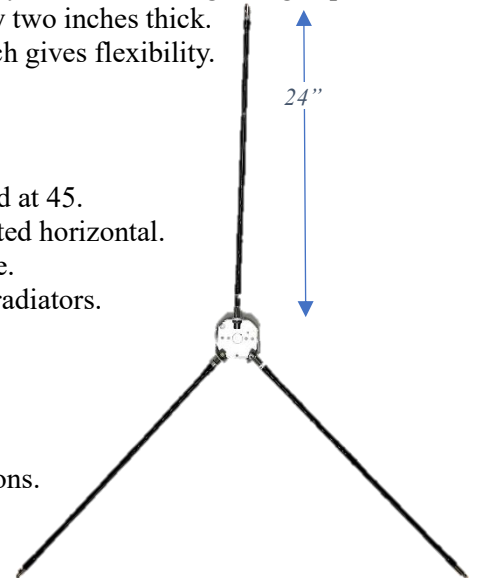


## Ham 132 – Hamstick Options

Dr. Marc & Rosemary © 231103

1. Our objective is an HF antenna system which is apartment usable, HOA friendly, and minimal lightning exposure.
  - a. The design is configurable for available space and access. All are flat, only two inches thick.
  - b. Shark Hamsticks are single band antennas for HF & 6M (75M – 6M) which gives flexibility.
  - c. A counterpoise of two radials is within 0.2 dB of much larger systems.
2. Five designs are considered.
  - a. Minimum cost: 1 Hamstick for radiator plus two wires for radials.
  - b. Best performer: 1 Hamstick for radiator and two Hamstick radials mounted at 45.
  - c. Minimum height: 1 Hamstick for radiator and two Hamstick radials mounted horizontal.
  - d. Minimum width: 1 Hamstick radiator and one opposite direction for dipole.
  - e. Multiple band: either b or c plus spreader bar and Hamsticks attached for radiators.
  - f. Change out the Hamstick to change band.
3. Basics required for all five designs.
  - a. Electrical octagon box 4", with double knockouts for more space.  
The box is mild-steel for indoor use. Round, weatherproof is alternative.
    - Drill 1/2" hole in top, near-center as radiator mount for all configurations.
    - Drill two 3/8" holes in bottom angles or in both sides for radials.
    - Drill one 3/8" hole in bottom for dipole.
  - b. 3/8"x24 to SO-239 antenna adapter.
  - c. Stainless washer, M10 or 7/16" for non-insulated coax shield contact.
4. Minimum cost design (a) uses two metal rods (5/32" or AWG12) for radials.
  - a. Make length  $\lambda/12$  or longer to reduce SWR  $\lambda * \text{MHz} = 300$
  - b. Obtain two of each: 10-32 x 1/2" bolts, star washers, nuts with spade lugs.
  - c. Drill two 13/64" holes to mount lugs. Use horizontal or 45 degrees for available space.
5. Hamsticks for counterpoise (b & c) allows very short radials for tight space.
  - a. Radiators are nominally  $\lambda/4$ . Shortened radials are down to  $\lambda/12$ .
  - b. Divide frequency in meters by 3 or less for hamstick radials. This allows multiple band use.
  - c. Obtain two more hamsticks.
  - d. Obtain two stainless 3/8"-24 nuts and star or lock washer to attach sticks to box.
6. A dipole (d) is the radiator plus a matching radial mounted in the opposite direction.
  - a. Obtain a stainless 3/8"-24 nuts and star or lock washer to attach stick to box.
  - b. Mount horizontally or vertically. Horizontal has directional gain so must be rotatable.
7. Feed antenna with 50Ω coax. A short piece of RG8 helps flex out of the box.
  - a. About a foot below the SO-239 connection, snap on 3 to 5 ferrite beads of Type 31.
  - b. Ferrite is critical to tune the antenna. Without beads, the coax shield is a counterpoise.
  - c. Mount feed-point 'preferably' higher than  $0.16\lambda$  above earth, outside the reactive field interference. If not feasible, mount above 10'.
8. Use an antenna analyzer to tune the antenna. Lengthen the whip to lower frequency.
  - a. Set the radials first. If room, extend whip as far as possible.
  - b. Adjust radiator for minimum SWR at desired frequency. Suggest the middle of phone. See Ham 102.
  - c. Repeat adjusting until get SWR is below 3:1.
  - d. Connect to the Icom 7300 HF transceiver. Set Frequency. Tap tune to improve match. Test bandwidth.
9. For multi-band, make a metal spreader bar about 3/4" wide. Drill 3/8" holes about 3" apart.
  - a. Place the middle hole over the SO-239 adapter. Attach with the middle antenna shaft.
  - b. Attach two or three different Hamsticks. They will couple to each other requiring retuning.
  - c. Adjust radials, then antennas. Repeat until acceptable.
10. Multi-band is tedious. Alternate radials may help. Bundles are a way to get longer overall lengths.
  - a. Use AWG14 insulated wire. Cut fifteen 10' lengths. Strip ends off five wires.
  - b. Connect together then to the box. Repeat for a total of three bundles or 150'
11. Hamsticks are about \$25 per antenna. A set of five is about \$100.
  - a. Gigaparts is preferred because shipping is cheaper.
  - b. Two sets of five will provide radiators and radials.
12. More details in design tradeoffs are in Ham 129, 130, 131.
13. Life is good. Enjoy!



# Hamstick Layouts



Radials - 45°



Antenna adapter



Nut & Star washer



Dipole



Radials - Horizontal