

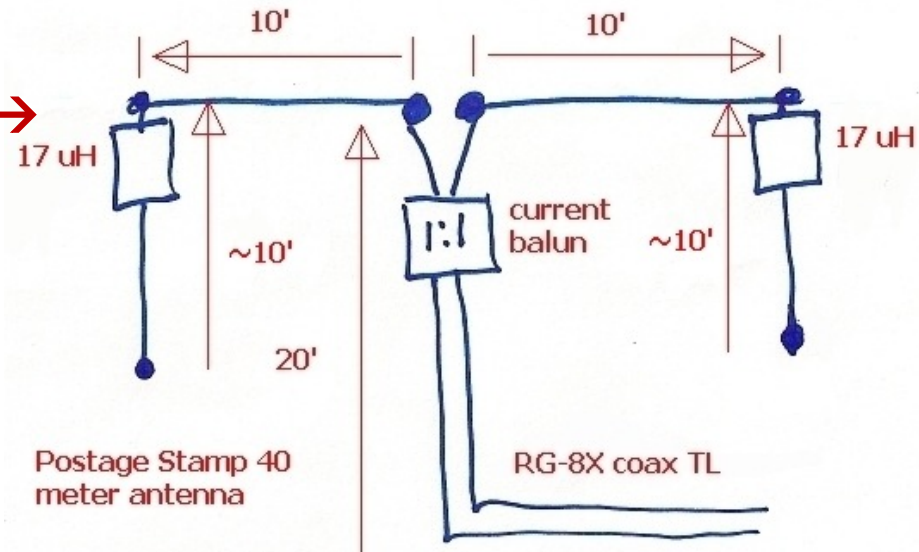
# “Home-brew” (HB) Antennas

- Relatively inexpensive
- Designed for your specific interests and location
- You'll learn a lot.
- Pride and satisfaction every time you make a contact!

Receiving loop→



Ultra-compact 40 m dipole →

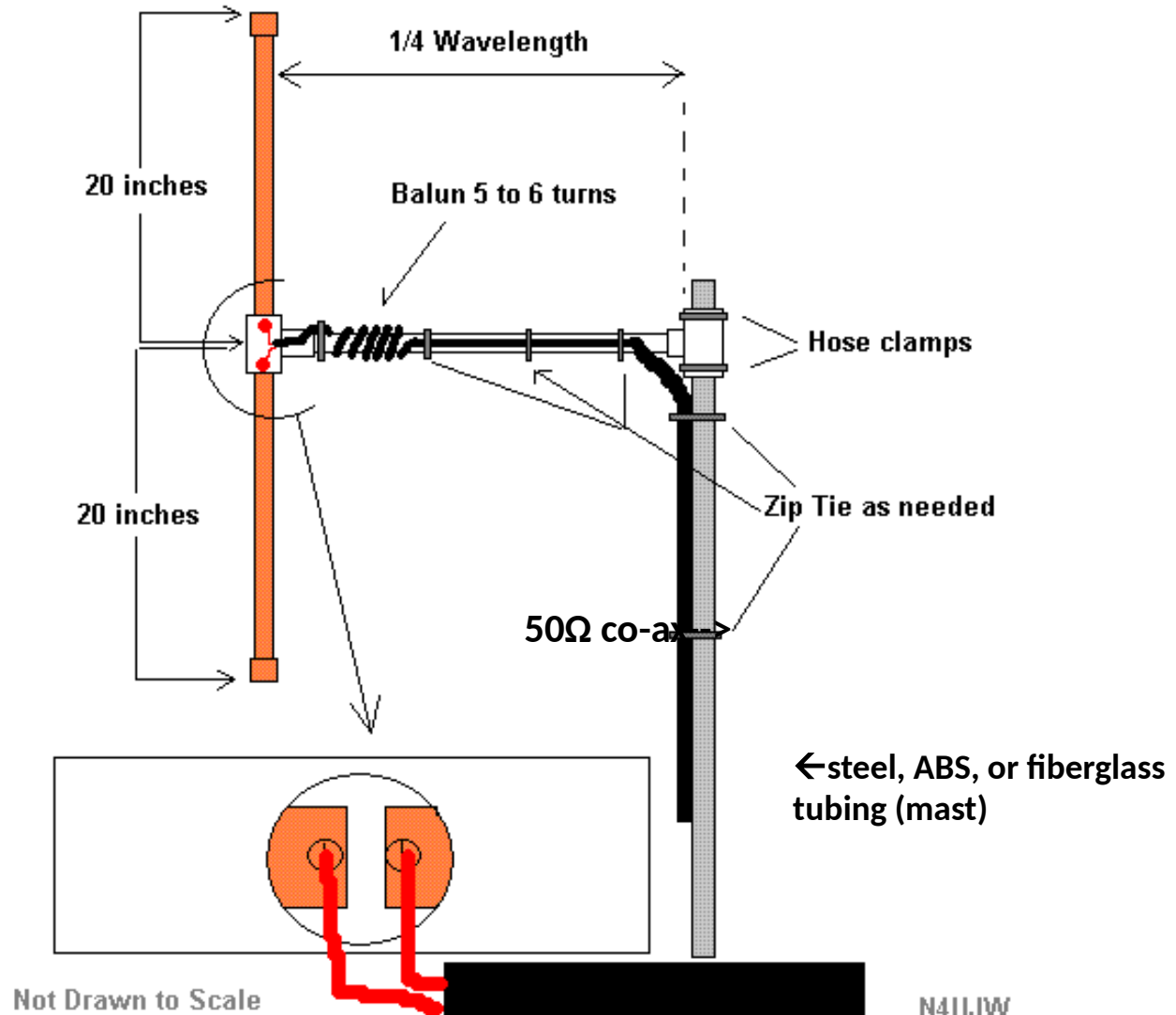


## Information sources

- Other hams
- Ham magazines: QST, TCA, RadCom, etc.
- Internet
- Low Band Dxing: John Devoldere
- ARRL Handbook (any year)
- ARRL Antenna Compendium, many other antenna construction publications

# Homebrew 2 meter vertical dipole

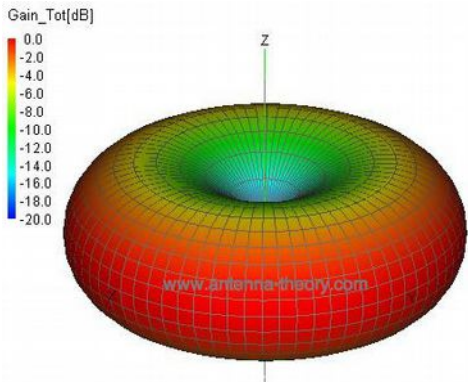
Antenna is made of ½" copper plumbing pipe mounted in CPVC tee and pipe



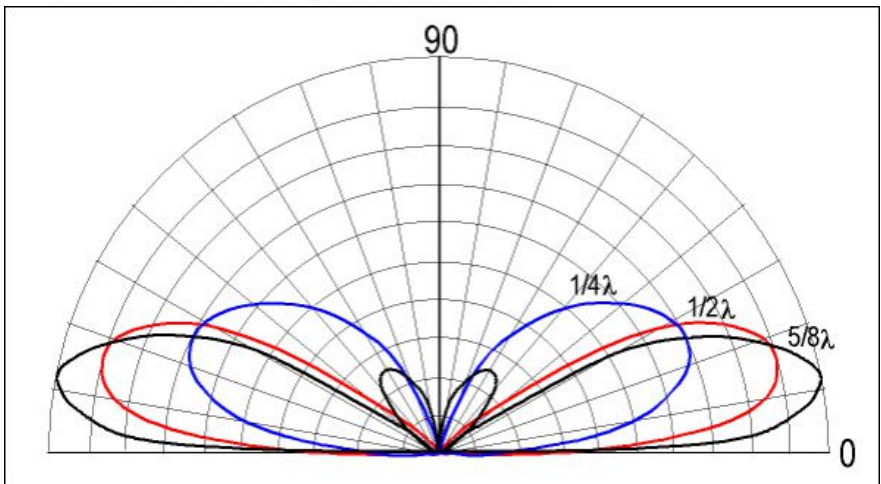
“Plumber’s Special” high performance “J-pole” VHF antenna

Easily sized for 6m, 2m, 70cm

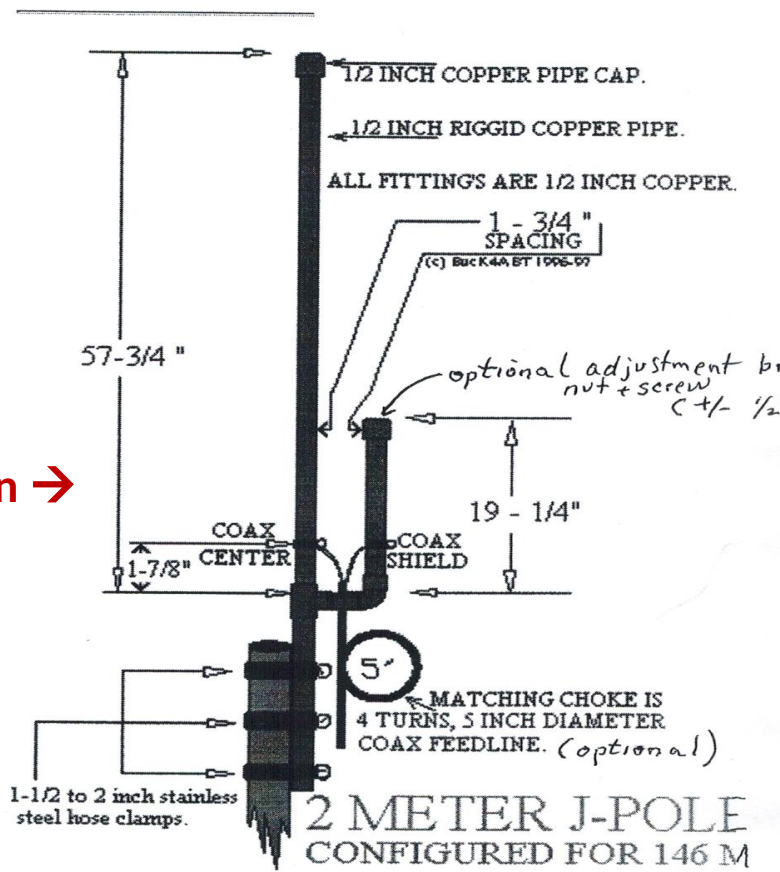
5/8 λ vertical design: gives 3 db better gain in horizontal plane than 1/4λ



2 m dimensions shown →



1/4λ: vertical max gain at 30°  
5/8 λ: vertical max gain at 16°

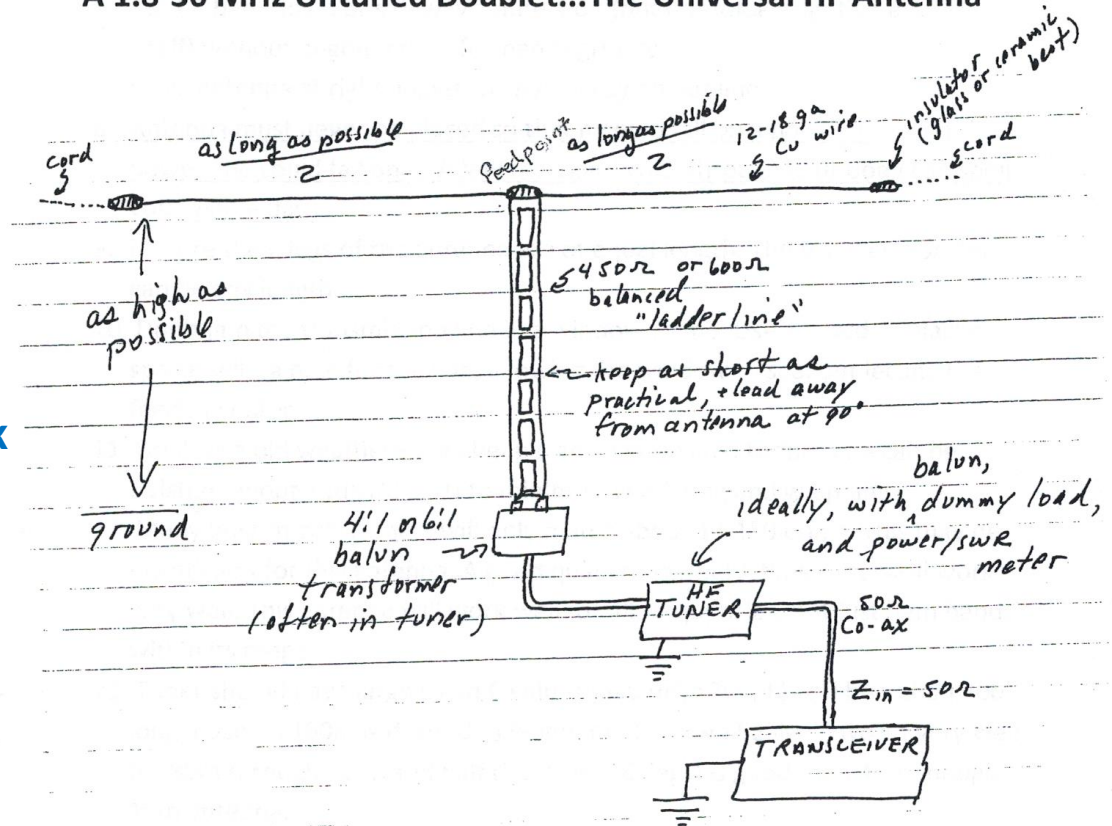


- Uses “gamma” (γ) match for Z=50Ω
- made from hardware store 1/2” copper pipe fittings soldered with standard propane torch
- very efficient omni pattern (on left)

## Hints/tips

- 2 legs should be equal length
- 3 high supports best
- Legs may be bent in any direction to fit your space, except tightly back on themselves.
- Higher is better!
- Very little directionality, unless produced by your location.
- Stranded black insulated wire is ideal.
- “Hard-drawn” copper wire best (less stretch, more strength). House wire fine for 120' and shorter antennas.
- Excessively heavy, stiff, or aluminum or steel wire best avoided.

## A 1.8-30 MHz Untuned Doublet...The Universal HF Antenna



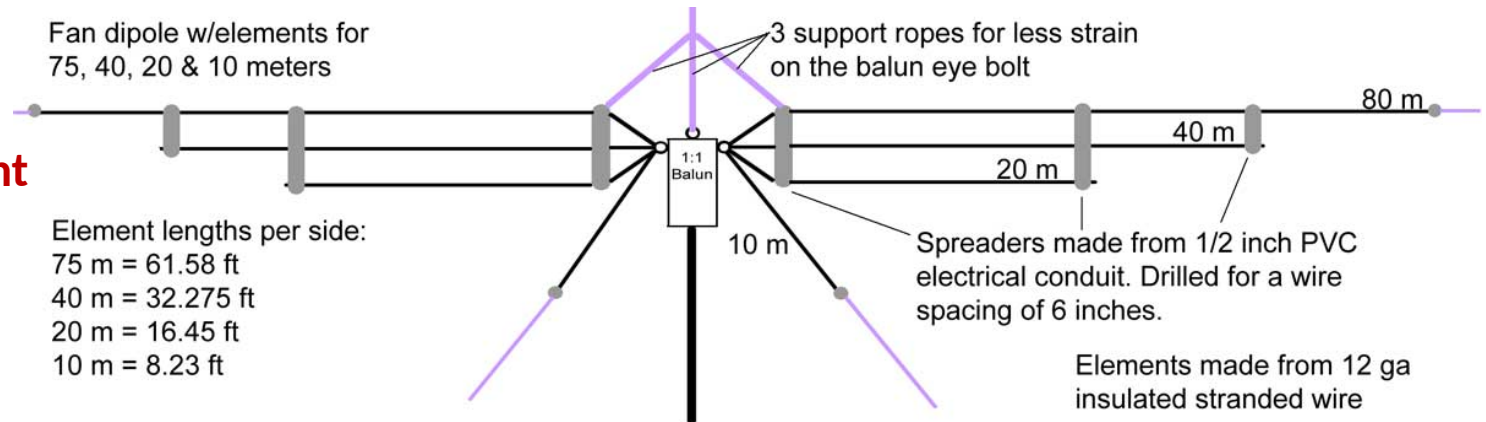
## Construction and Installation

1. Keep ladder line >12" away from wet wood, masonry, or metal, and use a "current"-type balun.
2. Twist together and solder all connections carefully, and use a strain relief (not shown) at the feedpoint. Feedline should be secured with quality cord or non-metallic standoffs to reduce whipping in the wind.
3. If flexible supports (like trees) are used, use pulley + weight at one or both ends to tension antenna.
4. Use black Dacron (best) or other black cord for long life in the sun.
5. Run antenna as far from large obstructions as possible.



# Home-brew multiband setups (two of many)

## 3-band resonant multi-dipole



## All HF band non-resonant (102' long for 80-10m) (54' for 40-10 m) doublet

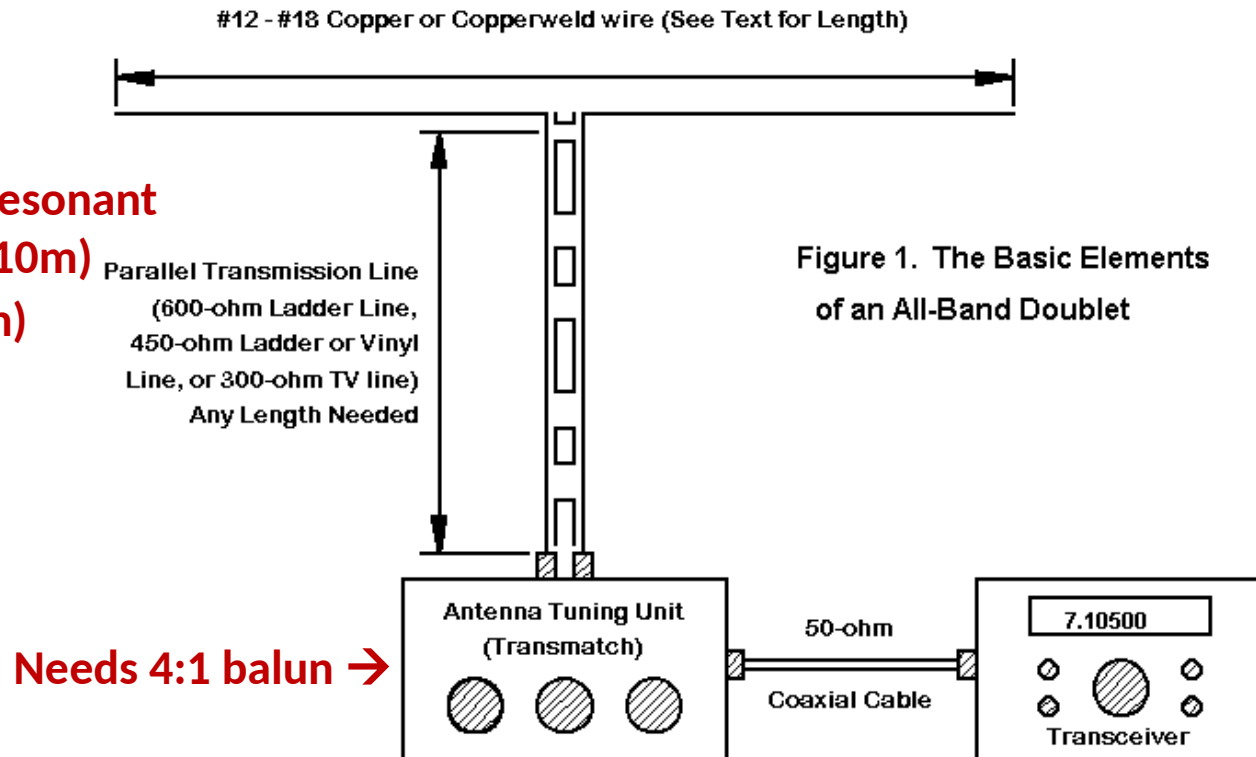
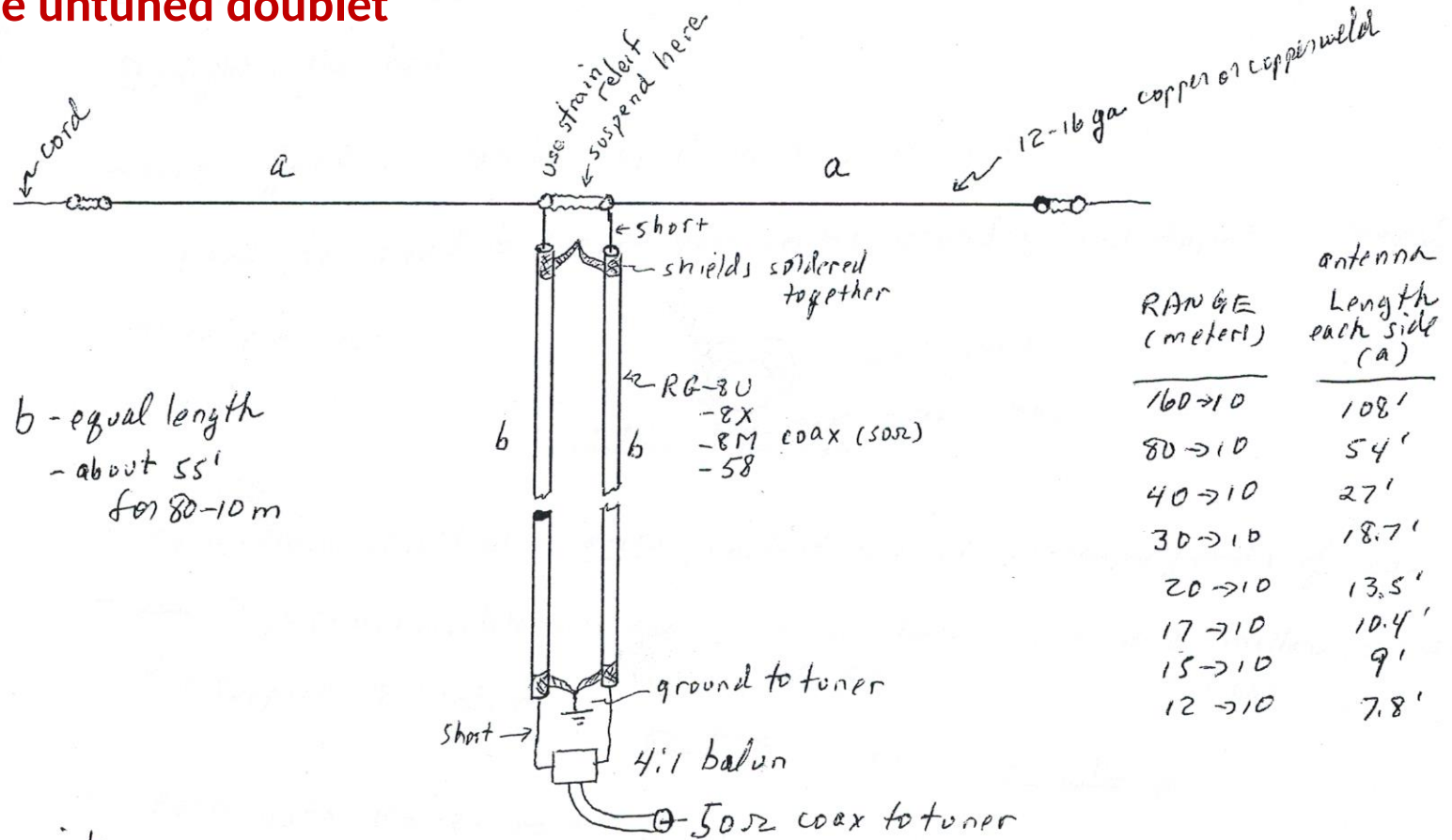


Figure 1. The Basic Elements  
of an All-Band Doublet

# Balanced, shielded-feed Zepp all-band HF antenna

## Variant of the untuned doublet



### points

- more efficient feedline than unbalanced coax
- quieter even than 450 $\Omega$  balanced line because combined balanced line signal cancellation and shielding eliminate noisy vertically polarized rf energy
- like unbalanced coax but unlike balanced lead-in this balanced, shielded

# Good, quiet, directional build-it-yourself receive antennas

Beverage →

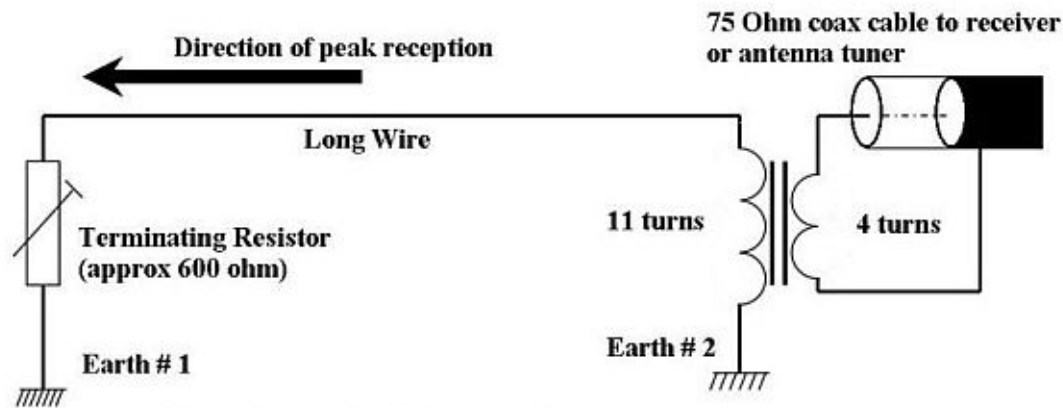


Figure 1: A basic uni-directional Beverage antenna

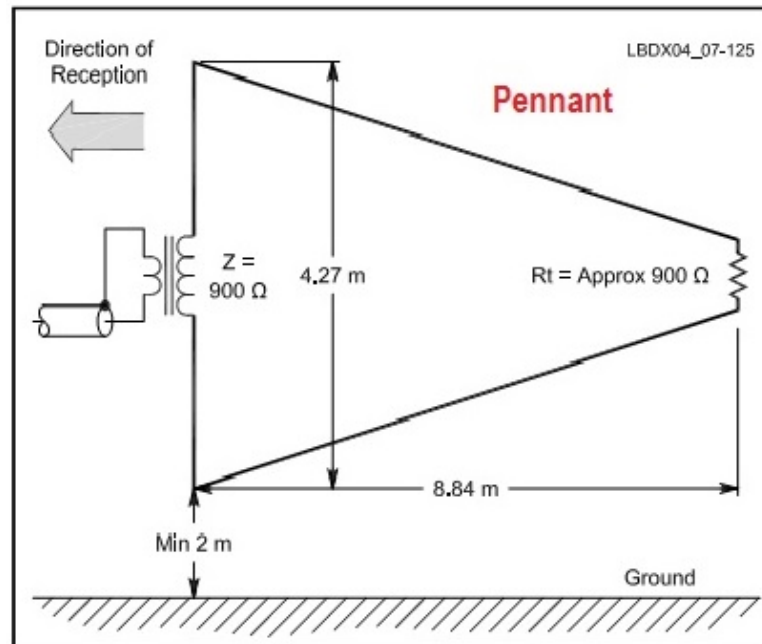


Fig 7-141 — Layout and dimensions of the optimized Pennant antenna. Sumber: ON4UN

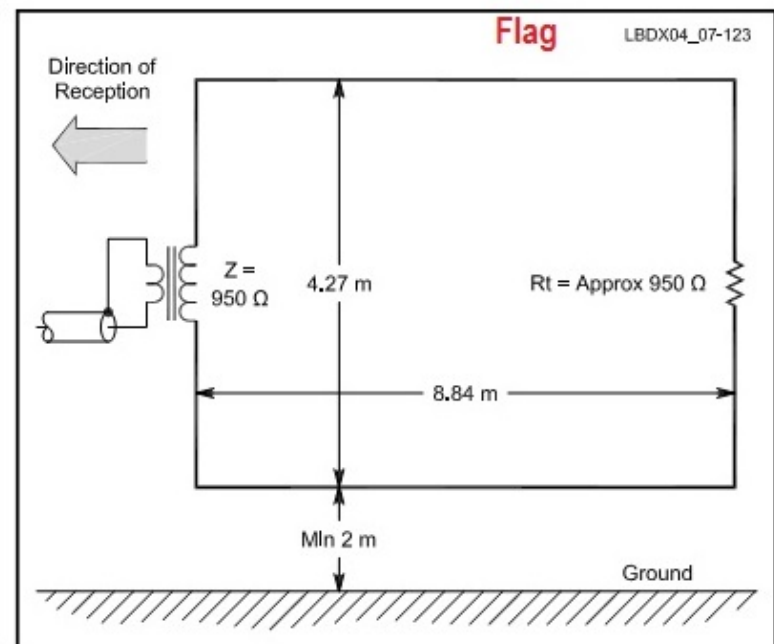
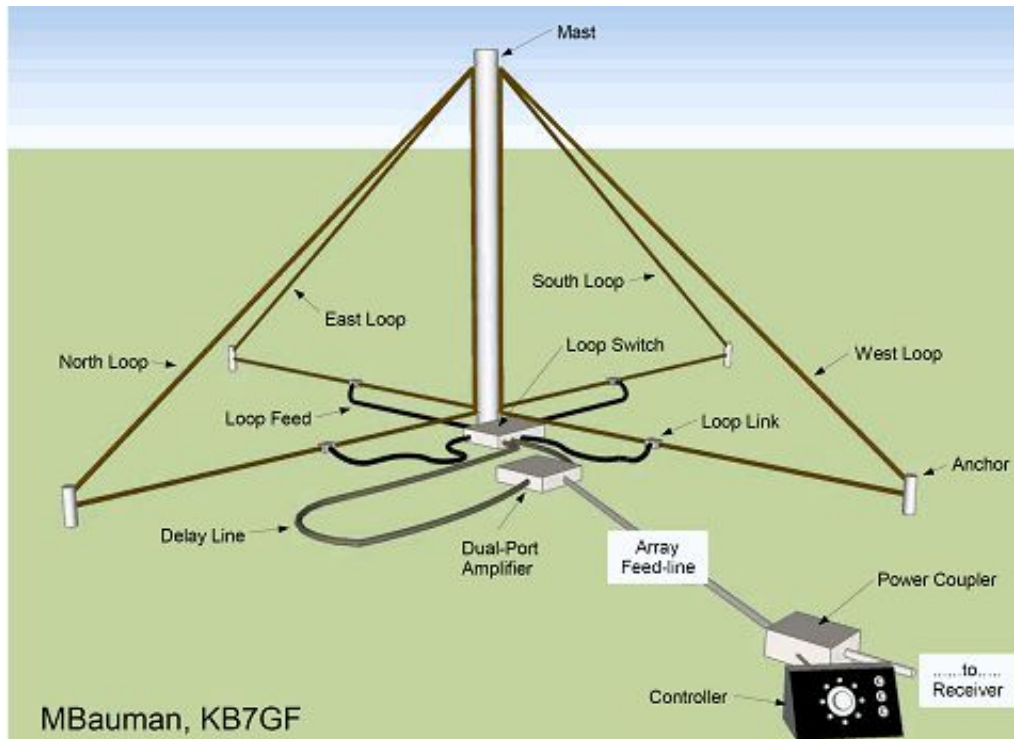
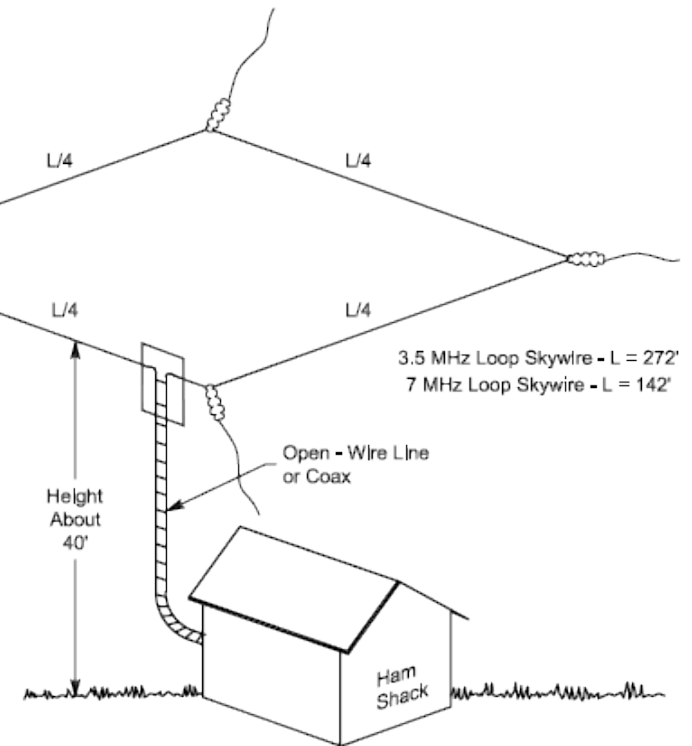


Fig 7-139 — Optimized dimensions for the 160/80 meter rectangular loop. Sumber: ON4UN

Horizontal loop-excellent on resonant frequency and all higher frequencies..but needs 4 supports

-can be 3-sided (delta)...only needs 3 supports



Shared-apex loop array: state of the art receive-only non-resonant LF-MF-HF antenna

- switchable to 8 directions
- high front-back ratio
- rejects much of atmospheric noise
- not a beginner's antenna project



# Quick Antenna Review

Antennas: Convert AC currents in conductor into electromagnetic radiation with 2 fields (electrostatic and electromagnetic) at right angles to each other.

Q.: EM radiation speed?

Q.: What is an isotropic radiator? What is it used for?

Q.: Relationship between RF current (I) and radiated signal? RF voltage (E) and radiated signal?

Resonant antennas: mostly based on half-wave dipole or full-wave loop  
Advantages? Disadvantages?

Q.: Relationship of  $X_C$  to  $X_L$  at resonance??

Q.: Why feed a half-wave dipole in the middle?

Non-resonant antennas: Advantages? Disadvantages?

# Frequency-wavelength concept....ya gotta know it!

$$f = c/\lambda$$

$$f = 300/\lambda$$

$$\lambda = 300/f \text{ (MHz)}$$

$f$  = frequency (Hz)

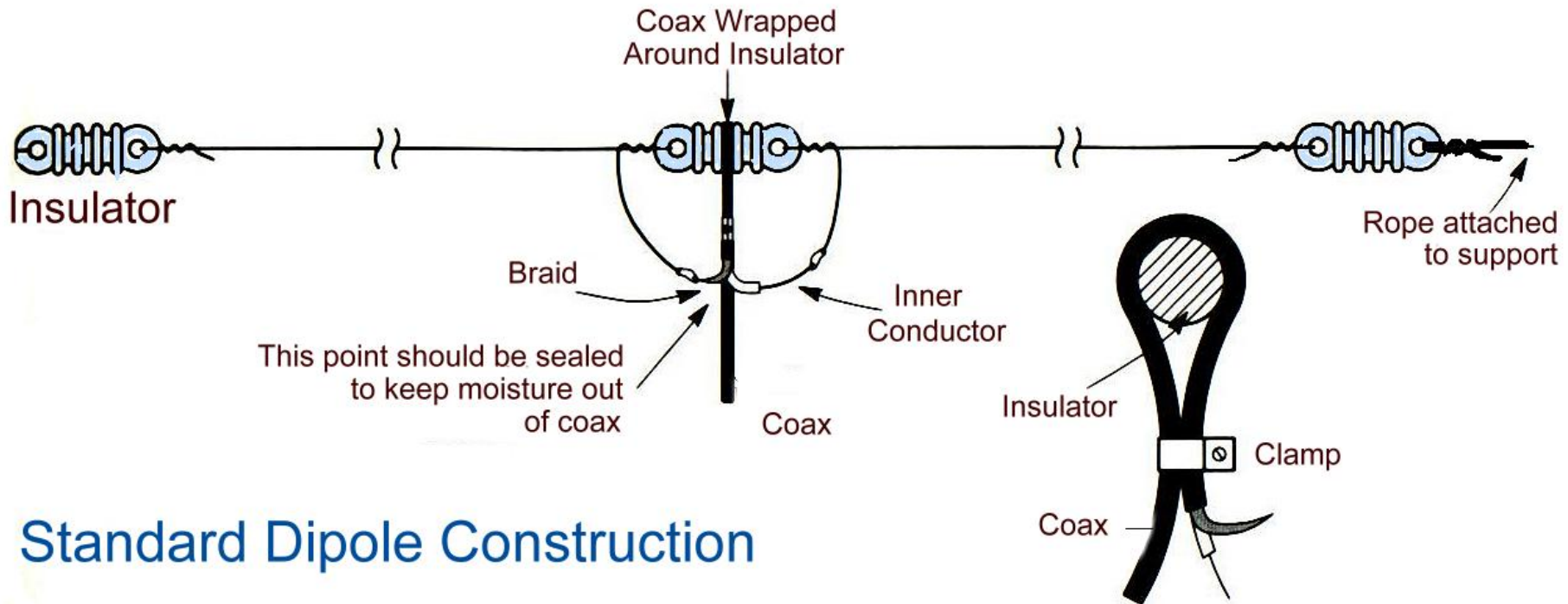
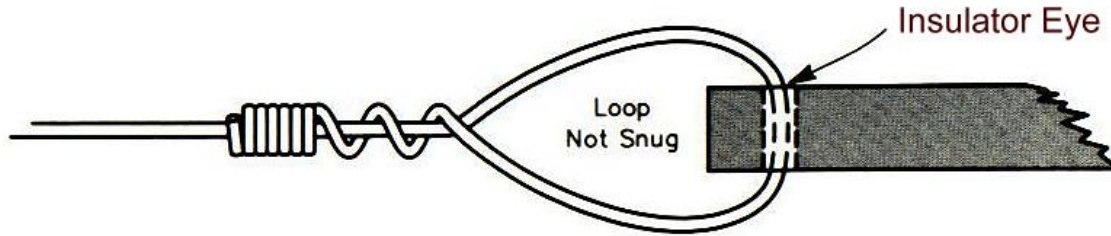
$\lambda$  = wavelength in m (meters)

$c = 300 \times 10^6 \text{ m/s}$

Common ham bands:

<u>Amateur Band</u>	<u>Frequency Range (MHz)</u>
160 m	1.8-2.0
80 m	3.5-4.0
40 m	7.0-7.3
30 m	10.1-10.15
20 m	14.0-14.35
17 m	18.067-18.167
15 m	21.0-21.45
12 m	24.89-24.99
10 m	28.0-29.7
6 m	50.0-54.0
2 m	144.0-148.0
0.7 m(70 cm)	420-450

# Some homebrew construction tips and tricks



## Standard Dipole Construction