

End-Feeding a Center-Fed Vertical Dipole

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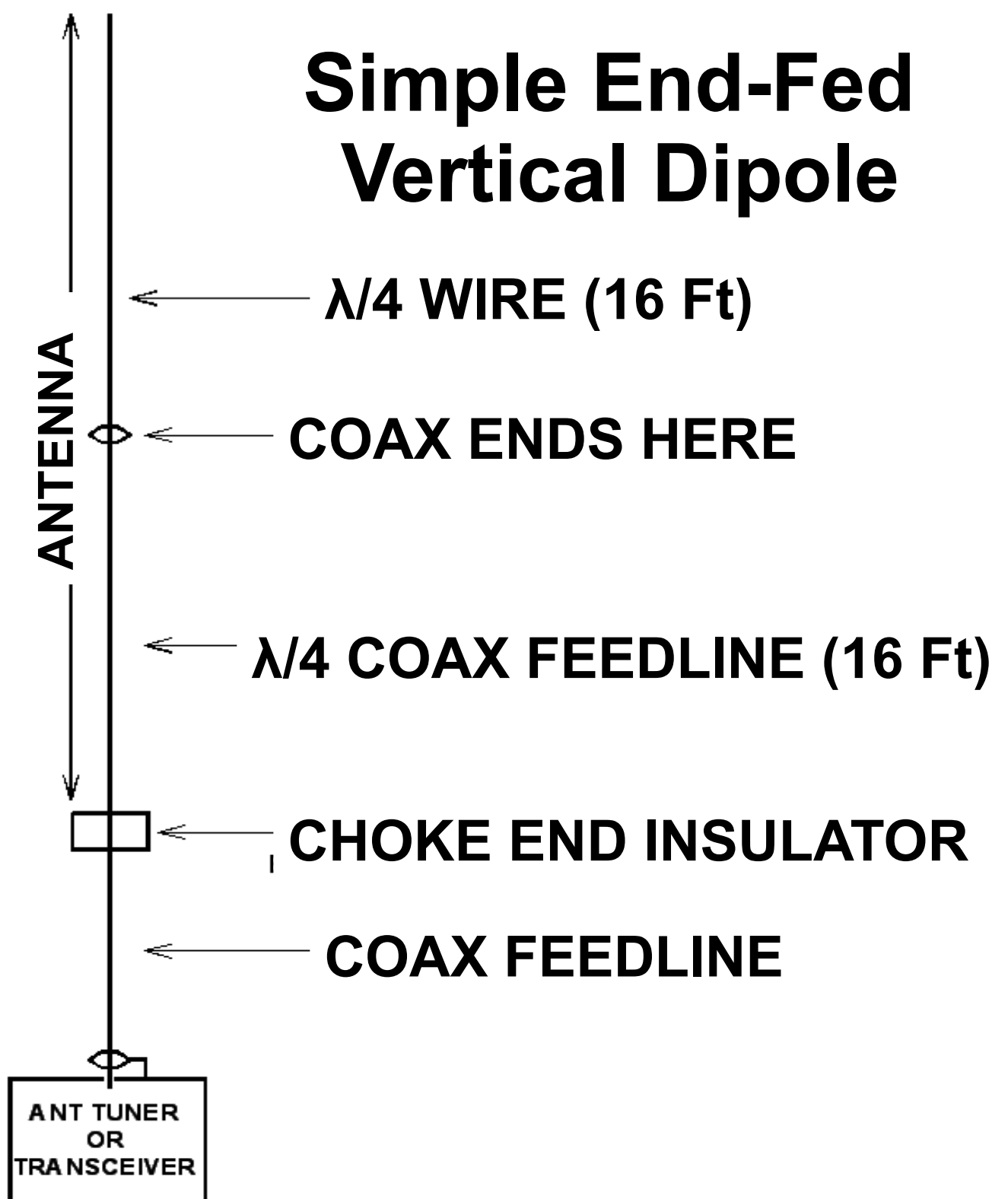
K9YC

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Simple End-Fed Vertical Dipole

Lengths shown are approximate for 20M



An End-Center-Fed Vertical Dipole

- **Behaves like a center-fed vertical dipole**
 - $Z_0 \sim 70$ ohms, so 75 ohm coax is the best match
- **Top half is $\lambda/4$ wire**
- **Outside of coax shield is the bottom $\lambda/4$**
 - Use $V_f \sim 0.97$ for a PVC insulated 0.25-in conductor
- **Ferrite common mode choke acts as end insulator**
- **Easy to rig with a single support**
- **Is a single-band antenna**
- **40M would work on 15M (third harmonic)**

The Ferrite Choke

- Use #31, #43 core materials
- Make resonant near the operating frequency
- Follow winding guidelines in Choke Cookbook (Chapter 8) of *k9yc.com/RFI-Ham.pdf*
- End of a dipole is a high voltage point
 - High voltage can overheat the choke
 - Higher choking Z reduces heating
 - It's the coax shield that gets hot

The Ferrite Choke

- **Choke guidelines for 1.5kW CW/SSB**
 - **at least 10K Ω**
 - **2 – 5K Ω chokes in series**
 - **3 – 3K Ω chokes in series**
- **For lower power**
 - **5K Ω for 500W**
 - **1-2K Ω is enough for 100W or less**

Coax Guidelines

- **For power handling in choke, use**
 - **A robust copper braid shield above QRP – RG6, RG59**
 - **RG11 with robust copper braid shield above 500W**
- **Avoid CATV/MATV coax with foil and thin braid shields**
- **75Ω coax is best, but 50 ohm coax is OK**
- **75Ω is best match to a vertical dipole**
- **50Ω may be harder to match at the rig**

The Ferrite Choke

- Higher choking Z reduces current through the choke, heat is I^2/R
- Two chokes divides power between them, and doubles choking Z
 - Power handling increases by 4:1
- It's the coax shield that gets hot
 - Bigger coax = more thermal mass
- Do not enclose the choke
 - Air flow helps cooling
 - Exposed choke helps heat radiation

End-Feeding a Horizontal Dipole

- This feed method also works to center-feed a horizontal dipole from one end
- For example, a dipole suspended near the window of an upper floor shack in a house, apartment building, or hotel, with the other end suspended in a tree
- Resonant Z of this antenna would be the same as an ordinary horizontal dipole rigged between the same points
 - 50Ω coax best for low antennas ($< \lambda/4$), 75Ω for high ones ($\lambda/2$)

How Much Does Feedline Z_0 Matter?

- Feedline SWR and loss is set by the match of the line to the antenna, not to the transmitter
- There is very little additional due to mismatch for $SWR < 2:1$, but that loss increases significantly if SWR gets larger than about 5:1
- Such a mismatch happens with a dipole off resonance by 3-5% or more
 - Most significant on 80M (+/- 7% bandwidth)
 - The “right” coax matters off resonance with long runs
 - Does not matter for short runs

20M Dipole Rigged For Testing

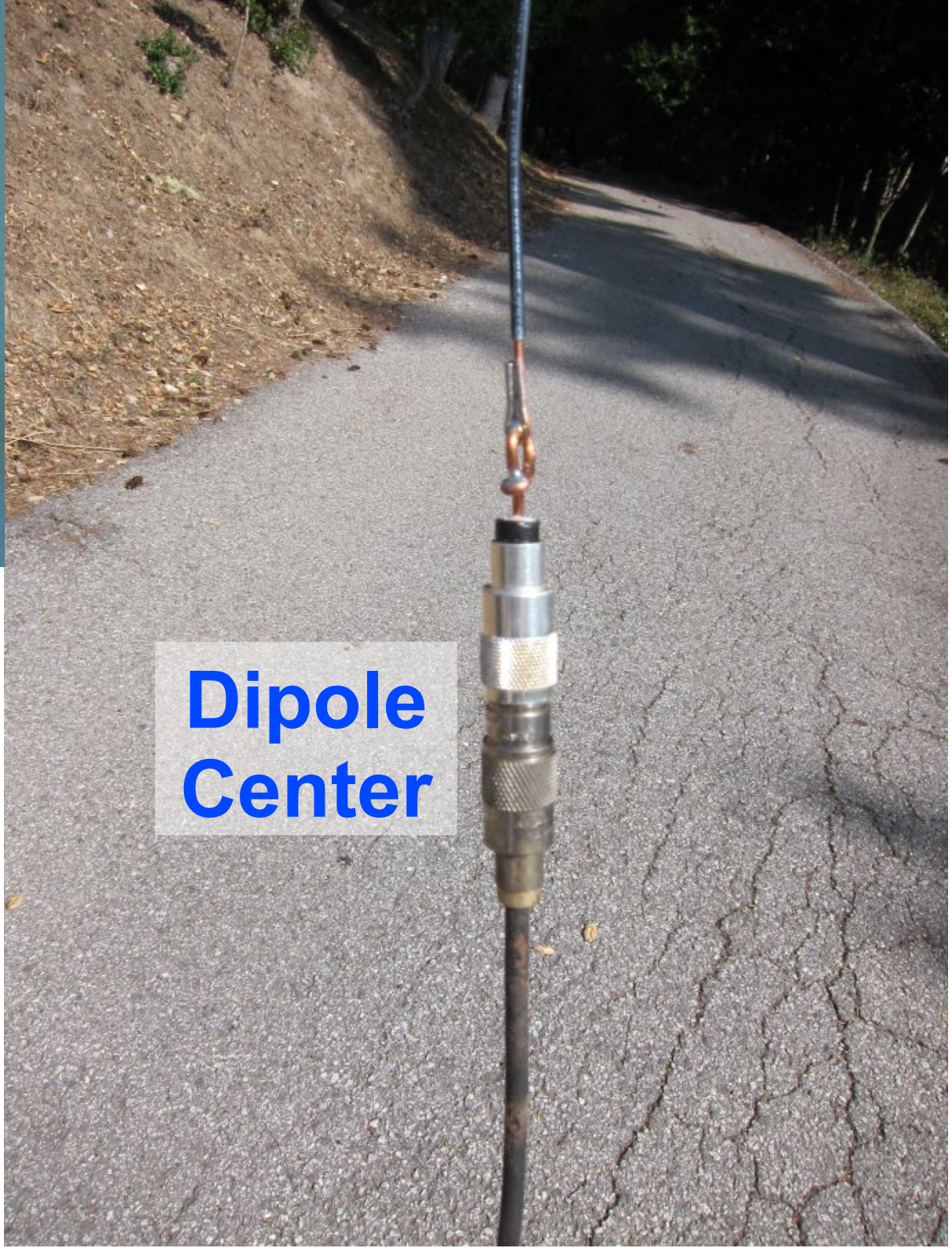
- Antenna was rigged at W6GJB for testing over 5 mile path to K9YC**
- Antenna supported from a pulley that is attached to a rope that supports one end of Glen's 80M dipole, strung between two tall redwood trees. Pulley is at about 80 ft**
- Antenna was tested with end insulator at 0, 10, 20, 30, and 40 ft above ground**
- Also tested with center at ground level coax laying on ground (acts as single $\lambda/4$ radial)**

More About This Test

- **Path from W6GJB to K9YC is over irregular terrain, generally poor soil**
 - **Elevation ~ 800 ft ASL at W6GJB**
 - **Elevation 2,000 ft ASL at K9YC**
- **RX antenna at K9YC was $\lambda/4$ vertical with two radials, to a K3**
- **TX was a KX3 at 5W**
- **This test measures low angle radiation**



Feedpoint



**Dipole
Center**



100W Choke

**20M dipole rigged
through pulley on
support rope for
another antenna**



A More Robust Choke For Higher Power



**These Chokes
Handle 1.5kW On a
40M Vertical
Dipole**



Field Test of 20M Vertical Dipole Over 5 Mile Path

Height of Choke	RX Signal
Center on ground	-4 dB
6 In	0 dB
10 Ft	+0.5 dB
20 Ft	+3.2 dB
30 Ft	+6.5 dB
40 Ft	+9.5 dB

**This result confirms that the ground
at W6GJB is quite poor!**

Height of Vertical Antennas

- This test was part of a large study of the effect of mounting height of vertical antennas, which shows why the antenna works better when it's higher.
- Slides for a presentation of that work can be downloaded at
k9yc.com/VerticalHeight.pdf

Credits

- I got the idea for this feed method for a vertical dipole from Rudy Severns, N6LF, who used a coil of coax (without a ferrite) as the end insulator of a rather different antenna
- My contribution was to use a ferrite common mode choke with a lossy core material as the end insulator, which more effectively decouples the antenna from the feedline, and makes the antenna essentially independent of feedline length. To understand why, study [*k9yc.com/RFI-Ham.pdf*](http://k9yc.com/RFI-Ham.pdf)
- I first published this on my website in 2008 [*k9yc.com/CoaxChokesPPT.pdf*](http://k9yc.com/CoaxChokesPPT.pdf)