Receive Antenna Loops For Your Fence

ANOTHER WAY TO HEAR THOSE STATIONS LOST IN THE NOISE AND COMPLY WITH YOUR HOA

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Background

- Have a lot of history with full size loops prior to relocating to Middle Tennessee
  - Experimented with full sized loops on 80, 60, 40M – vertical and horizontal configurations
  - Had several acres of woods in which to experiment

- Found them to be excellent in reducing band noise…to the tune of 2 db or better

- Improved READABILITY. Receive readings were varied compared to inverted vee's and less than my 40M vertical with 20+ radials. However…the noise reduction was worth the work of installation. Band noise on 40, 60, 80 and 160M can be extremely unpleasant.

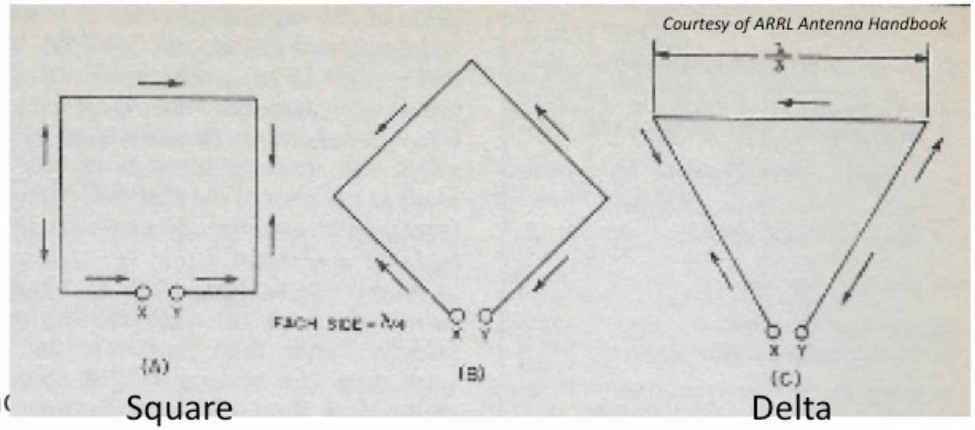
- Moved to new QTH with an HOA and had all kinds of limitations plus NO TREES!

- Attic antennas were passable but picked up noise from the electronics in the house

- Allowed to have vertical antennas (with some static) in the backyard with the yard fully enclosed by fence. While performing ok, the verticals are noisy…especially on 40/80M.

Loop Theory and Design

- Loop antennas are considered a "closed-circuit". The two ends are close together.
- There are many types of loop designs
  - Full-Wave
  - Half-Wave
  - Delta Loops
  - Quad Loops
- Small Loops – popular and expensive
  - Current distribution is same as a coil
  - Current is the same phase and amplitude through
- Large Loops
  - Current is not the same either in amplitude or phase in each part
  - Gain of about 2 dB vs. ½ wave dipole



Square Delta

Full-Wave Loop Designs

A & B are ¼ wavelength each side
C is 1/3rd wavelength each side

Large Loops & Dipoles

- Full-wave loops directional characteristics are different than the small loop
- Radiation is maximum PERPENDICULAR to the plane of the loop and minimized to the sides in the loops plane. Assume the same for the gain direction.[1]
- Terminal placement on the sides makes the loop VERTICALLY polarized
- Terminal placement on the bottom makes the loop horizontally polarized
- Electrical length of the circumference is SHORTER than the actual length.

Calculating the full wave loop length: Length (ft) = 1005/freq MHz

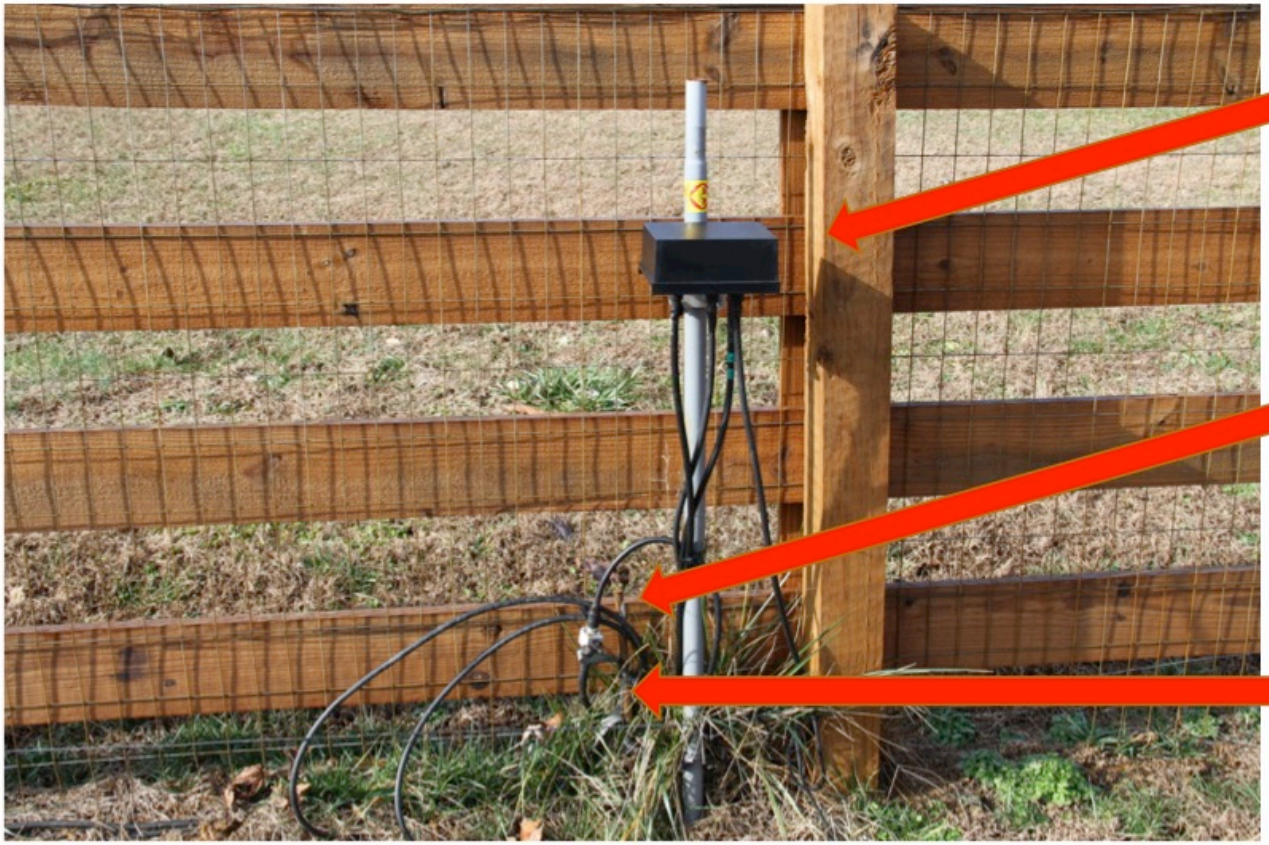
80M Phone 3.790 MHz (DX Window): **265.17 feet**	Dipole = 123.48 feet
40M Phone 7.150 MHz: **140.56 feet**	Dipole = 65.45 feet
20M Phone 14.200 MHz: **70.77 feet**	Dipole = 32.95 feet

1 - Courtesy of ARRL Antenna Handbook

My Goal: Build a Receive Only Loop To Reduce Noise and Improve Readability

- **QUALIFIER – THIS ANTENNA IS FOR RECEIVE ONLY!!!! Do not transmit in them at this low height as the SWR will be too high without a tuner and may interact with steel dog fence causing spurious harmonics!!! So a switch is required.**
- **My math:**
- **80M Loop:** 265.17 ft total length
  - 4' Fence: 3.5'H x 2 = 129.08' Length x 2
- **40M Loop:** 140.56 ft total length
  - 4' Fence: 3.0'x2 = 67.28' Length x 2
- **20M Loop:** 70.77 ft total length
  - 4' Fence: 3.0' x 2 = 32.38' Length x 2
  - Use 4:1 Balun for interface

Fence Antenna Views

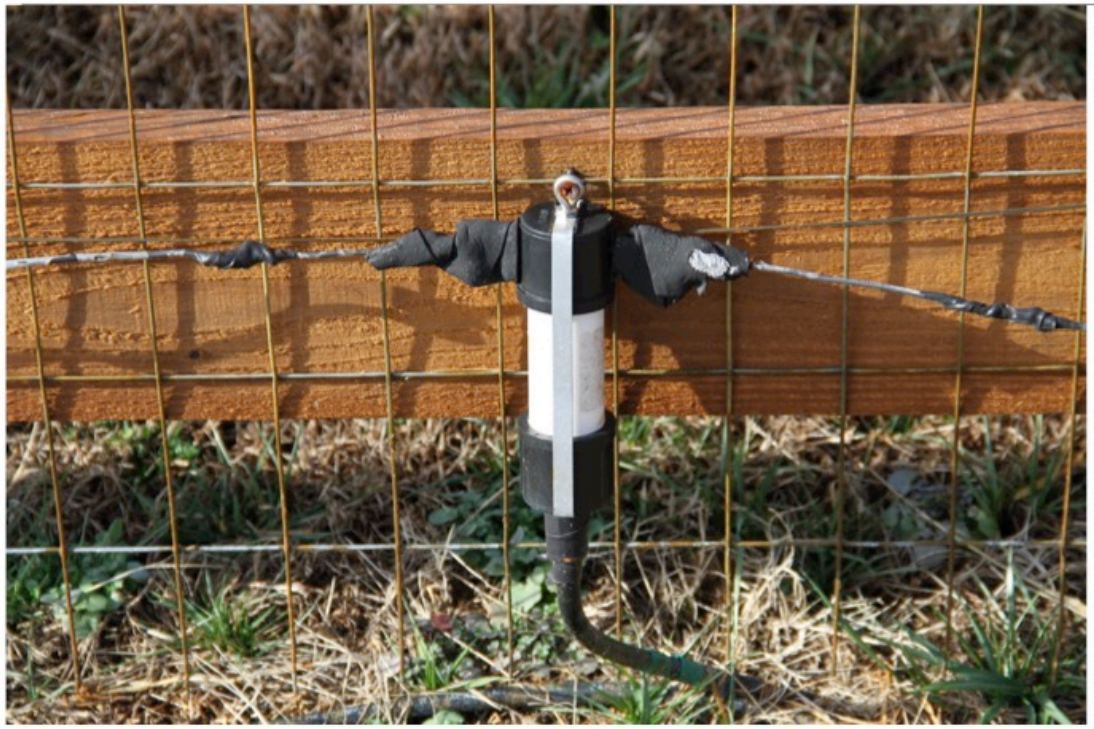


Remote Antenna Switch

Surge Protectors on Feedline to shack

Ground Rod for Surge and Grounding Fence

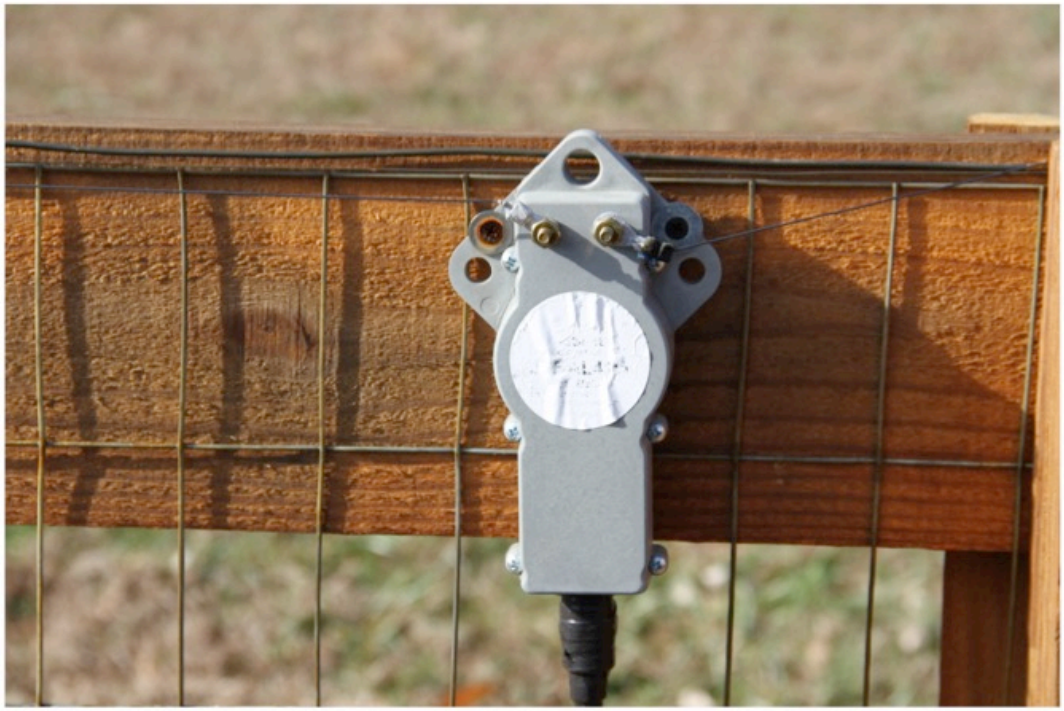
Fence Antenna Views – 40M Feedpoint



40M 4:1 Balun Bottom Feed @ Center (Outdoor Balun)

Standard #14 House Wire

Fence Antenna Views – 80M Feedpoint



80M 4:1 Balun Top Feed @ Center (Outdoor Balun)

#22 Wire!!!! Low Visibility

Fence Antenna Views – 20M Feedpoint

20M 4:1 Indoor Balun
Bottom Feed @ Center (Indoor Balun)

#22 Wire!!!! Low Visibility

Weatherproof plastic AC Disconnect Housing with interior removed (Home Depot)

Fence Antenna Views

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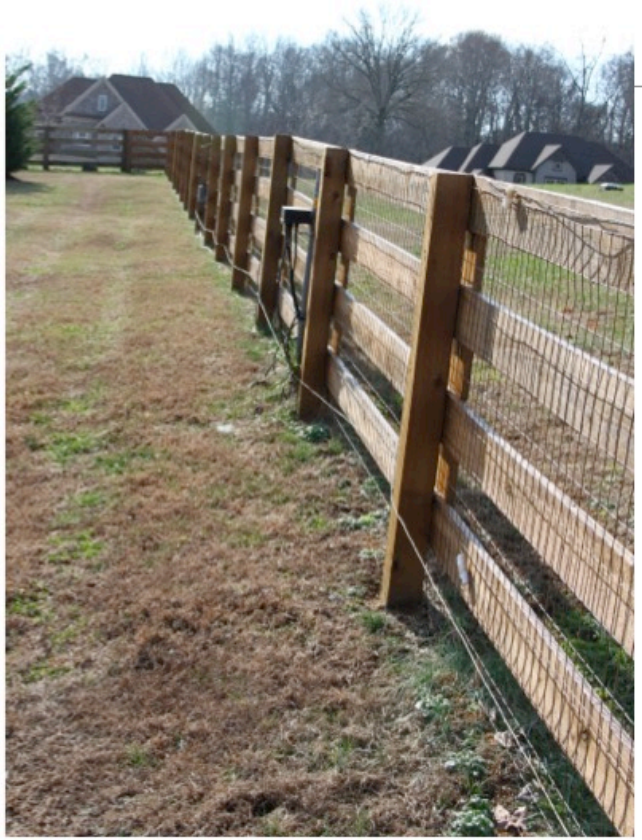

Barely See At a Distance!

Audio Comparison

Conclusions/Recommendations

- I have 3 loops on that fence almost overlapping in places – no issues
- Low visibility from the house or in the yard until you're almost on top of it
- Feedline is 265' of RG-213 to shack – so some loss…could add a switchable preamp at the fence – but passable for my use
- Some days are better than other. Antenna's are directionally sensitive E-W vs. N & S
- The Loops have bailed me out in tough fades/conditions to receive stations especially on 40/80
- Having more than one antenna to account for signal polarity changes/conditions is always better!
- Low cost installation using pretty common items.
- **While not optimal for transmit – IT WORKS for receiving!!!!!!!**