A Portable 4-Band Delta Loop

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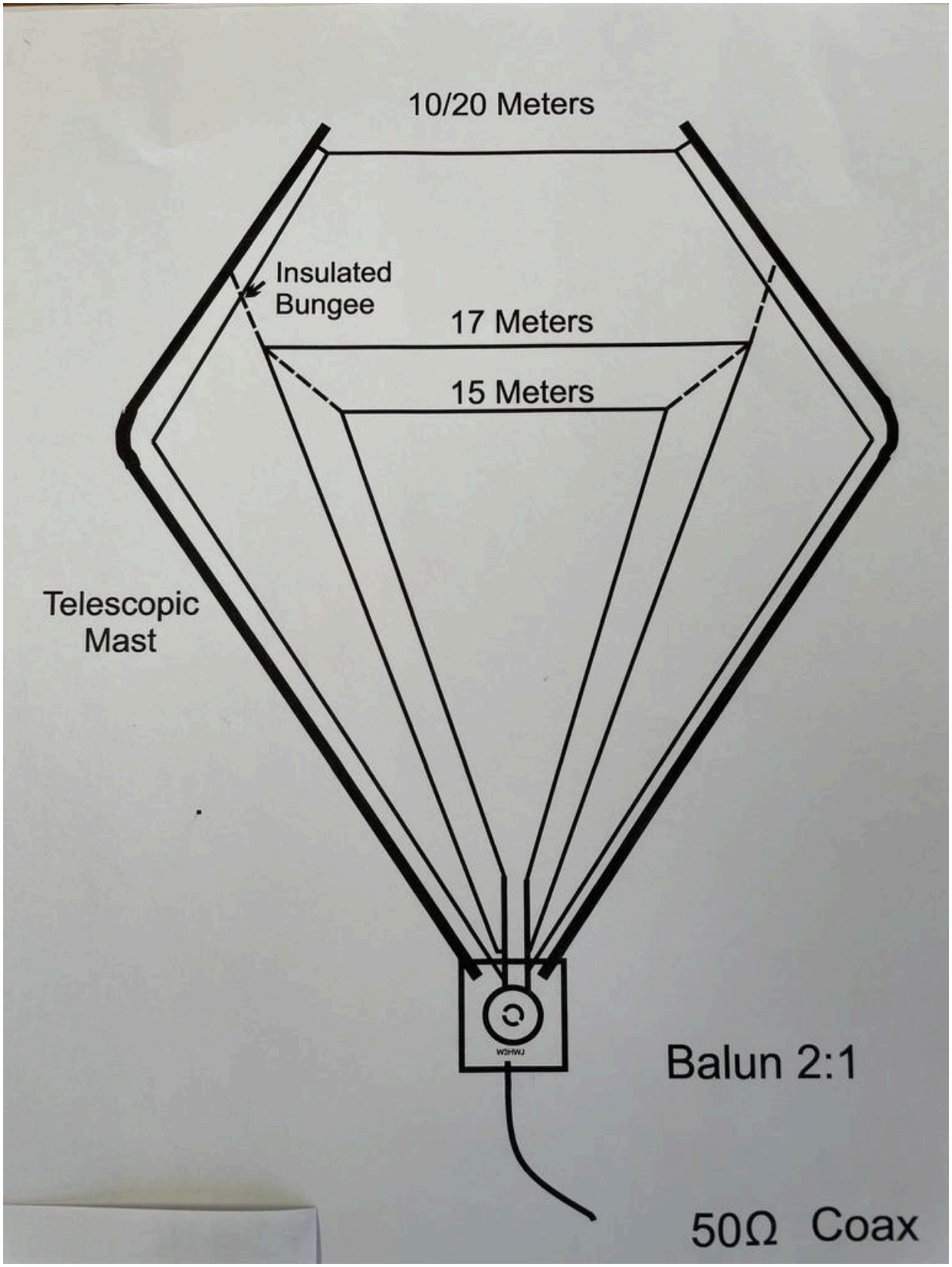
Because of its large size and unwieldly look, few hams would consider adopting a delta loop for portable use despite its known advantages. Actually, it is not much more difficult to construct one than a dipole and it can be deployed for portable use. Here is a way I built mine and I have been very pleased with its on-air performance as well as with the relative ease of deploying it in the field. Since the majority of my on-air activities are done outdoors due to my home QTH's HOA antenna restrictions, I have built and experimented with many kinds of portable antennas, including verticals, end-feds, dipoles and magnetic loops*. The delta loop antenna described here is by far the best performer of all the portable antennas I have built to date.

A delta loop antenna's advantages include the following:

1. Gain over a dipole, a vertical or an end-fed half wave wire antenna. A full wave delta loop is essentially two stacked (albeit bent) dipoles. In the case of using a 20m delta loop for the 10m band, it is the equivalent of four stacked dipoles. Actual gain varies depending on height, a particular shape and the surroundings in which the antenna is deployed.
2. Low angle radiation, making the delta loop a good DX antenna.
3. Directivity. If it is vertically erected, a single loop has a broad side bi-directional radiation pattern.
4. Broad-banded. Once properly tuned to the middle of each band, the useable VSWR range exceeds 200 kHz on each band, thus using a tuner unnecessary for most applications.
5. Quiet. The delta loop, as is true of other closed loop antennas such as a magnetic loop or a folded dipole, is less susceptible to RF noise making it a very quiet receiving antenna.
6. No radials wires required.



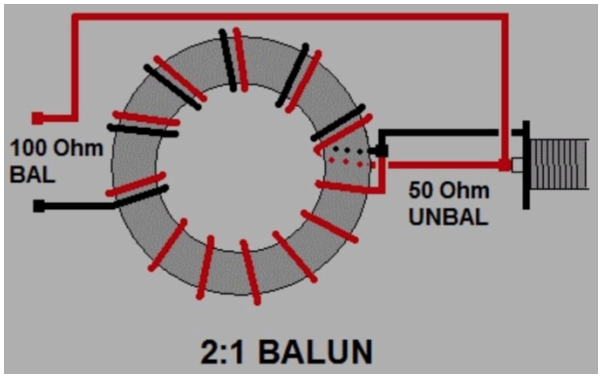
(Drawing by Rich Bonkowski, W3HWJ)

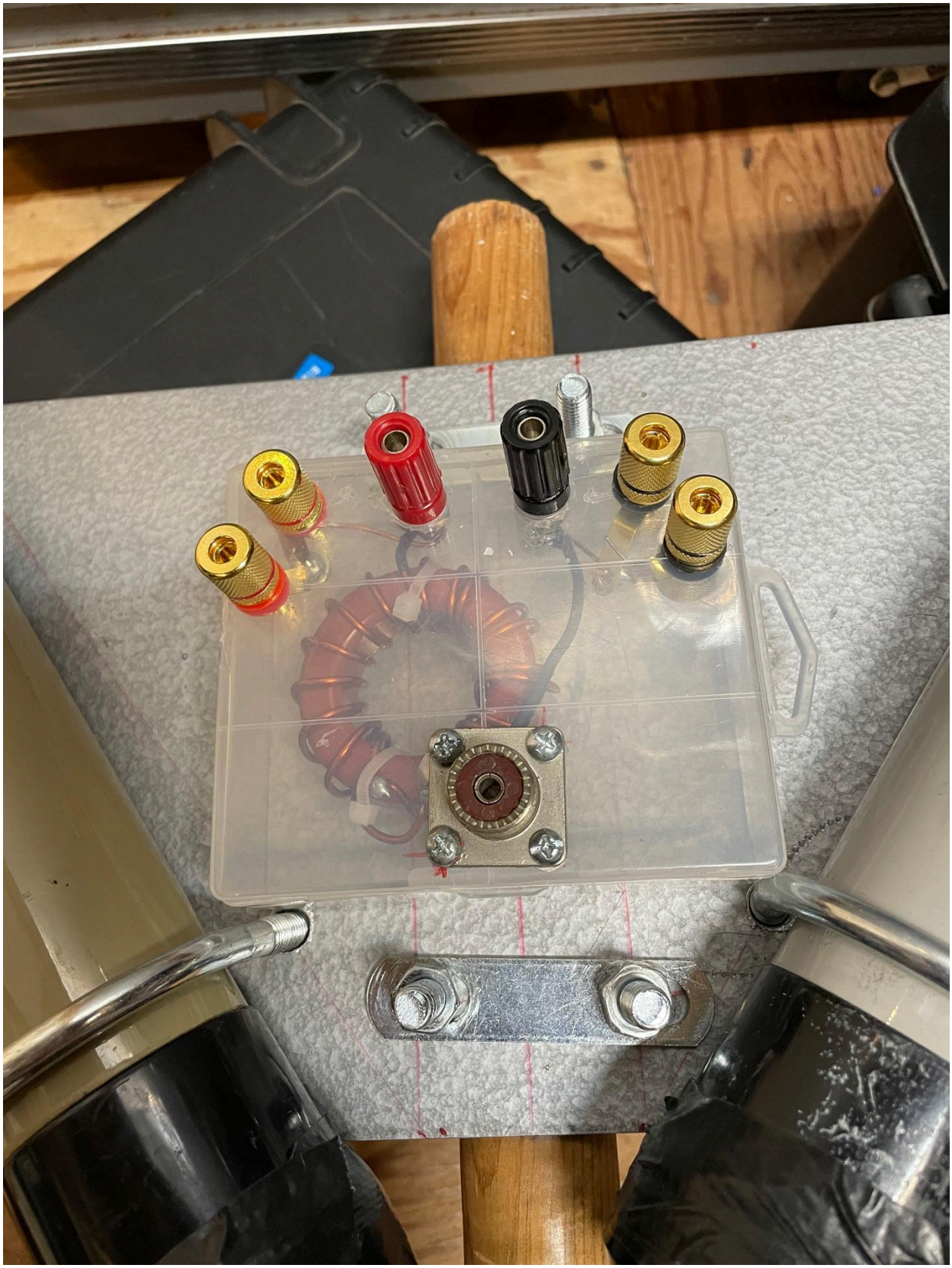
Construction

Two 8.2 metre telescopic fiberglass poles are fastened to a metal plate at the bottom with u-bolts with a 70 degree opening**. The plate is attached to a repurposed vehicle mounted bicycle holder inserted into the car's hitch mount as you see in the photo.

The three wire elements for the 20 (works also for 10), 17 and 15 meter bands are 21.5 metres, 16.9 metres, and 14.4 metres respectively. I used 16 AWG stranded vinyl covered copper wire. These wires are rigged with a combination of bungee cords and plastic carabiners. The natural bend of the fiberglass masts offers a good tension to keep the suspended wire in place. You do need to play with the length of the bungee cords to find the "Goldilock" tension for the 17 and 15m wires.

To match the loop to a 50 ohm coaxial lead, a home-brewed 2:1 balun was inserted at the base. Here is the construction detail of the balun.


100 Ohm
BAL
50 Ohm
UNBAL
2:1 BALUN



The toroid used is T130-2 and the magnet wire is AWG18 size.

I placed the balun in a repurposed plastic case. The terminals are common audio 5-way type I had in my junk box.

VSWR

These are the VSWR distribution of the antenna

20m 1.1:1 at 14250, under 2.5:1 for the entire band
17m 1.7 at 18130, under 2.0:1 for the entire band
15m. 2:1 at 21300 under 3.0:1 for the entire band
10m 1.2:1 at 28400, under 2.5:1 between 28000 and 28500

Performance

I have used the delta loop antenna on the air on all four bands for a year since October, 2023 and the results have been excellent. Not only was I able to work stations all over North America with 10 watts (most of the time with an Icom IC-705) on each band, I routinely worked JAs and South American stations with both SSB and CW during the afternoon hours. Every Friday afternoon, I get together with a group of QRP enthusiasts at a bay front public park in Palo Alto, California***. Our members have been using all kinds of home-brewed and commercial antennas including magnetic loops, full-length or shortened quarter wave vertical antennas, EFHWs. My delta loop has consistently outperformed all of the other antennas for DX contacts.

Notes:

*Several of the portable antenna I built appeared in QST Aug. 2021; Nov. 2023 , CQ Feb 2023 Oct.2023. RadCom, Sept 2024, Oct 2024

** In my case, I used PackTenna products. There are many other vendors which offer fiberglass masts of various lengths. Carbon fiber poles should be avoided because they are somewhat conductive.

***Our small QRP group, called QRPops (QRPops@groups.io), has been meeting weekly for more than 10 years, mostly at Baylands Open Preserve park located in the middle of salt marsh on the San Francisco Bay, and occasionally venturing out for expedition to hills and beaches in California.