

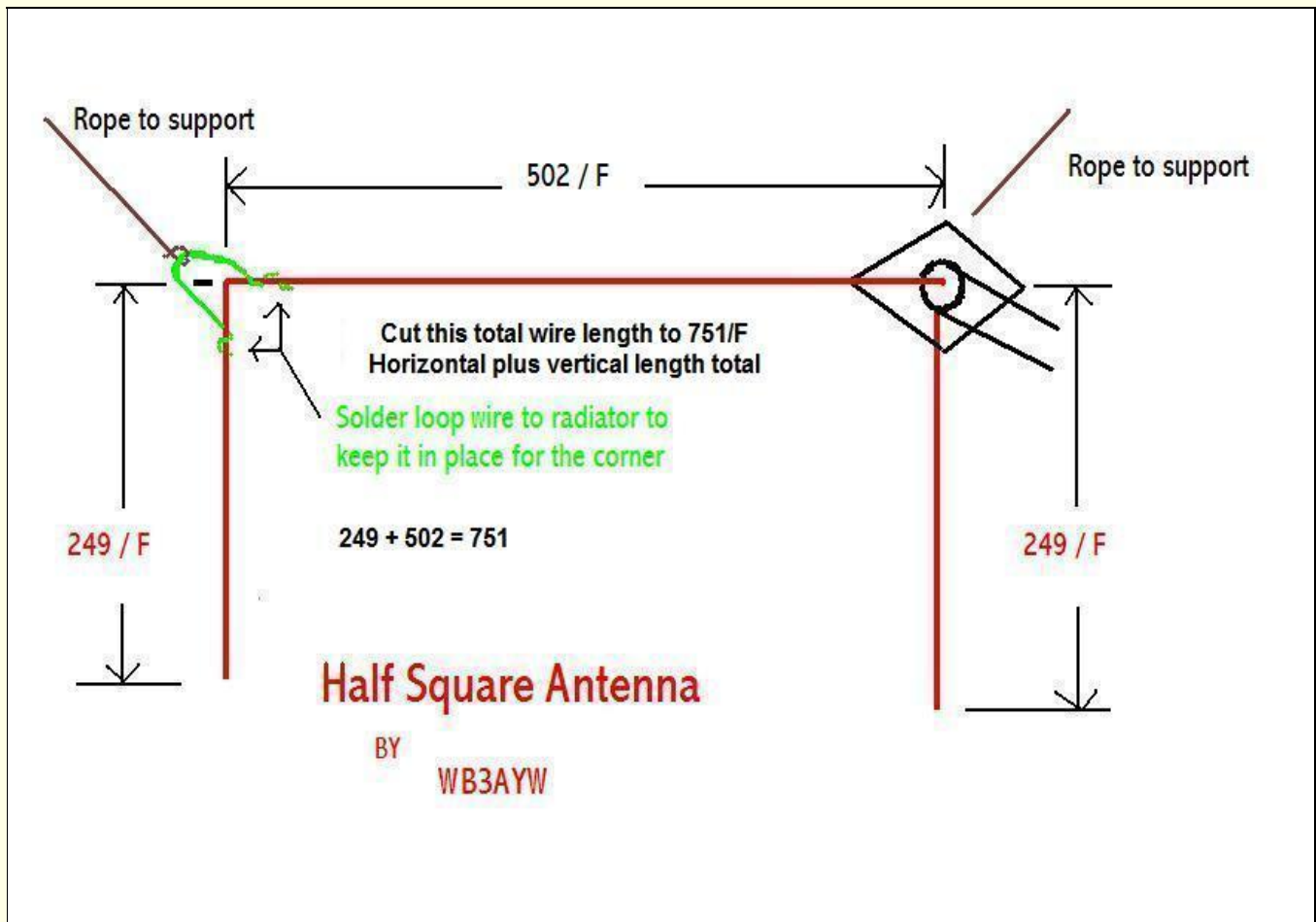
The Half Square, Double Half Square and Bobtail Curtain Antennas!

By WB3AYW

My property has a lot of trees, oops! Antenna supports!

So to take full advantage of them I use the curtain style antennas.

In this article you will see 3 different variations of them that I have used with great success!



The Half Square Antenna

Note in half square antenna drawing above that $(249 + 502 = 751)$ refers to the Formula $751 / F$ used to calculate total length of left vertical PLUS horizontal element going to the feedline connector. Antenna is fed at top right corner. Center of connector to horizontal, shield side to vertical element.

The half square is, in my opinion, the best and easiest antenna to put up and keep up. According to the books it supposedly has a bidirectional pattern. I find it is a vertical omnidirectional antenna with some gain because of the top feed wire and in some directions is better in my opinion.

The horizontal wire on top is a feed line for the vertical element on the other end. The coax by the first element, "feed point" needs to be at about a 45 degree angle or more to the vertical element for a low VSWR at the operating

frequency.

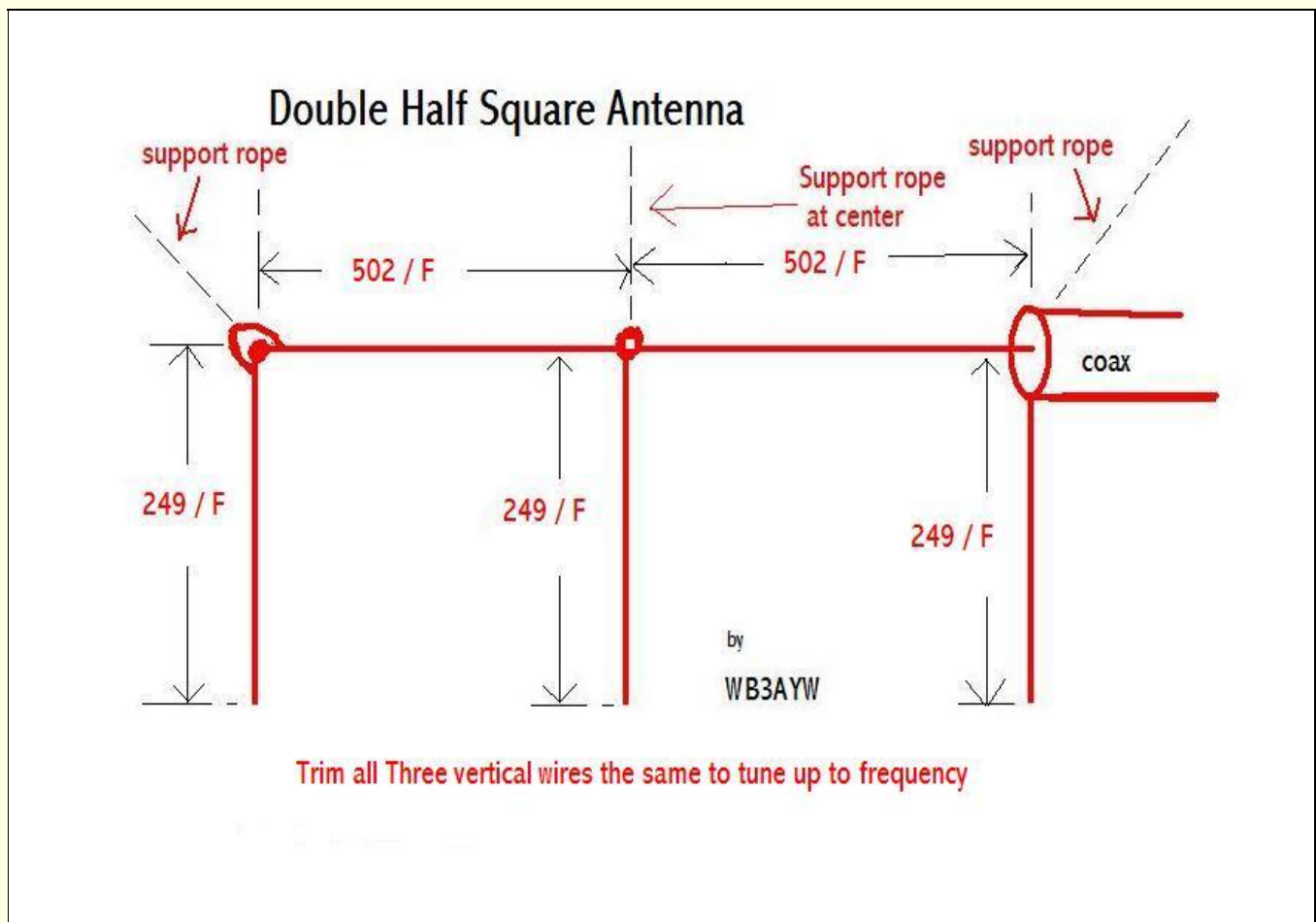
The antenna is built using #12 or #14 stranded, black electrical wire with the insulation left on except at the far corner away from the coax where it is necessary to bare it, to wind and solder the corner loop in place. **The loop must be soldered**, so it will not slide on the element wire; thus keeping the measurement correct at the corner. Some articles on the internet and books say to use a balun at the feed point, but I have not found this to be necessary in any of my designs.

I use a Budwig center insulator at the feed point myself. I am not saying they are the best I have seen on the market, but this is my preference here as I use them over and over again.

For 40 meters this antenna design will work on 15 meters as is, with no antenna tuner. It will work with an antenna tuner for other bands including 80, 10, 20, 60 etc. meters, since it uses no tuning network at the feed point. An 80 meter version laid sideways about 20 feet high will also resonate on 160 with no tuner.

I have a friend who is in a deed restricted area and has had a 20 meter half square up for over a year now and I have not heard that it has been spotted yet. It uses #22 wire with insulation the same color as the house and is hard to spot at 40 feet from the street.

I use half squares for all bands that I use here in northeastern Georgia. I have a 40 meter half square antenna over my driveway now for about a year and have had no complaints from my XYL!



The **double half square shown above** is a version that has a little more sideways directionality to it if the three elements are not tapered as if it would be in a beam configuration.

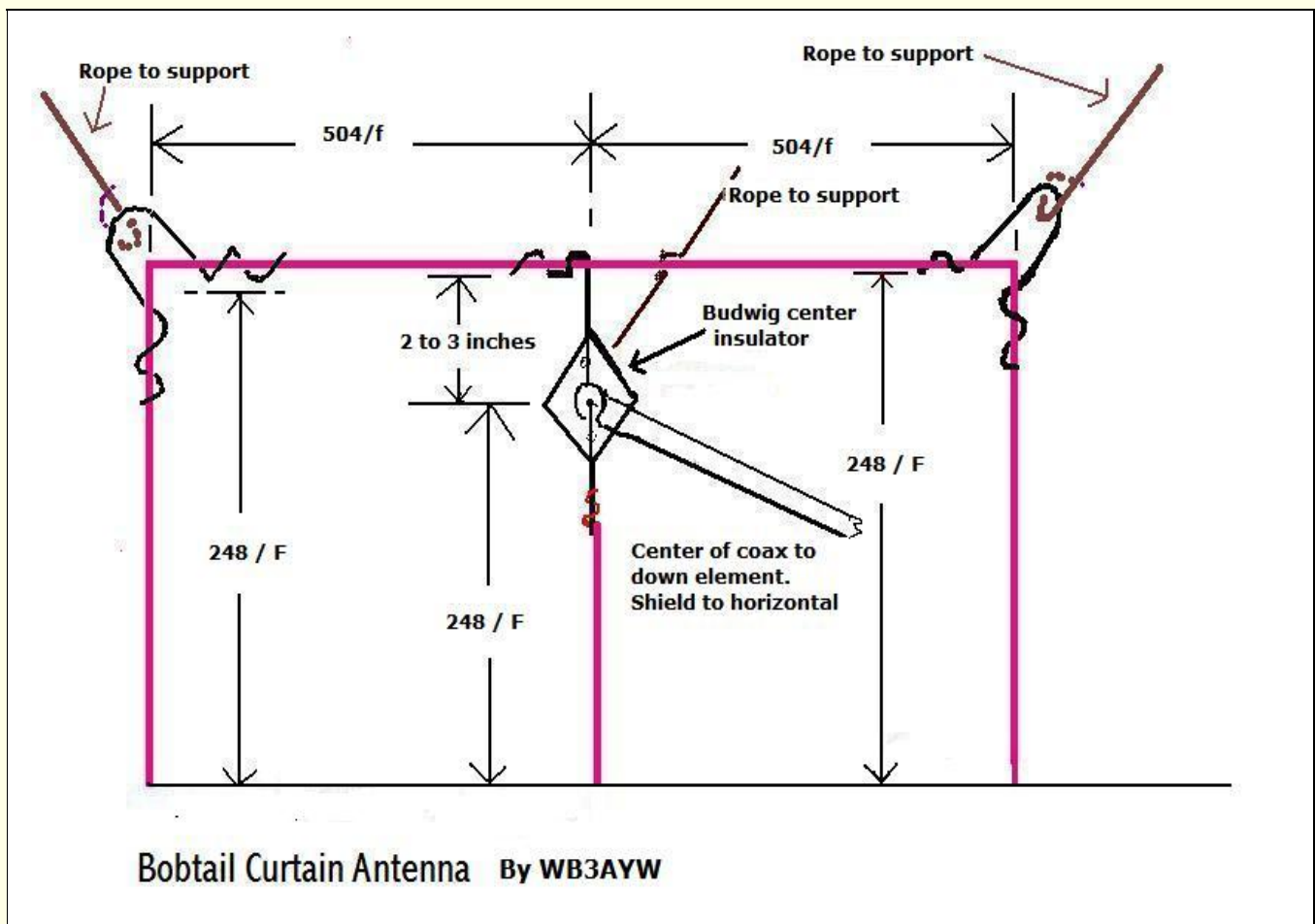
If the end elements are set a little shorter "an inch or two", it should have an elongated radiating pattern to it, but the frequency will go higher when tuned.

This antenna needs three mounting points instead of two and will be harder to keep up in a high wind environment, which is why I prefer the half square antenna design.

I put it up leaving the support ropes hanging down with the weight of the antenna sagging some. This leaves the antenna a way to go up and down with the wind on the trees so the ropes and antenna do not break.

If you do not have the height for a quarter wave this curtain design can be end loaded to shorten the elements and put up at a lower height than a quarter wave would be; just keep the bottom of the wires above head height for safety. Gain will not be affected much as the radiation is from the top of the vertical wires. Do not load the top wire as it is a 1/2 wave feed line, not a radiator.

The Bob Tail Curtain shown below is another slightly more complicated curtain type antenna.



The bobtail antenna is basically the same as the double half square except it is fed at the center element, not at the end corner. The radiating pattern is similar to the half square, mostly omnidirectional.

(Added info by editor)The Bobtail Curtain style antenna is a bidirectional, vertically polarized, phased-array antenna that has two horizontal sections, each about 0.5 electrical wavelength long, that connect three vertical sections, each about 0.25 electrical wavelength long. This [design provides quite a bit of gain over a single element](#). The antenna performs as three in-phase top-fed vertical radiators approximately 1/4 wavelength in height and spaced approximately 1/2 wavelength. It is most effective for low angle signals and makes an excellent long-distance antenna.

Installation Hints using trees as supports!

I use a compound bow and a fiberglass arrow to shoot a # 20 to #30 pound monofilament line over a tree limb, then tie a rope to the line and pull the rope back over. I then tie the two rope ends together as a loop, and tie the antenna to the rope. I pull the antenna up and tie the rope off to the tree or another tree near it.

NEVER EVER leave the ground to put up an antenna in a tree! ! It is not safe no matter how high you climb or how big the limbs are!

All of these antenna designs above are similar, easy and cheap to build.

Material list for a 40 meter half square:

Two trees (or other supports) at least 70 feet apart and about 40 feet tall, or higher.

One center insulator

One piece of # 12 or 14 stranded wire with black insulation 36 feet long.

The black insulation will fade to a blackish gray over time; it is not uv protected.

One piece of # 12 or 14 stranded wire with black insulation 104 feet long.

One piece of #14 solid wire with no insulation about one foot long.

Solder the corner loop wire attachments after wrapping on long wire at the correct point. Support with rope from these points and in the center! (See drawing)

Two pieces of rope, long enough to support antenna at the insulator end and at the other corners where the foot long wire was wrapped with the loop at the 502/F point.

The two wire element ends can just hang as is, in the air above head height when installed.

Do not tie them down; a small weight can be added if necessary, but not required!

Use a good coax. I use RG8x that has an all copper center and braid.

The cheap coax is asking for trouble!

The antennas above use basically the same formulas as for the top wire length and the elements.

FORMULAS

I use $502 / F$ for most of my designs for the top wire since it has no end effect and is a half wave transmission line with only the copper wire velocity and insulation involved.

The $1/4$ wave verticals usually use $248 / F$, but I usually use 249 or 250 instead for an inch or two in extra length, because it is easier to trim a wire than to add to it in the field.

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