

## A Four-Band “Tree” Vertical

If the thought of a high-visibility HF antenna leaves you cold, it's time to branch out and get to the root of the problem...

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I live in a townhouse on a small lot in a neighborhood where no outdoor antennas are allowed. That's a fairly typical situation these days. So if I want to operate on the HF bands, am I resigned to an attic dipole or some other indoor compromise? No way! Believe it or not, I'm the proud owner of a four-band full-sized vertical antenna, and it's sitting right in my front yard. And the best part of all is the fact that my antenna is virtually *invisible*. No Klingon/Romulan cloaking devices here, just old-fashioned ingenuity.

### The Concept

I tried an attic dipole and had nothing but problems. RF got into everything! It got into the TV and the kids howled. It got into the telephone and my wife howled. The antenna also picked up every kind of noise from my computer, TNC and any other electronic devices in the house.

One day while staring out my front window, dreaming of 100-foot towers and stacked Yagis, my gaze fixed upon a solitary 20-foot tree in my front yard. Wait a minute! I can run a 15-foot hunk of wire up the side of that tree! That's almost a quarter wavelength on 20 meters! But what about 40 meters, one of my favorite bands? I decided to worry about that later. Thus was born my four-band “tree” vertical.

My idea isn't new, although the application may be unique. The antenna is comprised of three quarter-wavelength wires (for 10, 20 and 40 meter), snaking up the side of the tree, more-or-less in parallel, all soldered together at the bottom to the center conductor of the coax (see Figure 1). Several radials are then soldered to the ground braid of the coax. But how do you get a quarter wavelength wire for 40 meters into a 20-foot tree? That's over 30 feet of wire! Easy. Bend the wire at the halfway point and run it to an upstairs window of your house, or some other convenient support. When you're finished you'll have an inverted **L** on 40 meters, a vertical with the top bent over so it looks like an upside down **L**. The 40-meter inverted **L** also works on 15 meters, where it's a 3/4 wavelength.

### Construction

Cut three pieces of wire at quarter wavelengths on 10, 20 and 40 meters using the formula:

$$\text{Length(feet)} = \frac{234}{\text{Frequency(MHz)}}$$

Choose frequencies that are in the middle of the bands, or your favorite band segments. I recommend #26 enameled wire available at Radio Shack. It's strong and difficult to see.

Examine your chosen tree and the surrounding area. Make absolutely certain that you're not near any power lines. If you see power lines running through the branches, find another tree.

Once you've selected your tree, run the wires up the side of the trunk. If you're an experienced tree climber, work

your way up the branches taking the wire along as you go. The alternative is to use a ladder, but make sure you have someone on the ground hold it for you. If inquiring minds want to know what you're doing, explain that you're trimming the tree and/or inspecting the leaves. You can attach the wires to the tree with loops of fishing line, or any other low-visibility means.

The idea is to get the wires as high as possible. You'll probably have to bend the 20 and 40-meter antenna wires, depending on the height of your tree (and your desire to climb it!). The tree in my yard is about 20 feet from the house, so the end of my 40-meter antenna reaches to an upstairs bedroom window. If you use your house as a support, you need to insulate the antenna wire so it won't come in contact with metal siding, storm windows or whatever. I loosened a screw in my metal window frame, tightened it down on a piece of insulated wire and tied the antenna to the wire.

Now build your ground system. Take bare copper wire, preferably something thick like #14, and loop it around the bottom of the tree at ground level. Solder several radial wires to this loop and run them out into the yard. I only used six radials at various lengths, making each one as long as possible. Bury the radials about an inch beneath the soil. (Do this at night if you live in an antenna-restricted area. If anyone asks, just tell them you're checking the lawn for grubs.) The radial wires don't have to travel in straight lines. Zigzag them as much as necessary to fit the available space.

Now install the transmission line. My townhouse, like many, has a water spigot on the front. That means there is a hole through the house for the water pipe to pass through. There was enough extra room in this opening to pass a length of RG-58 coaxial cable. You may need to bury this coax between the tree and the house, so make sure to buy cable that's made specifically for burial in soil.

Back out at the tree, solder all three antennas to the center conductor of the coax and solder the coax braid to the copper radial loop. Weatherproof the coax connections. I used Radio Shack "Outdoor RF Connector Sealant" (part no. 278-1645). Cover the copper radial loop with mulch or soil so it won't be visible. I planted pansies around mine and it looks very nice.

## Testing

An SWR meter is all you need for testing. If you measured the antenna lengths correctly, the SWR will probably be no higher than 2:1. If you want it lower, add a few inches of wire to the antenna, or trim it as the case may be. If you have an antenna tuner, you don't have to bother with tuning unless the SWR is grossly out of whack. Simply adjust the tuner for a flat 1:1 SWR. Because your transmission line is likely to be short, an elevated SWR isn't as bad as it seems. On 15 meters you're using the 40-meter antenna on the third harmonic. This means that your SWR might be high, but the tuner should be able to take care of it.

## Results

Is this antenna "optimal?" Far from it. No doubt there is some RF absorption by the tree, and the radiation patterns probably look like abstract art. I'm sure that some RF is being used to heat the coax when the SWR is high.

The point, however, is that this antenna solved my problems. It works well and is far enough from the house that I no longer have complaints about TVI and telephone interference. Signals from my computer and TNC are but distant memories.

Many operators are astonished when I describe my antenna. They can't believe that my signal is so strong. When conditions are decent, I even work a fair amount of DX. I've also managed to use the system on 30 and 17 meters with good success.

As far as visibility is concerned, you can't spot the antenna unless you walk right up to the tree. Even then, you need to know what you're looking for. So far it's been completely disregarded by the spies from the homeowner's association.

Take it from me: If you live in an apartment, townhouse or condo, you *can* get on the HF bands with a full-sized antenna. If you can see a tree anywhere on your lot, you've just found a home for your next antenna—and it will probably outperform any indoor design. I must admit, however, that I still stare out the window and dream of 100-foot towers and stacked Yagis!

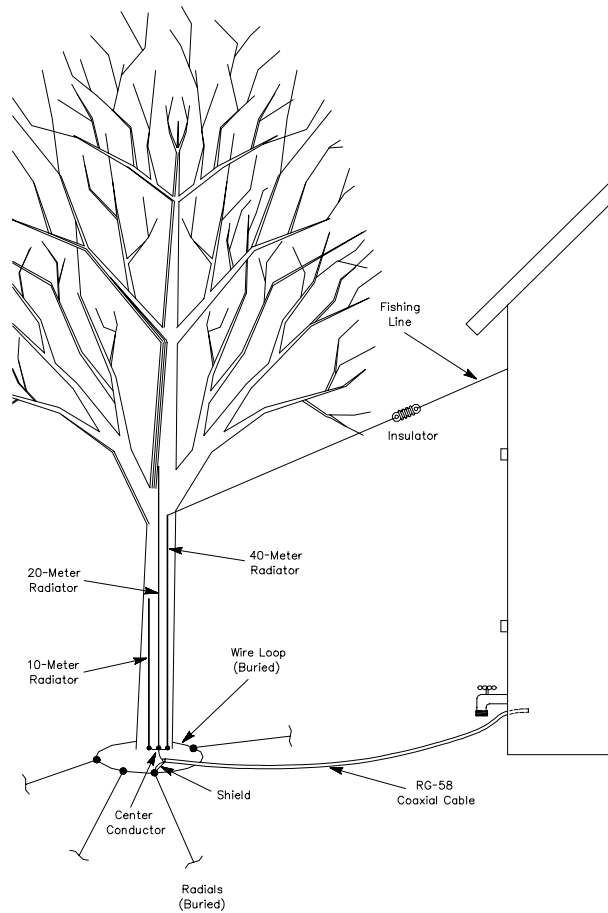


Figure 1—Run the three antenna wires along the trunk and then, if necessary, bend them along the branches. My 40-meter wire is so long that it leaves the tree altogether and attaches to my window frame. Use at least six radials for your ground system, more if you have the space and the patience to place them beneath the soil.