

W5ALT Indoor Vertical Antenna

A base loaded vertical antenna for use on all the bands from 6 to 40 meters.

I have been operating from an apartment in Maracaibo, Venezuela for over a year and during that time have worked well over 100 countries, all 50 states on HF, and well over 100 grid squares on 6 meters mainly using CW, SSB and PSK31. Many people have asked me how I get a signal out of an apartment, so this page will show my indoor vertical antenna and explain how I set up a station that works well from inside an apartment.

First, here are some thoughts on how a station should be set up from inside an apartment. I want to point out some important facts and dispell some common misunderstandings about antennas and operating.

- **You need a good ground.**

All I can say is that satellites, airplanes, and moving vehicles usually don't have a ground connection. A good ground is almost impossible from an apartment on the 9th floor. Instead, use a balanced antenna design or use radials (or counterpoises, whatever you prefer to call them) to balance an unbalanced antenna, such as a vertical. These will not provide a DC safety ground, though. That's a different issue.

- **Short antennas won't work well.**

That's simply not true. The principle of conservation of energy applied to antennas basically says that whatever energy goes into an antenna is either burned up in heat or radiates. Period. So, if you can load an antenna and the resistive losses are low, it will radiate. The trick is the low radiation resistance of short antennas, so you need an efficient way to feed them.

- **An indoor antenna is dangerous.**

All I can say is that whoever says that without knowing the situation is uninformed. Basically you need to do a radiation safety check, but normally if the antenna is more than a few feet from people, there's not much of a problem at typical power levels. For example, I have a 100 watt transceiver which I normally run at 90 watts. It's rated at about 50% duty cycle, but I never operate non-stop for more than a few minutes. Most of us do a lot more listening than transmitting. Check out your situation, but let's not get paranoid over nothing.

- **Good antennas are complicated, expensive, etc.**

There are those that want to believe that, and I feel sorry for them, unless they are selling antennas. Many simple antennas perform well and can be built from inexpensive materials. My indoor vertical is just one example.

Design and Construction

Although the design is fairly typical and I claim nothing new, my indoor vertical was custom designed for my location. The constraints are that it must fit into the corner of the room where I operate, be unobtrusive to my wife and visitors, work well, and be easily constructed. After playing with various designs and ideas, I decided to build a base loaded vertical antenna with 2 radials for use on all the bands from 6 to 40 meters. The size of the vertical element is 2 meters, so it will comfortably fit under the ceiling in the room. The diameter was determined by available aluminum tubing. The loading coil needed to be as large diameter as possible to provide enough inductance for loading. The dimensions were tweaked a little using MultiNEC antenna modeling and then I started looking for parts.

The vertical element consists of 2 one meter pieces of aluminum tubing used for hanging curtains. One piece is 1/2 in diameter and the other is 5/8 in diameter, so they could be

telescoped. There's nothing critical about the dimensions. I paid Bs 2000 for them at a hardware store in Maracaibo (about \$1.50). The wire for the radials and coil was also bought at the hardware store for about Bs 3000 (about \$2.25) and consisted of 10 meters of 3 conductor #14 guage solid copper house wire.

I was in a quandry about what to do for a coil form and how to make a stand for the antenna. My wife found a small plastic trash container that was very slightly tapered and about 5 1/2 inches in diameter and 1 foot long. Then, with her typical flash of brilliance, she found a plastic toilet brush with a stand and said "Why don't you put those pipes on this?" In fact, it worked out quite well! The cost of the trash can and toilet brush stand was about another Bs 2500 (less than \$2.00). Besides an alligator clip and a coax chassis mount socket, the total cost of materials was around \$5.00.

Construction was quite simple. The ends of the tubing sections were scraped shiny, slipped together and joined with a small bolt. The loading coil was wound on the plastic trash container. I cut a hole in the bottom of the trash container to fit over the toilet brush and mounted it upside down on the brush stand. The vertical element slipped over the toilet brush and a hole drilled through the tubing and handle holds the whole thing in place. See Figure 1 for a close up of the base.

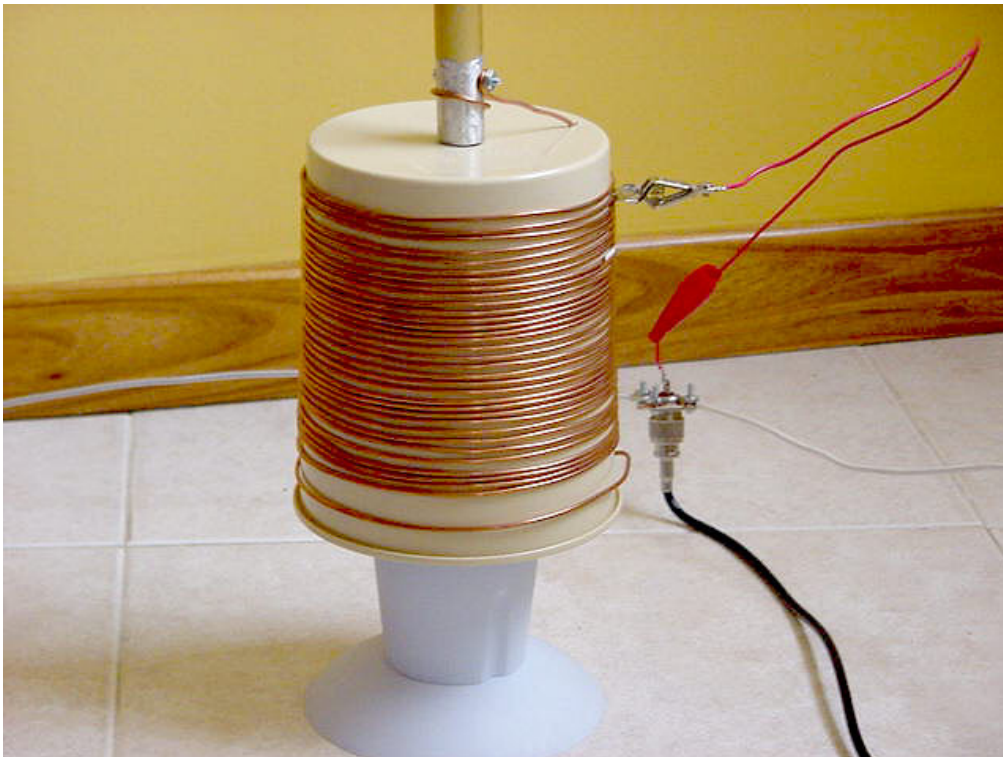


Figure 1. Picture of antenna base

The ends of the radials were attached with small hardware to a coax chassis socket and then run along the baseboards from the corner where the antenna sits. A short wire with an alligator clip is attached to the center conductor of the coax socket and used to tap the loading coil. The whole thing is fed with standard 50 ohm coax from an MFJ antenna tuner. The whole thing took about 1 afternoon to build and test. That's it.



Figure 2. The finished vertical in place

Tuning the vertical was accomplished by adjusting the tap on the coil for lowest SWR on each band without the tuner. On most bands the lowest SWR is around 2:1, which is marginally OK. After finding the tap point, the tuner is used to tweak the match so the transceiver is happy. I made some paper labels to stick on the coil to indicate the tap points.

So how does it work?

Well, without doing side-by-side comparisons, it's hard to really evaluate an antenna. All I can say is that it tunes on all the bands from 6 to 40 meters and I have worked the world. I am usually able to get through DX pileups, although I know my signal is not the best or strongest. The best indication of its performance is probably the QSL cards that I've received, some of which are shown on another page here. In the first 3 months using the vertical, I made over 300 contacts from about 50 countries. You decide if it works or not!

73,

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