My Indoor Antenna Farm

Yes, you really can work DX with a stealth antenna.

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Radio operators of the French Resistance often used indoor antennas with satisfactory results. A typical Type B Mark II suitcase radio had a 6L6G final with an output of about 20 watts. The recommended antenna installation zigzagged wire across the ceiling to form a top capacitance. Another zigzag on the floor served as a ground counterpoise. The vertical portion that did most of the radiation was only about eight feet long.

Indoor antennas have several advantages. First, they are out of sight (my years on the TVI Committee taught me that the ham with the highest tower got the most complaints.) Second, the antennas are protected from the weather, so they can be built without elaborate waterproofing or windload requirements. And third, no dangerous roof or tower climbing is required.

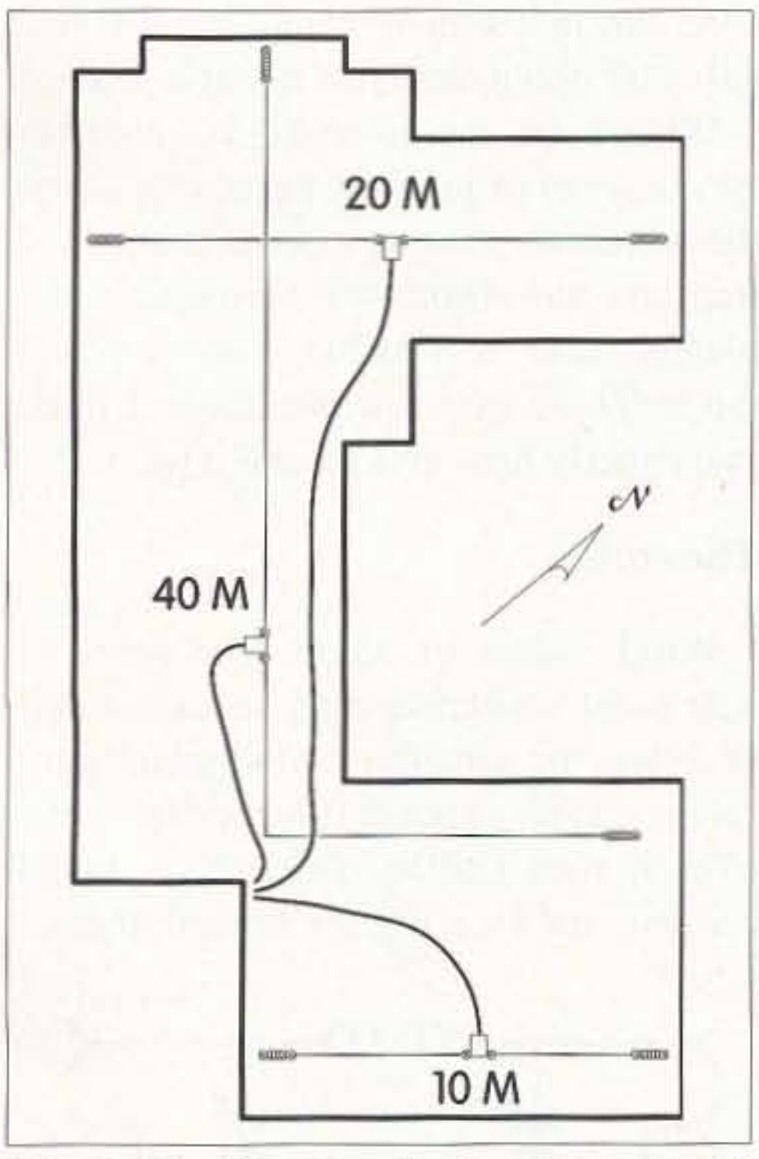

***Fig. 1**. The 20 meter dipole fitted perfectly into our front attic. I installed the 10 meter dipole in the back attic, leaving plenty of room for a 75 meter loop and a dipole for 15 and 40 meters.*

"Tar paper, shingles, and a half inch of plywood are all that stand between my 20 meter dipole and Japan."

I prefer to have a separate antenna and tuner for each band. The antennas can then be pretuned and simply switched for band changing. My QTH is an English Tudor style house on the western slope of a hill. It has a peaked roof with a 17 in 12 slope. Only tar paper, shingles, and a half inch of plywood stand between my 20 meter dipole and Japan. The front of the house is 35 feet wide, just right for a 20 meter dipole (**Fig. 1**). In order to reduce transmission line loss, I have placed my 10 meter dipole in the back attic, right above the operating position. The dipole I use for 40 and 15 meters runs from the front of the house to the rear, then makes a 90-degree bend into the attic, where the walls are filled with insulation backed with aluminum foil. The foil-backed insulation is also laid over the ceiling, thereby insulating the attic from the living area. Of course, the unbonded aluminum foil is not a good electrical shield, so it has minimal effect on the antenna system.

What about 75 meters? A 120-foot dipole just wouldn't fit. A quarter-wave dipole fed by a quarter-wave resonant open wire line was a possibility. This was an attractive choice because the line would actually be part of the antenna, thereby permitting tuning over a fairly wide range. However, I didn't want to bring the open wire line down to the operating position. I then considered a half-wave voltage-fed loop. As in the case of a half-wave dipole, the ends of the loop would be very high voltage points. This called for the use of a quarter-wave open wire feedline. You will recall that a quarter-wave line with a short or a very low resistance at one end will have a very high impedance at the other end. In order to avoid bringing the open wire line into the shack, I used 70 ohm transmitting type twin lead for the last 11 feet. This twin lead is no longer manufactured but you could use RG-8/U instead, if you are not too fussy about maintaining a perfectly balanced line. Actually, I added 15 feet of RG-8/U between the antenna switch where the 70 ohm line terminates and my Yaesu FC-757AT antenna tuner. The VSWR at the tuner output is 3.5 at 3775, 1.7 at 3880, and 3.1 at 4000 kHz.

Number 14 insulated house wires, spaced at four and a quarter inches, were used for the open wire line. It is 45.5 feet long. The spacers were cut from one-inch PVC water pipe. The loop itself is a single run of number 14 house wire extending with numerous bends all the way from the front of the house to the back attic and back. Its total length is 146 feet. This length was determined by the reliable cut-and-try method. Due to the presence of metal gutters and chicken wire lath, all of the antennas

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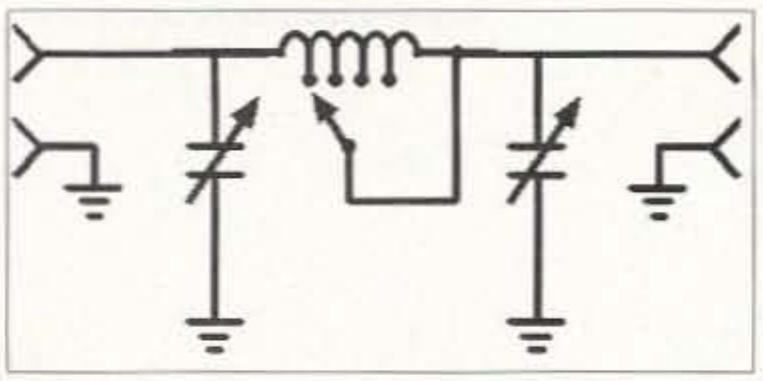

Fig. 3. "T"-to-"Pi" match.

This is a good time to scrounge the parts. You will need a compression mica, a glass piston or small air variable capacitor with a value of about 5-25 pF, a 0.001 µF disc capacitor at 1 kV or higher if running more than 100 watts, and two 100 ohm, 2 watt resistors. These are assembled as shown in **Fig. 4**, with the two resistors in parallel, to make a 50 ohm load to absorb the harmonic. Just shunting the little devil to ground won't cut it, as all you've done is attach it to the chassis of the tuner to radiate in fine style.

The procedure is quite logical. While transmitting on 10 meters, using a dummy load if possible, hold the dipper coil near the trap coil and adjust the capacitor to null the harmonic out. It isn't terribly critical as the Q isn't sky high—on purpose. It's sacrificed for a bit broader bandwidth. This may be done with someone watching Channel 2 if you don't have access to a dipper. In my case, after I had done this, I put the dipper coil into the tuner inductor and checked from 50-250 MHz to see if there were any more snakes in the grass. If there were, they were hibernating.

Proper grounding

What the heck is a coaxial ground? It's simply a method of shielding your ground cable, so any signal radiated off the ground wire is shunted back to ground. Despite having been printed in four publications at least six times, many hams have never heard of it. These hams are also the same fellows who have monster RFI problems, while the local "experts" drink all their beer and tell them it's one of nature's unfathomable mysteries. The first thing these poor souls tell me is that they are *positive* every item in their shack is grounded! I don't doubt that a bit.

If manufacturers really wanted to save a little money, the ground connection on accessories would be a great place to start! What that little double-nutted screw on the back of an audio filter, or that #2 copper battery braid, does is set up ground loops that let your RF have the time of its life!

The *only* thing you ground is the *RF generator*—meaning the transmitter or receiver—*not* the linear, tuner, rotor box, preamp, low-pass filter, keyer, phone patch, EXT, VFO, AUX, or the dog. To use the water analogy for RF: *Keep it in the pipe (coax) and let the coax shield do the grounding automatically!* This is so obvious that no one does it.

To make a coaxial or "zero length" ground, you just need two 0.001 µF 1kV disc capacitors and enough RG-8X to reach from your rig to the ground rod, which should be at least six feet, driven next to the foundation where moisture is retained. Using a stainless steel worm-driven auto fuel hose clamp, attach the bypassed center conductor of the coax to the rod. Waterproof it with glue, caulk, or acrylic spray. It doesn't matter if you're on the third floor; the ground length is still very short—just a matter of inches. The other end goes to the RF generator. That's the only ground connection you use (see **Fig. 5**). Use any or all of these methods in combination, and you'll definitely be off Channel 2 for good! 73

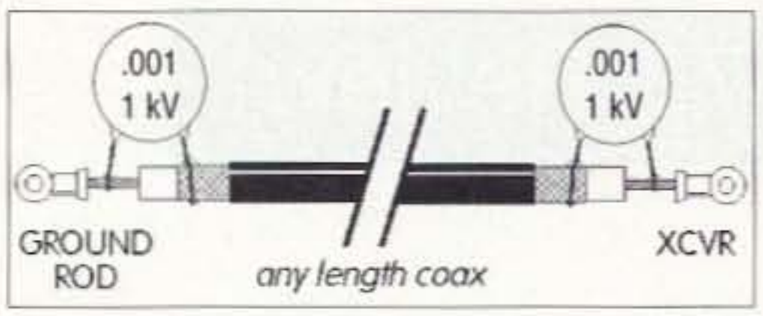

Fig. 5. The coaxial ground.

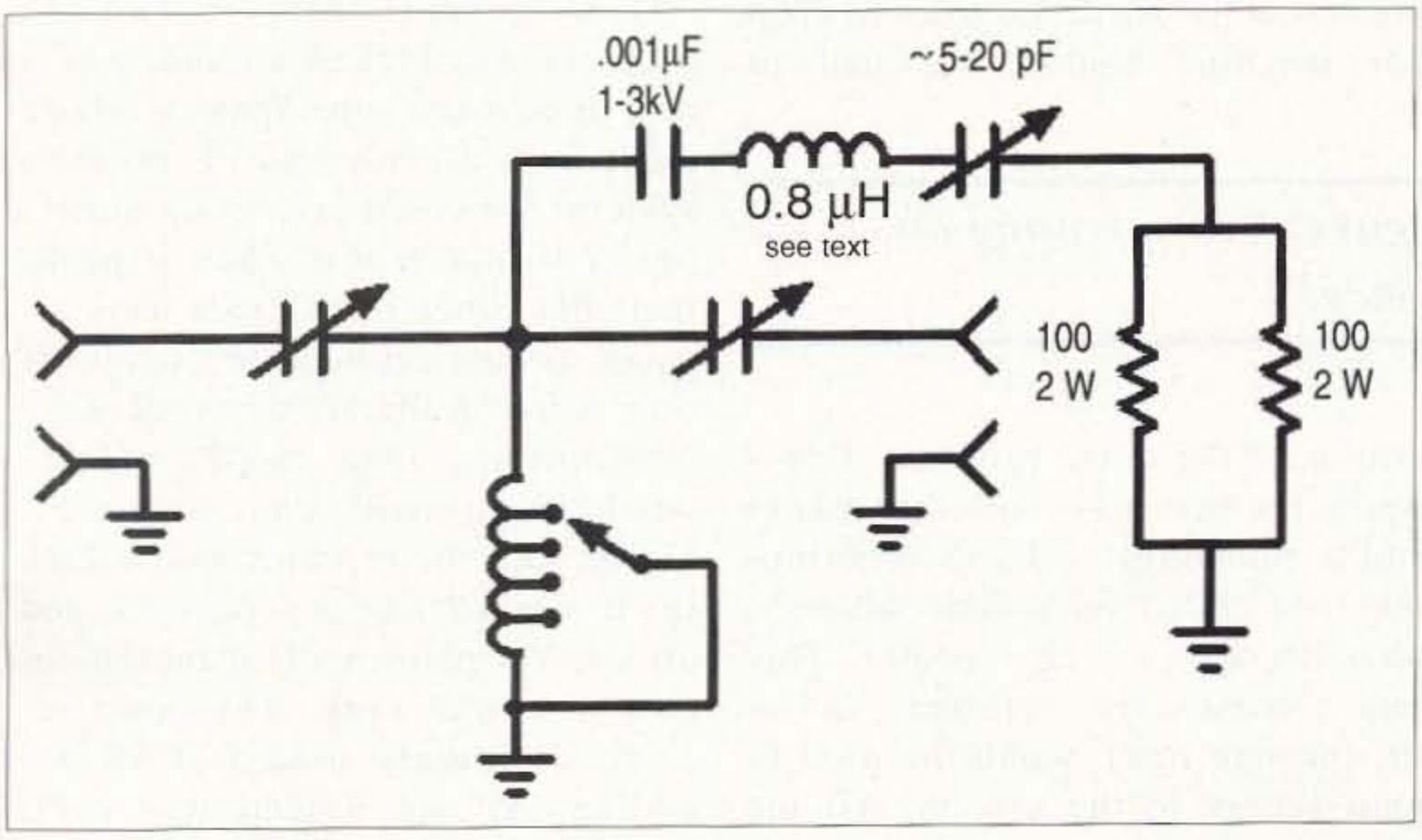

Fig. 4. Channel 2 trap.

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required pruning. The metal in the structure also detuned the 40 meter dipole, making it difficult to find the electrical center of the antenna. TVI has not been a problem. The small amount of interference introduced by the 20 meter antenna over the family room was quickly cured with a high-pass filter on the TV set itself. The only place where I haven't been able to cure the interference was with the burglar alarm. The sound of sideband audio emanating from the speaker is annoying, but hasn't damaged the unit or affected its operation.

Of course, the indoor loop is not as effective as a full-sized outdoor dipole. It is, however, just fine for working southern Oregon from San Francisco. My friends in Japan and Australia may be interested to know that this was the 20 meter indoor dipole I used to work them with my 20 watt MOSFET amplifier (References 1-2). It just goes to show that a resourceful ham, like the members of the French Resistance, can still make important contacts while keeping a very low profile! 73

References

1. Vreeland, Robert W., W6YBT, "Transformerless Amplifier," *73 Amateur Radio Today*, August 1995, pp. 48-54.

2. Vreeland, Robert W., W6YBT, "More Gadgets for your MFJ-9020," *73 Amateur Radio Today*, October 1993, pp. 10-12.