Recycle Those Rabbit Ears

How many pair of rabbit ears do you have lying around?

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My 2-meter rubber ducky, used inside my apartment, wouldn't reach a couple of local repeaters with a full-quieting signal. I needed a simple, inexpensive, indoor antenna that would radiate a little better signal than did the rubber ducky. Rummaging around for suitable antenna materials, I found two pair of TV rabbit ears in my junk box. You can adjust the length of each of the two extendible whips to 19 inches, a quarter-wavelength at 2 meters. Two quarterwave whips make a half-wave dipole. *Ta-da!*

You always get a pair of rabbit ears when you buy a TV (and sometimes with a VCR). Hams being the natural packrats that they are, the rabbit ears never get thrown away. You don't believe me? When I showed my new dipole to Steve Ford, WB8IMY, I asked him how many pair of rabbit ears *he* had. Even without going home to check, he could think of three pair that he had. What a packrat!

I first thought that I could take the easy approach and just replace the short piece of twin lead on the rabbit ears with a short piece of RG-58, and make no other mechanical changes. *Wrong*! The twin lead was attached to a pair of little metal clips via crimped tabs, which I don't trust to deliver a low-impedance RF connection. I disconnected the twin lead and connected the RG-58 to the crimp tabs, and then tried to solder the connections. Oops! the metal clips wouldn't accept solder. So much for that idea!

So I disassembled the rabbit ears, kept the two extendible whips, and threw the rest of the parts away. I bummed a small piece of clear plastic from the ARRL Lab (thanks to Mike Gruber, WA1SVF) to use as the mounting block and center insulator for the dipole, and went back to my junk box for the BNC connector and the rest of the small hardware (three solder lugs and some 4-40 nuts and bolts).

I drilled a hole in the middle of the plastic block and mounted the UG-657 BNC connector in the hole, placing a large solder lug under the nut. This was a solder lug made to go on the shaft of big old 1950s potentiometers, to be used to ground one lug of the pot via its shaft. If you can't find one of these lugs at a ham flea market, you can just put a loop of #20 tinned solid wire under the nut, with a short pigtail to reach to and around the bolt that secures the antenna element to the center insulator.

Then I drilled two smaller holes and mounted the two extendible whips to the plastic block, using 4-40 hardware. Again, I used solder lugs under the nuts to make the connections between the two halves of the dipole and the center conductor and ground of the BNC connector, but short pigtails of wire work just as well.

Figure 1 shows the center block of the dipole, and Figure 2 shows how the two halves of the dipole are wired to the coax connector on the center block.

Note that I am not giving you blow-by-blow details for making the antenna. Just use whatever insulating material you can find for the center mounting block, and keep the inside ends of the whips fairly close together. Here's your chance to experiment a little, rather than following detailed instructions! That's the best way to learn things. The accompanying photo shows the center insulator of my dipole, to give you an idea of how it was assembled.

You can substitute a UHF connector for the BNC, if you prefer. Or you can just connect the bare end of a piece of coaxial cable right into the dipole feedpoint, with no connector. If you do that, provide strain relief for the connection, so you don't subject the electrical connections to strain and possible breakage. A simple nonconductive cable clamp can be used to hold the cable to the block that supports the antenna.

The whips from my rabbit ears each collapse to a length of 11-1/2 inches and extend to a length of 39-3/4 inches, so that the overall length of the dipole can be adjusted from 24 inches to 80-1/2 inches. Plugging this into the familiar formula

that relates frequency to dipole length tells us that the dipole can be adjusted to be a half wavelength from about 70 to 234 MHz. Thus it can be used as a half-wave dipole on two ham bands—144 MHz and 222 MHz. (If you want to build a dipole like this for 6 meters, a pair of Radio Shack's 270-1408 replacement rod antennas, each 71-3/4 inches long, will get you down to 6 meters, where you need a 112-inch dipole.)

To adjust the completed dipole to resonance on 2 meters, connect 50-Ω coaxial cable from the connector on the dipole to a VHF SWR meter or wattmeter, and from the measuring device to your rig. Hang the dipole vertically. You can hang it by a string from the ceiling, or attach it to a broom handle or the edge of a wooden door with tape or a rubber band—just keep it away from metal objects and other antennas. Run the coaxial cable away from the dipole at a right angle for about three feet, for best results.

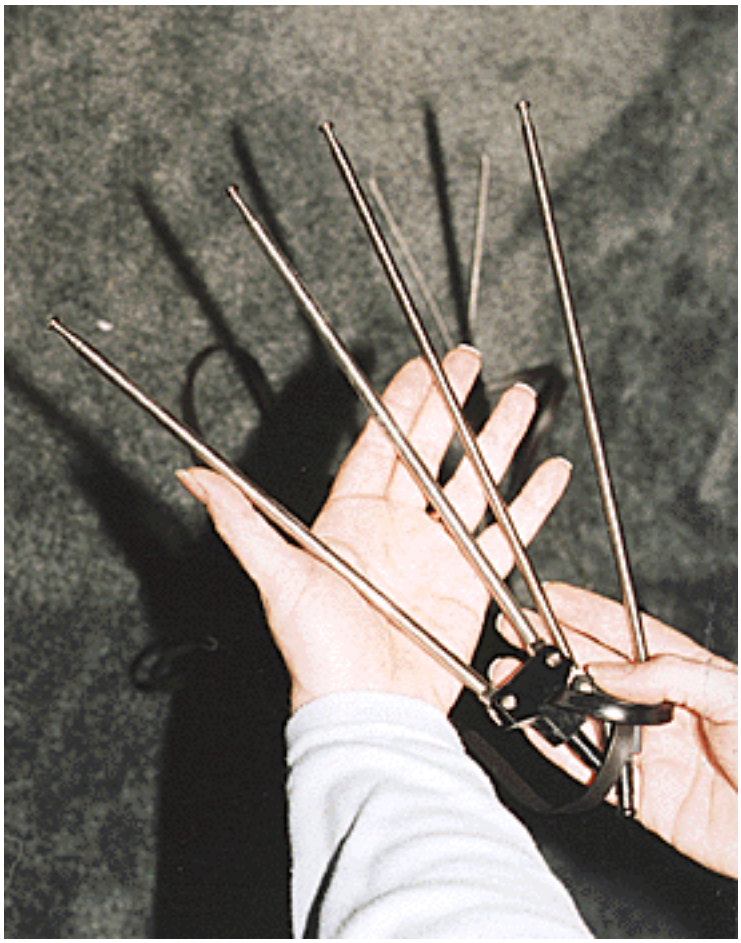
For starters, adjust the length of each half of the dipole to 19 inches. (Keep in mind that the two halves of the dipole should be adjusted to the same length—whatever it turns out to be—so the dipole is fed at its center.) Set the rig to an unused frequency near your desired operating frequency, so as to avoid causing interference to other hams while you're tuning up. Press the push-to-talk switch and check the SWR. If it's more than about 2:1, adjust the length of each whip to be about 1/4 inch longer and try again. If the SWR is *lower* than your first try, you're adjusting the length in the correct direction; if the SWR is *higher*, you went the wrong direction, and you need to adjust the length of the whips slightly *shorter* as you continue the adjustment process. And please sign your call sign when you begin these test transmissions and when you finish them, so as to follow legal (and good) operating practice.

After a few adjustments and measurements, you will find the dipole length that gives you an SWR near 1:1 at your favorite frequency. Remember to make a final physical measurement of the lengths of the two halves of the dipole, to be sure that they are the same.

After I had adjusted my dipole to the desired resonance point, I used a small file to score a mark around the center rod of each extendible whip to indicate how far it was pulled out of the next piece of tubing, so I can collapse it for travel and then easily reset it to the correct length.

That's it! If you don't believe my claim that the dipole will work better than your rubber ducky, make some comparison checks with another ham on simplex, first trying the rubber ducky, then the dipole. If, in fact, your dipole doesn't outperform the rubber ducky, you better recheck your dipole to find out what's wrong with it.

If you can't find the problem, ask some old-timer with good technical skills to help you. He would probably be flattered that you value his expertise, and would be happy to help you find the problem *and* to teach you some things that would help you in your future ham ventures.



How many of these do you have lying around?

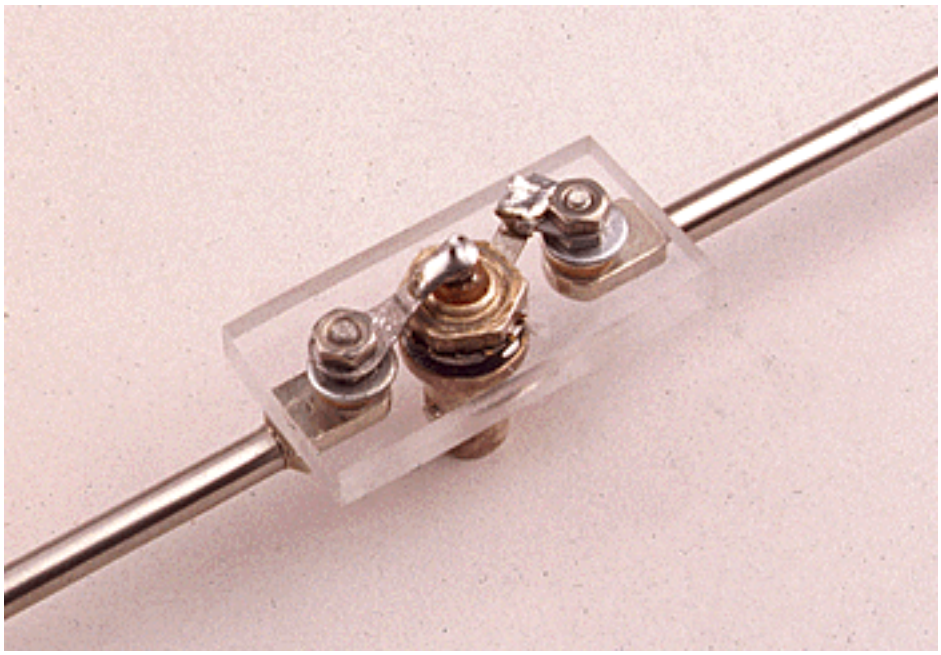


Figure 1—The center block of the dipole. Instead of solder lugs, you can use short pigtails of #20 tinned solid wire between the coax connector and the whips.

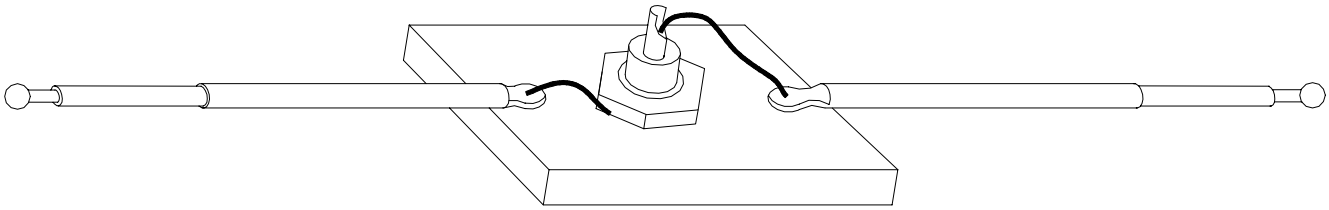


Figure 2—Wiring the dipole to the connector consists of making one connection from one whip to the center pin of the connector, and making a second connection from the other whip to the shell of the connector.