Hidden Antennas & Ferrite Beads

With all the various deed restrictions and covenants out there, many of you have a few problems putting up a tower and a triband beam. Back in my Novice days, my first antenna was a 40-meter folded dipole made of out recycled twinlead from a neighbor’s old TV antenna, stapled to the rafters inside my parents’ attic. I even had some teenage notion that a 40-meter folded dipole would also work on 80 meters, but many hours of pounding out CQ without an answer (the only crystal I owned was 3720 kHz) convinced me I was wrong about folded dipoles. A few years later I took an old conical TV antenna, added 6 inches to the elements, put it up in the attic, and made my first 6-meter AM contacts.

Up in the Attic

Today, attic antennas are still one way of staying on the air. In photo A, we are using a mobile antenna mount (see several options in photo B) and one of the “stick” type mobile whips chosen for your favorite band. The base is made from a couple of pieces of aluminum L section, each two to three feet long. Certainly there’s a lot of other stuff you can use; you just need something electrically conductive and long enough to rest on a couple of rafters.

I like cheap projects and wanted some radials with lots of surface area and, of course, cheap. As a result, I used a couple of rolls of aluminum foil from a local dollar store and some binder clips. The total tab was less than $5. It may be hard to get the aluminum foil 1/4 wavelength long on the lower bands, but it’s easy to get more ground plane than the antenna has when it’s used on a car! The longer you can make aluminum-foil ground radials, the better off you are.

There are many different mobile whips on the market. The mount shown in photo A should work with any of them, or with one of the motorized multiband antennas. Of course, if you need to put the antenna back on the car, just unscrew it and put it back on the car.

I’m sure glad I shot some photos of the antenna in the driveway, since I couldn’t get a good photo up in my attic—where, of course, you won’t need the bricks. In the photo I have four long radials, but up in the attic I added several smaller radials using up the last of the rolls of aluminum foil. You can hold a lot of foil with a binder clip.

Making the Antenna Multi-Band

It’s a bit tiring to crawl up in the attic every time you want to change bands, so you might want to make this antenna operate on more than one band. There are two ways to multiband this ground plane. The first would be to use one of those motorized vertical antennas. I wasn’t able to test one out (I don’t have a motorized vertical as yet, but just might haul one home from Dayton this year!), but I have put two verticals on the same ground plane before (see photo C), and they do work.

In the photo you can see I just have two whips on the same coax. Electrically the “wrong” antenna has a high impedance and very little of the energy goes into that one. Thus, one antenna resonates and the other just sits there. There are some loading effects from the non-resonant whip, but this tunes out easily. I’ve never tried using more than

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two, but there's no electrical reason why you couldn't have more than two whips on this ground plane, or even one of those spider assemblies that lets you put several loading/band coils on the end of the same vertical. Good DXing!

The Care and Feeding of Ferrite Beads

You see "ferrite beads" these days on just about every computer product (photo D). If you're throwing out something that has some ferrite beads on it, at least scrap out the ferrite. I'll be covering many uses for these devices in the coming months.

The construction of a ferrite bead is pretty straightforward. Take some ground-up iron or other magnetic material. Mix it in with pottery clay. Extrude the clay into a bead instead of a tea cup. Put it in a kiln and cook until well done. You have a ferrite bead!

At low frequencies putting a bead over a wire will greatly increase its inductance. At high frequencies, above about 100 MHz for most ferrites, the bead starts to look absorptive. There are many ways to take advantage of this absorption. For example, take a handful of ferrite beads, grind them back into a powder, mix the powder into a good grade of paint, and paint it on your stealth airplane or stealth pickup truck.

We will be using the inductive properties of these ferrites to tackle many antenna and RF problems. In the classic drawing of a dipole, fig. 1, we show the signal coming up the coax and traveling out the elements. In reality it's more like fig. 2. Much of the current thinks the coax is the other half of the antenna, so a lot of the power just comes back down the outside of the coax. Ever have a station with a "hot" mic? One that burns your lips when you get too close? RF on the coax is usually the problem. Antennas with RF on the outside of the coax usually have a poor SWR as well, and a lousy pattern. RF on the outside of the coax is also a good path for the signals getting into the AC power lines. Now your QSO comes out of the clock radio, stereo, etc. You need an RF choke on that coax!

The best fix is a proper balun,¹ but a few ferrites on the coax will work almost as well (see photo E). I learned the hard way about using the split-type ferrites outdoors. Those plastic snap holders last just a few months in sunlight, and the ferrite halves make interesting noises when they go clunk on your roof. Therefore, if you're using the split types, put a few turns of electrical tape or a cable tie around them. They make less noise on your roof that way. If the ferrite core is big enough, loop the coax back though it as many times as is practical. That really helps the inductance (see fig. 3).

Build a Noise Balun

Field Day, portable operation and no ferrites around ... another quick fix is the noise balun, or choke balun (photo F). Here we are winding the shield of the coax itself into an RF choke. For 6 meters, three or four turns of RG-58 about 6 inches in diameter work well. For HF, you need about ten turns. More is better, but you are trading off coax loss and the weight of the extra coax.

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¹ A balun is an inductive component used to match between a two-wire transmission line and a single-wire transmission line. It is used to prevent the flow of current in the outer conductor of the cable. More specifically, it is designed to reduce current flow in the outer conductor, which is essentially the ground wire, while passing RF currents through the center conductor. Baluns are often used in amateur radio to match impedances and reduce noise.
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Notes

1. To learn more about baluns and their cousins, ununs, see the book Understanding, Building and Using Baluns and Ununs, by Jerry Sevick, W2FMI, available from the CQ bookstore and at many ham dealers.