BY KENT BRITAIN,* WA5VJB

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.

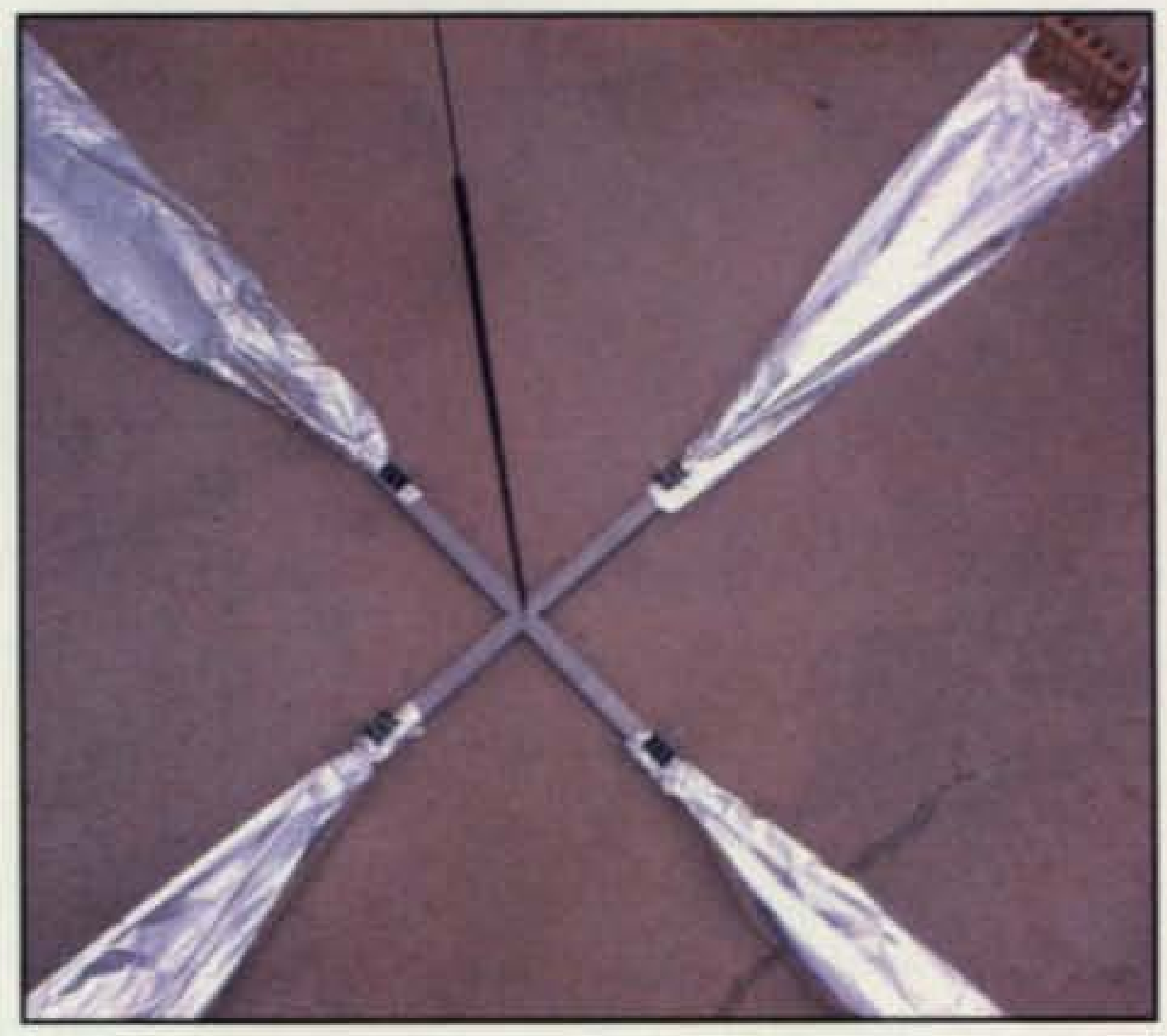

Photo A– Using a mobile antenna in the attic. Just keep headroom issues in mind, especially with motorized multiband antennas.

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

Photo B– Various mobile antenna mounts are available to meet your needs in whatever type of setup you decide to build.

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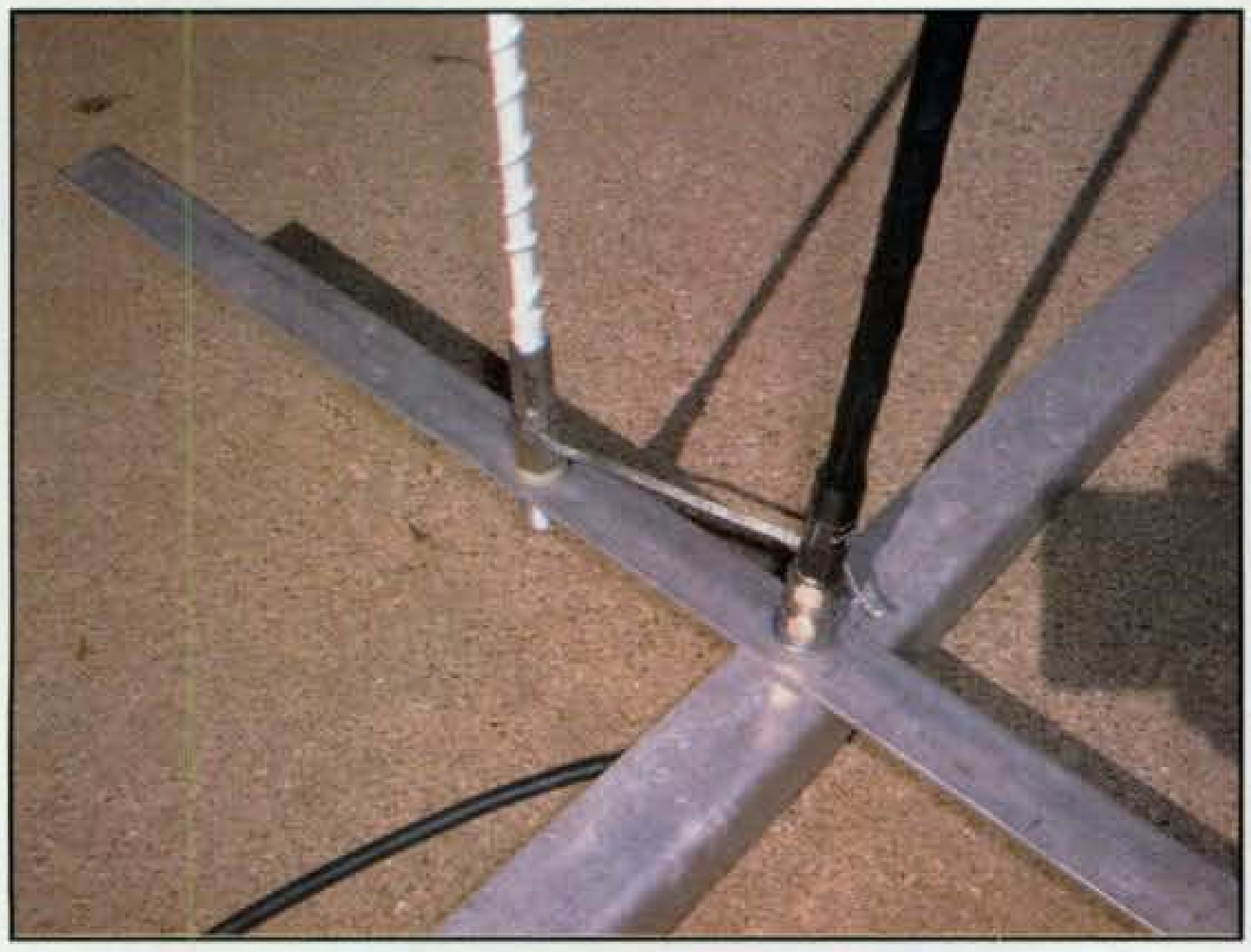

Photo C– Using two "stick" style antennas on your new ground plane. See text for details on using two antennas and just one feedline.

Photo D– Ferrite beads come in a variety of shapes and sizes, depending on your specific needs.

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!

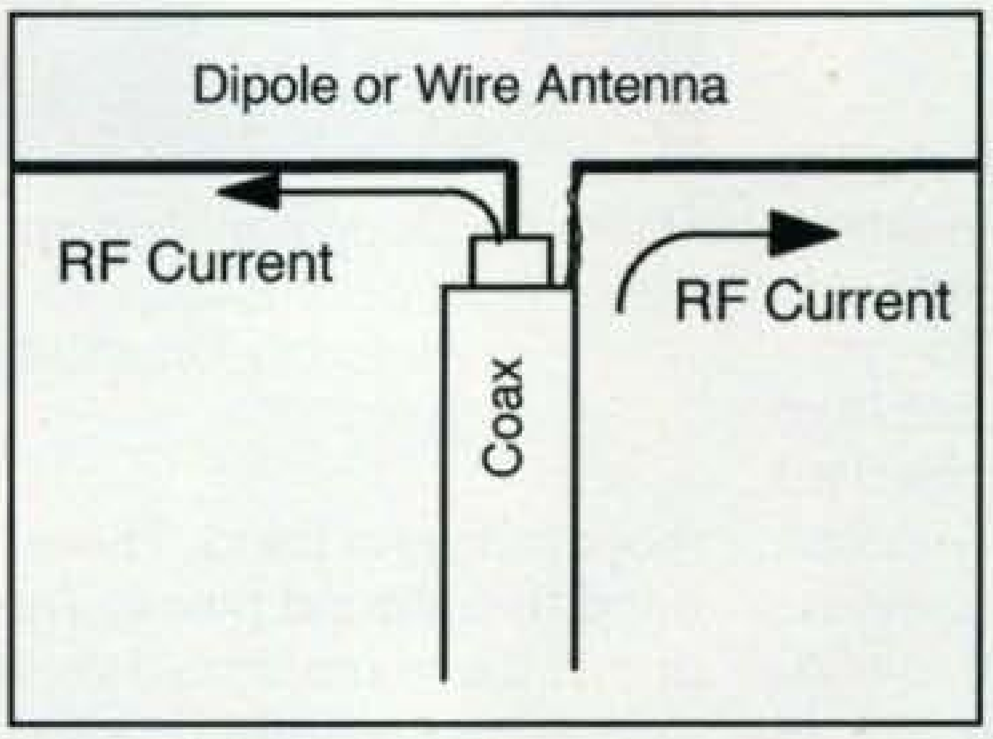

Fig. 1– The classic illustration of RF current coming up through a feedline into a dipole or other wire antenna. In reality, however, the current flow is more like that shown in fig.2.

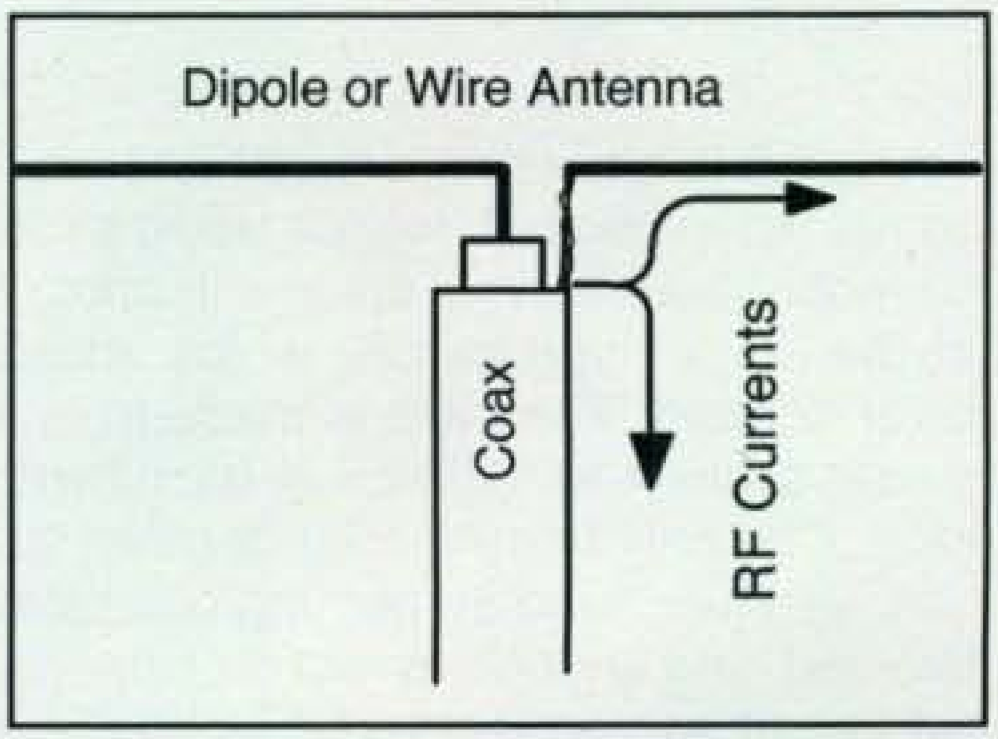

Fig. 2– "Real-world" RF current flow at the feedpoint of a dipole or other wire antenna. Much of the current "thinks" the coax shield is the other half of the antenna and flows back down the outer conductor of the cable. An RF choke (see fig. 3) will help block that flow and redirect the RF to where it belongs.

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. This 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.

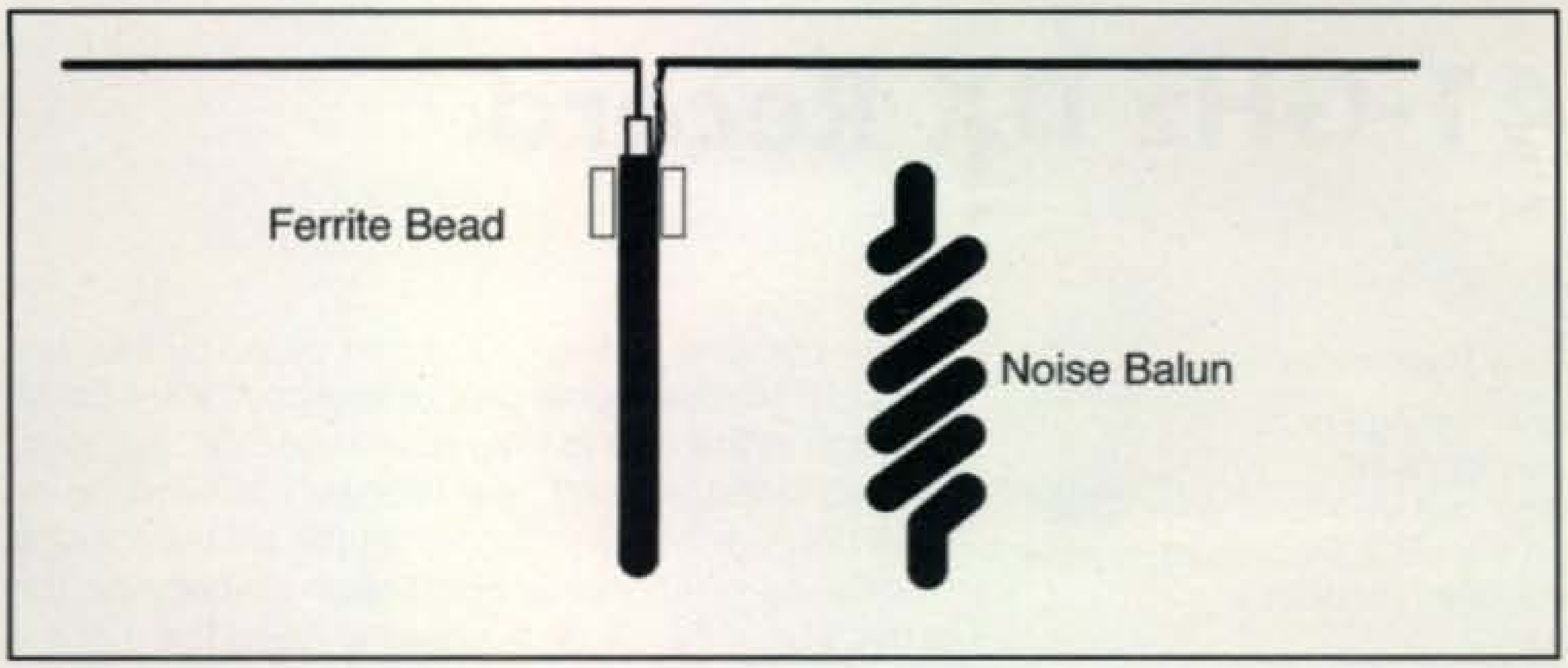

Fig. 3– Either a ferrite bead or a coaxial "noise balun" (see text) at the antenna feedpoint will create an effective RF choke to prevent RF energy from flowing back down the shield of the coaxial cable.

Photo E– Some common examples of ferrite beads used as RF chokes.

I've held the coils in shape with garbage-bag ties, cable ties, and tape.

Letters, Letters...

Dick, Ron, and a couple of others got quite a side discussion going on the Q of a dummy load from the last column.

Photo F– If you don't have ferrite beads handy, several turns of coax will have a similar effect, creating what's known as a "noise balun." (See text for details.)

If you use the fundamental definition: Q = Energy Stored/Energy Dissipated, you get a Q of zero for a dummy load. If you use the bandwidth definition: Frequency/Bandwidth, you can get a Q of 1 using an old HeathKit Cantenna, with its 30 MHz or so limit, on 10 meters; or a Q of .001 for a microwave load operated at VHF. Finally, if you just point a piece of waveguide up in the air and use the universe as your dummy load, the final answer can depend on the nature of the universe! I think I'm going to stay away from dummy-load Qs in the future, and we'll talk about some "cheap" 2-meter beams next time. For those of you who remember this antenna from a few years back in *CQ VHF*, I promise some new material.

Remember: There just is no substitute for a piece of wire in the air.

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. ■