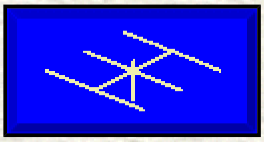

No. 8 Raiding the Hardware Store

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Home-made antennas have no warranties. We build them, modify them, fix them, and then use the pieces for another project. We move them from the roof to a mast, and from there to the attic. We fold, bend, staple, and mutilate them with great regularity. We do not have to think like manufacturers when we look for materials for small, experimental antennas. The hardware store will do just fine for 10-meter antennas (except for stock items like coax, ladder line, baluns, connectors, and #14 stranded copper wire).

Think hardware store if you build any of the following: attic antennas, portable or field antennas, experimental or short-term antennas, hidden antennas, "hurry-up-and-get-it-in-the-air-because-the-contest-is-about-to-start" antennas. By hardware store, I mean anything from the traditional shop to the giant home improvement depots.

The rule of thumb is this: if it is copper or aluminum, then it may be an antenna element; and if it is plastic--especially PVC or its offshoots--then it may be an insulator.

Here are a few examples to get your creative juices flowing.

1. Why tubing? Manufacturers use tubing for at least two good reasons. First, it is relatively strong among available antenna element materials. Secondly, it slips the wind better than most other economically feasible shapes. However, without a good shop, working with tubing is inconvenient. Lining up holes for connectors is a bear if we only have hand tools. We often crush it with both regular bolts and U-bolts. So, for experimental and field antennas, why not use something else.

Angle aluminum is available in a wide variety of sizes. We can choose 1/16 or 1/8" thickness in half-inch or three-quarter-inch widths. I prefer the 1/16" thickness for its lightness and the 3/4" width because I can mount a coax connector right on the element (after grinding off two of the corners).

Some years ago, I put together a collapsible square quad loop made from a combination of angle aluminum for the horizontal members and wire for the vertical. Construction and field assembly were a breeze because all the nuts and bolts went through flat surfaces. Any difference between the radiation of a tube and a complex angled surface was washed out in practice.

Hardware stores also have flat aluminum bar and often you can find aluminum rods. The bar would flap too much as an antenna element, but it makes good connector straps in short lengths. If you can thread aluminum rod, you can link pieces, as I did some time back with a collapsible dipole.

While you are thinking about alternatives to tubing and #14 wire, consider both 300-ohm twinlead and 450-ohm ladder line. You do not have to make folded dipoles out of them. Instead, just connect the wires together at the ends of an element to simulate a fatter wire for a slightly greater bandwidth than you can usually achieve with a single wire. For attic and field antennas, the slight weight difference may be offset by the wider QSY possibilities.

The usual steel mast and steel or aluminum tower is a marvel of engineering, and most handbooks show metal plates using metal hardware to mount a metal mast to a metal boom to metal elements. The operative ideas are durability and lightning protection. For many indoor, experimental, and field operations, these ideas are secondary, at best.

Schedule 40 PVC makes a good partial substitute for steel masting in short lengths. It works easily with hand tools. I have experienced no RF difficulties with it at 10 meters. I have used 1/2" to 1 1/2" diameters for various element support, mast, and boom exercises. The 2-element Yagi in a past episode used a PVC boom under 6' long, well within the sag limits of the tube.

Schedule 40 PVC gives "nominal" or minimum diameters: the actual inside diameters are greater. 1.25" PVC has closer to a 1 3/8" inside diameter and a 1 11/16" outside diameter. 1" nominal will nest inside 1 1/4" nominal, but not tightly. However, most other sizes will not nest well or at all.

Consider the following portable dipole. The elements on each side of center are 3/4" and 5/8" aluminum tubes that slide into each other for carrying. The center insulator is a 2' to 2.5' piece of 5/8" dowel--a foot or so of antenna element over each end of the dowel. The dowel slides into a hole through the near top of a 2' piece of 1" nominal PVC. The PVC slides over the end of a section of TV masting. 5' sections of the mast put the antenna as high as safe and feasible, with rope guying. The dipole is turnable by hand over 90° for nulling QRM into the element ends. Wherever the tubing fit is too loose, some electrical tape on the inner tube tightens the grip without gluing the assembly together. It all breaks down into a collection of tubes no longer than 5' maximum. Nest what you can; then lash the bundle together with the guy ropes for transport. It is possible to drill a hole and fasten a coax connector to the PVC top mast section, or you can make up a little plate for it from some scrap aluminum.

For wire antenna element spacers, portable quad element supports, and similar light duty functions, try some of the lighter-weight tubing available. Half and three-quarter inch CPVC tubing is available, as is Schedule 315. For both 90° and 45° corners, as well as for section couplings, there are fittings that glue together so permanently that I have never had one fail yet.

3. Flat and angled insulators: Sturdy plastic insulating plates are easy to fashion from thick freezer containers. They are temperature impervious for normal use lifetimes. The sides are either straight up or slightly angled, making good mounting lips. A hacksaw cuts these 4" square containers into handy sizes, and a 5/8" hole saw for wood cuts a perfect coax connector hole. The uses are limitless, but the first use that comes to mind is as a center insulator for either straight wire or folded dipoles.

However, do not overlook round and "squared" plastic bottles for special uses. The semi-rectangular bottles used for some liquids have rounded 90° corners. Cut a pair of round holes (to match a boom, a mast, or an antenna element), one on each surface of a corner section. Squeeze the corner together and slip it over the mast, boom, or tube. Let go, and the corner grips well enough to withstand small loads and winds up to 45 mph. You can use this scheme to space feedline from a boom or mast or to suspend linear loading elements beneath a main element.

4. Wood and the "auto" section: For most experimental, indoor, and field antennas, metal mast-to-boom and boom-to-element plates are not necessary (unless you just happen to have a stock of 3/16 to 1/4" thick aluminum). 3/8" or 1/2" plywood will do as well.

Put away the varnish, because it will not last long in the weather. Instead, look in the auto supply part of any of the X-mart stores for a can of auto body work fiberglass resin liquid. Spread it liberally over the plywood piece (already cut and drilled). Give special care to the edges, where plywood is very porous. Once dry, recheck the hole sizes for easy hardware passage and redrill as needed. If your wood plate is lumpy, sand the surface flat, but not down to wood again. If you slip up, retouch the area. Now your plate is sealed against weather much more perfectly than any varnish I have found.

The one exception is epoxy paint made to seal concrete and similar benches, tables, etc. It does much the same work about as well, but is not always readily available.

Note that I do not use the fiberglass cloth in this process. It is unnecessary for this application.

5. Hardware: For antenna work, use stainless steel hardware (nuts, bolts, washers, hose clamps, etc.)

wherever possible. Stock sizes are now readily available in the depot-type stores, and there are in many medium to large cities specialty suppliers of stainless steel hardware. If it is rustable, do not use it for an electrical connection out of doors. Beware, for example, of those little wire-end rings: most turn to rust in a few months.

For hardware that does only mechanical, but not electrical work, clear sprays can extend their useful lifetimes. Of course, such coatings take the hardware out of the secure grounding system. So if you need a ground lead from your antenna boom to the rod in the earth, run a separate flat braid. Do not rely on coated or rustable hardware for this job.

This is just the start. If you like to play with experimental antennas, especially for 10 meters, just wander around a hardware depot. Buy a few fittings that look promising and cheap just to stare at in your leisure. I am sure you will find a use for some of them in your next project. Remember: antennas do not have to look like commercial versions to do the job you need them to do. They just have to be electrically and mechanically sound enough as antennas and convenient enough relative to your situation.

Now where was I? Ah, yes. This elbow joint just fit over the end of the tube for my bedspring helical J-pole antenna. . ..

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