By Michael Atlas, N7FC

# A Q&D Multiband Antenna

A brick, some PVC tubing and a few other common hardware store items can be transformed into an effective Quick & Dirty RF-launcher—for less than $25!

Having recently acquired a Yaesu FT-817 transceiver, I plunged wholeheartedly into the world of QRP. This was the stimulus to come up with a truly portable station setup. My main objective was to devise some kind of portable antenna—maybe one of those shortened vertical dipoles I had read about. Better yet would be a combination dipole and vertical whip that could be coupled with almost all antenna tuners in use today.

You can build this antenna as described or add your own ideas and technical wizardry. If you build it from the suggestions herein, however, you'll have lots of fun putting together and using this cheap and dirty state-of-the-art plumbing project. It shouldn't take any more than a couple of hours once you have all the parts in hand.

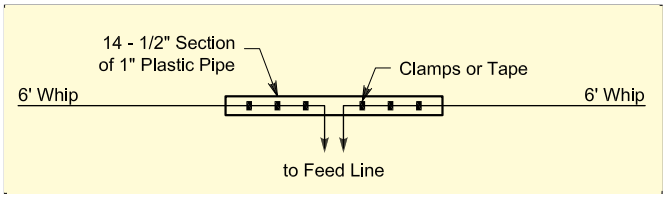


**Figure 1—The main section of the antenna consists of a 14½ inch section of PVC with four small holes drilled on each side to make it easy to install the cable clamps that hold the whips in place.**

**Figure 2—The antenna breaks down easily for storage. Self-supporting and easy to set up, it weighs 8 pounds including base. No water flows through these pipes—only pure RF.**

## The Amateur Hunter-Gatherer

Armed with this vague idea, I set off to the local Home Depot. I soon found myself among the myriad of tubing, fittings and other exciting accessories for the plumbing enthusiast. As I was standing there in the dazzling brilliance of the glittering off-white plastic, a design idea was coming to the fore as thousands of previously dormant neurons began exploding like firecrackers. I started to pluck tubing, adapters and miscellaneous items from the shelves at a frenzied pace. Visiting the Home and Garden section, I found a very nice red brick to serve as the base for my freestanding vertical/dipole combination. With neurons still furiously firing, I drove a few blocks to a local RadioShack and purchased some 72 inch collapsible whips and coaxial cable clamps, perfect for keeping the two whips in place.

## From Mind to Matter

I drilled a couple of holes in the red brick and mounted the floor flange; so far, so good. Now the difficult part—mounting two whips connected end to end and fed at the bottom as a vertical or split at the center and fed as a dipole. I sawed off a 14.5 inch section of pipe and drilled four tiny holes on each side of center where the cable clamps (which hold the two whips in place) attach. This made it easy to hammer the nails that affix the clamps (Figure 1). The whip assemblies can also be fastened with nylon cable ties rather than clamps. Simply wrap and tighten the ties at the indicated points of Figure 1.

I left 1 inch of space between the two whip ends to accommodate 300 Ω twin lead when the antenna is used as a vertical dipole. The collapsible whips each have small mounting holes in their base, enabling the use of tiny metal screws to fasten the whips to the plastic pipe. They also serve as contacts for the twin lead or vertical shorting bar consisting of two small alligator clips and a 1 inch piece of heavy gauge solid wire (Figures 3 and 4).

Assembling the antenna and mounting it on the base is a snap. After screwing the 1 inch adapter fitting into the floor flange and attaching the other previously sawed pieces together, they are then coupled to the floor flange. The antenna becomes self-supporting (Figure 5).

**Table 1**
**Parts List**

*Available at most hardware and plumbing supply stores. RS is RadioShack (***www.radioshack.com***).*

1—10-foot section of ¾ inch PVC pipe.
4—female ¾ inch PVC couplings.
1—PVC end cap for ¾ inch pipe.
1—¾ inch PVC female to 1 inch male threaded fitting.
1—1 inch metal floor flange.
1—package cement screws.
1—⅜ inch masonry bit.
1—standard brick.
2—72-inch collapsible whips (RS 270-1408B).
1—package cable clamps (RS 278-1660A).
Tiny metal screws, assorted soldering lugs, jumpers and radial wire (readily available from any halfway decent junk box).

**Figure 3—The shorting bar that enables the antenna to be used as a 12 foot vertical.**

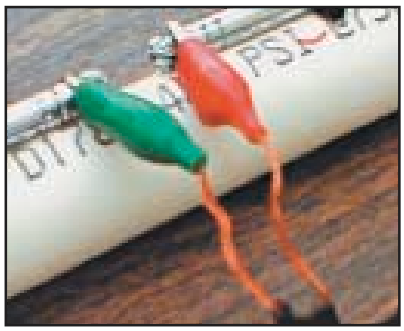

**Figure 4—Close-up showing the connection that allows the Q&D antenna to be used as a center-fed dipole.**

**Figure 5—The base and connections to the tuner for operation as a vertical antenna.**

Depending on your own circumstances, you can elect to assemble the mast as one piece or cut it into several sections for portability. Instead of a brick base you can devise a clamp or other means to attach the antenna to a railing, gutter, bumper, tripod or other object, depending on the circumstance and the limits of your imagination.

You are not restricted to using 300 Ω line for the dipole. Depending on the tuner, you may want to use 450 Ω ladder line or even coax.

The only somewhat critical dimension is the overall length of the plastic pipe mast, which should be a minimum of 78 inches (not including 14.5 inch antenna section) to allow for clearance of the lower whip when fully extended.

With my arrangement, adding a 6.25 inch section that mounts in the flange enables me to keep a fairly uniform length for the other pieces of pipe with the added benefit of lessening strain on the adapter when dismantling the mast (Figure 2).

The antenna is low profile, which makes it ideal for me and others like me who suffer from CC&R (covenants, conditions and restrictions) constraints. Add (at least) four 33 foot radials, or whatever works best in your particular location. A good rule of thumb is to make your radials at least a quarter wavelength on the lowest frequency on which you intend to operate. Radials are not required for the dipole configuration. The antenna may be loaded using any antenna tuner. For optimal performance, place the tuner at the antenna feed point.[1]

## The Smoke Test

A test setup was installed at the home of my friend Dave, KD7V, using an Elecraft K2 with two antenna jacks and running 10 W using the internal tuner. We positioned my antenna approximately 40 feet from Dave's commercial lightweight all band $150 portable vertical. It requires manual adjustment for band change in addition to the radio's built-in tuner. The antenna was mounted on an iron railing around his pool. Radials were deployed for both antennas.

With the help of Don, W3RDF, in South Carolina, I ran several checks on 20 and 17 meters, the only bands open for that path. The result was a draw, with good signals at both ends. Meter readings were almost the same regardless of antenna used. A contact with AH6NJ in Hawaii at 5 W on 40 meters with antenna in the living room was the icing on the cake. Not bad for the N7FC Quick and Dirty Special—and less than $25 spent.

This is an easy project that can provide tons of fun, enjoyment and satisfaction. Oh, by the way, all those agitated neurons are now receiving a much needed rest.

*All photos by the author.*

*Michael Atlas, N7FC, was first licensed in 1947. Michael's fascination with radio began as a toddler—crawling behind the family's Zenith to stare at the red glow coming from the vacuum tube filaments. Although never professionally engaged in electronics, Michael maintains a strong interest in science, technology and Amateur Radio—particularly working CW at 30 to 45 WPM. You can reach the author at PO Box 90436, Tucson, AZ 85752;* **n7fc@arrl.net**.

[1]An antenna tuner is an impedance transformer. When it is placed at the transmitter end of the line, it will present a 50 W load to the transmitter, although the SWR on the transmission line remains the same. When SWR is high, additional transmission line losses can be large, especially with coaxial transmission lines. Placing the tuner at the antenna feed point will keep the SWR on the transmission line near 1:1 and greatly reduce SWR losses. For more information, see *The ARRL Antenna Book* available from the ARRL Bookstore for $39.95 plus $8 shipping in the US ($10 elsewhere). Order no. 9043. Telephone toll-free in the US 888-277-5289, or 860-594-0355, fax 860-594-0303; **www.arrl.org/shop/**; **pubsales@arrl.org**. QST