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The Texas Tango Antenna

Ticked off at traps, K5BTV stumbles onto a 75/40m tuned-stub dipole.

Over the years I've tried many types of antennas for 75 and 40 meters. These have included verticals, folded dipoles, inverted vees, and trapped antennas—plus a few that still defy description. Several common requirements have emerged through this work: The antenna has to be confined within my property line (90 feet x 120 feet) and the wires kept to a minimum to keep the neighbors and XYL at bay. But most importantly, the antenna has to perform well.

The addition of the WARC bands presented a new challenge. Until I could develop a suitable yagi to cover the bands above 40 meters, a trapped inverted vee seemed the best way to become active on the new bands. So a three-band trapped inverted vee was constructed to cover 75, 40, and 30 meters using coaxial-cable coils on PVC tubing.

The trapped inverted vee was erected at 40 feet on my tower. On 75 meters, the operating frequency limit to stay within a 2:1 swr was approximately 50 kHz; on 40 and 30 meters it was about 25 kHz. The coil-and-capacitor trap impedance is responsible for the bandwidth of each band, as described in an article by John Grebenkemper (*QST*, May, 1985). But having already constructed the antenna, I knew I would have to construct new traps if I desired more bandwidth.

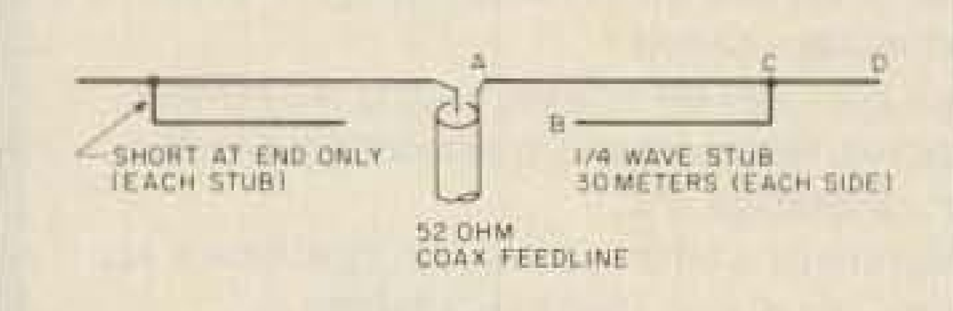

Fig. 1. Quarter-wave stub traps on a half-wave dipole. For a 75/30-meter antenna, the distance from A to D = 234/3.825 = 61 feet. The distance from A to B = B to C = 234/10.115 = 23 feet.

While enjoying the patio and thinking about the disadvantages of the coaxial traps (moisture penetration, arcing of the capacitor, added weight, etc.), I thought about an old TVI-prevention scheme that used a tuned stub to trap out the offending signal. Then the idea came to light. Since a quarter-wave section of feedline that has been shorted at one end and is open at the other exhibits an infinite impedance at the open end—perfect for a trap—why not use quarter-wave stubs for traps? Some further thought provided the final solution: Make the 75-meter leg of an inverted vee part of a quarter-wave stub for 30-meter operation.

Fig 1. shows the mechanical layout. At my station, I use separate 40- and 75-meter antennas fed from a single 52-Ohm coax feedline. The 40-meter antenna is broadside to the north, allowing me to keep schedules with my dad (WØIMZ) while the 75-meter inverted vee is used for contacts east and west of my QTH. The object was to end up with two antennas that could operate on 75, 40, 30, and 12 meters using one 52-Ohm feedline.

Construction of the antenna was surprisingly simple, as was the adjustment. First the 75- and 40-meter inverted-vee antenna elements were erected using #14 copper wire obtained from the local hardware store. The antennas were then resonated at the frequency of interest on each band. The 75-meter antenna was to carry the 30-meter stub, and the 40-meter antenna the 12-meter quarter-wave stub. Since the construction of both antennas uses the same principles, this discussion will cover 75/30-meter elements.

From the feedpoint on the 75-meter leg, measure out a quarter wave using the *Radio Amateur Handbook* equation L(feet) = 234/f (MHz). For 30 meters this is L = 234/10.115, or 23.1 feet. Therefore, from the feedpoint, measure out 23.1 feet. This is the point at which the open end of the 30-meter stub begins. You may want to wrap a piece of masking tape on the 75-meter leg to mark the spot for future reference. From this spot, lay out the 23.1-foot wire beneath the top wire. At the end of the quarter-wave stub, it will be necessary to short the wire to the top 75-meter section. I used alligator clips so I could tune the stub before I soldered the connection. To complete the stub, you must use spacers for the wires. Radio Shack has

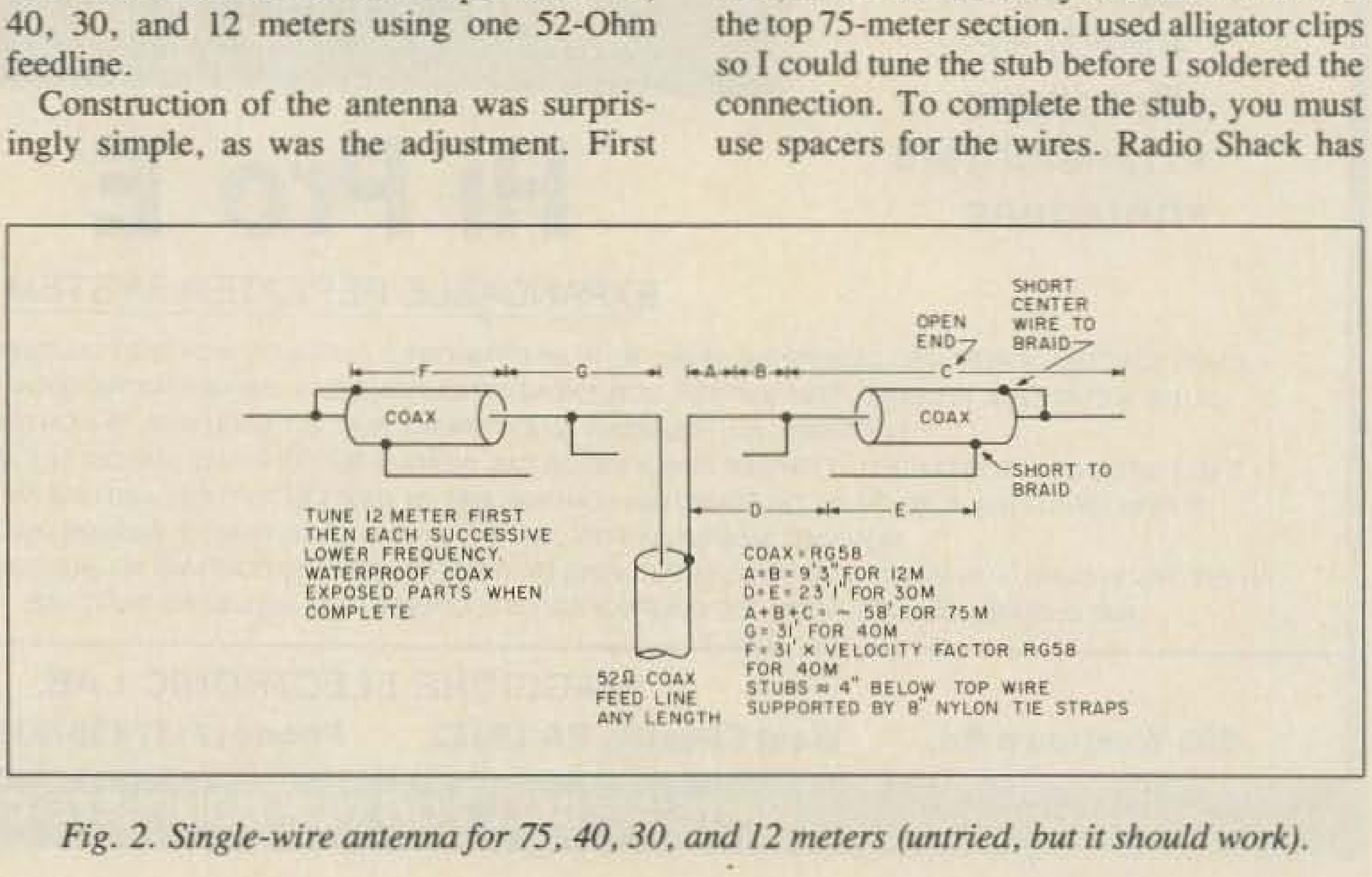

Fig. 2. Single-wire antenna for 75, 40, 30, and 12 meters (untried, but it should work).

6-inch nylon cable ties that work well for spacers. Simply loop them around the two wires and pull the tie to the first notch, locking it. This results in approximately a 3-inch spacing. The wire size and spacing result in approximately a 600-Ohm quarter-wave stub. Wooden dowel spacers could also be used.

An alternative to the construction as discussed above would be to use 300-Ohm twinlead or commercial open-wire twinlead. Simply use one leg as the top element of the 75-meter antenna. An advantage of twinlead is that it can be cut to approximately one-quarter wavelength, shorted at one end, and resonated using a grid-dip meter while on the ground. Then one side of the wire can be used as the top-wire element for the 75-meter antenna.

Once the mechanical details have been worked out, final-tune the 30-meter stub—either by moving the alligator clip toward the feedpoint an inch or two at a time if the resonant frequency is too low, or by moving the shorting alligator clip to the far end if the resonant frequency is too high. A final check of the 75-meter band will now be necessary because of the effects of the lower wire. Once the antenna is resonated, you may want to solder the end of the stubs to the top section to complete the job. You are now ready for some fun operating.

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Operation of this antenna has met the expectations set for it. Tuning the 75-meter band from the low-frequency point to the high-frequency point provided a vswr of 2:1 or better over 4.4% of the band, which was almost the same when the 75-meter inverted vee was used alone. The 30-meter operation covered the entire 30-meter band with less than a 2:1 vswr. It measured about 2.2% of the resonant frequency. These percentages seem to agree with the expectations derived from the *QST* article.

This antenna offers some advantages over coil/capacitor trapped antennas. It eliminates the need for high-voltage capacitors. It also can handle the full, legal power limit, is easy to construct, and provides wide bandwidths on each band. There are several other methods that should prove satisfactory whereby quarter-wave traps could be constructed. Although I've not tried it, a single, full-size wire antenna could be made for 75, 40, 30, and 12 meters using a combination of coax quarter-wave stubs and open-wire quarter-wave stubs (see Fig. 2). I would like to hear from others who may try these ideas. 73 and good operating over more of our bands. ■