Extending the Bravo 5k Antenna

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The Bravo 5k from Tom Schiller, http://N6BT.com, is a portable multi-band vertical antenna for 20 through 10 meters. It is the smaller, lighter (8 lbs vs 13 lbs) little brother of the Bravo 7k reviewed in the March 2012 QST. Like the 7k it breaks down to pieces no longer than 36". It is a good solution for those who want to carry equipment some distance and who do not need the 30 and 40 meter bands.

Like the 7k, the Bravo 5k is complete (including tripod) and very well constructed. It has one vertical element with two horizontal elements at its bottom, all made from telescoping aluminum tubing. The center wire of the coax feed line connects to the bottom of vertical loading coils which then connect to the base of the vertical element. The coax braid connects to the bottom of horizontal loading coils which then connect to the joined bases of the two horizontal elements. The loading coils not in use are shorted by jumpers on the sides of the coil box.

The antenna is essentially an off-center-fed, resonant dipole. Since the two identical horizontal elements carry equal currents in opposite directions, radiation from them cancels. The horizontal elements help to resonate the antenna, but the total radiation pattern of the antenna is that of the vertical element only---the desirable low-angle and omni-directional pattern of a resonant vertical dipole.

The smaller size comes at a price. The 5k requires a ticker coil across the coax input in order to obtain a match to 50 ohms. This is a standard matching technique for beams and short antennas, but does place a lot of current in the tickler coil. Fortunately, a simple and cheap extension of the 5k permits matching without the ticker coil, and in fact allows operation on 10, 12, and 15 meters with no loading coils at all.

The extension is simply to add to the vertical element a 36" length of 1/4" aluminum rod stock[1] which telescopes perfectly into the final piece of 3/8"OD, 1/4"ID tubing at the top. The weight added is minimal (the 1/4" rod is actually 25% lighter than the 3/8"OD tubing it telescopes into), and the wind load from the 1/4" rod is not great. The antenna seems sturdy enough to bear the additional piece with no danger of damage.

One problem is that the top-most 3/8" tubing of the antenna is not slotted. To use a compression clamp to hold the 1/4" rod in place, slots must be cut in the top of the 3/8" tubing. This is easily done with a fine-tooth hacksaw. The 3/8" tubing is recessed slightly into the 1/2" tubing below it, and the slots in the 1/2" tubing serve as a guide for the cut.

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[1] I used 36"x1/4" Rd 6061-T6511 Aluminum extruded; SKU: 61r.25-36 at http://www.speedymetals.com; $1.21 + $16 shipping. Also see Home Depot SKU:477052; $4.21. (Check the OD of the Home Depot rod for fit.)

The extra adjustment latitude from the added length of the vertical element allows the size of the loading coils to be reduced. Table 1 and Table 2 show the element lengths and loading coil sizes for the various bands. The SWR is low at resonance and is never more than 2.0 at band edges. I find that these adjustments vary somewhat with the terrain in which the antenna is used. But in a flat field with the closest large metal object (e.g., your car) at least 25 feet away, your results should be similar to those in the table.

Band	Vertical turns	7/8" tubing	3/4" tubing	5/8" tubing	1/2" tubing	3/8" tubing	1/4" rod
10	none	12"	17"	33"	33"	23"	1"
12	none	12"	17"	33"	33"	33"	7"
15	none	12"	17"	33"	33"	33"	33"
17	5	12"	21"	33"	33"	33"	33"
20	5+8	12"	21"	33"	33"	33"	33"

Table 1. Vertical loading coil turns and element lengths.

Band	Horiz turns	3/4" tubing	5/8" tubing	1/2" tubing	3/8" tubing	Min SWR	Max SWR
10	none	3.5"	16"	28"	1"	1.2	1.9
12	none	3.5"	16"	33"	10"	1.2	1.3
15	none	3.5"	16"	33"	26"	1.2	1.3
17	4	3.5"	16"	33"	12"	1.3	1.4
20	4+3	3.5"	16"	33"	18"	1.6	1.8

Table 2. Horizontal loading coil turns and element lengths. The SWR is measured at the antenna end of the coax feed line. The dimensions are for each one of the two identical horizontal elements.

Figure 1 shows the coil box of the 5k after the changes. The black project box at the bottom was added to bring the antenna terminals out to an N jack for connection to the coax. Also, ten ferrite cylinders (not shown) are strung onto the coax just below its connection to the antenna, to block common-mode currents. The red jumper wires on the outside of the box are here set for 10/12/15 meters (all loading coils shorted).

One final caveat: wind. Even without the extension, the antenna probably needs some sort of guying or other protection from being blown over. The winds here in coastal California can suddenly gust to 30 MPH even on a calm day. As seen in Figure 2, I use three steel tent stakes driven at the feet of the tripod. Three short elastic cords wrap around the bottom of the vertical pole and connect to the stakes. This arrangement provides compression along each of the legs and keeps them from lifting, but does not add strain to the tripod assembly.

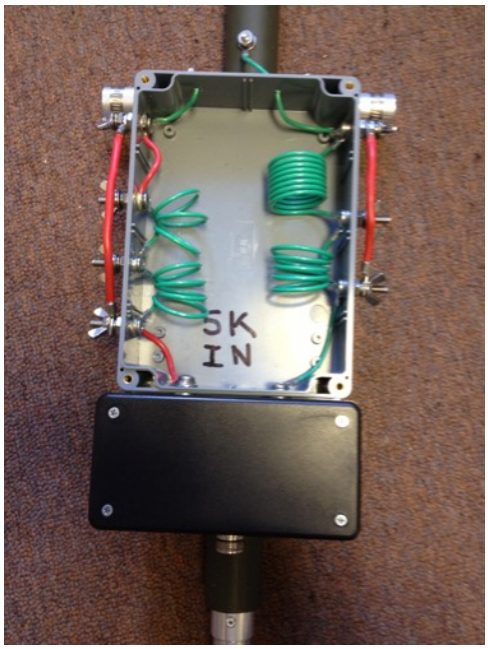

Figure 1. Interior of the coil box with cover removed, showing coil arrangement after modification.

Figure 2. Tripod with elastic cords compressing the legs.

Figure 3. The modified 5k in operation, with the vertical element fully extended.