suitcase antenna

Complete description of a continuously-loaded multiband trap antenna that fits in a suitcase

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Some amateurs like to take their equipment with them when they travel. Mobiling these days is very easy with modern rigs and the many fine commercial antennas which are available. It is not so pleasant though, to work mobile in today's traffic, and many traveling hams hanker for a ragchew in the comfort of their motel room at the end of the day. What is required here is a portable antenna.

A loaded whip, helical or whatever, needs a groundplane. It is also prone to detuning when moved; these considerations prompted me to look for an alternative and I decided on a dipole.

the antenna

The 5BI Suitcase is a continuously-loaded trap dipole antenna for 80, 40 and 20 meters. It is 65-inches long when assembled, and may be dismantled to fit diagonally into a suitcase. The maximum dimension when dismantled is 33 inches. I have tested it to an input power of 500 watts PEP.

Any antenna which has its radiating portion compressed is going to be inefficient. However, with today's compact high-power transceivers these inefficiencies are less important. What is required of any antenna before it can be used is resonance at the required frequency and an ability to match the transmitter output. When designing a loaded antenna it is necessary to decide on your favorite operating frequency and wind the antenna to suit. Any deviation from this frequency will cause a marked rise in vswr.

The design impedance is determined by the spacing between the sides of the dipole, i.e., the proximity of the two coils. In the case of the prototype the impedance was in the order of 300 ohms on 80 meters.

Before attempting to construct this antenna two pieces of test equipment are essential. Every amateur should possess an antenna bridge of some sort. I recommend the Omega Noise Bridge because of its simplicity and low cost. With this instrument it is possible to read off resonant frequency and impedance quickly and without resorting to math. There have also been a number of constructional articles on similar devices in recent amateur magazines. The other piece of test gear to have on hand for this project is a grid-dip oscillator.

construction

The antenna is wound on two pieces of rigid 1-inch diameter polyethylene plumbing pipe, 31-inches long. My antenna is designed to resonate on 3.60, 7.10 and 14.20 MHz, but as will be explained, it is not difficult to change the resonant frequency.

Each side of the dipole is wound identically. Starting from one end, wind 153 turns of number-24 plastic-insulated copper wire. Anchor it at 153 turns and wind a further 9 turns (for the 14-MHz trap) and anchor it again. Now, wind 84 turns for the 7-MHz section and follow this with 15 turns for the 7-MHz trap. Finally, wind 206 turns on each for the 3.5-MHz section.

The traps are resonated as follows: the 14-MHz trap is resonated with 50 pF and the 7-MHz trap is tuned with 100 pF. The capacitors I used were 500-volt micas.

The antenna is used in conjunction with a balun transformer and 70-ohm coax feedline. My balun is constructed from two pieces of Mullard FX1588 ferroxcube ring. Make two windings with number-14 copper wire, one of 10 turns and the other of 2 x 5 turns. Connect as shown in **fig. 1**. This provides an impedance of 50 ohms on 20 meters, 80 ohms on 40 meters and 50 ohms on 80 meters. This is well within the matching capability of most modern transceivers. Of course, if you really wanted to get fussy, a separate balun could be constructed for every band.

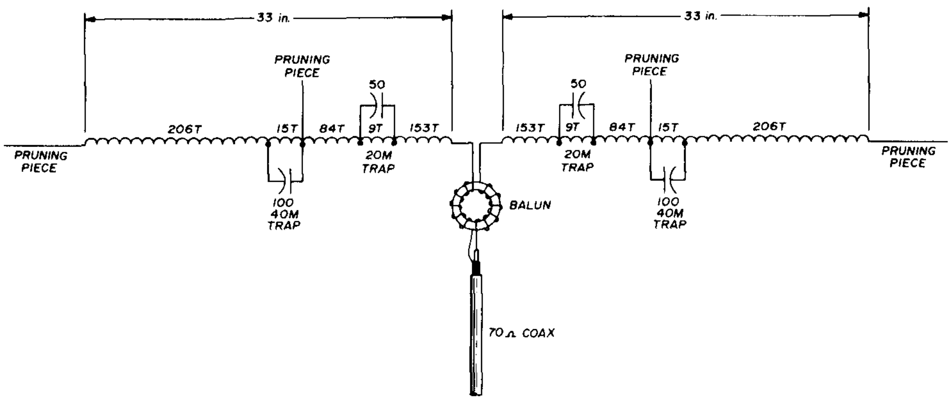

fig. 1. Continuously-loaded trap dipole is small enough, when dismantled, to fit into a suitcase. Antenna can be erected in just a few minutes.

tuneup

It is important that, when in use and during testing, the antenna be well clear of surrounding objects. The antenna is assembled using a piece of wooden broomstick at the center, giving 2½-inch spacing for the windings. If desired, the traps may be pruned, although I found them to be uncritical. This would be best accomplished by adjusting the trap tuning capacitance although you'll find the figures given to be fairly close.

The antenna is then connected to the bridge and the 20-meter section resonated, if necessary. This is done by connecting a short length of wire to each of the dipoles before the trap. The 40-meter section is adjusted next. In my case 15 inches were added to each 40-meter section and placed at right angles to the plane of the antenna.

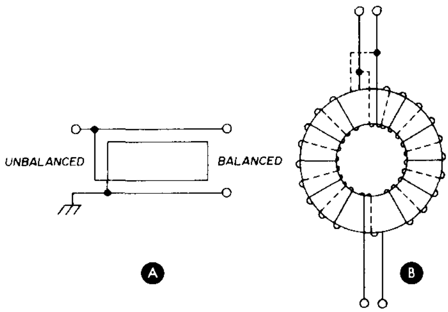

fig. 2. Circuit (A) and construction (B) of a 4:1 *balun for use with the suitcase antenna.* Although the author used a Mullard toroid core, an Amidon T-50-2 core with 10 or more bifilar windings of number-14 wire would be suitable.

On 80 meters I finished up with 4 inches added to the end of the coil. Keep an swr bridge in the line and see that the antenna doesn't swing against any objects; this will alter the resonant frequency.

Keep people away from the ends of the dipole while you're transmitting. I haven't had any corona problems, but the antenna *talks* due, no doubt, to the electromagnetic concentration in the turns. I found the directivity to be about nil.

No difficulty was experienced with rf feedback although trouble had been expected. The transceiver I use is a Yaesu FtDX 400, which is about the same as the FtDX 560 sold in the United States.

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