Half-Length Dipoles (for 40 Meters)

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Below 20 meters, full-length dipoles (and other antennas based on the dipole) present space problems. For many amateurs, such antennas are simply too long to fit within the modern urban and suburban yards. So the antenna builder begins to think of ways to shorten the dipole. The questions surrounding shortened antennas are complex. Some involve performance levels compared to the full-length dipole. Others concern the relative efficiency of antennas that use different means of shortening. Another group of questions focus on the mechanical issues created by various methods of shortening. Moreover, there are auxiliary matters, such as matching the shortened antenna to one of the standard feedlines in common use.

To explore these questions in a somewhat systematic manner, we shall pick a single antenna length on a single amateur band. 40 meters (7.0 to 7.3 MHz in the U.S.) is handy, since the average dipole length is in the vicinity of 67', just on the verge of fitting or not fitting a typical back yard. Let's use a half-length dipole and set its length at a fixed value of 33' for our explorations. Most of our antennas will use AWG #12 (0.0808" diameter) copper wire. With these simple premises, we can examine a myriad of ways of shortening dipoles, including but not limited to, folding back the elements, using inductive loads at the dipole center or along the element length, using end "hat" loads or element extensions, and employing U and other shapes. Each alternative method of shortening the length of a dipole has its own cluster of variations, its own set of issues, and its own set of consequences, for example, when constructing basic parasitic beams with half-length elements

This series of PDF documents tries to explore the basic territory in an orderly fashion, beginning with the development of basic properties of full size elements to form a baseline with which we can compare various techniques of shortening. The next step is to look at the performance potential of shortened elements and explore a few ways in which amateurs have simply folded and bent full size elements to fit a half-size space. Actual shortening takes us into the realm of element loading using inductive and other methods to resonate a half-length element. The last step is to look at some consequences of element shortening for the design and performance of directional beams.

Since each new step makes use of information developed in the previous step, you may wish to keep earlier episodes open while reading the new one. To return to this master page, use your browser's "previous page" button, since PDF documents have no ready means for returning to this page. The titles for each of the episodes should by self-explanatory.

Most of the material has appeared in other articles at this site, but under a scattered collection of specific topics and at different test frequencies. Drawing the ideas together may provide you with a more cohesive understanding of the principles involved in radically shortening a dipole and obtaining the best possible performance from it.

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