

Baluns for Multiband Loops and Doublets fed with Open Wire or Ladder line

Posted by Bob, KZ5R on 20th Nov 2014

At least once a week we receive a request for a high ratio balun to manage the transition from high impedance open wire feedline to a coax feedline. This is a common misconception and when using a loop, doublet or double extended Zep for multiband operation will result in "operational frustration". This is because any type of open wire (including ladder line and twinlead) will present nearly the same complex impedance of the antenna feedpoint to the other end of the open wire and can result in many, if not all bands, being difficult or impossible to match.

An example would be the primary band a full size loop is cut for. Typically this will have a 100-125 ohm feedpoint impedance and when divided by the ratio of the balun, i.e. 12:1 if trying to match 600 ohm open wire, the resulting 8-10 ohms is impossible for all but the absolute best tuner to match. In addition, when a low impedance match is created, the losses in the tuner are higher than a high impedance match.

This problem can be even worse for doublets. If the doublet is cut for resonance on the primary or lowest band, the feedpoint impedance will be around 60-70 ohms and the resulting impedance, after a high ratio balun, will be even lower than a similar loop antenna. This is why doublets work better when sized smaller (read shorter) than a standard resonant dipole of the same primary band.

The solution is using a balun with a much lower ratio such as a 1:1 or a 4:1 which will transform the balanced line to the unbalanced coax. Matching the resulting high impedance is far easier for a tuner and losses within the tuner are also minimized. Which ratio to use is the other frequently asked question and the answer is not as black and white as many would have you believe.

Our position, derived from experience rather than mathematics, is you have two choices based on your tuner. If your tuner has the ability to match a wide impedance range, then the [model 1171](#) is an excellent choice and designed just for this type of application. Keep in mind this is a 1:1 balun and even though it provides the highest efficiency, it also places all the work load for the match on your tuner. Please be careful when deciding if your tuner fits this description as many of the compact size auto tuners claim to have a wide range but will struggle to match a low impedance.

If you want to try using your internal tuner or want to provide some additional margin to your external tuner, a 4:1 current balun such as our [model 4114](#) or [model 4115](#) is the way to go. These models also provide a broader bandwidth for each tune and thus require less frequent retuning as you move within a band. As a side note, for some reason most LDG models prefer a 4:1.

All of the baluns we recommend provide excellent transformation from balanced to unbalanced feedline, high level choking and isolation, very low insertion loss and overall best in class performance.