

# DIY

*Worthwhile projects you can build on your own*



## Ladder line

Among the ham radio-related gear that a person can build, one that people rarely discuss is the feed line, the two-conductor *transmission line* that carries your RF (radio frequency) signal to your antenna. After all, it's a simple thing to order some coax (coaxial cable) online, either by spool or even cut to length with the connectors already installed. Most of us use coax of one model or another for our feed line, yet there are other types, such as twin-lead, window line, and *ladder line*. also known as open-wire line (OWL).



Of the feed line types used by amateur radio operators, ladder line is the only one I can think of, that you can actually make yourself. There have been attempts to create \*coax\* out of insulated wire painstakingly slipped inside copper tubing, but resulting in inconsistent impedance, high loss, and a very rigid and exposed outer \*shield\*. Even when homebrewed, ladder line tends to present a very consistent impedance and very low loss. Here's a 50-foot version.

*Note: you must use a 4:1 balun with this feed line, whether the line is used to match or simply convey RF energy.*

### Parts list

100 feet [14 AWG stranded wire](#) Four ¼" ring terminals for 14 AWG wire  
100 [ladder line spacers](#) or 1 box Zareba™ [4-inch insulators](#) and 100 8-inch zip ties  
For a 4:1 balun, I recommend the [BalunDesigns 411TW](#), for \$84

### Construction

Cut the stranded wire in half, making two 50-foot lengths. If you're using *LadderSnap* spacers, simply snap the spacers on the pair of wires every 12 to 18 inches. If you're using the 4-inch insulators, drill a ¼" hole about ¼" from each end of the insulators, and wrap a zip tie through each hole and its wire, one every 12 to 18 inches.



# DIY, continued

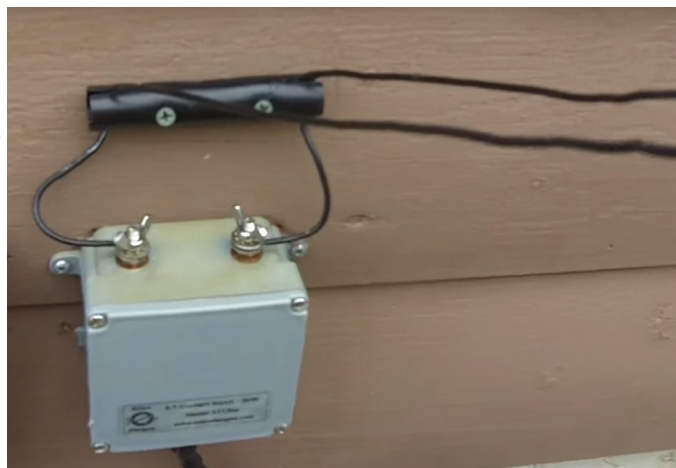
## Ladder line



Strip each of the four ends of the two wires, and solder a ¼" ring terminal to each end. Once you've constructed your ladder line, you can store it by rolling it up on an empty paper towel or similar tube.

### How to use your ladder line

By keeping the two conductors of your ladder line about 3½" apart, you're giving it an impedance of about 600 ohms, for which you'll need a balun to match to your coaxial cable, plus a tuner. Using one of the spacers for a strain-relief, connect the two ring terminals of one end of your ladder line to the antenna connection of your balun. Connect the ring terminals of the other end to your favorite dipole, long wire, or fan antenna.



*Use one of the spacers to anchor the feed line*

Connect one end of your coax to the SO-239 end of the balun, and the other end to your tuner, or to your transceiver, if it contains an internal tuner. By the way, you can use a balanced-line tuner (such as the \$150 [MFJ MFJ-941E](#)), instead of the balun,

but that'll require you to route part of your ladder line into your shack or install your tuner outside, either of which is no easy task for a permanent arrangement.

When using your ladder line during actual radio operation, make sure it's not strung or placed within eight feet of anything conductive (gutters, aluminum siding, swing set, topsoil, water, etc.), if possible. Unlike coaxial cable, the open-wire configuration of a ladder line is not shielded, and so will inductively couple with nearby conductive objects quite easily, throwing off its impedance.

Alright, why use ladder line? Why not just get online and buy coax? The biggest reason for using ladder line, as previously mentioned, is that it has perhaps the **lowest loss** of any type of feed line. This means *nearly all of the power your transceiver puts out will go to your antenna, instead of losing a huge chunk of it through your cable.* Your tuner, balun, and their connectors will already exhibit very low loss; this feed line will now be icing on the cake.

### Conclusion

It is indeed possible to make your own feed line, and a ladder line is one possibility. It's not difficult to make, but it can be difficult to use, especially routing it into your shack or home. Even though ladder line has very low loss, its characteristic impedance is far from the ideal 50 ohms we're used to, in the amateur radio world, and so requires a good matching system made from an balun in series with a tuner, like one that's internal to your rig.

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