

Tech Corner – Two ultimate HF chokes

If your HF station is plagued by noise, this might be the article for you. Just to be clear, not all noise that you hear is the same; in fact, noise sources are so abundant that it's often necessary to remove them individually. The noise that I'm attempting to reduce or eliminate in this case is [common-mode](#) noise, the undesirable signal your coax is picking up on the outside of its shield. It often originates from solar inverters, generators, Wi-Fi routers, surge-protected power strips, and defective wall and laptop chargers.



We've discussed an effective common-mode choke in a [previous article](#), but its construction was a little more involved than some people wanted to tackle. In this discussion I'm presenting the two best contenders for the title of **ultimate common-mode choke**. They're the "ultimate" chokes because they're the most effective across most of the HF spectrum, they're very inexpensive, and they're simple to make.

The specifications for these chokes come from [extensive research performed by Steve Hunt G3TXQ](#), and others who have confirmed and validated Steve's findings. He shows that the most effective ferrite materials for high frequency common-mode choking are either 31 or 43, with 43 providing less overall reactive impedance (you want more resistive and less reactive), but greater bandwidth (frequency coverage across the HF band). Additionally, the construction for the RG-316 choke originates in part from a [video by Paul Kline W2PAK](#).

Parts list (for the RG-316 / FT140-43)

One [FT140-43 ferrite toroid](#)

One [3-foot RG-316 cable with PL/SO ends](#)

Two [14" zip ties](#)

Parts List (for the RG-58 / FT240-43)

Two [FT240-43 ferrite toroids](#)

One [6-foot RG-58 cable with PL/SO ends](#)

Four [14" zip ties](#)

The construction

Install a couple of zip ties around the FT240-43 toroid pair to keep them together while winding. Construct each choke the same way. First, slip the RG-316 coax through the FT140-43 toroid and the RG-58 through the two stacked FT240-43 toroids, and zip-tie the coax to the toroids.



Two ultimate HF chokes, cont'd



Left : all the parts needed for both chokes, including zip-ties

Next, **tightly** wind five turns of each coax around one half of the toroid or toroid pair. Slip the coax into the toroids for the fifth turn, but complete the fifth turn on the opposite side. Complete the remaining five of the ten windings on the other half of the toroids, then secure the ends of the coax with another zip tie. Quickly enough, the choke constructions are finished.



Because three feet of coax was all I needed for the RG-316 coax, I was tempted to use a three-foot length of RG-58 (in the "all the parts needed" photo on the previous page) for the other one. But, three feet turned out to be two feet too short for the double-toroid, and that's why I had to use a six-foot length.



Two ultimate HF chokes, cont'd

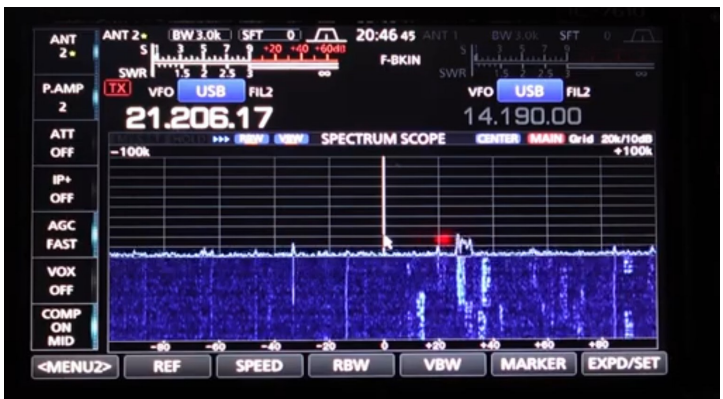


Testing the chokes

What tells the story better than a pair of "Before" and "After" photos? Using an Icom IC-7610 and its waterfall on 15 meters, the (double-toroid RG-58) choke is connected right on the rear of the transceiver. LMR-400 coax is then connected between the choke and a roof-mounted Hustler 5-BTV vertical. The noise level went from about S4 to nearly S0 (you can see the vertical marker on the S-meter below).



Before



After



Finally

Please understand that not all noise is created or received equally. These two chokes are very good for **filtering common-mode noise**, not *every kind of noise*. So, if your noise level is high because of some other issue, these chokes might not work for your situation at all. Then again, that's the beauty of these chokes, that they're inexpensive and easy to build, so if they don't filter out your particular noise, you won't have lost much time or money in the project.

But if your station is being bombarded by common-mode noise whose source is difficult to remove, like that from a neighbor's noisy solar inverter, then one of these chokes might just be in your future. And because they exhibit less than 1 dB of insertion loss, you can keep them attached permanently if you need. Besides being easy to build, a feature of these chokes is their high resistive choking impedance at HF compared with their reactive impedance.

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