

RF

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A Narrow 80 Meter Band-Pass Filter

A common problem during Field Day is interference between SSB and CW transmitters on the same band. Clever antenna design helps a lot, but a sharp filter would also help make operating more pleasant. This design should help out an 80-meter CW receiver. The goal was to achieve a reasonable trade-off between cost, performance and practicality. With a 3.56 MHz center frequency, it has a 59 kHz –3 dB bandwidth and 2.3 dB of insertion loss, using self-shielding toroidal inductors. Signals above 3.75 MHz are attenuated by another 26 dB, for an insertion loss of at least 28 dB.

I did some experimenting and decided that 23 turns of #14 (AWG) enameled wire on a T-130-6 core offers the best trade-off between unloaded Q and cost, for an 80-meter inductor. I wound several samples and found worst case Qs of 371, 410 and 412 at 4.0 MHz; Qs are slightly higher at 3.5 MHz. I tried thinner wire, but this noticeably decreased the Q from 371 to 330. The filter was built using the two inductors that exhibit the highest Qs.

The resonating capacitors are 330 pF silver-mica capacitors (with #22 wire leads) in parallel with Johnson trimmer capacitors. Thicker leads would work even better; avoid capacitors with thinner leads that have more loss. There are chip capacitors with higher Qs and silver strap leads for easy installation, but they can be difficult to obtain. Silver micas can usually be found if you look for them in places that cater to parts for building RF circuits. The Johnson trimmer capacitors feature relatively high Q, and appear to still be in production, unlike many other air variable capacitors.

Due to component tolerances, it may be necessary to try several different parts as C4. Alternately, one could substitute an air variable trimmer capacitor for C4.

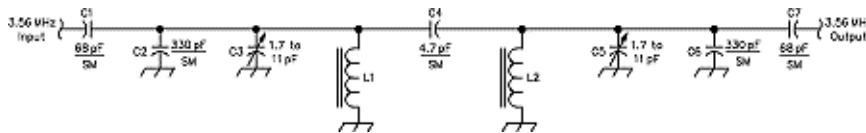


Fig 1—80 meter band-pass filter with 59-kHz bandwidth.

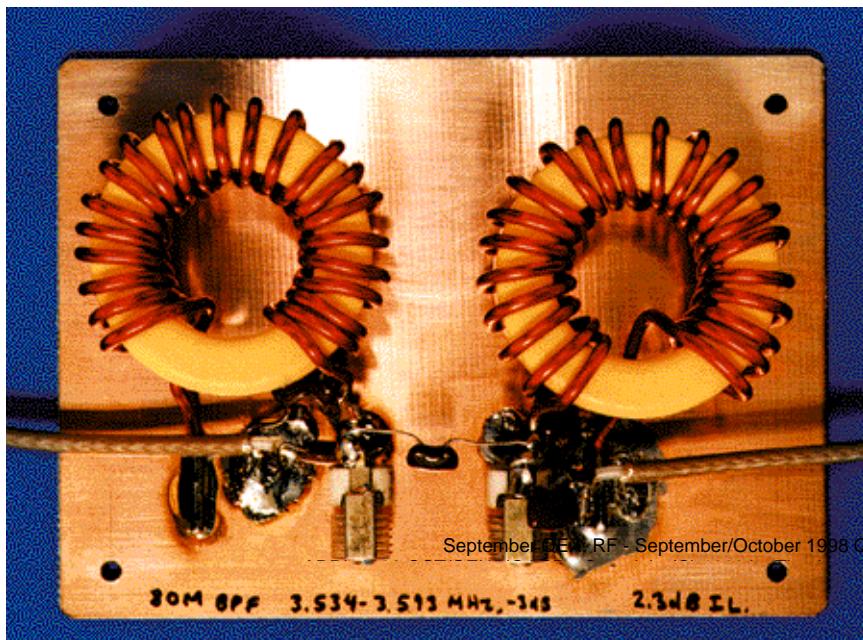
C1, C7—68 pF, silver mica.

C2, C6—330 pF, silver mica.

C3, C5—Johnson T6-5 air variable trimmer. 1.7 to 11 pF; Q = 2000 at 1 MHz.

C4—4.7 pF, silver mica.

L1, L2—23 turns, #14 enameled wire on T-130-6 iron-powder toroid core.



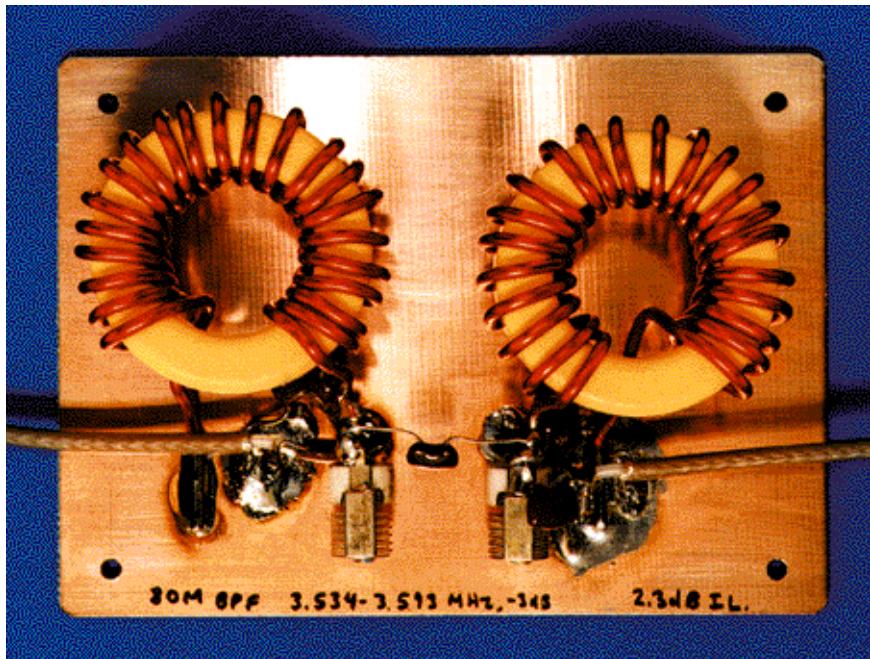


Figure 2—The 80-meter band-pass filter.