

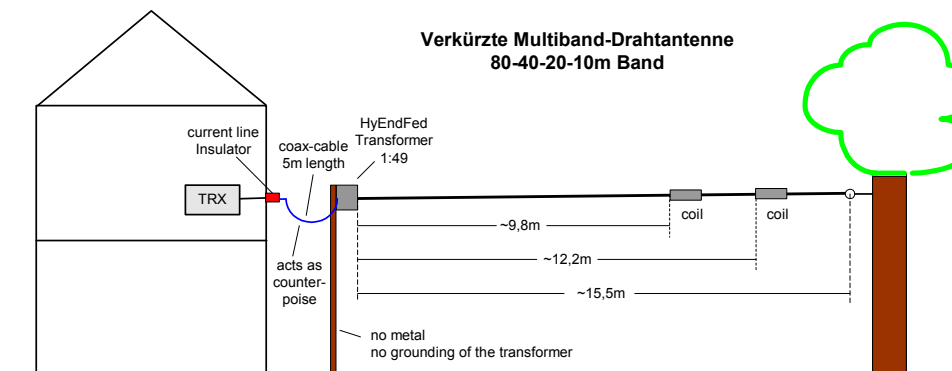
Short HyEndFed-Antenna for 80-40-20-10m

The Hyendcompany (<https://www.hyendcompany.nl/>) offers a new, sharply shortened HyEndFed antenna for 80m, 40m, 20m and 10m bands. Shortened wire antennas with extension coil have already been reported in (1) and (2). The new ultra short half wave antenna uses another 40m extension coil, reducing the overall length from 23m to 15.5m. The aim was to create the shortest possible wire antenna for 80-10m, which can also find space in smaller gardens.



Picture 1: Multi Band Extra Short Antenna 10m-20m-40m-80m

Ron sent me the antenna wire and the two coils for testing. Since I have always wanted to mount a second KW antenna in my garden, but I have only limited space available, I found this very convenient. As a transformer, I use a standard 1:49 transformer from HyEndFed and the wire runs horizontally 5m above ground (picture 2).



Picture 2: Installation of the shortened KW antenna, total length only 15.5m

The resonance curve (SWR) of the mounted antenna is shown in Figure 3. The purple curve shows the SWR without counterweight (original) and the yellow curve with a choke (current line insulator) at the input of the TRX.



Figure 3: SWR of the strongly shortened KW wire antenna

In the 80m band the SWR is about 1.4 (return loss 15dB), in the 40m band about 1.22 (20dB) and at 20m and 10m smaller 1.06 (> 30dB). The values in the 80 and 40m band are not terribly good, but for a strongly shortened KW antenna that seems sufficient. In the practical reception operation on 80 and 40m almost no differences between the 23.5m long and the 15.5m long HyEndFed antenna were noticeable.

Counterpoise

The counterweight of my half-wave antenna consists of the 5m long coaxial cable. This cable belongs to the unsymmetrical antenna! The length is calculated by " $\lambda \times 0.05$ ". To capture the 80m-Band the counterpoise cable length has to be at least $80\text{m} \times 0.05 = 4\text{m}$. On this piece of cable, the current mantle waves can spread undisturbed. At the end of the coaxial line there must be a current line insulator (choke) which shuts off the returning sheath current - especially during the transmission - so that it does not find any way into the transceiver or to other parts in the ham shack. In no case should such a filter be placed directly at the output of the transformer, because the sheath current will then find no way and the SWR curve will be completely bent (figure 4).

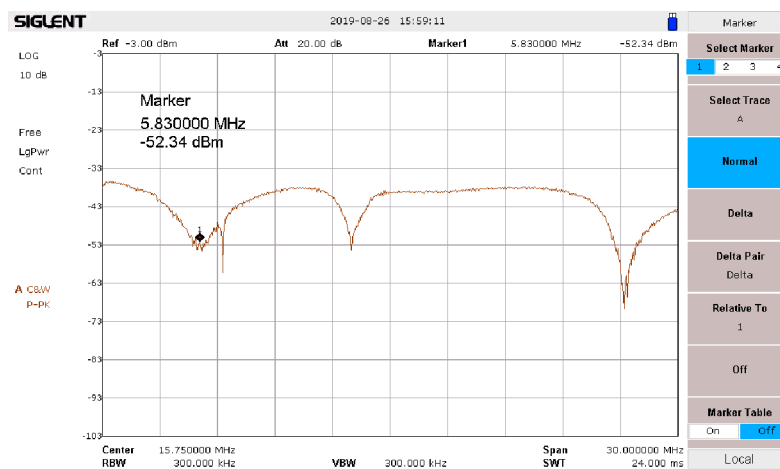


Figure 4: Incorrectly mounted current line insulator (choke) bends the SWR

If the antenna is only used as a receiving antenna, you may be able to install the antenna without the current line insulator before the TRX, because the two curves in Figure 3 are not very different. However, I would like to consider that without a line isolator, the background noise in the 80m band increases by almost 15dB! Only on the higher bands there is no difference in noise. Conclusion: Using a current line insulator, positioned at the correct position, makes sense.

Adjustment of the antenna

If the resonance at 80m is not around 3.65MHz, the end of the antenna wire must be extended by a few cm (at > 3.7MHz) or shortened (at < 3.7MHz). I had to shorten the end of the antenna by almost 15cm.



Figure 5: Piece of wire at the output of the 1st extension spool

For adaptation in the 40m band, a short piece of wire (stub) of about 10cm length is attached to the output of the first coil (figure 5). When shortening the stub, the resonance frequency increases at 40m, and vice versa. I had to extend the stub by about 4cm to get a resonance at 7.1MHz. Changing the antenna length and changing the stub will have a mutual influence, so the resonance for 80 and 40m will have to be controlled with each change.

Werner Schnorrenberg
DC4KU
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