(English translation of the first two pages:)

Dimensioning of filters

VHF/UHF low pass for high performance in tubular elements

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These filters are very useful, if not essential, to use behind a high power amplifier.
For a VHF filter sized with an LC line impedance ratio of 14, the insertion loss is less than 0.05 dB and the VSWR is less than -35 dB (1.036/1) in the band.
The attenuation of the third harmonic is about 58 dB for 7 poles, about 80 dB for 9 poles, and for 13 poles the attenuation of the second harmonic is about 100 dB.

Due to the physical dimensions of the components, these filters can easily handle power of several kW. Choose connectors that are suitable for the power. N connectors accept 1.5 kW at 144 MHz without getting too hot, but that is the limit. Above that, HN connectors, DIN 7x16 or EIA 7/8 are preferable.

This design is adaptable in 7 poles from 2m band to 70cm band, in 9 poles from 2m band to 23cm band, in 13 poles from 70cm band to 13cm band. Beyond that, the dimensions are either too large or too small. A filter with 7 elements 145 MHz made of copper tube with a diameter of 26x28 mm with the core made of threaded rod M2.5 and the capsules made of 22 mm copper tube is about 830 mm long.

The basis for sizing the filters is :
Low-pass, Chebyshev, number of poles: 7 or 9, input chokes, ripple 0.01 dB, and for 13-pole filters: low-pass, variable impedance with 6 cells (13-pole), input chokes.
The values of the chokes and capsules for the Chebyshev filters were calculated using RFSIM99, a freeware available on the Internet.

The calculations take into account impedance discontinuities caused by the variation of the lines. of the line diameter, which change the value of the elements by adding a parasitic capacitance to the ground when passing from one diameter to another. It also take into account the change in impedance and length of the lines input and output lines when they are connected to the end connectors.

The EXCEL worksheets for 7-, 9-, and 13-pole filters allow you to size the filters with the elements you have or can obtain at a nearby hardware or model store. The ideal for the center conductor is a 2 mm brass threaded rod (with nuts).

IT IS VERY IMPORTANT THAT YOU MEASURE THE DIAMETER OF THE ELEMENTS EXACTLY (0.01 mm) !!!!! (also that of the 2 mm threaded rod).
Click here to see what can happen.

Click here to see a video about machining.
Click here for an editing video.

A ratio between the impedances of the capacitors and the chokes of more than 13.5 is desirable. Below 12 it does not work properly...

For your information for a 7-pole filter: at a ratio of 11.2, the 3rd harmonic at is-51dB, and the SWR is not very good....
At a ratio of 14.0, the 3rd harmonic is at -58 dB, at a ratio of 15.3, the 3rd harmonic is at -60 dB, at a ratio of 17.2, the 3rd harmonic is at -61 dB,
at a ratio of 22.4, the 3rd harmonic is at -63 dB.

You can simulate the designed filters using the EXCEL sheets before realization by entering the values of the calculated lines (without corrections) into a simulation software. Enter simulation such as RFSIM99 (the most user-friendly) or QUCS. These are all 'freeware that allows this type of simulation. The download links can be found on the "LINKS" page....
If you have professional software that allows this kind of calculations, compare, and let me have the results, maybe I can use it to improve my technique.

Before you start working, make sure you can machine the following parts with a lathe, as an accuracy of 1 to 2/10 mm minimum (VHF & UHF) is required. to guarantee the result.

Ideal for the best performance is to have a center conductor from a rod with 2 mm brass thread, which is used among other things in modeling. Nuts can be used to adjust the spacing before soldering. For assembly, use a piece of ~40 mm long steel angle, this allows good centering of the elements.

Following these simulations, filters were created. The measurements confirmed the calculations, simulations and the final choice of filter parameters that achieve the greatest suppression of the 2nd or 3rd harmonics at an acceptable SWR.

EXCEL calculation sheet LP7_145_26222.5.XLS