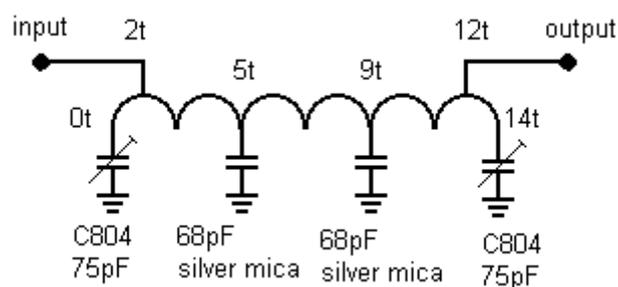# A home-built low-pass filter for 4m

This unit uses four capacitors, only two of which are variables (Jackson C804 type), and a single tapped coil. It is built in a die-cast box, and has been tested up to 80W input power.

The coil consists of 14 turns of 12-14 SWG copper wire, on a 13mm former, and spaced at 3mm/turn.
The fixed capacitors are 68pF silver-mica types, and the C804 variables are 75pF maximum, and their ground connections are made via solder tags, bolted to the die-cast box.


Alignment is a simple process: connect the filter between a transmitter and VSWR meter, and attach a dummy load to the filter output.
Set the TX to the highest frequency, then adjust C1 and C2 for lowest VSWR.

Alternatively, connect a power meter between the filter and dummy load, and adjust C1 and C2 for maximum output power.

I have tried to simulate the above filter using the following values "left to right":

- 57 nH
- 30 pF
- 102,4 nH
- 68 pF
- 151,5 nH
- 102,4 nH
- 30 pF
- 57 nH
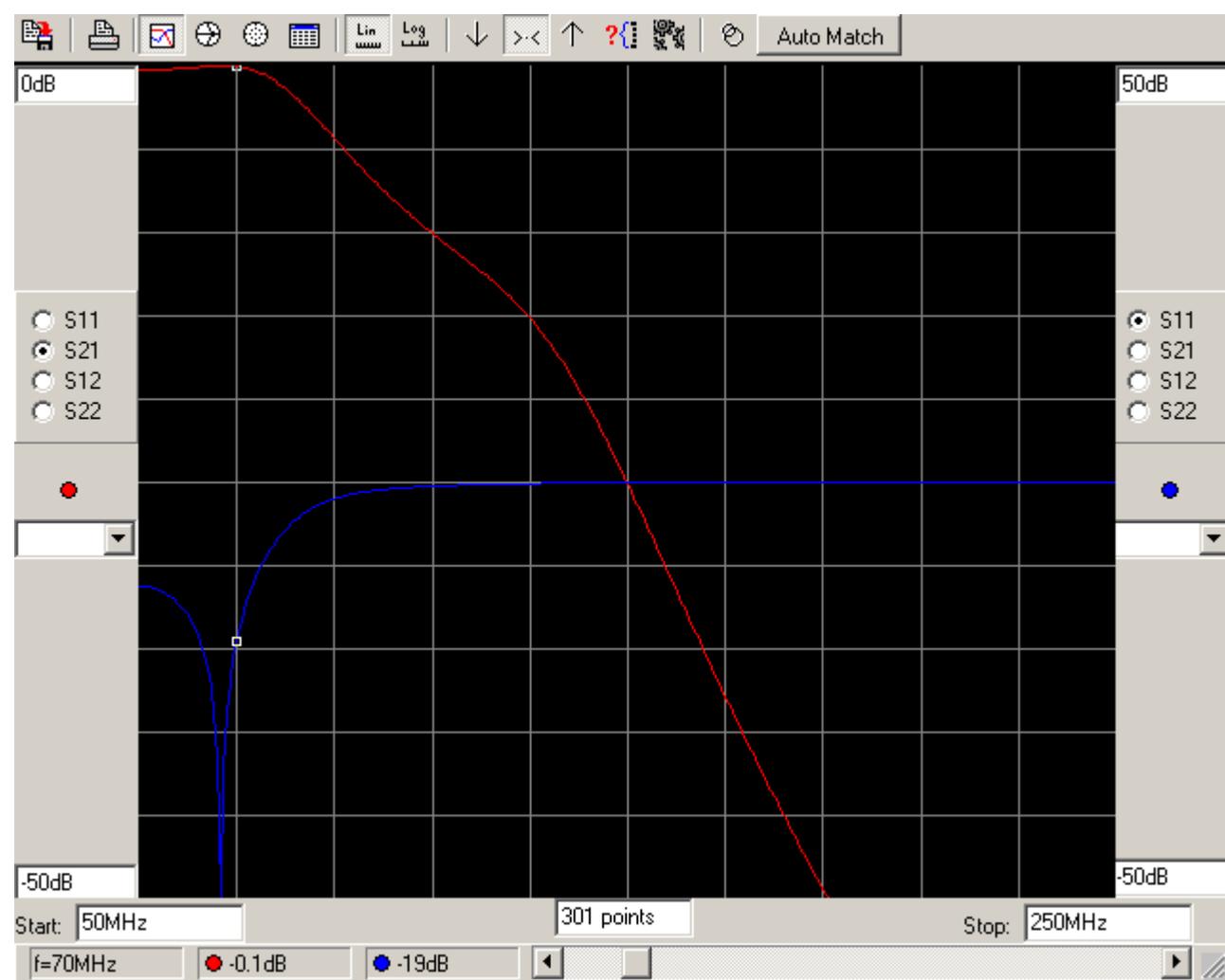
As it can be seen the 70 MHz attenuation is 0,1 dB, but more can be expected in a real circuit. The second harmonic is attenuated about 19 dB and third harmonic 60 dB.
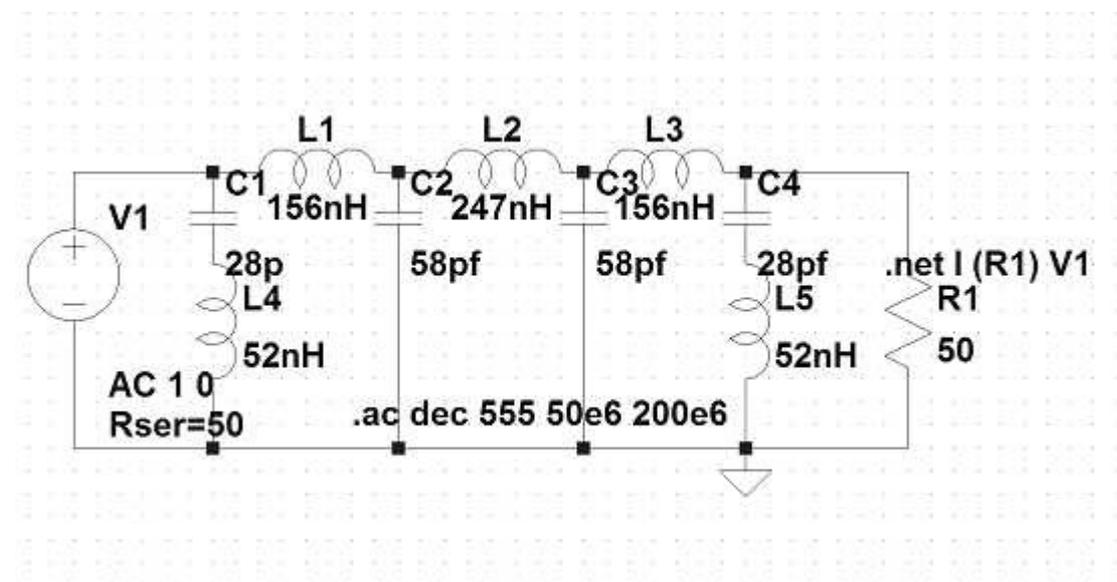
Simulation and implementation.

The 7 element Cheby low pass filters are difficult to get right as far as IL is concerned in the pass band. Basically getting the up part of the ripple in the correct place. Stop band attenuation is very good and easily obtained but I was lucky to get better that 0.7 dB in the pass band.
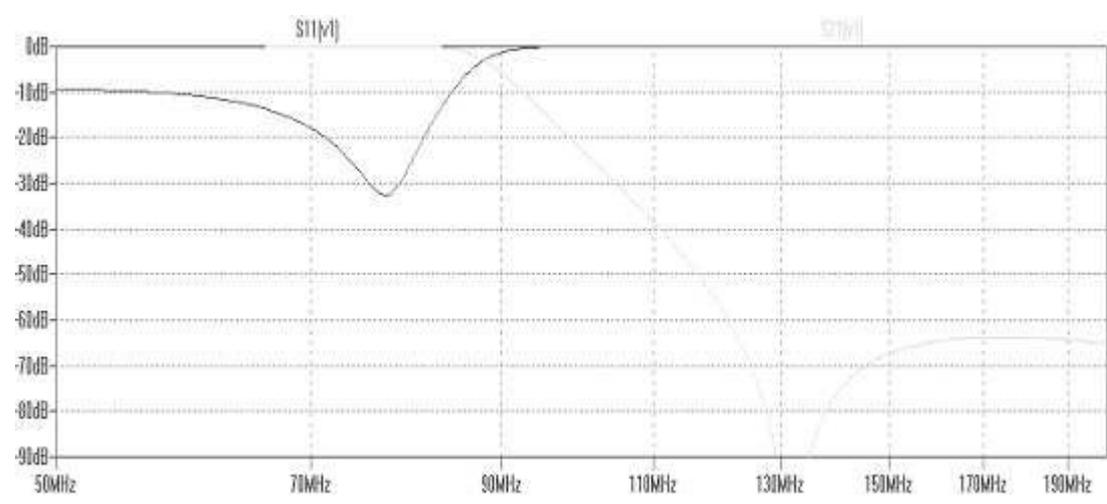
The use of elliptical filters is better, see the OZ2M filter for the 70 MHz transverter. When I do an Elsie I get similar results but not as good and the component values are somewhat different.

A 5 element inductor input low pass filter gives poor 2nd Harmonic attenuation but in conjunction with two traps at the input and output gives much better results, see LT Spice simulations. This is from the 70 MHz org website, and gives -60 dB at 140 MHz and 0.2dB in the passband. Have yet to try and see if this is in fact the case.
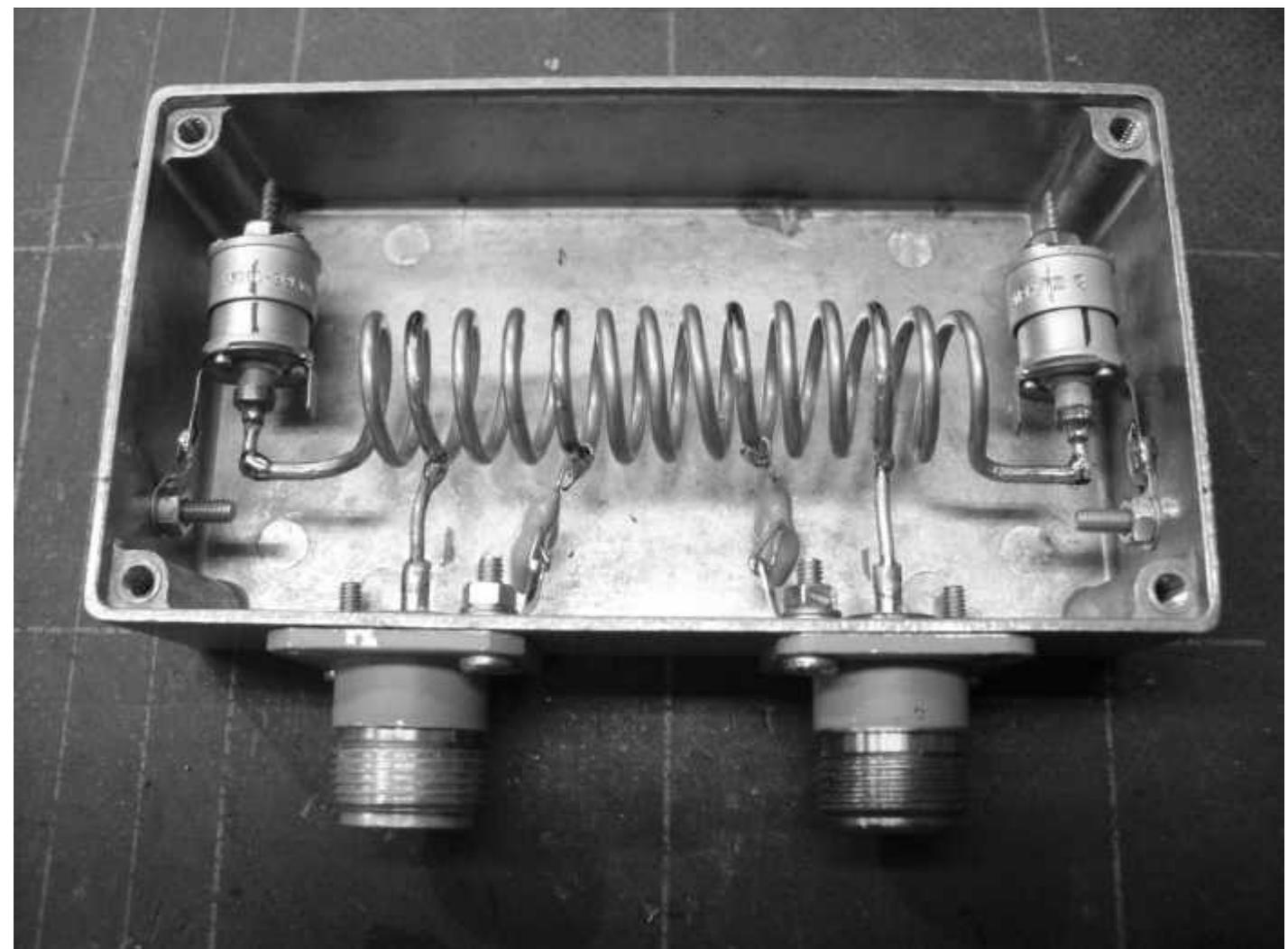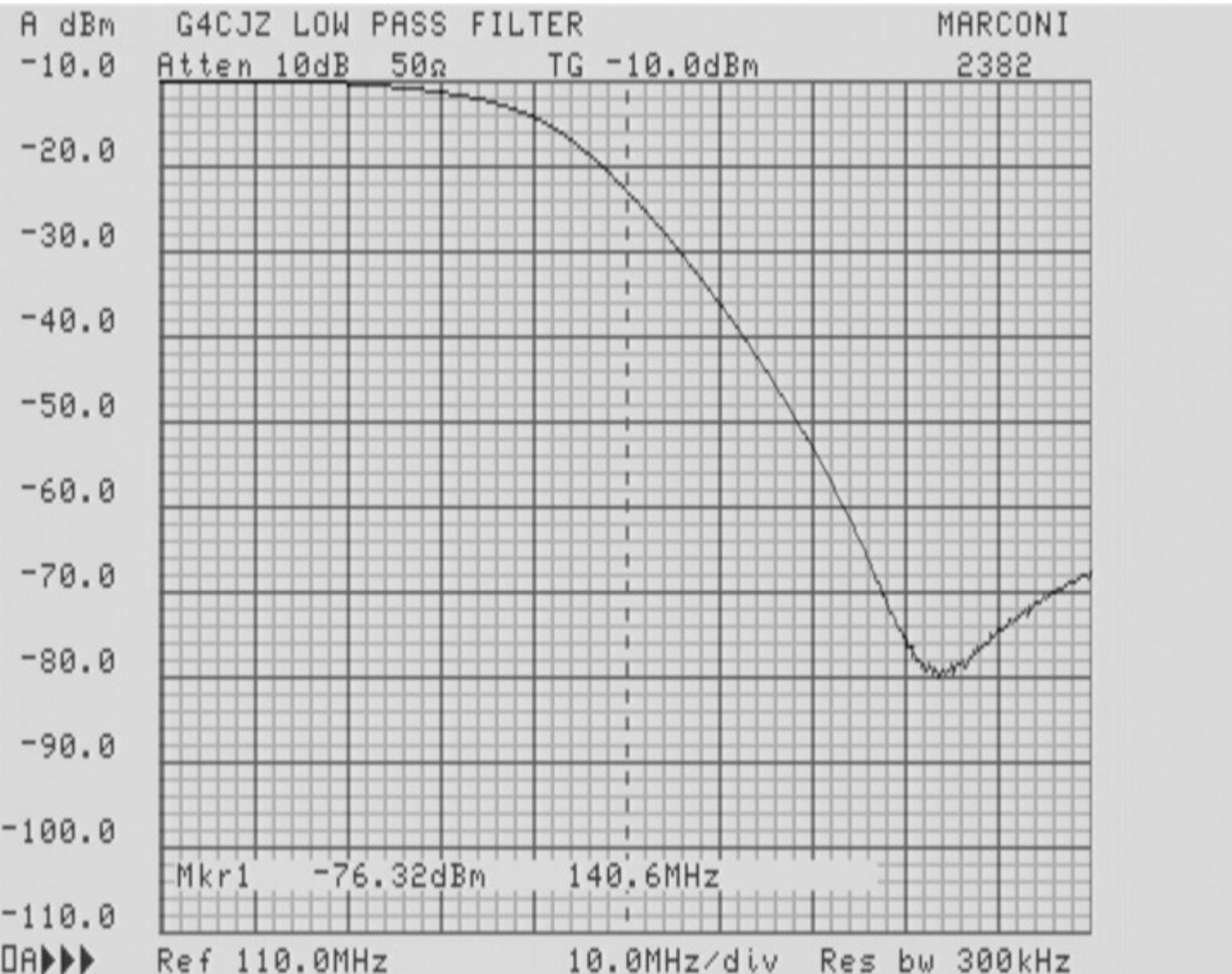
Simulated filter values.

Simulated characteristic.

Actual filter implementation.

Actual filter characteristic.

```
A dBm      G4CJZ LOW PASS FILTER                    MARCONI
-10.0    Atten 10dB    50Ω          TG -10.0dBm        2382
```

A plot with vertical axis labeled in dBm from -10.0 at top to -110.0 at bottom in 10 dB divisions, and horizontal axis Ref 110.0MHz, 10.0MHz/div.

```
Mkr1      -76.32dBm          140.6MHz
```

```
DA▶▶▶    Ref 110.0MHz          10.0MHz/div   Res bw 300kHz
```

The 2nd harmonic is in excess of -60 dB below. The filter by G4CJZ does seem to work better in real life.