Two Simple Low Pass Filters for 145 – MHz Band

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A Low Pass Filter is recommended to use in a Field Day operation when several amateur radios that work at 145 and 430- MHz are placed close to each other. In this case the third harmonic of the 145- MHz radio (when it transmits) may cause interferences for 430- MHz radio.

Schematic of a simple Low Pass Filter for 145 – MHz Band is shown in **Figure 1**. The filter made on a piece of two sided PCB. Capacitors of the filter are created on the board by the foil. **Figure 2** shows design of the filter. **Figure 3** shows view of the filter. **Figure 4** shows layout of the capacitors.

The capacitors made on a PCB that has thickness in 1.5- mm. However different PCBs depend on the stuff and the thickness may have another capacity per square centimeter. It is very useful to find the capacity per square centimeter and re-calculate (if it should be done) the sizes of the capacitors before the capacitors would be made.

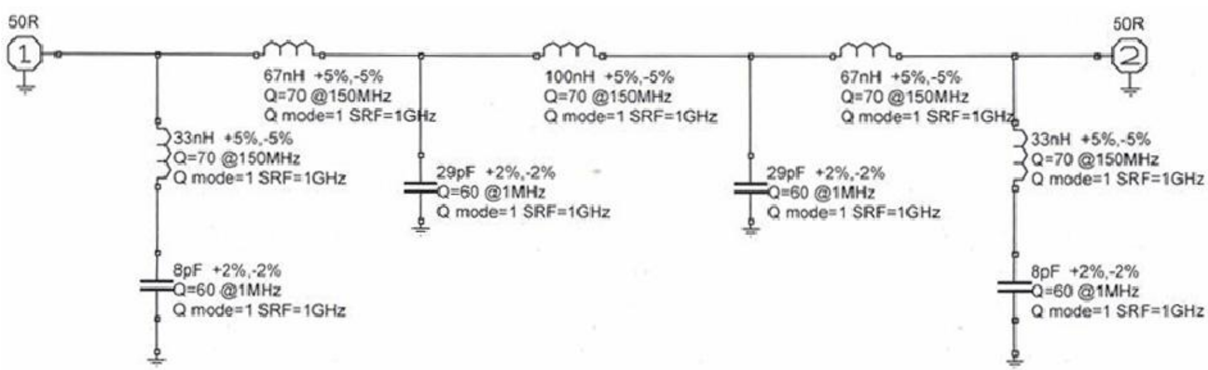

Figure 1 Schematic of a simple Low Pass Filter for 145 – MHz Band

Figure 2 Design of the simple Low Pass Filter for 145 – MHz Band

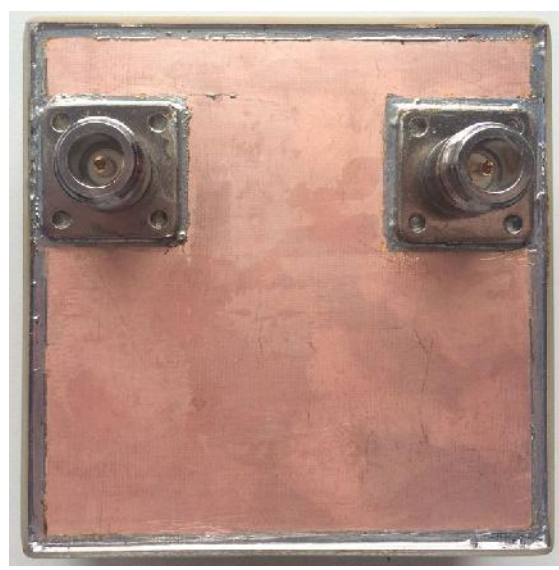

Figure 3 View of the simple Low Pass Filter for 145 – MHz Band

Inductor 100 nano-H contains 3 turns. ID is 15 mm. Inductor is wound by wire in diameter of 2.5- mm (10 AWG), 10- mm gap between turns.
Inductor 67 nano-H contains 2 turns. ID is 15 mm. Inductor is wound by wire in diameter of 2.5- mm (10 AWG), 7- mm gap between turns.
Inductor 33 nano-H contains 1.2 turns. ID is 15 mm. Inductor is wound by wire in diameter of 2.5- mm (10 AWG), 15- mm gap between turns.

Filter has SWR 1.1:1 at the 2- meter band. **Figure 5** shows SWR for the filter at the 2- meter Band. **Figure 6** shows return loss of the Low Pass Filter for 145 – MHz Band at frequencies 200- 500- MHz. **Figure 7** shows attenuation for the Low Pass Filter for 145 – MHz Band at the 2- meter Band.

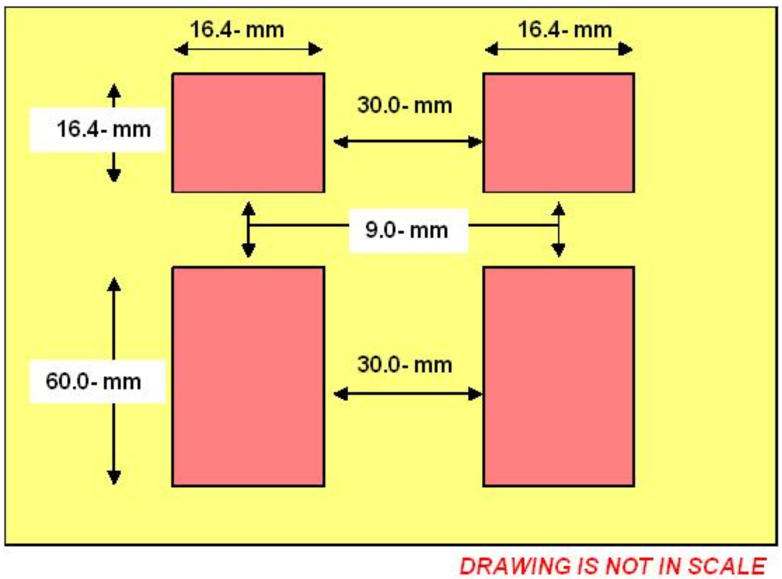

Figure 4 Layout of the PCB capacitors

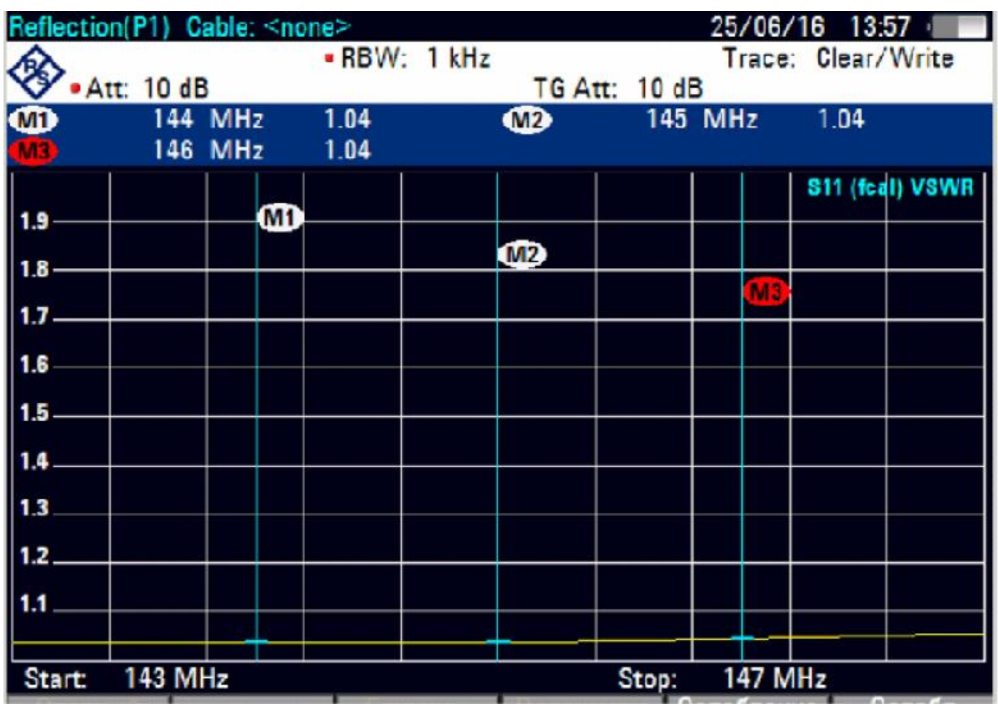

Figure 5 SWR for the Low Pass Filter for 145 – MHz Band at the 2- meter Band

Figure 6 Return losses of the Low Pass Filter for 145 – MHz Band at frequencies 200- 500- MHz

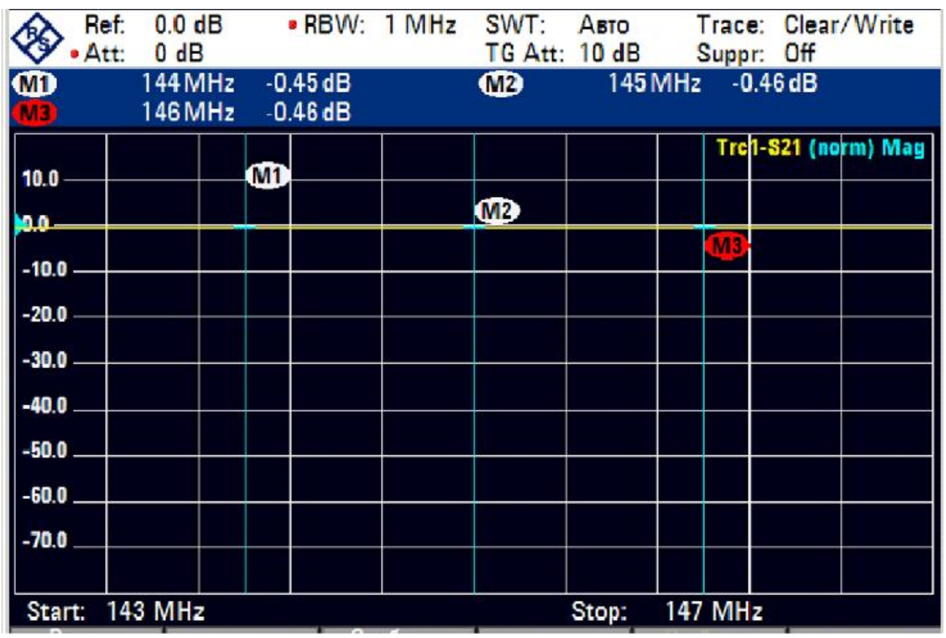

Figure 7 Attenuation for the Low Pass Filter for 145 – MHz Band at the 2- meter Band

Best result for tuning the filter will provide a Spectrum Analyzer. In this case the tuning may take just 20 minutes. At first step the filter is tuned for low SWR. At this step only horizontal inductors are adjusted by pressing/ stretching. The second step is adjusted the filters for rejection of the second harmonic- 288- MHz.

After that again check the SWR (and adjust if it is needed) of the filter then turn on the filter in revers (where was the filter’s input – now is the filter’s output) and check SWR once more time and adjust inductors if it is needed.

However, ever recently in our crazy tech epoch it is not everyone has a Spectrum Analyzer in own home or access to such device at some place. Without a Spectrum Analyzer it is possible to tune the Low Pass Filter for 145 – MHz Band to minimum SWR but hard to adjust the internal rejection filters. In this case it is possible to do a compromise variant of such filter-without internal rejection filters.

Schematic of a simple Low Pass Filter for 145 – MHz Band without internal rejection filters is shown in **Figure 8**.

The filter made on a piece of two sided PCB. Capacitors of the filter are created on the board. **Figure 9** shows design of the filter. **Figure 10** shows view of the filter. **Figure 11** shows layout of the capacitors. The capacitors made on a PCB that has thickness in 1.5-mm. However different PCBs depend on the stuff and the thickness may have another capacity per square centimeter. It is very useful to find the capacity per square centimeter and re-calculate (if it should be done) the sizes of the capacitors before the capacitors would be made.

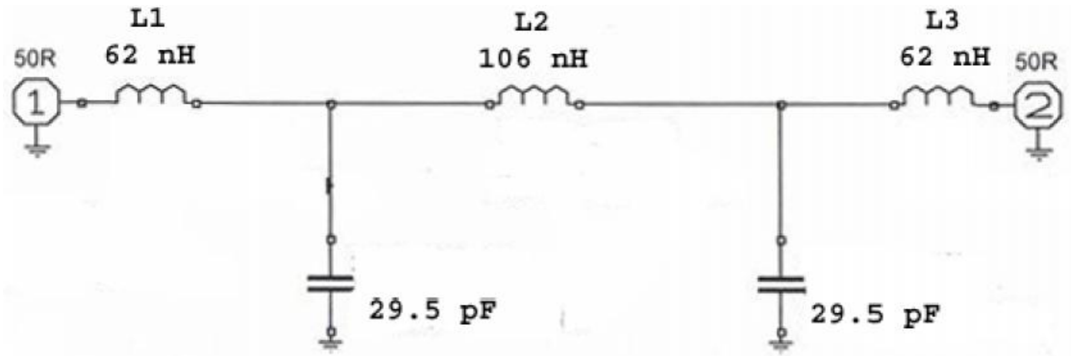

Figure 8 Schematic of a simple Low Pass Filter for 145 – MHz Band (without internal rejection filters)

Figure 9 Design of the simple Low Pass Filter for 145 – MHz Band (without internal rejection filters)

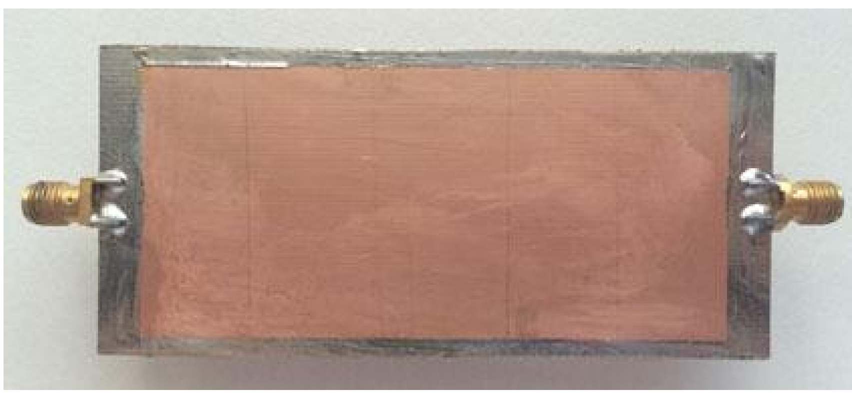

Figure 10 View of the simple Low Pass Filter for 145 – MHz Band (without internal rejection filters)

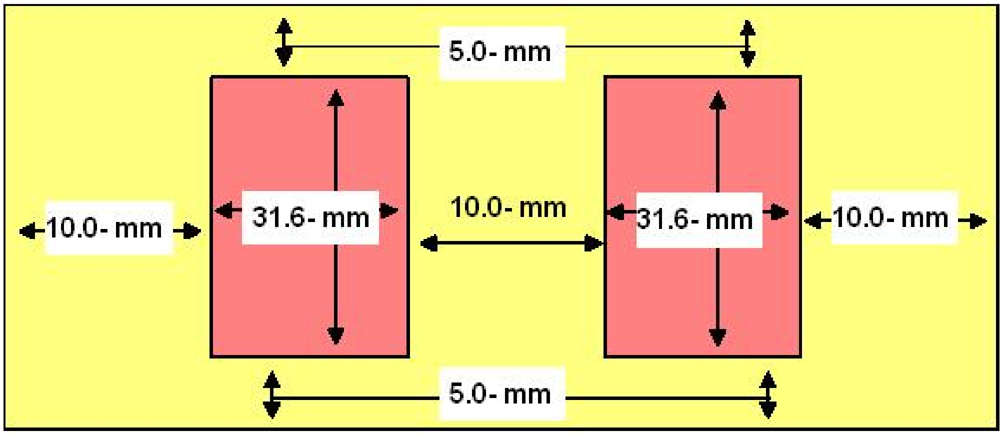

Figure 11 Layout of the PCB capacitors

Inductor 106 nano- H contains 4 turns. ID is 10 mm. Inductor is wound by wire in diameter of 1.5- mm (14 AWG), 5- mm gap between turns.
Inductor 62 nano-H contains 2 turns. ID is 10 mm. Inductor is wound by wire in diameter of 1.5- mm (14 AWG), 5- mm gap between turns.

Filter has SWR 1.1:1 at the 2- meter band. **Figure 12** shows SWR for the filter at the 2- meter Band. **Figure 13** shows return loss of the Low Pass Filter for 145 – MHz Band at frequencies 200- 500- MHz. **Figure 14** shows attenuation for the Low Pass Filter for 145 – MHz Band at the 2- meter Band.

Best result for tuning the filter will provide a Spectrum Analyzer. In this case the tuning may take just 20 minutes. At first step the filter is tuned for low SWR. At this step inductors are adjusted by pressing/ stretching. At the second step the filter is reversed (where was the filter's input – now is the filter's output) and the filter checked and adjusted if it is needed. The filter may be tuned without a Spectrum Analyzer. Just turn on the filter to a transmitter, load the filter to 50- Ohm, and tune the inductors to minima SWR. The procedure may be done with the real antenna system (cable plus antenna).

73! RL1L

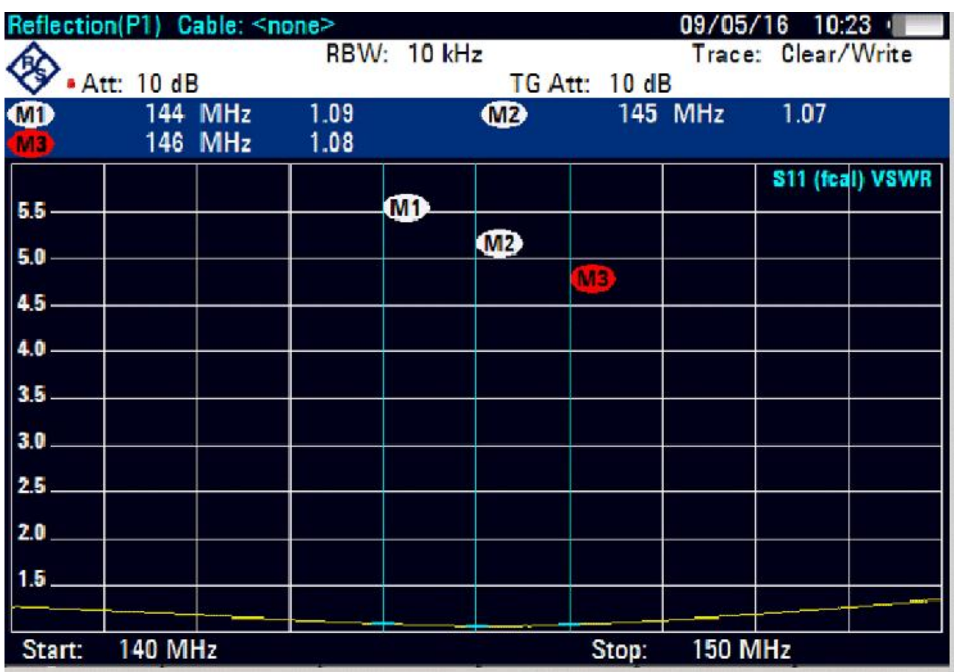

Figure 12 SWR for the Low Pass Filter for 145 – MHz Band at the 2- meter Band

Figure 13 Return losses of the Low Pass Filter for 145 – MHz Band at frequencies 200- 500- MHz

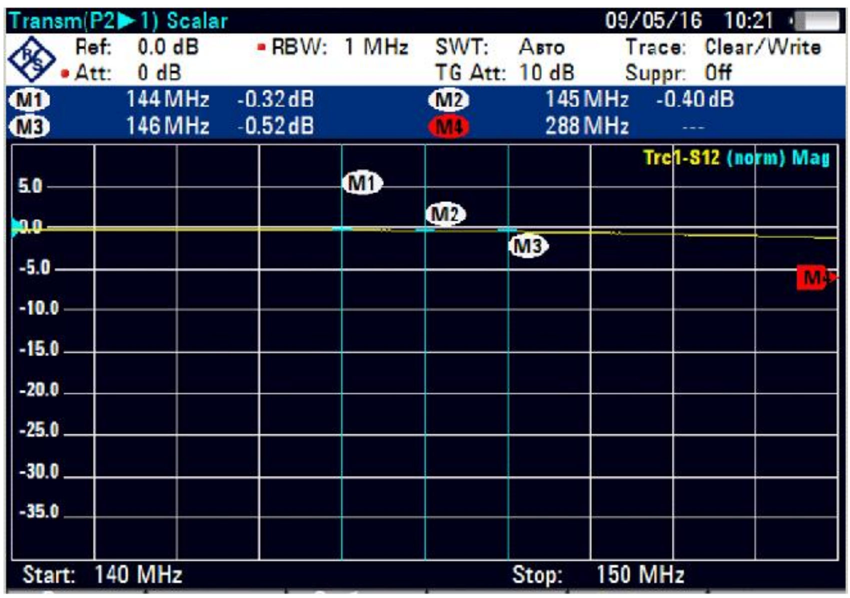

Figure 14 Attenuation for the Low Pass Filter for 145 – MHz Band at the 2- meter Band

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