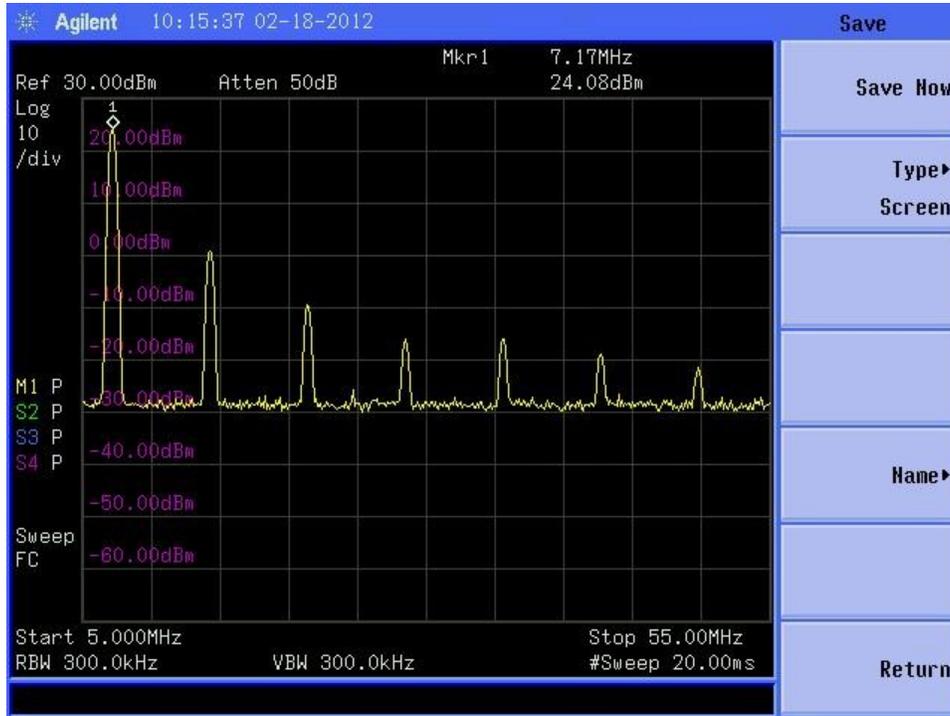


## How to Put the SAVXO on the Air and be Legal



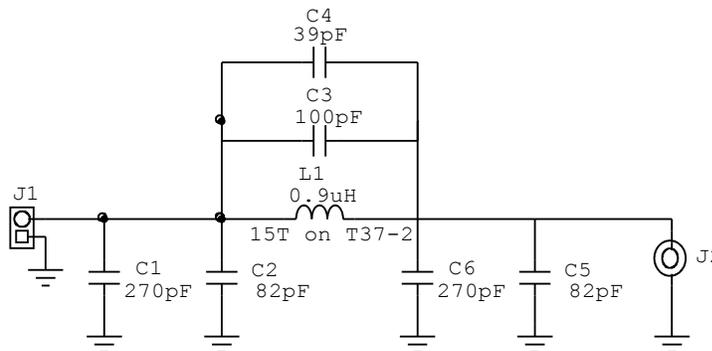
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**February 18, 2012**  
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A number of inquiries have surfaced asking about putting the SAVXO on the air barefoot, as a QRPp transmitter, running nominally 200 milliwatts. That can be done, but the SAVXO does not meet current Part 97 requirements without an additional filter. Part 97 requires that a transmitting device below 30 MHz has its harmonics at least 43 dB below the main carrier, or -43 dBc. The SAVXO does not meet that specification with the internal low pass filter. The photo below illustrates the problem.

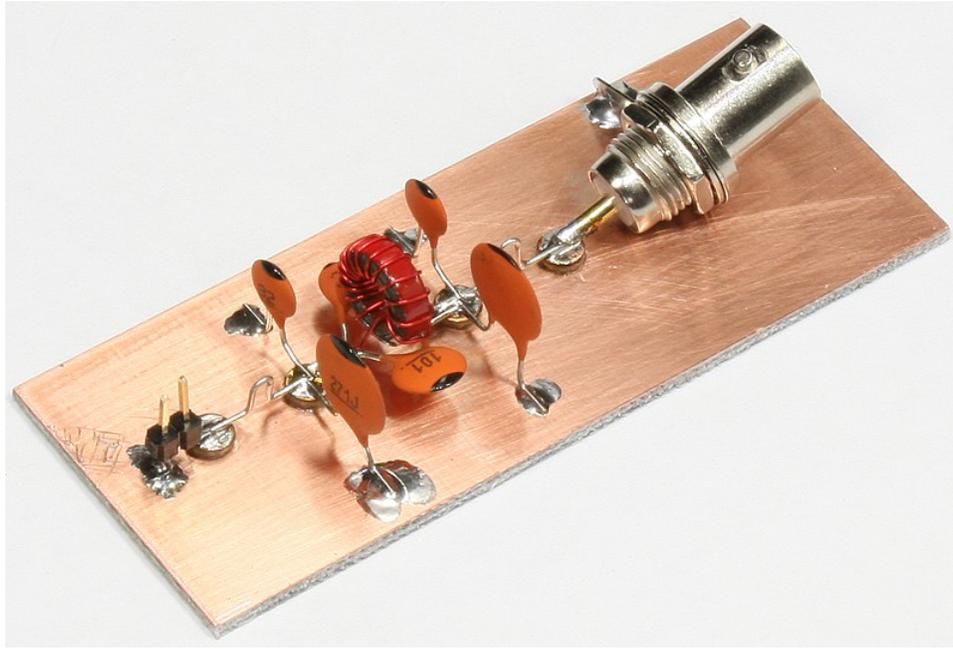


None of the higher order harmonics will meet the -43 dBc specification until the 4<sup>th</sup> or 5<sup>th</sup> harmonic, and then compliance is marginal. What is needed is an outboard filter that is specifically designed to reduce harmonic content, with emphasis on the 2<sup>nd</sup> harmonic, the largest of the set shown here. Below is the schematic of such a filter. It was designed using the free AADE Filter Design Program available on the internet.

7 MHz 3-element Elliptic Low Pass Filter for 7 MHz SAVXO



This filter can be built using Manhattan-style construction in less than an hour. Below is a photo of what it might look like.



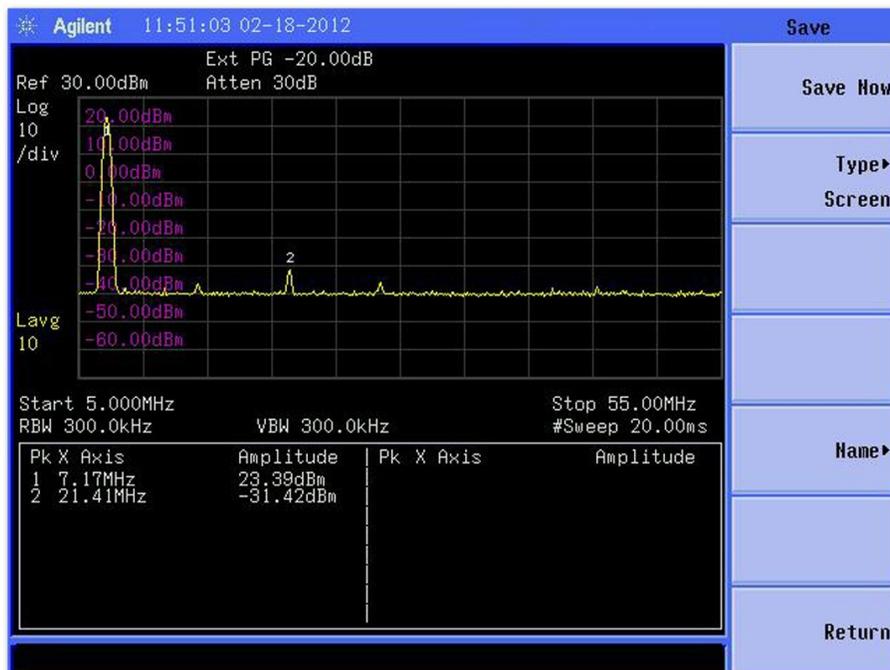
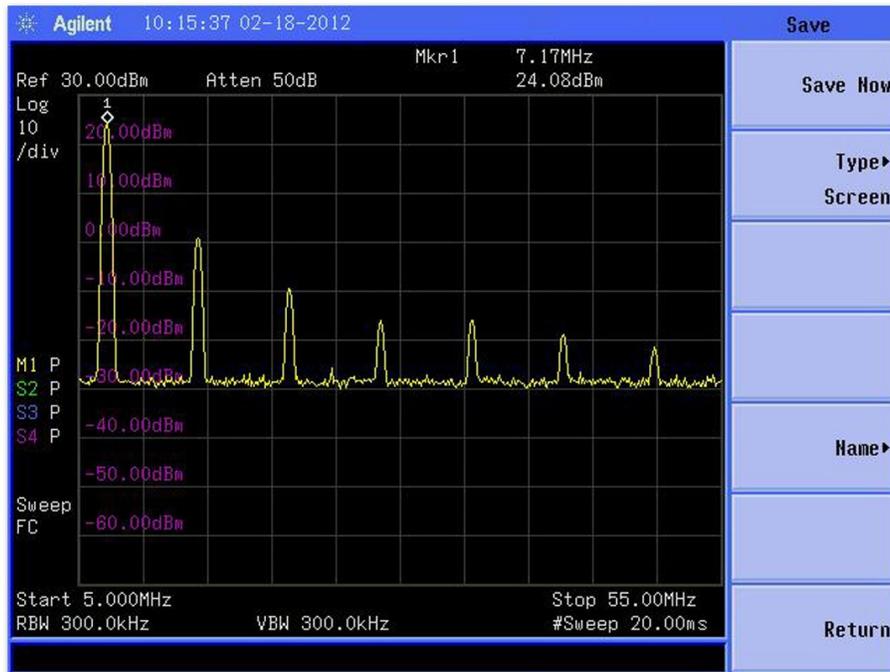
It is constructed using the exact component values shown in the schematic. The input is on the left and uses the same 2 pin header as is used on the SAVXO and the output is a BNC, which would connect to the antenna. Below is the frequency response of this filter.



The 50 dB notch in the response is positioned where the 2<sup>nd</sup> harmonic will fall. Also notice, the loss through this filter is very small, on the order of 0.1 dB, so will not waste much power; a few milliwatts at most.

So the burning question in your mind ought to be, how well does it work in the real world? The

answer is shown in the composite photo below. The upper part is the SAVXO output spectrum without the external filter and the lower part is the output spectrum with it.



The outboard filter has reduced the 2<sup>nd</sup> and 4<sup>th</sup> harmonics to tiny blips and the 3<sup>rd</sup> harmonic, where the “2” marker is in the lower plot is nearly 55 dB below the carrier. There is now a 12 dB margin of safety over what is required by the Part 97 Regulations. With this filter, the SAVXO can be legally used on the air. Note: The filter components can be frequency scaled to any band. Just follow the procedure outlined in the SAVXO Assembly Manual.