Ham Radio 101

Ham Radio Building Blocks

5.0MHz to 5.5MHz Variable Oscillator

Hal Silverman WB6WXO

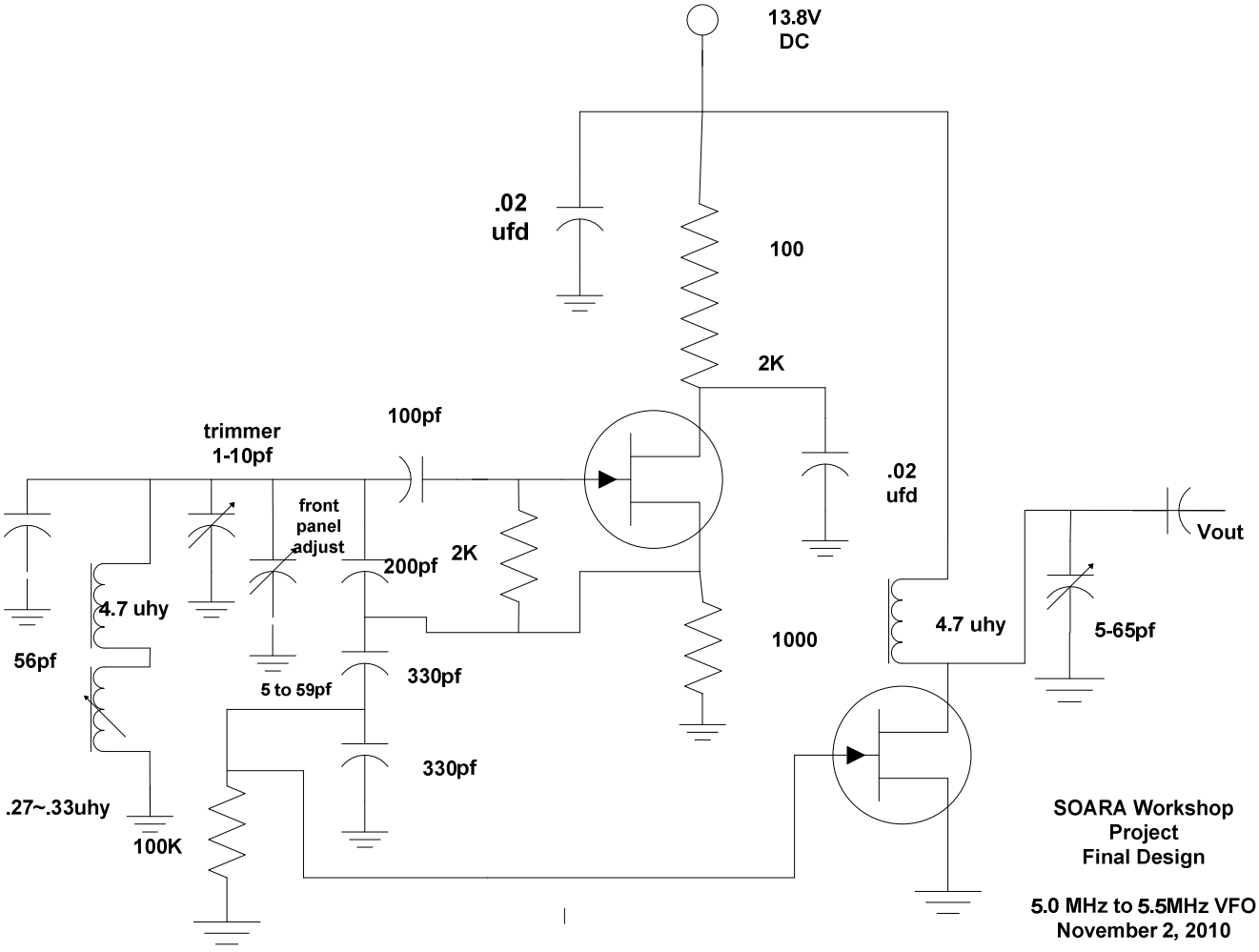

Figure 1

Schematic Diagram of the 5.0MHz to 5.5MHz VFO

In the last installment, we looked at a process to develop circuits that will be used in a simple QRP CW transmitter. The plan is to use handbook circuits where a minimum of math is required.

These circuits are available from the ARRL Handbooks and other publications as well as on line presentations.

My circuits for the most part come from earlier editions of the ARRL Handbook and Heathkit Single Band Manuals. I also used a 1990 version of the ARRL QRP for the basic 80M output stage.

In this article, a 5.0 MHz to 5.5 MHz variable frequency oscillator was built as part of a SOARA Workshop in 2010.

Since that time, I have packaged the breadboard in an aluminum chassis.

The trimmer capacitors that are shown on the schematic have been replaced with tubular panel mount variable capacitors. The variable inductor remains on the breadboard. An ideal solution is to have the variable inductor mounted on the front panel.

The biggest challenge was to find a variable capacitor that would be the main tuning capacitor. I experimented with three different capacitors. The first one was assembled on the solderless breadboard.

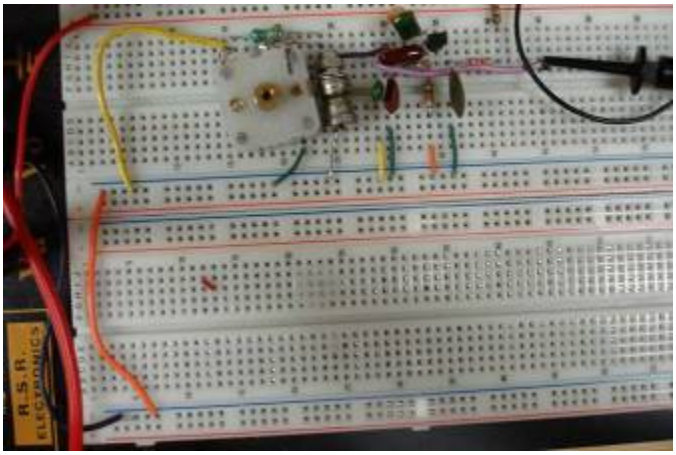

Figure 2

VFO Layout on solderless breadboard

The main tuning variable capacitor is the white square object and a trimmer is located next to it. This proved out the circuit.

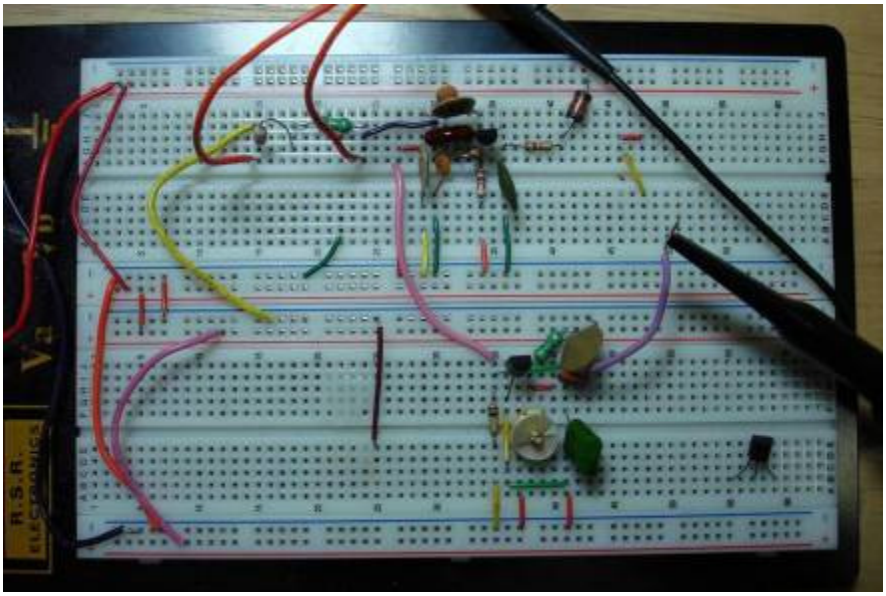

Figure 3

Solderless Breadboard With Trimmer Cap

What is missing from Figure 2 is the main tuning capacitor.

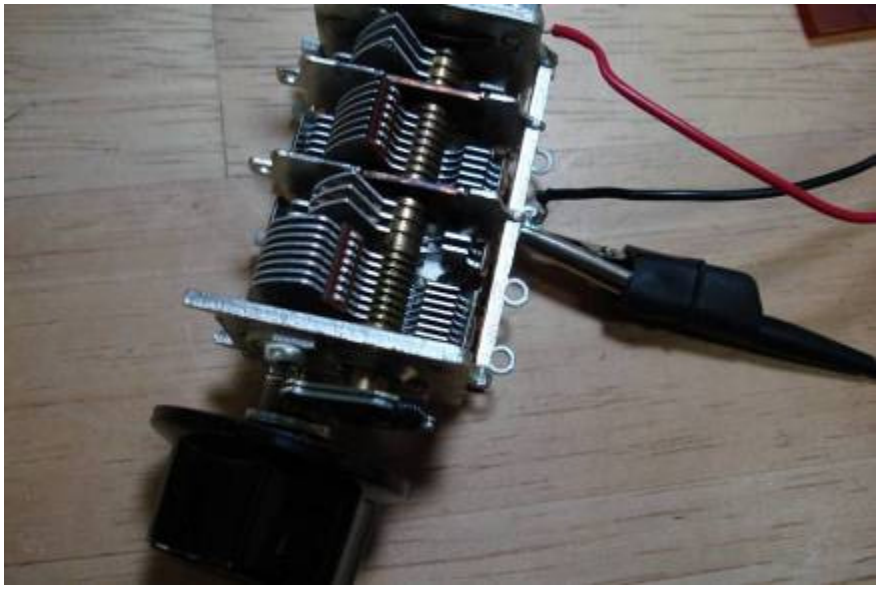

Figure 4 four gang variable capacitor

The 4 gang variable capacitor shown in figure 3 is used to further test out the circuit. There are four separate sections that can be paralled together for a variety of applications.

The variable capacitor shown in figure 4 is great for experimenting with various circuits. Several of the individual capacitors have trimmers built into the capacitor.

What I finally wound up with is shown in figure 4. It is a single section air variable capacitor. This is a single section air variable capacitor that I found on the internet.

I found this on a web site called WWW.oldradioparts.com For those hard to get parts, this site can be a treasure. The parts are reasonably priced and he will ship right away.

The capacitor tunes from 9.8pf to 53.9 pf.

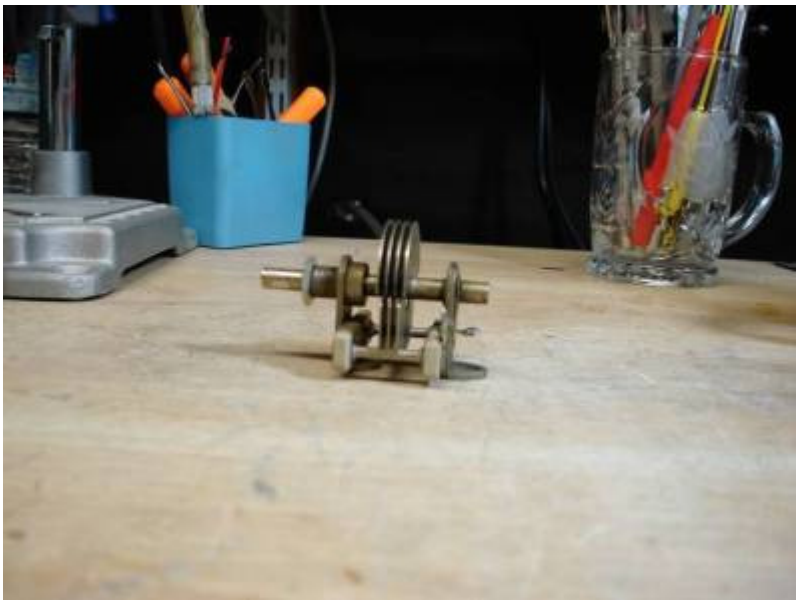

Figure 5

Single section air variable capacitor.

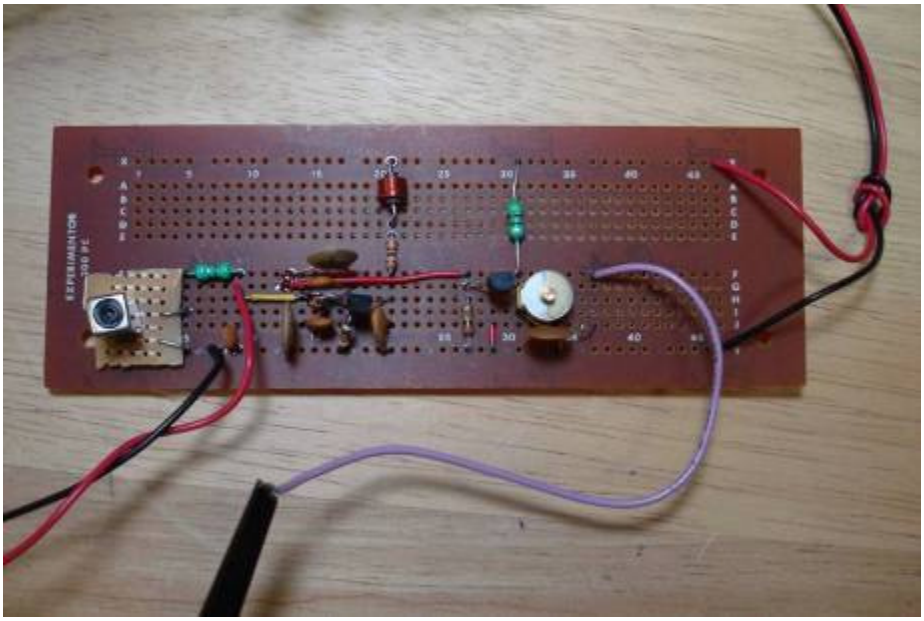

Figure 6 VFO on Breadboard

This is the next step. The circuit was assembled on a solderable breadboard.

What is not shown is the air variable capacitor of figure 4 and figure 5. The breadboard also includes a trimmer capacitor and a variable inductor. This is the design that Heathkit used in its single band transceivers to set the band spread.

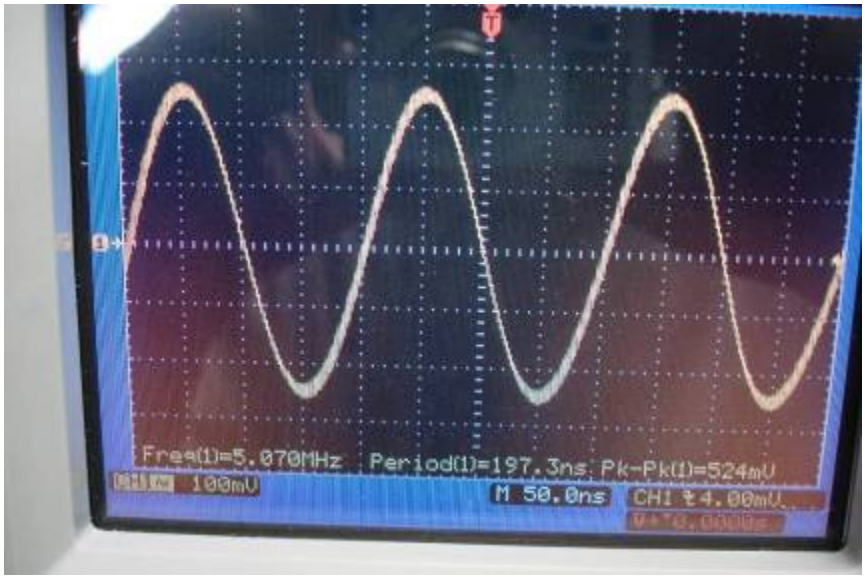

Figure 7: Oscilloscope Presentation of the Breadboard

This picture was taken at 5.070MHz and had an output of 524mv p/p.

At this point I decided to package the circuit in an aluminum chassis. The final design added two tubular capacitors for a trimmer and for adjusting the output for best sine wave output.

Figure 8

Front panel of VFO

The picture in figure 8 is the front panel of the VFO. The chassis has been fitted with a five way binding post, and on/off switch and a LED assembly. What is not included is a mechanical drive mechanism that has a 7:1 gear ratio. This on order and will be included in the next iteration.

At this point, here is the output waveform, and p/p voltage. The output voltage is 1.38V p/p at 5.5071MHz

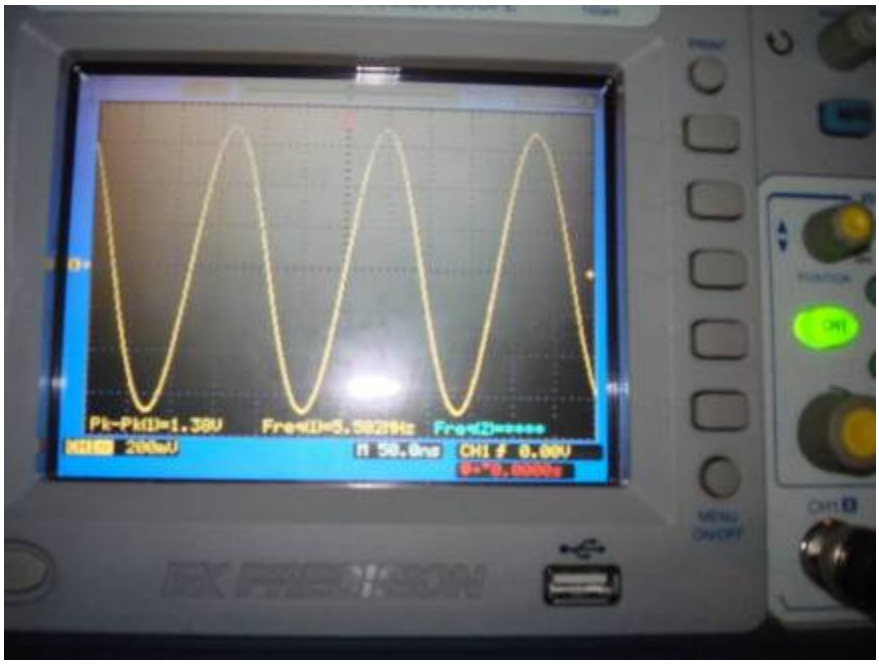

Figure 9

Output wave form at 5.5Mhz

The output wave form is tested into a 100K ohm load. The is the load that the next stage (mixer) will present to the VFO.

Figure 10

Counter presentation at 5.5Mhz output.

At this point I have had the circuit running at room temperature and the circuit seems to be very stable. The proof of the pudding is when the whole thing is assembled in one chassis and the ambient heat from the final transistors raise the temperature, we can see how much the circuits drift.

In closing, I would like to thank Howard Brown (KG6GI) for his suggestion for purchasing printed circuit boards. I have added that task to my “to do” list

If there any questions, please let me know. You can E Mail me at WB6WXO@SOARA.org