Heathkit Home Brew Project

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In the last article, I described the VFO oscillator and presented the schematic and the solder type bread board. I was able to make use of several parts that I salvaged from my two HW32 clunkers.

I have spent time during this past reporting period constructing the heterodyne oscillator. For test purposes, I have substituted a 0.02µF capacitor and a 3KΩ resistor to ground to measure the output voltage and frequency. They are located at the output labeled "to rcvr mixer".

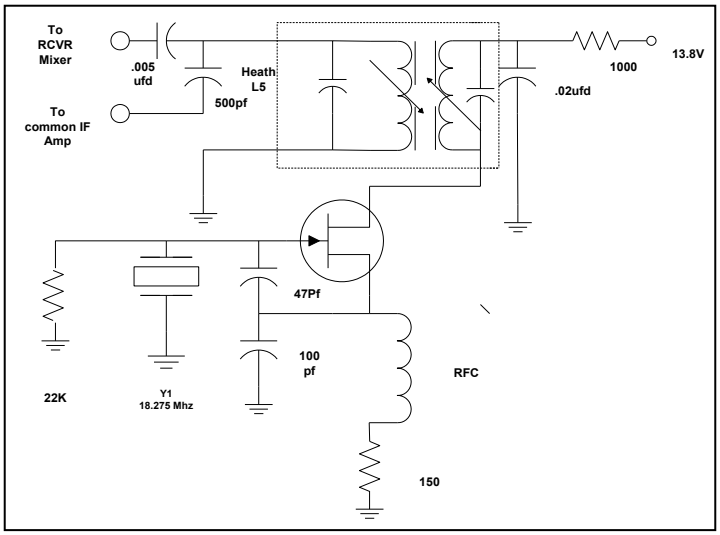

Figure 1
Hybrid Heterodyne Oscillator

As part of the design plan, I intend to use salvaged parts where appropriate. The RFC and the double tuned transformer are salvaged from the HW32. Having two units to be able to salvage parts from is an absolute bonus.

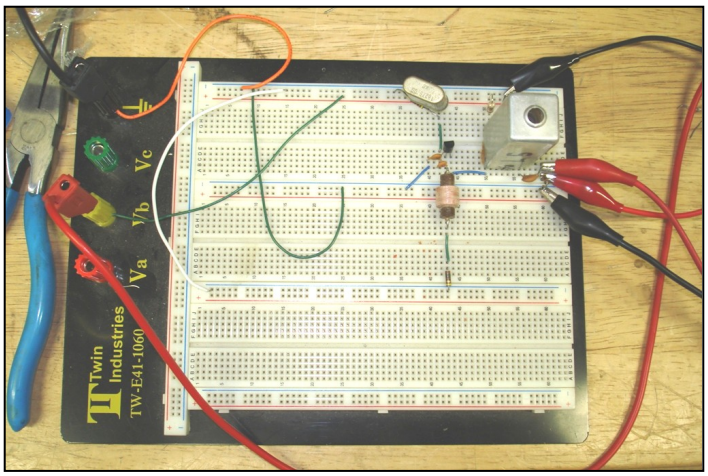

Figure 2
Heterodyne Oscillator Layout

Figure 2 shows the solderless breadboard layout of the oscillator. The plan is to add the mixer and FET amplifiers to the same board. With the test set-up I am using the oscillator output level is 300mV$_{P-P}$. The frequency is measured at 18.2716 MHz on the breadboard. Figure 3 is a photograph of the HP 5328A frequency counter. Note that the frequency is displayed in KHz. In figure 4 the oscillator output waveform is displayed on the oscilloscope. The waveform is a clean sine

Figure 3
Heterodyne Oscillator Frequency

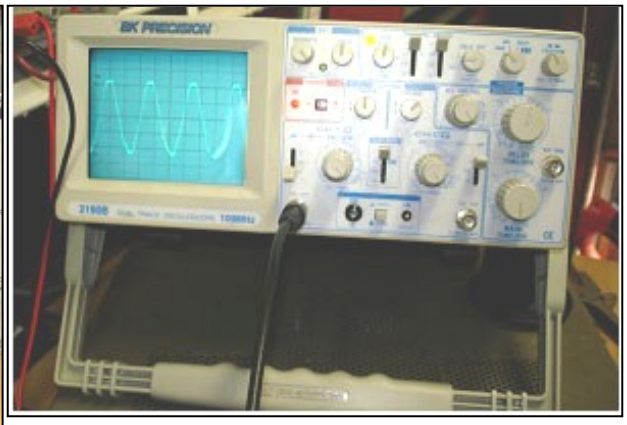

Figure 4
Oscilloscope view of the Heterodyne Oscillator

wave.

A problem that occurred with measuring and the presentation of the oscillator was the band width of the scope probes. The scope probes that I use have a bandwidth of 6+ MHz in the X1 position and 100 MHz in the X10 position. I finally resorted to using a BNC cable that has a BNC connector on one end and clip leads on the other end. That worked out just fine.

I have started to look at the mixer section. Originally I thought that I would use an MC1496 IC, but I found a mixer circuit using a type 2N5486 FET in the ARRL handbook and decided to use that device. A preliminary schematic is presented in figure 5.

My approach is to construct the mixer as a class A amplifier and then drive it with an external signal generator and make sure the output of the amplifier is tuned to $f_{het\ osc} - f_{vfo}$ or in the 16.500MHz range. The final VFO frequency will be adjusted at the time of the final tuning.

If I have to boost the signal from the VFO and the heterodyne oscillator, I will use a class A common source FET or a common emitter bipolar transistor.

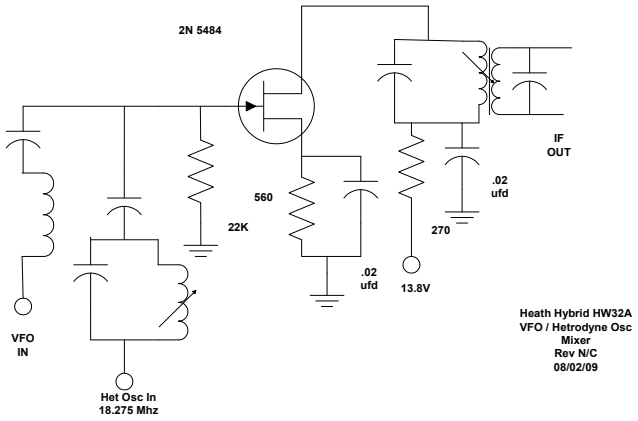

Figure 5
Preliminary Schematic Heterodyne / VFO Mixer

For the September Propagator, the plan will be to have a sub-

assembly consisting of the VFO, Heterodyne Oscillator and mixer that has been assembled and tested.

For those members that have an interest in bread boarding and testing circuits, I will be glad to answer any questions that you might have.
Contact me at WB6WXO@SOARA.org