SOARA Workshop
1.5 Watt QRP 80M CW Transmitter

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I thought that this transmitter project would give the students a variety of experiences. In addition, there could be a useful piece of equipment that would put out 1.5 Watts, CW in the 80m band. The circuit comes from several places. The crystal oscillator part of the circuit is used in the 20m single band Heathkit HW32A. It is used as the heterodyne oscillator (18.271MHz).

I scaled several of the capacitors and the output transformer to optimize the circuit for the 80m output. The crystals for this circuit are from the analog TV days. They are widely available and are very inexpensive. The transistor for the oscillator is a 2N2222A. It has been around for over 35 years and is easy to find and is also very inexpensive. I could have used a junction FET as I did in the HW32A hybrid.

The basic circuit comes from the ARRL QRP Handbook published May 1990. The ARRL circuit uses a 2N3553 as the output device. I substituted a 2N3866. The 2N3866 is a device that can be used up to 150Mhz.

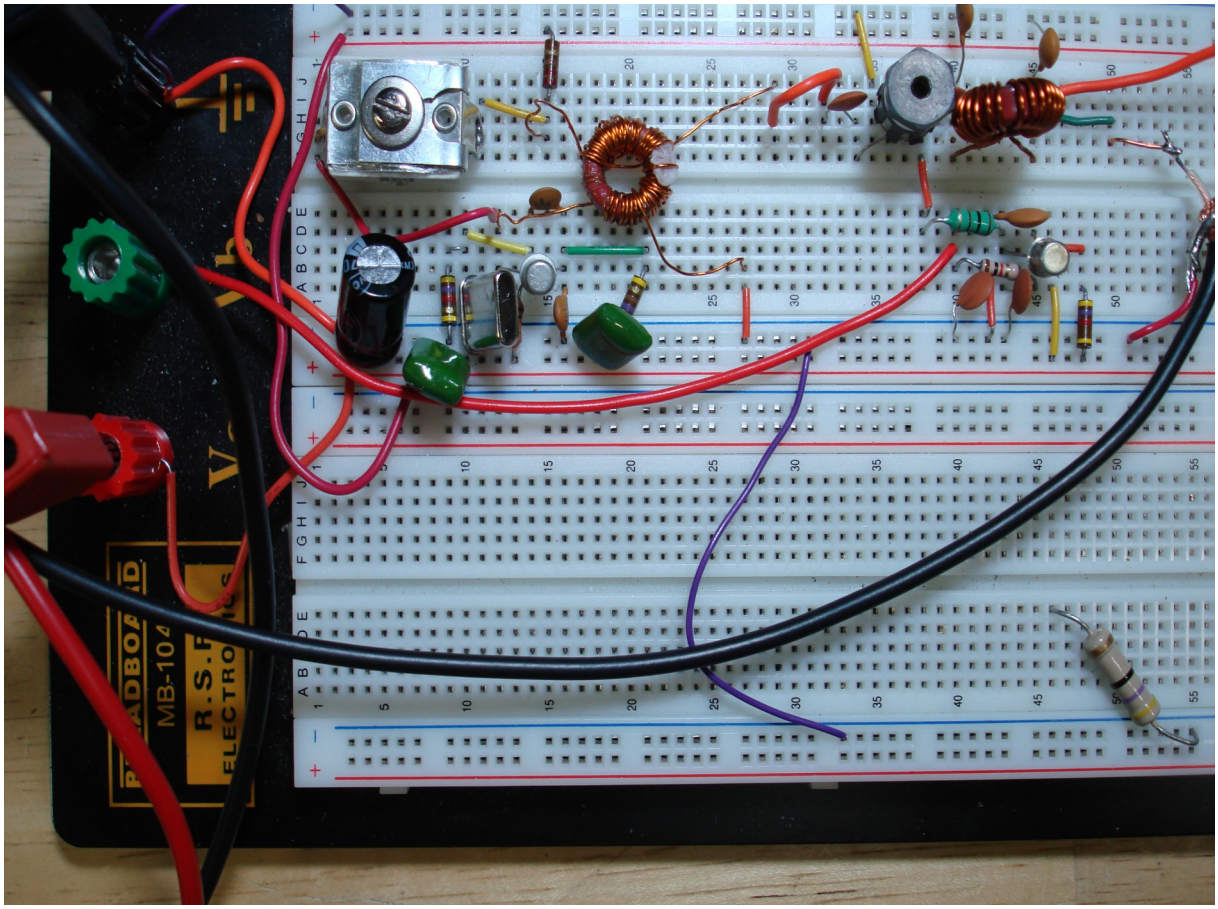

Figure 1
Breadboard Layout
1.5W CW 80m Transmitter

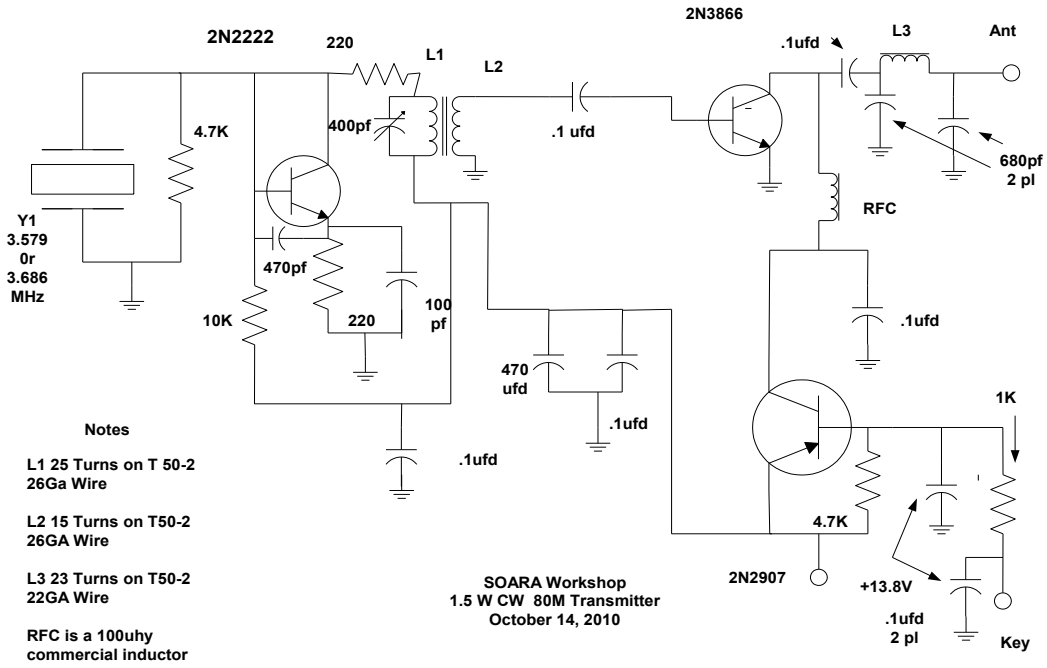

Figure 2
1.5W CW 80m Crystal Controlled Transmitter Schematic

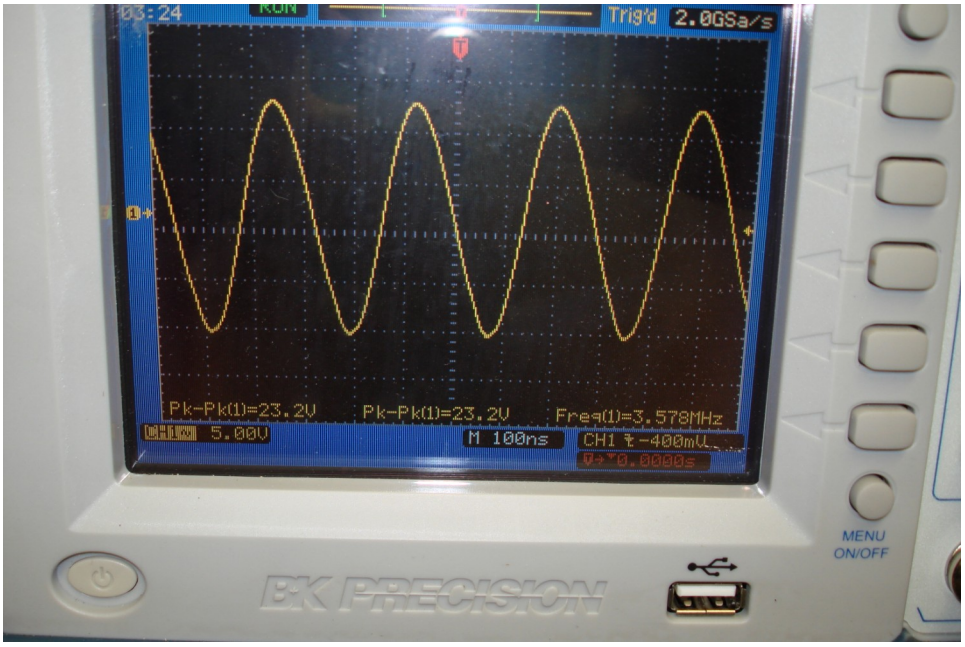

Figure 3
1.5W CW Transmitter Output Waveform

The oscilloscope trace of the output wave form looks like it has a minimum of harmonics.

When the key is closed, the base of the 2N2907 allows the transistor to conduct applying Vcc to the collector of the 2N3866 amplifier stage. The output is fed to the tank circuit and then to an antenna. So far I have used a 50Ω

dummy load. The output power is monitored by an oscilloscope across the dummy load

The output tank circuit is broadband enough that there no additional tuning required. I also tried to use 20 gage wire on the toroid and changed the caps to 820pf. There was no significant change in the performance.

In this design, the oscillator runs continuously and the output device is turned on and off by the key.

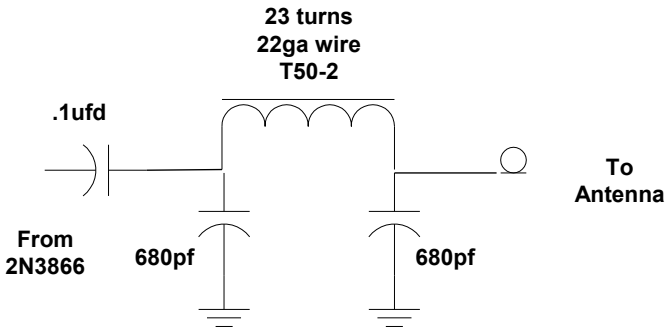

Figure 4
Output Tank Circuit

Some of my observations were that the measured voltage across the dummy load varied from 16.1V p/p to 23.2V p/p as shown in figure 3. My plan is to add a small heat sink to the can of the 2N3866 and rebuild the circuit on a solderable breadboard. The solderless breadboard has some limitations as to repeatability of performance. I was able to measure a minimum of 1.35W peak power.

The next step is to add a little side tone generator that will provide the operator with a comfortable tone when the transmitter is keyed. I am also considering adding a 12V DC T/R relay so that this mini-rig can be interfaced with a receiver.

I am going to rebuild the circuit on a solderable board and package it in suitable chassis with a small fan and speaker. Another consideration is to have a frequency doubler added to the circuit so that the transmitter can be either a 80m or 40m transmitter. There are no limits as to what can be done to add versatility to the transmitter.

I will be happy to publish a parts list and a list of suppliers for the basic transmitter.

If there are any comments, please feel free to contact me at WB6WXO@SOARA.org