QRV? QRP Quarterly, October, 2000

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Well, here it is, QRV time, and once again, I find myself on my way home from another business trip to Germany. It seems like yesterday that I was flying down the Autobahn and thinking about transistors and biasing. I did get to operate a bit this time--which was really fun--using my DSW-20. That is one sweet rig!

So, I have to apologize for not making the NOGA QRP HF CW net lately (Tuesdays, 9:30PM Eastern, 3686.4KHz). Have you?

Of course, with the normal summertime increase in atmospheric noise, thunderstorms and the occasional solar coronal mass ejection, you may be waiting for those nice quiet winter evenings on 80 meters. So how about if we get those final touches on our NOGAnauts and get QRV?

To recap, over the past few issues, we've (1) built a basic crystal oscillator, (2) added a power amplifier, and (3) constructed a filter so that the output meets FCC spectral purity requirements. A lot of contacts can be made with the NOGAnaut just as it is (you can almost always find somebody on 3686.4KHz after sundown).

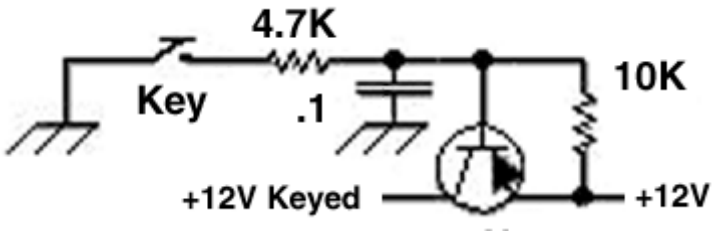
However, you may want to attach the rig to a keyer, instead of using a straight key. The trouble is, the NOGAnaut is keyed by interrupting the +12Volt power supply to the oscillator. Most keyers, though, are set up to *ground* the key-line. Grounding the power supply would make a mess of things in a hurry.

One thing you could do is rig up a battery and a relay, and interrupt the flow of current to ground through the relay coil. The normally open contacts can be inserted between the power supply and L1.

One problem with this technique is that the relay is an electromechanical device, and the inertia that the relay arm must overcome will cause a slight delay each time the key pressed or released. This might work for really slow Morse code, and the relay click could possibly serve as a pseudo-sidetone, but clearly, this arrangement is less than optimal.

Enter the transistor switch. Remember from last time that when the base of a transistor is given a positive *bias*, current will flow between the emitter and the collector. In an NPN transistor, when the base is biased positively, the collector is made positive with respect to both the emitter and base and the emitter is made negative with respect to the emitter and base. In a PNP transistor, the opposite is true, that is, when the base is biased positively, the emitter is made positive with respect to both the collector and base and the collector is made negative with respect to the emitter and base.

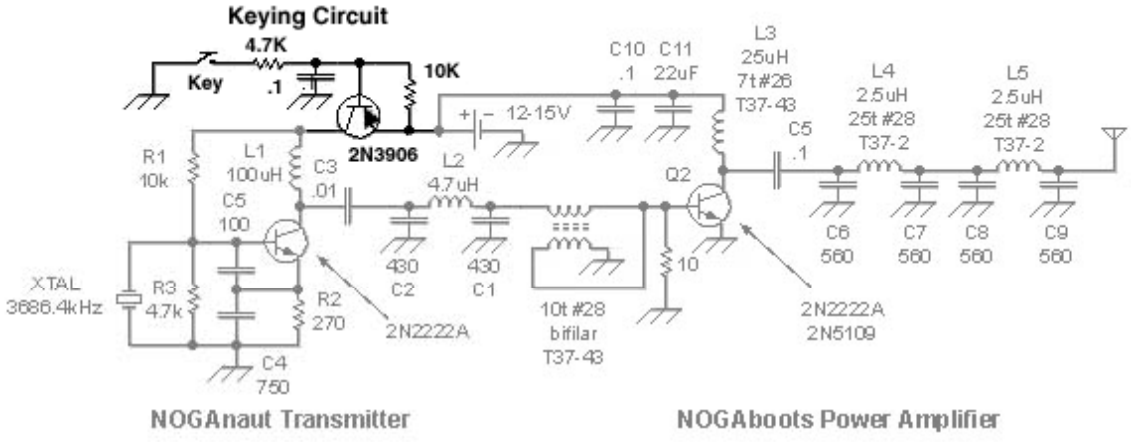
If too much bias is applied to the base, the transistor *saturates*. When a transistor is saturated, it ceases to operate in a linear manner, however, the maximum collector-emitter voltage difference, also called Vce(sat) exists. Switching the bias on the base causes a nearly simultaneous flow of current between emitter and collector (determined by the frequency-response characteristics of the transistor). This allows a small bias to control a large amount of switched voltage (it is extremely important, however, to not exceed the maximum transistor voltage ratings).



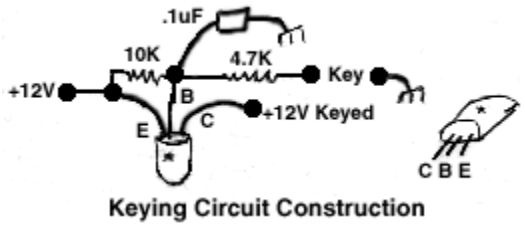
The PNP transistor above acts very effectively as a keying switch. The 10K and the 4.7K resistors work together as a voltage divider. When the key is grounded, 6V bias is applied to the base of the 2N3906 transistor. This is enough bias to saturate the transistor, so +12V appears at the collector of the transistor, and the keyed circuit receives power.

The transistor is truly a remarkable device, isn't it?

So, here's our final circuit for the NOGAnaut, using a 2N3906 PNP transistor to key the oscillator on and off:



This little keying circuit is incredibly easy to construct. The easiest, perhaps, is "dead bug" style, like so:



Start by gluing the transistor upside down to the PC board, and then build the rest of the circuit around it. On my board, I also added a 1/8 inch mono phone jack, which I use as standard in my shack for key jacks.

Perhaps, one day, I'll write about Zen and the art of radio construction. I feel that if you're going to go to the trouble of building a radio, it should look nice as well. To house my NOGAnaut, I chose a Whitman's Sampler box, available in many drug stores. Due to the heat sink on my power amplifier, there wasn't quite enough room in an Altoid's tin, and besides, I really like the chocolate that comes inside!

In small QRP rigs, I usually use RCA jacks for the antenna, 1/8 inch phone jacks for keys and coaxial power jacks for the power input. Be sure to use a small nail or punch to start the holes, otherwise, the drill might slip and mar the box. Also, there is a layer of paint on the inside of the Whitman's Sampler box, so

use a knife or sandpaper to scrape off the paint around the inside of each hole to get a good ground. You can glue or tape the PC board to the inside bottom of the box, but be sure to also solder a couple of wires from the ground plane on the board to the bottom of the box (after scraping an area to solder to).

Now it's time to get QRV! Hope to CU soon on 3686.4KHz!

72 de Mike, KO4WX