Introduction to the Cricket

nm0s_qrp
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Welcome to the Group!

The Cricket is a minimalist 30M CW transceiver designed to be a simple, easy-to-build project. It is comprised of 49 components, but maximizes features and performance of the parts it has.

This radio was designed as the Build-a-thon kit for Ozarkcon 2018. Selection of a build project for an event such as this is always a challenge, because there is always a good number of beginning hobbyists there for whom this might be their first soldering experience. It needs to be simple enough that it can be completed in an hour or so of allotted time for the event. Finally, it must be something useful and fun enough to be worth building.

The Cricket was designed to meet these requirements, as well as to be something _other than the ubiquitous 40M radio kit that everyone has already built. The starting point was the notorious 'Pixie' transceiver....but from there, the resemblance ends!

For anyone who has actually built and operated one, the Pixie is a cheap and simple kit, but has serious performance deficiencies. It is underpowered (0.3W), it's harmonic output does not meet FCC requirements, the receiver is a bit deaf, and very prone to AM broadcast bleedthrough and 60 Hz hum pickup.

The Cricket starts its circuit with that section of the Pixie that works well - the crystal oscillator. It's a very conventional Colpitts circuit, using a bipolar transistor as the active device.

The output of the oscillator is coupled to the gate of a 2N7000 MOSFET. This transistor is configured as a Class-E power amplifier, delivering 0.5W from a 9v battery. The output network uses spiral PC traces to make up the inductors, and all harmonics are attenuated at least 50 dB.

When the circuit is operating as a receiver, the key is open and there is not DC presented to the drain of the PA MOSFET, but the drive is present on the gate of the PA FET. RF signals entering from the antenna are mixed by the switching action of the PA FET, and converted to audio. This circuit is much more linear in its action than the bipolar transistor used in the Pixie, and results in better immunity to AM broadcast interference and 60 Hz hum.

The detected audio signal is coupled to U1, an NJM2113, which is a low-noise headphone driver IC.

When the key is closed, a number of things happen. 9v is applied to the drain choke, and the PA begins to generate RF power to the antenna. Voltage is applied to the gate of Q4, which mutes

the audio amplifier and voltage is applied to the Q5-Q6 sidetone oscillator circuit, sending the sidetone to the headphone jack. Voltage is also applied to the gate of Q3, which switches out the frequency offset capacitor in series with the crystal, permitting the transmitter to operate directly on the crystal frequency.

All this from 49 common electronic components.

It's a fun rig!

73 Dave NM0S