



Crystal Tester – Version 2

Background Information

This version of the Crystal Tester is electrically identical to the first version of the crystal tester, but has been functionally modified in several important ways to improve operation and make the unit completely self-contained.

Notable in these modifications is the incorporation of a battery holder on the PCB that negates the need for a battery snap dangling from the PCB as in the version 1 tester. Additionally this version of the tester has a BNC jack instead of the RCA jack on the version 1 unit. This upgrade removes the need for adapters to be used when connecting the unit to a 'scope or frequency counter. Another improvement is the incorporation of a frequency adjusting trim capacitor; this allows the test crystal to be 'pulled' onto frequency if desired. Finally as the battery is connected all the time, the test function is activated only by pressing the small on board test button, this allows for fast testing or batching of test crystals.

As with previous versions the lighting of the LED indicates a good crystal that has driven the circuit to oscillation.

Technical Description

The tester is designed to measure or confirm activity of crystals in the range 1MHz – 60 MHz, it is not capable of measuring lower frequency crystals.

The tester is a Colpitts type oscillator built around Q1, a 2N2222 type transistor, the output of the oscillator is coupled by C3 to a diode detector D1 and rectified by D2. The output of D1 feeds Q2, another 2N2222 which is a buffer amplifier that drives the LED. The oscillator output is then further decoupled by C4 to the BNC jack for displaying the oscillator frequency.

The output of the crystal tester is 'raw' as the oscillator is un-tuned hence the output is harmonic rich, this is obvious if the output is viewed on an oscilloscope. The actual RF output level is around 100uV; however, this level can vary depending on crystal type and its activity level.

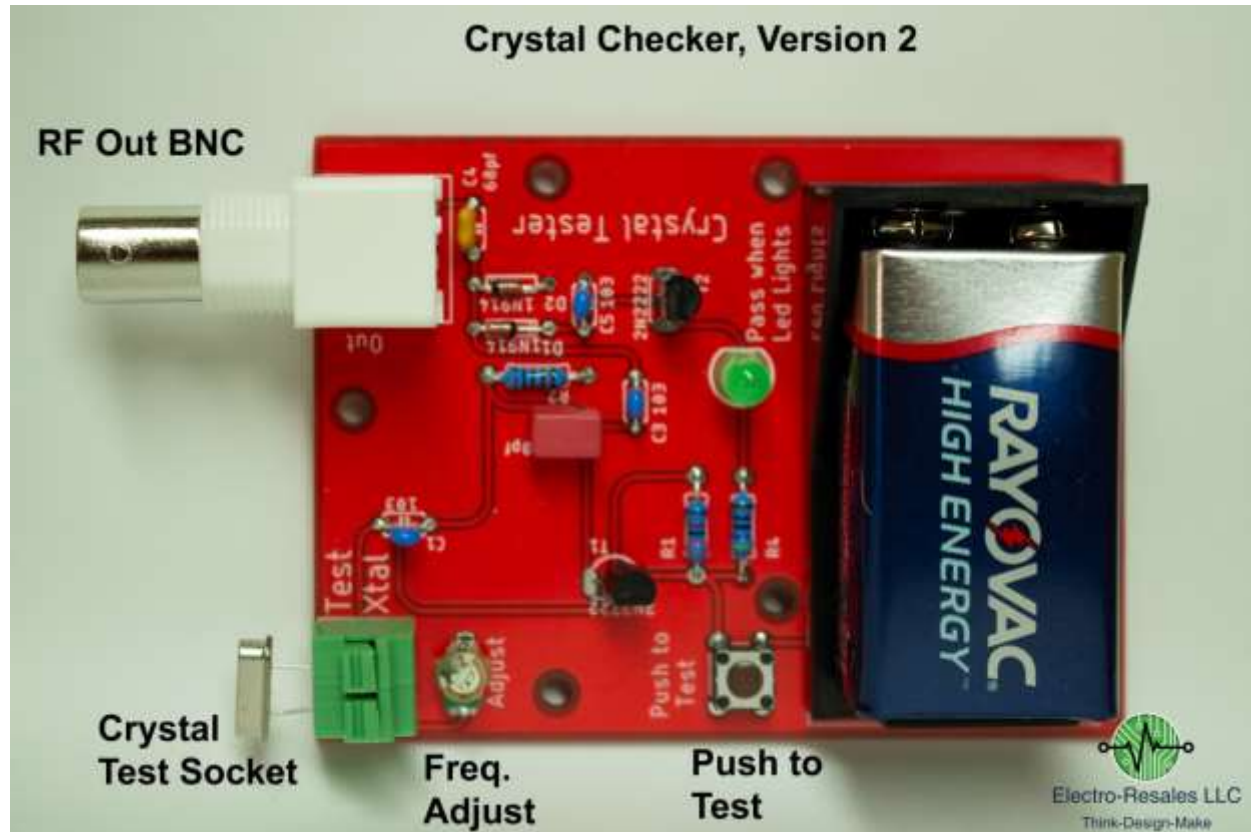
Basic Operation

When reading this we recommend also referring to the overall layout photo included in this document to allow you to become familiar with the unit and its features.

Basic operation involves first installing a fresh 9 Volt battery (see the appendix for instructions on how to do this properly) and then installing the test crystal. The test socket consists of a 2 pin socket with press to open actuators. These need medium finger pressure to open and insert the test crystal. If a crystal such as an HCU is being tested the use of test clip wires may be employed to attach the crystal to the tester.



Crystal Checker – Version 2, Layout



Once the crystal is installed, pressing the test button will activate the tester and a good crystal will cause the circuit to oscillate and in turn light the LED.

Once the activity has been confirmed the output BNC can be used to check the frequency using a frequency counter or an oscilloscope to visualize the output.

As the output of the tester is quite low, the use of good quality cables or adapters is encouraged.

This version of the crystal tester incorporates a trimmer capacitor on the crystal input and this allows the frequency to be adjusted. The main reason for this is to determine the degree that a particular crystal can be 'pulled' this can be important if the crystal is to be used in a project such as a QRP transmitter that may need to have the frequency altered slightly.



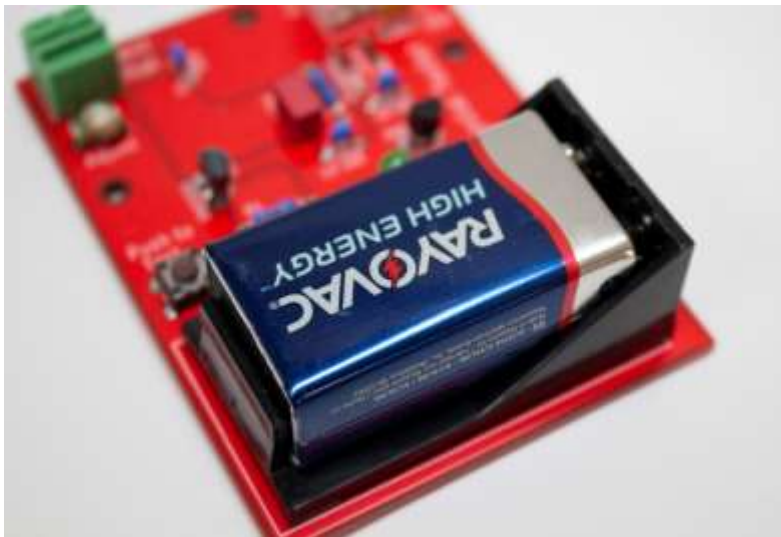
Appendix A - Battery Installation

The tester incorporates a built in battery that accepts a standard MN1400 (PP3) type 9 Volt battery. Installing the battery requires a two-step process involving angling in the battery after aligning the snaps in the battery box with the snaps on the battery, see the photo below, then engaging the snaps and pressing the battery into the box so it lays flat and is held captive by the back clip on the box.

Angling in the battery



Battery in Place





Appendix B - Schematic

