100 KHz Crystal Calibrator

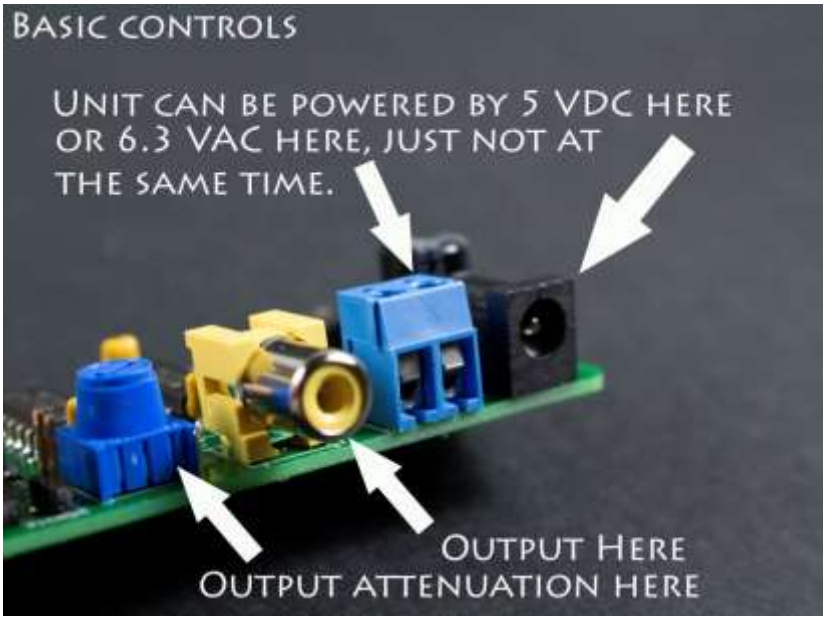
A Little Background

A crystal calibrator is a very useful piece of test equipment that is used to generate audible markers across the RF spectrum at precise intervals. This has the benefit of being able to accurately measure, without other equipment, the calibration accuracy of a radio dial or frequency indication. While of more use with vintage equipment the calibrator still finds a use in checking modern radios.

Our version has a 100, 50 & 25 KHz selectable output signal that is a strong square wave into the upper MHz region. We offer two versions, one as a bare PCB and one with the PCB protected by a laser cut acrylic case.

Operation and Usage

The calibrator has several input and output jacks and it is worth taking a moment to review each of these. While examining the PCB, please also refer to the picture below for reference.



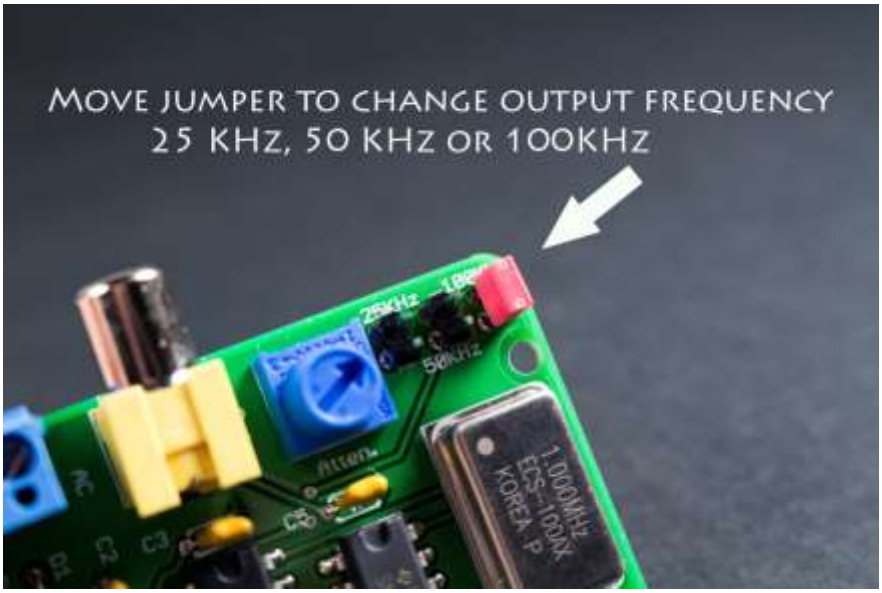
The three jacks shown in this picture are the output RCA jack, a screw terminal block for the AC power (6.3VAC or 12 VAC from the heater line) and a 2.1 MM barrel jack which is center positive for 9 – 20 Volts DC.

Please note that the unit should never be powered form both AC and DC Power at the same time.

Note that in this picture an output attenuator Potentiometer is also shown. The output can be attenuated with the potentiometer, however for initial testing we advise to leave this alone as it has been set at manufacture and QC for a strong output level.

DC power can be provided by a 9 volt battery or a bench power supply set to a nominal voltage of 12 volts. The barrel jack is a 2.1 x 5.5 mm jack and the polarization is center positive. AC power can be supplied to the blue screw terminals either from a bench supply or by tapping into the tube (Valve) heater chain on a radio.

The output of the calibrator can be either 100 or 50 or 25 KHz, and this is selected by moving the header shorting block between the marked locations on the PCB. If you have the cased version a small needle nose plier can be effective for doing this step.



In the above picture the header shorting block is on the 100 KHz setting.

The actual outputs for each setting are shown in the next picture.

Electro-Resales

Output trace for each setting

To use with a radio for actual calibration, the signal from the calibrator RCA jack needs to be coupled to the radio under test, this can be directly to the antenna jack or a looser coupling can be achieved with placing the output lead near the radio LO. Some experimentation may be required, but remember;

If working on a tube (Valve) based receiver or equipment that is tube based, be aware that high voltages are present and take due caution to avoid contact with these voltages to protect yourself, the radio and calibrator.

Classically, to use a calibrator, the radio is tuned to 10.005 MHz, and with the calibrator on and connected, the radio is slowly tuned until the dial (analog or digital) reads 10.000 MHz, the beat of the calibrator should be heard as the radio is tuned until it nulls at the 10.000 MHz point, tuning up or down, past the null at 10.00 MHz, will produce a new signal and null every 100 KHz, in this way the accuracy of the radio dial can be determined.

Troubleshooting

We have designed and manufactured the calibrator to be a robust unit that should give a long service life, however problems can occur and the following quick notes are designed to assist with simple troubleshooting. Please also refer to the schematic in the appendix. If these fail to produce a positive result please reach out to us at resalese@gmail.com

1. **No signal – Check that the unit is receiving power, if using the AC input make sure the heater chain is on, if using DC is the input voltage above 9 VDC**
2. **No signal – Check the shorting jumper is in place on one of the output selection headers, is the jumper on both headers and not just one?**
3. **No signal – If using the cased version, check that the clock oscillators is properly seated in the socket, note this is a polarized device and must be fitted with the square corner pointing at the trim pot. Press the oscillator gently to make sure it is seated.**
4. **No signal – Check your output cable is in good condition, replace or substitute if needed.**

The small Print

DISCLAIMER

Any person who constructs or works on electronic equipment may be exposed to hazards, including physical injury, the risk of electric shock or electrocution.. These hazards can result in health problems, injury, or death. Only qualified persons who understand and are willing to bear these risks themselves should attempt the construction of electronic equipment. By purchasing this item, the buyer acknowledges these risks.

There is a risk of electric shock, electrocution, burns, or fires that is inherent in the construction and use of electronic equipment. By purchasing this item, the buyer acknowledges these risks.

IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE including, but not limited to, property damage, personal injury, death or legal expenses. Buyer's recovery from Seller for any claim shall not exceed the purchase price paid by Buyer for the goods, irrespective of the nature of the claim, whether in warrant, contract or otherwise. By purchasing this item, BUYER AGREES TO INDEMNIFY, DEFEND AND HOLD SELLER HARMLESS FROM ANY CLAIMS BROUGHT BY ANY PARTY REGARDING ITEMS SUPPLIED BY SELLER AND INCORPORATED INTO THE BUYER'S PRODUCT.

Schematic diagram