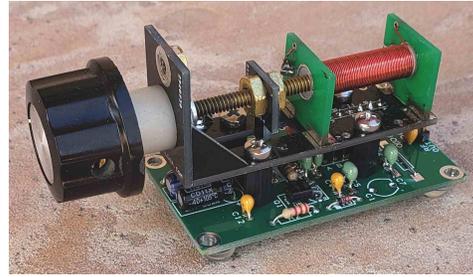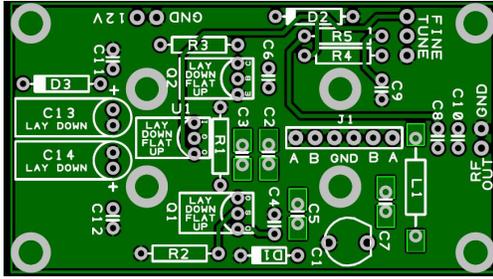# Using the QRP Builder PTO/VFO Development Bare Board

The PTO/VFO development board is a complimentary addition to the PTO Mechanism kit. The bare board is Steve Weber's circuit (schematic below) for his 2MHz PTO/VFO to be used with a 4.91592 IF for 40m. Other frequencies are possible. The buffered output is ~6Vpp. We give you the bare circuit board, and it is up to the experimenter to source the easily obtainable components. The circuit below draws ~10mA using 12V supply.

Here are some of the design features we incorporated into the development board and tips to help in your project.

- The PTO mechanism and development board can be mounted together using SIP socket and pins for the interface. To keep the distance between the two boards to a minimum, some components can mount flat on the board to reduce the clearance if you desire. Spacers between the two boards can be 3/8" thick metallic or plastic and the holes are sized for #4 or 3mm hardware. It is designed to use inexpensive Tayda pins and sockets, or similar, for the electrical interface. The development board is 1.38" x 2.50".
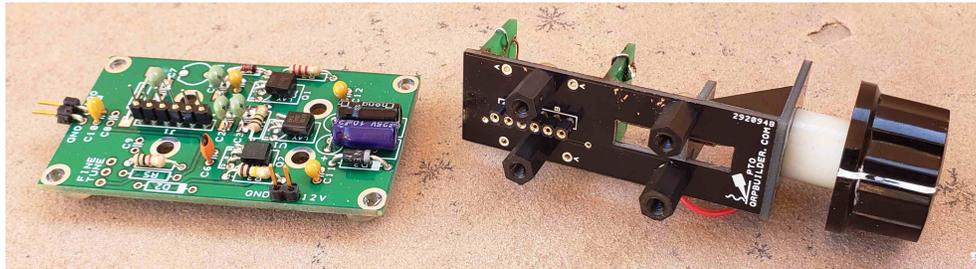
My 40m fundamental frequency test

- The capacitors, C2,3,5,7 should be C0G/NP0 dielectric. We provided pads as well as thru holes. The pads also allow the use of SMD capacitors 0805 or larger, sometimes easier to find in C0G/NP0 dielectric. Also, if you are using leaded components for testing, just tack them on top of the pads to save stressing the through holes. The variable, C1 should only be used to establish the value for C7. When you are close to your design frequency, take it out of the circuit, measure it and use the value for C7 or C1 with C0G/NP0 dielectric fixed capacitor. These small variables are not stable enough for frequency stability.

- The optional "FINE TUNE" section may be eliminated if your design does not warrant it. Just leave out C8, C9, R5, V1,and D2.

- L2 is wound with #32awg using the smaller Ø.25 option coil form diameter.

- Any hand capacitance changes in frequency are usually solved the added ground wire mentioned in the PTO assembly and mounting in your final enclosure.

- If you choose, there are four places indicated on the back of the development board for 3/8" rubber feet, or you can use some spacers in the four corner mounting hole locations to stay off the workbench.

- We have included brass and steel 6-32 threaded rods. Mechanically the function is the same. Electrically each has a different effect on the magnetic field when tuning. My test show more inductance change using the brass slug. Either one can be changed out easily while testing.
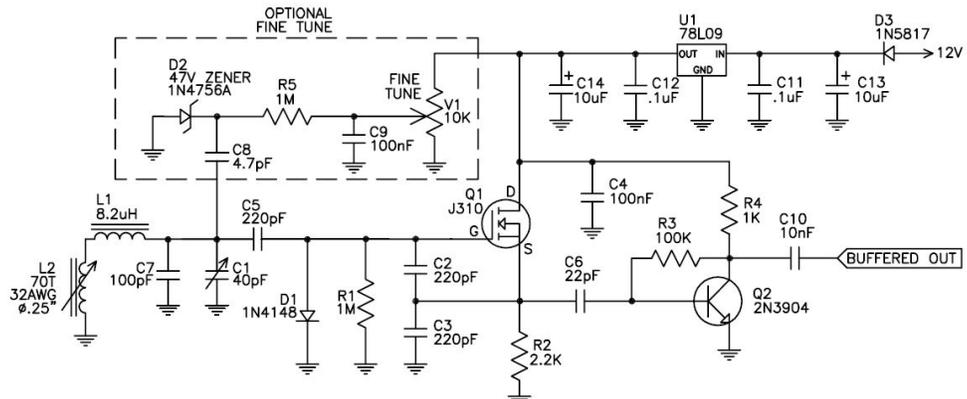
Steve's Colpitts circuit

My 40m fundamental tests without the IF shown with these values below:

L2 – 55 turns, Ø.25" form, #28awg, .74" long, resulted in 6.90MHz – 7.44MHz bandspread, 30-35KHz per turn in the 40m band without the fine tune circuit.
L1 – not used, but needs to be jumpered
C1 – not used, open
C2,3 – 120pF C0G/NP0 caps.
C7 – 33pF C0G/NP0 cap.

When you are experimenting with other frequencies, it is ok to use L1 and C1 to get you in the frequency ballpark. After determining the correct inductance from the combination of L1 and L2, wind the equivalent inductance in L2 and jumper L1. Also, the most stable vfo is obtained by measuring the trimmer (C1) and replacing it with a C0G/NP0 fixed capacitor. Get close to the value with the standard capacitor values available, and finally tweak the L2 winding if necessary.

Most the parts can be obtained from Tayda, with the exception of the NP0/C0G dielectric capacitors. The interconnecting sockets and pins are Tayda #'s A-1605 and A-4662, The 40pF trimmer is Tayda A-2497. Mouser and Digikey have a full complement of C0G/NP0 capacitors in smt and leaded.
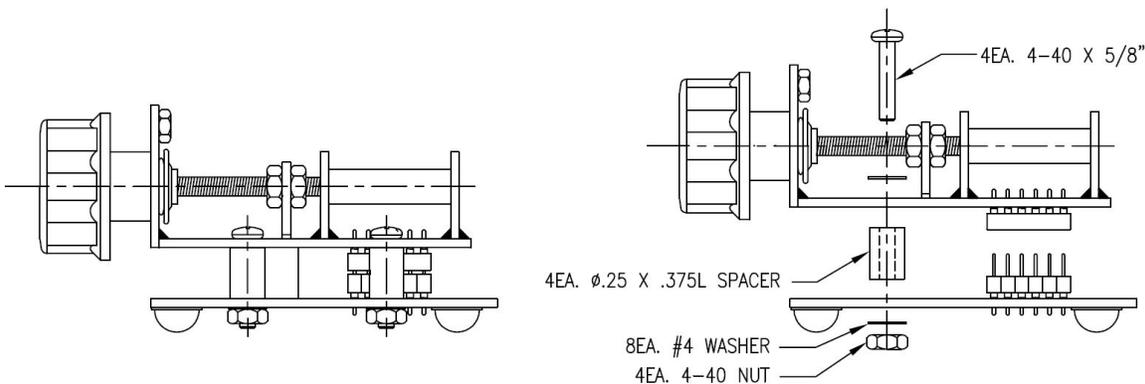
Typical hardware for testing. The PTO mechanism and circuit can be incorporated into your main board without the use of the pins /sockets, and mounted flat on your pcb.

Please forward any suggestions, modifications, improvements, additional bands, and or circuits you use the device in.

73's, Ken - wa4mnt

Notes:

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