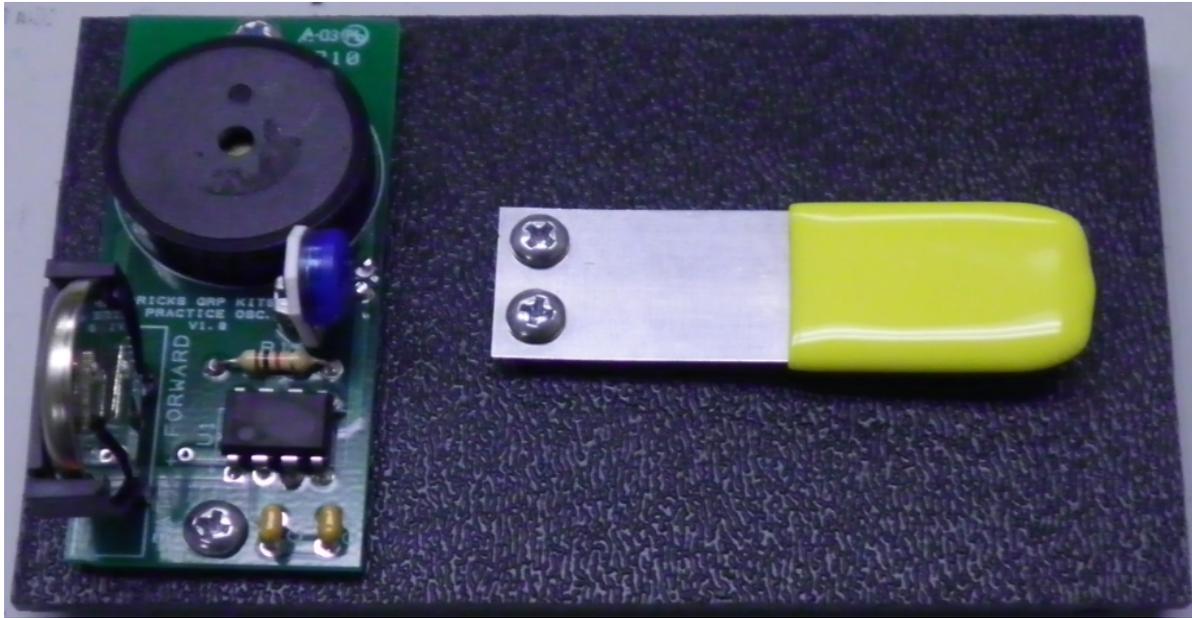


Pacific Antenna Code Practice Oscillator Kit



This kit is offered to initiate the first time builder in the various techniques of mechanical and electronic kit construction.

At the end of the approximately one hour project, the builder will produce a code practice oscillator to generate International Morse code.

This is a very basic, easy to assemble kit. The kit includes a professionally fabricated printed circuit board, all electronic and mechanical components, and a battery.

The tools required are an inexpensive soldering iron, and rosin core solder, a hand drill with a 1/8" dia. drill bit, small side cutters pliers, needle nose pliers, a file, a phillips screwdriver and a centerpunch.

The builder will begin the project by learning how to identify the various mechanical and electronic components and then, step by step, assemble the project to produce a working code practice oscillator.

The builder will first check the parts inventory and then assemble the printed circuit board. The circuit will then be tested for operation before proceeding to the mechanical portion.

For the mechanical assembly, the use of simple hand tools is required, and the youngest builders will require adult assistance and supervision.

Soldering components is required, so if you have never soldered components before, seek an "Elmer" to learn basic soldering techniques.

Parts Inventory:

R1 – 1K ohm resistor (brown-black-red-gold)

R2 – 50k ohm potentiometer

C1-C2 - .01 uF capacitors (103)

U1 – TLC555CPE4, 8 pin DIP, Integrated circuit

PC1 - Piezoelectric transducer

1 - Battery – CR2032, 3v, Lithium Ion battery

1 - Battery holder

12” Hook up wire

1 - Key base - 4” x 2 1/2” x 1/8”

1 - Printed circuit board – 2.30” x 1.00”

1 - 4-40 x 5/16” pan head screw

4 - 4-40 x 3/8” pan head screw

7 - #4 x 1/16” thick nylon washer

5 - 4-40 nut

1 - S. S. key lever with yellow vinyl sleeve pre installed

4 – Rubber feet

Parts identification

Start by laying out and familiarizing yourself with the individual components, and matching them to the pictures below.



R1: 1K ohm resistor, (brown-black-red-gold)



R2: 50K ohm board mounted potentiometer



C1 and C2 capacitors are yellow in color and have the value code printed on them as shown: 103 is a 0.01uF capacitor



U1 – TLC555 8 pin Integrated circuit



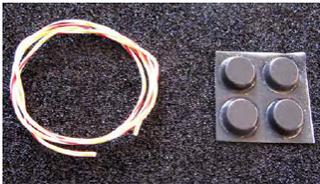
SP1 – Piezoelectric transducer **Note:** Do not peel off the protective tape until finished



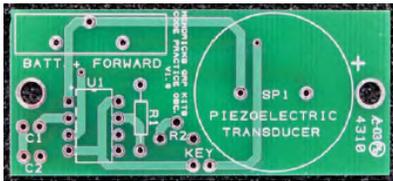
CR2032, 3V Lithium battery



Battery holder



Key base Hook-up wire and Mounting feet



Printed circuit board



Key base



From left to right: Nylon washers, 4-40 nuts, 3/8" screws, and a 5/16" L screw. Note to carefully sort out the single shorter screw as the 3/8 and 5/16 screws are close in length



Spring metal strip with yellow vinyl cap to form key lever

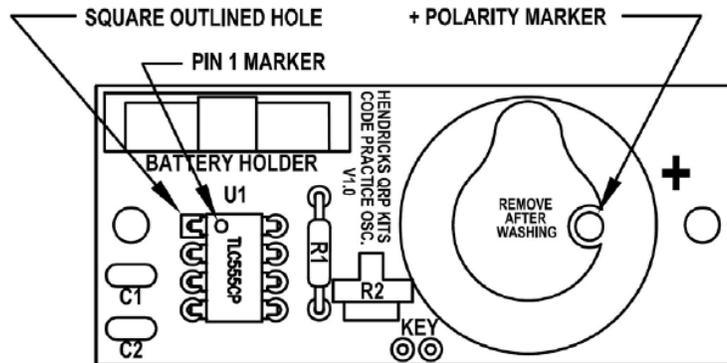
Electronic Assembly

We will start with assembling the printed circuit board, starting with the smallest components, and ending with largest.

Install one component at a time. Place the component on the top side of the board.

Note: The top of the board is the side with the silk screen lettering.

Solder the component to the backside of the board, and then trim the component lead on the back side. The picture below shows the location of the various components.



R1 – 1K ohm resistor (brown-black-red-gold).

C1 - .01uF (103) capacitor.

C2 - .01uF (103) capacitor.

U1 – TLC555CPE4, 8 pin DIP, Integrated circuit. Install so that pin #1 of the IC, shown by the small circle on one corner of the IC matches up with the square outlined hole on the printed circuit board.

Note: Before soldering, double check the U1 orientation, because this component is difficult to remove after soldering.

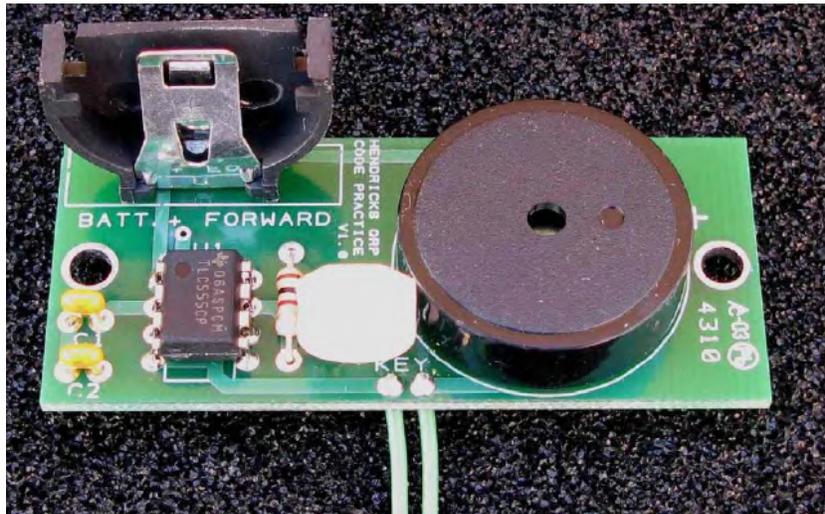
R2 – 50K ohm potentiometer.

SP1 – Piezoelectric transducer. Note: Install so that the polarity marker, shown above, is to the right side of the board.

Battery holder, place on board and solder the three pins.

Strip and solder two 4” long pieces of the hook-up wire, to the pads marked “KEY”.

Note: These are extending from the bottom of the board, and soldered on the top side. Consult the picture below.



The finished board should look like the picture above.

Now is a good time to test the board. Start by stripping 3/8" off the ends of the two 4" leads, soldered to the board.

Peel off the protective tape on the piezoelectric transducer, and install the CR2032 battery into the battery holder with the "+" side of the battery facing towards U1, the integrated circuit.

Touch the two stripped leads together. A tone should be heard out of the transducer.

The tone can be adjusted by turning the potentiometer, R2. This also acts somewhat as a volume control, due to the frequency response peaks and valleys of the piezoelectric transducer.

If all is OK, remove the battery for now.

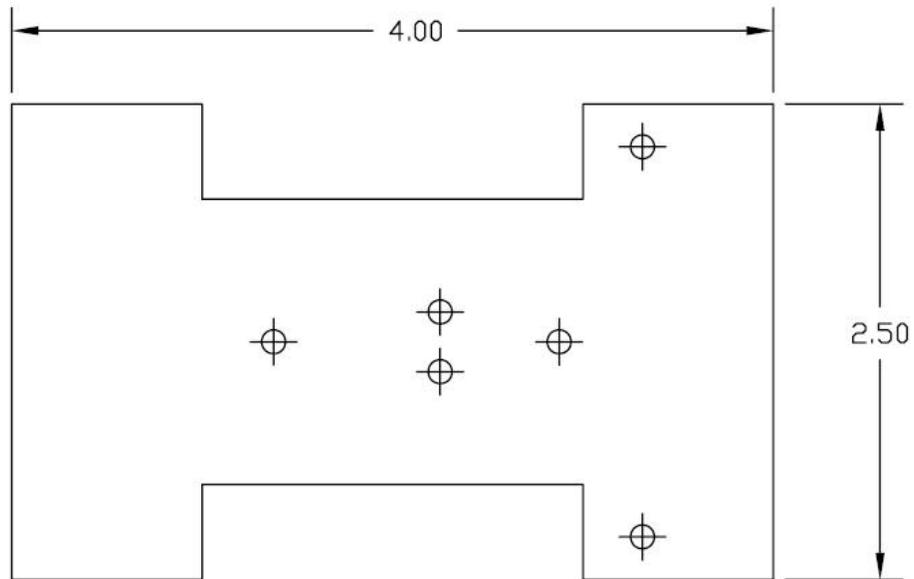
Troubleshooting:

If nothing is heard, the most common fault is bad solder joints

Inspect the board carefully with a magnifying glass, and correct any bad connections.

Due to the small number of parts and diversity of shapes, it is difficult to put a part in the wrong location.

However, sometimes it is difficult to see your own mistakes, so have another person look at your work.



Mechanical Assembly

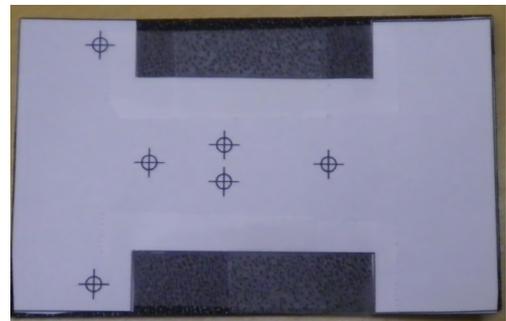
Key base preparation:

Marking template for drilling

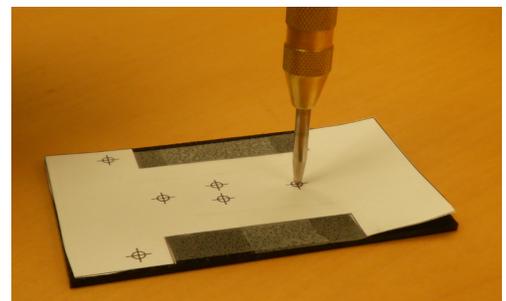
Print this page at “no scaling” and check that the output is the size shown. Adjust your printer scaling if necessary.

Note: This must print to these dimensions, or the hole spacing will not be correct. If you cannot obtain these dimensions, refer to the hole pattern reference in the appendix.

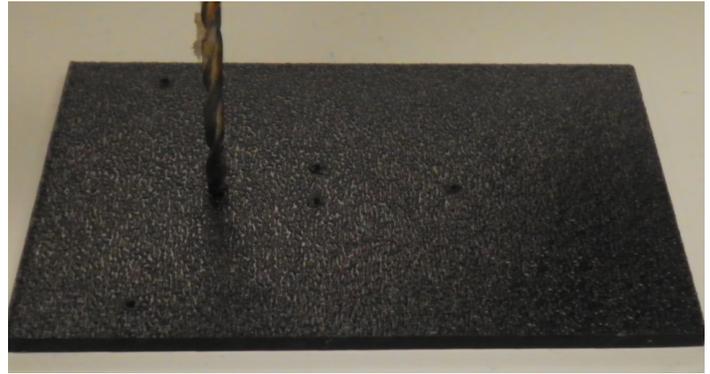
Cut the outline and tape it to the key base by placing tape in the cutouts on each side.



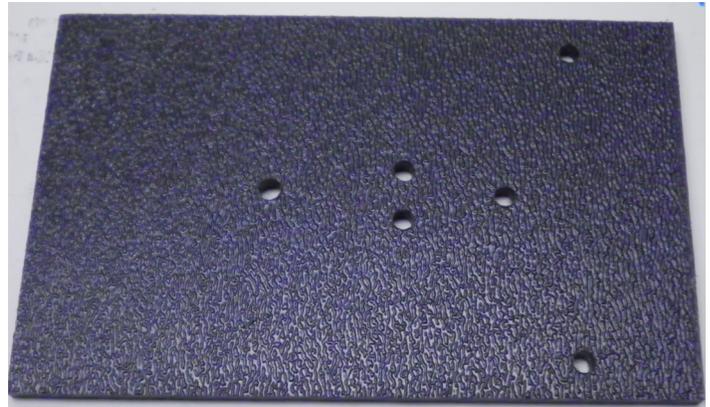
Mark the crosses with a nail or center punch as a location for drilling.



Drill all six holes, 1/8" diameter.



The base should look like this when finished.



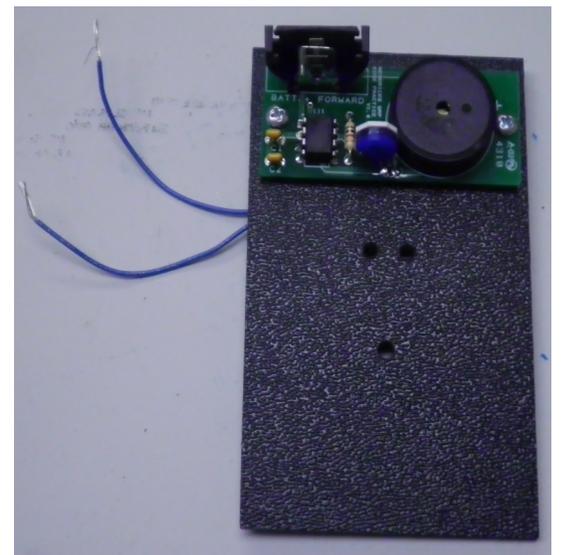
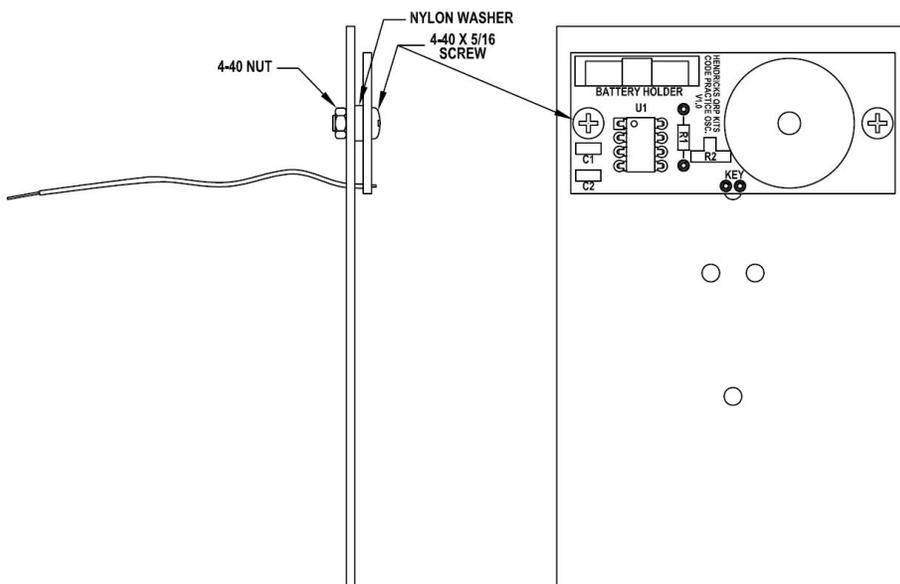
Next, assemble the finished and tested printed circuit board to the key base as follows:

Note: Make sure all component leads on the bottom of the circuit board, except for the two 4" wires, are trimmed to 1/16" or less.

Feed the two pieces of hook-up wire through the hole shown.

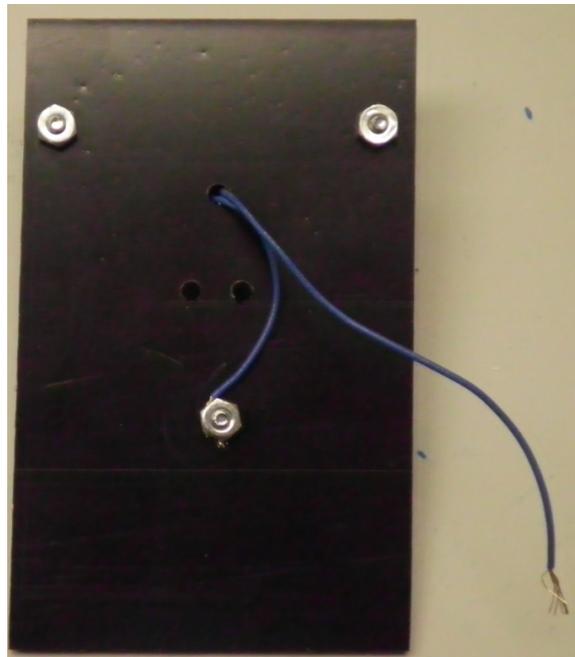
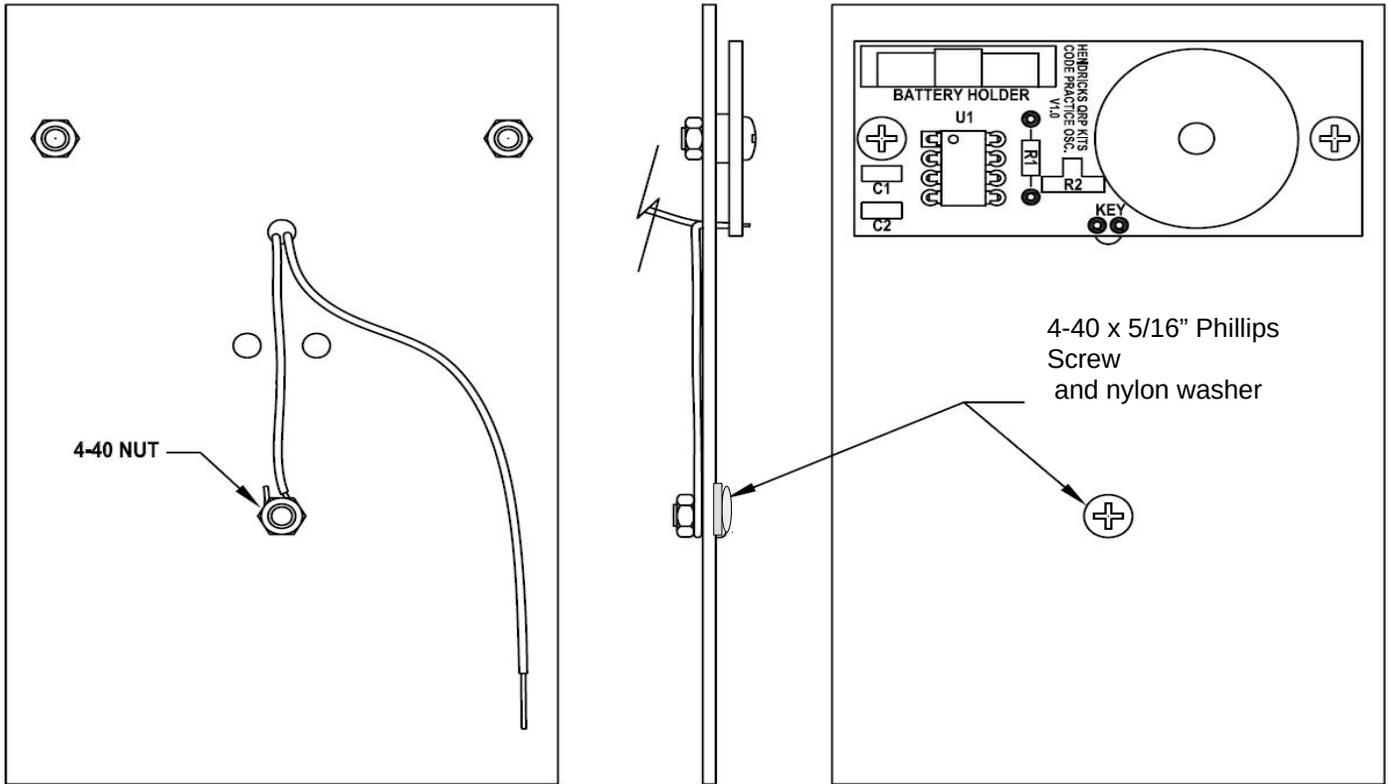
Use two 4-40 x 3/8" screws, and place the two nylon washers between the PCB and the Key base.

Secure the board with two 4-40 nuts as shown.

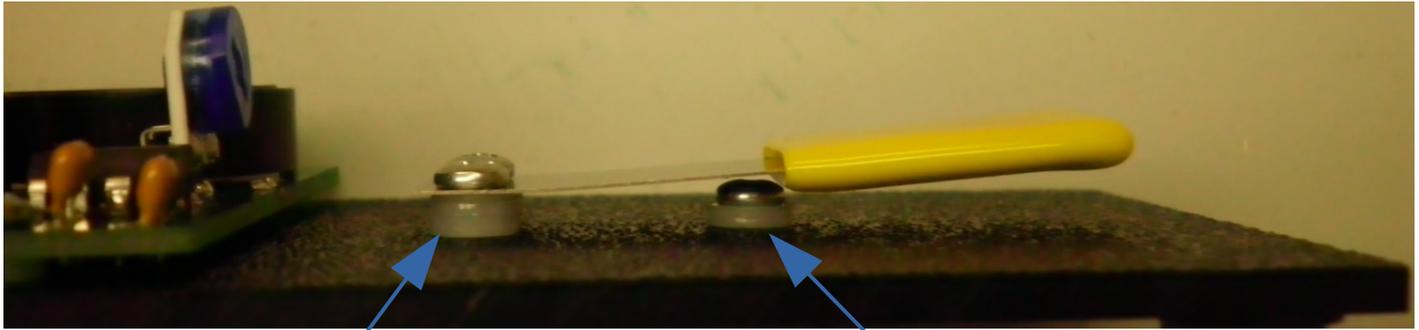


Place the 4-40 x 5/16" long screw and a nylon washer so that the head of the screw with a nylon washer under it is on the top of the key base, as shown below:

Cut and strip either of the wires as shown and attach it under the nut that secures the brass screw. This screw acts as the contact point for the key lever.



Mount the key lever using two 4-40 x 3/8" screws, two nylon washers between the base and the lever on each of two 4-40 nuts. This will result in a stack of two washers under each screw of the key lever. This is to raise it a bit above the board to allow room to press the lever.

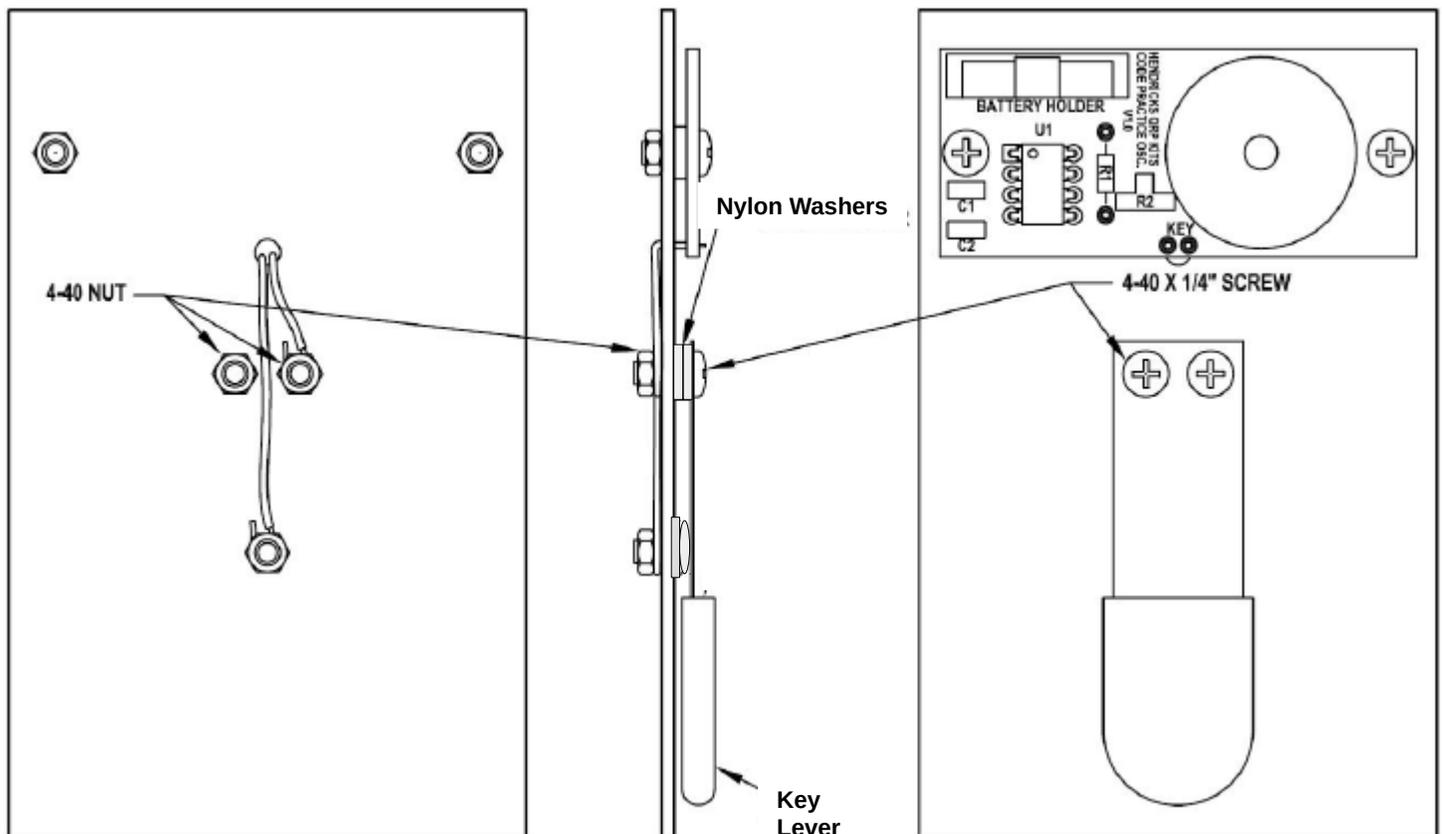


2 washer stack

Single Nylon Washer

Secure the trimmed and stripped remaining wire under one of the nuts, as shown.

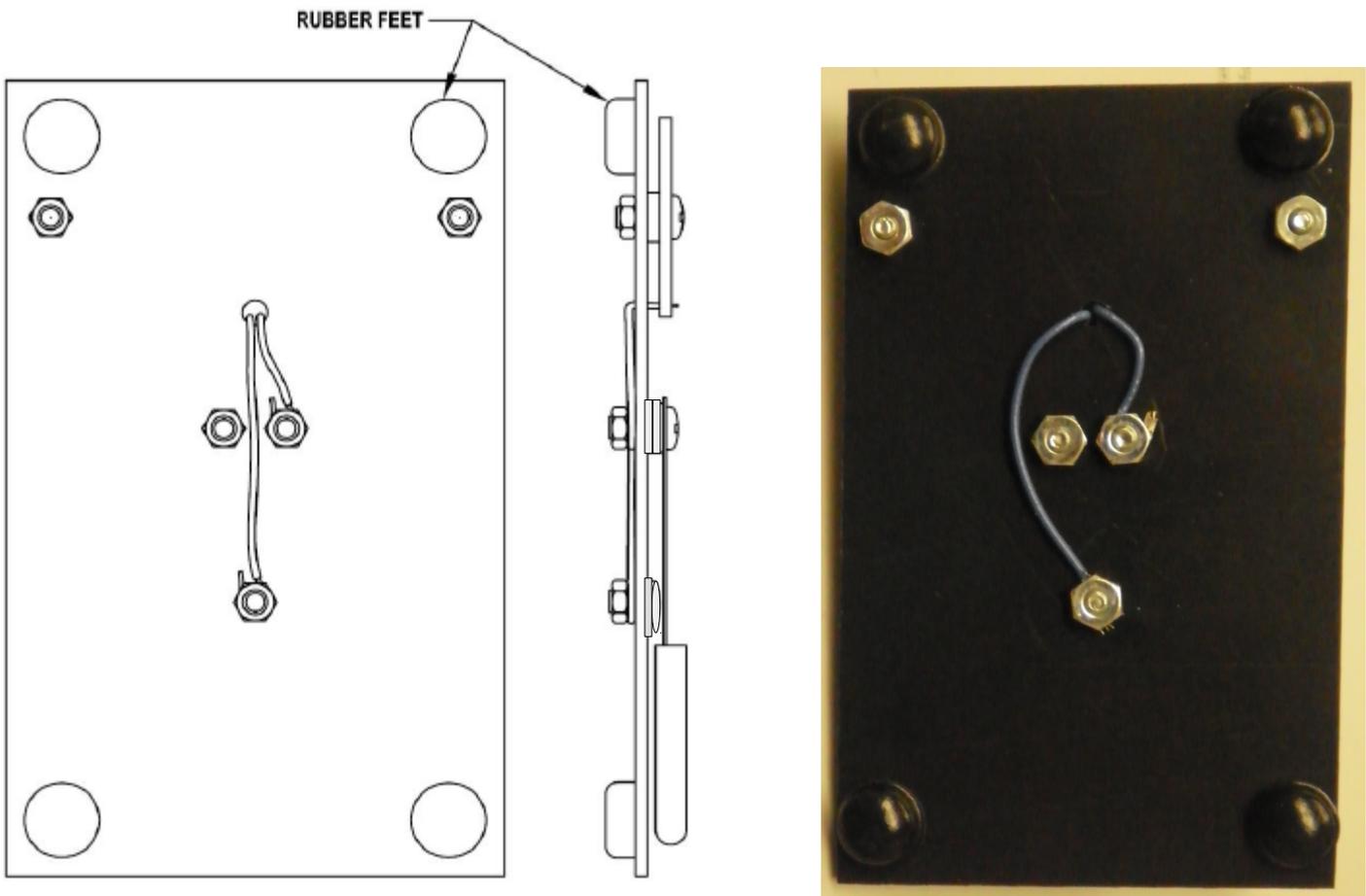
You can now re-install the battery and if needed bend the S.S. leaf spring to achieve the feel you desire for your key.



Note: You will need a small amount of clearance between the leaf spring and the screw head as shown below



Lastly, apply the four rubber feet, at the corners as shown below



Congratulations, you have completed assembly of your Code Practice Oscillator Kit!

Note: When your CPO kit is not in use, you may want to remove the battery or put a small piece of cardboard between the contacts to keep from depleting the battery.

