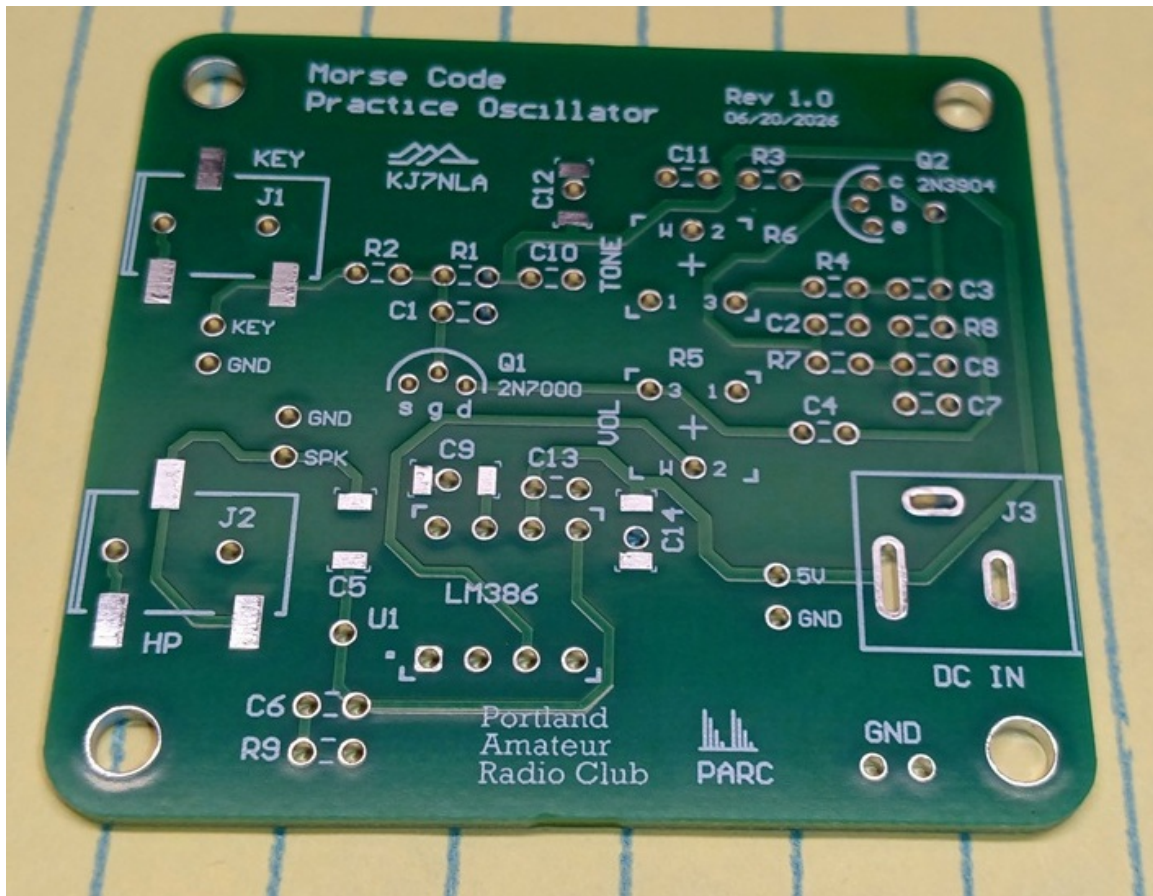


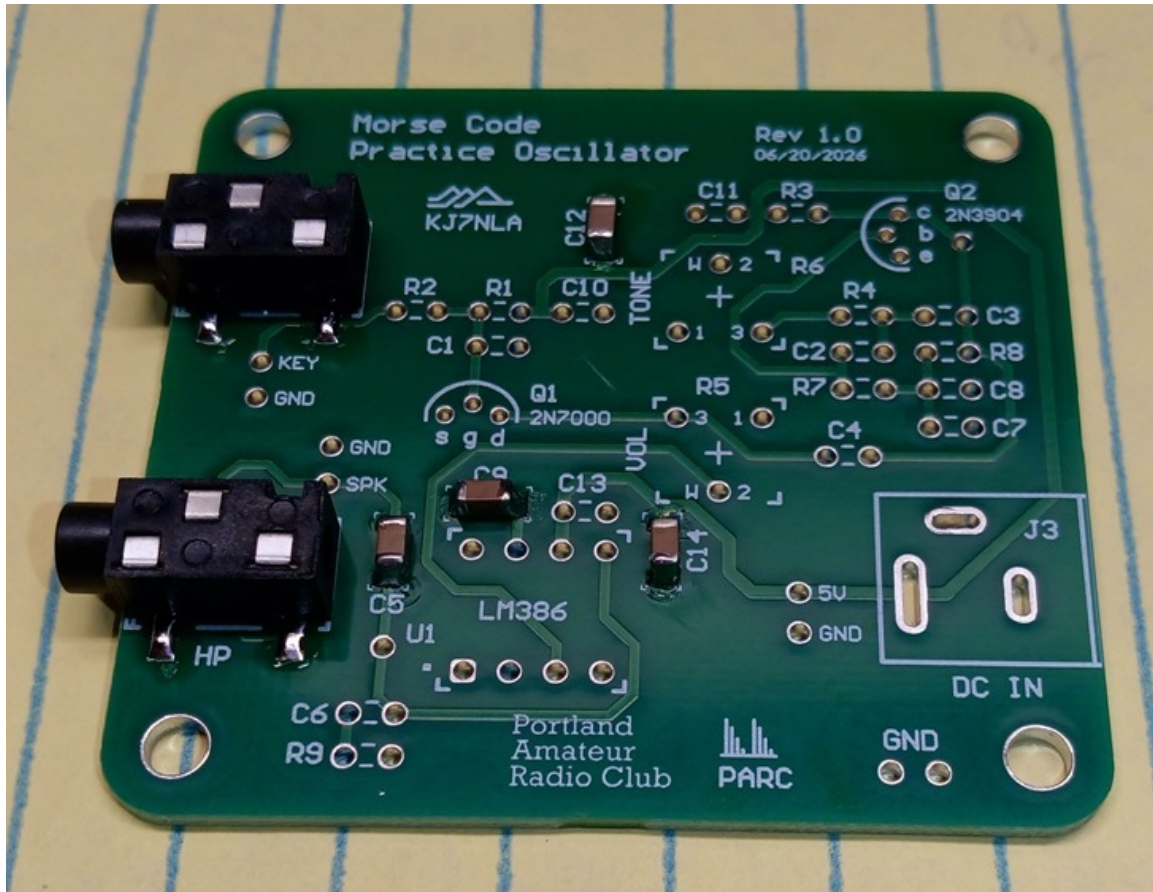
Morse Code Practice Oscillator Build Instructions

Scott Baker
Portland Amateur Radio
Club
July 19, 2026

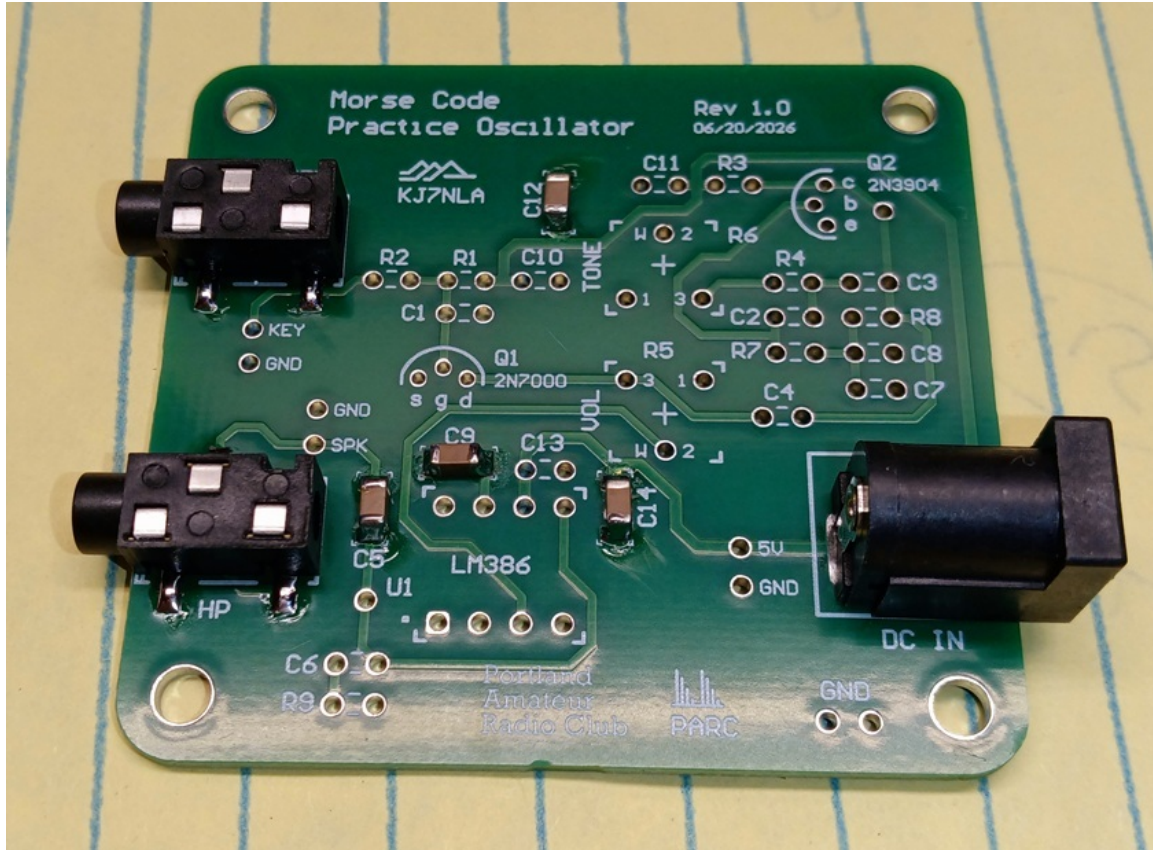
Step 1: Start with a bare board



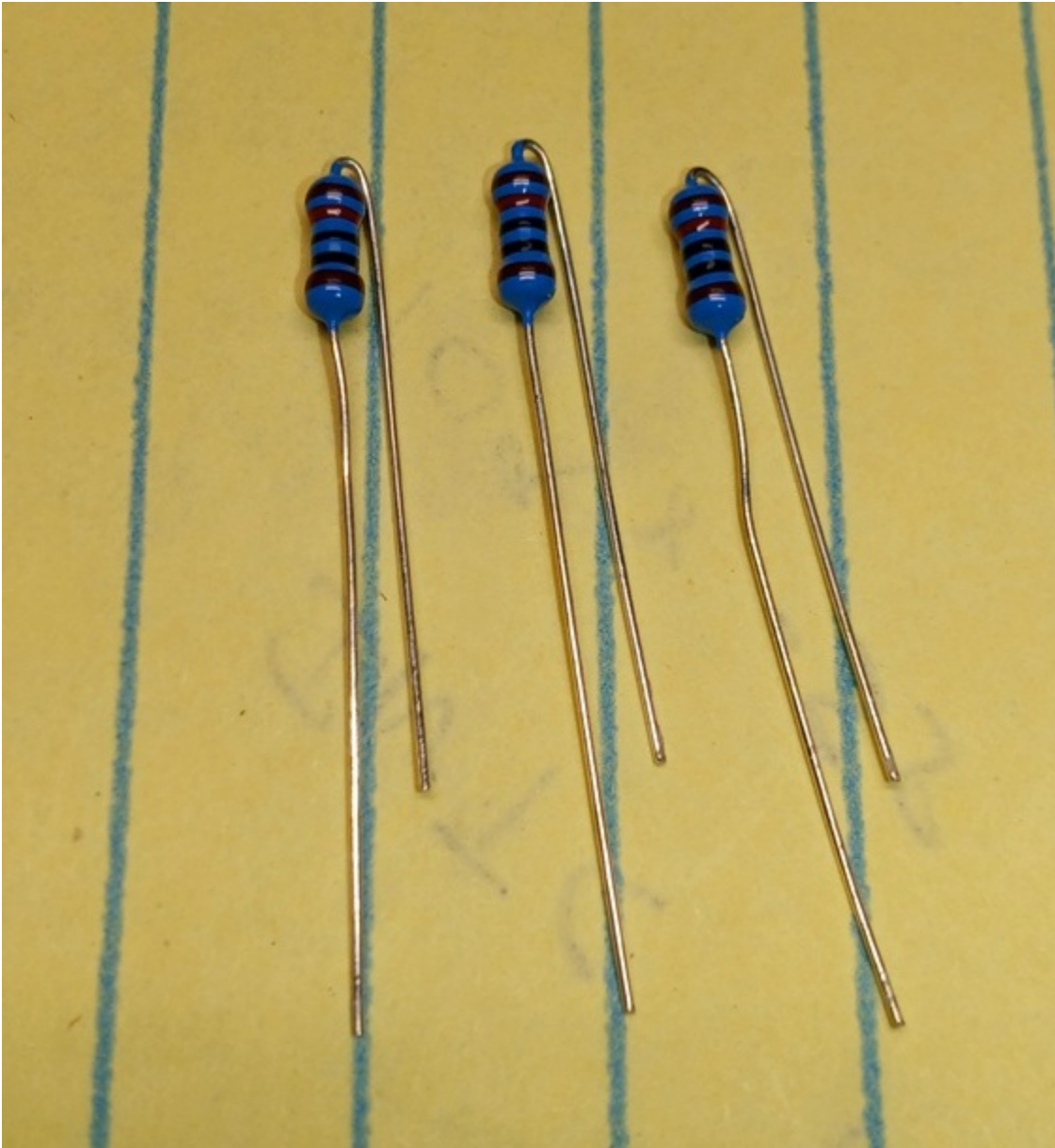
Step 2: Install the SMT parts 47uF caps C5, C9, C12, C14 and J1 and J2



Step 3: Install J3 (power)



When installing the resistors, bend the leads as shown here:



Step 4: Install 10k resistors R1 and R3



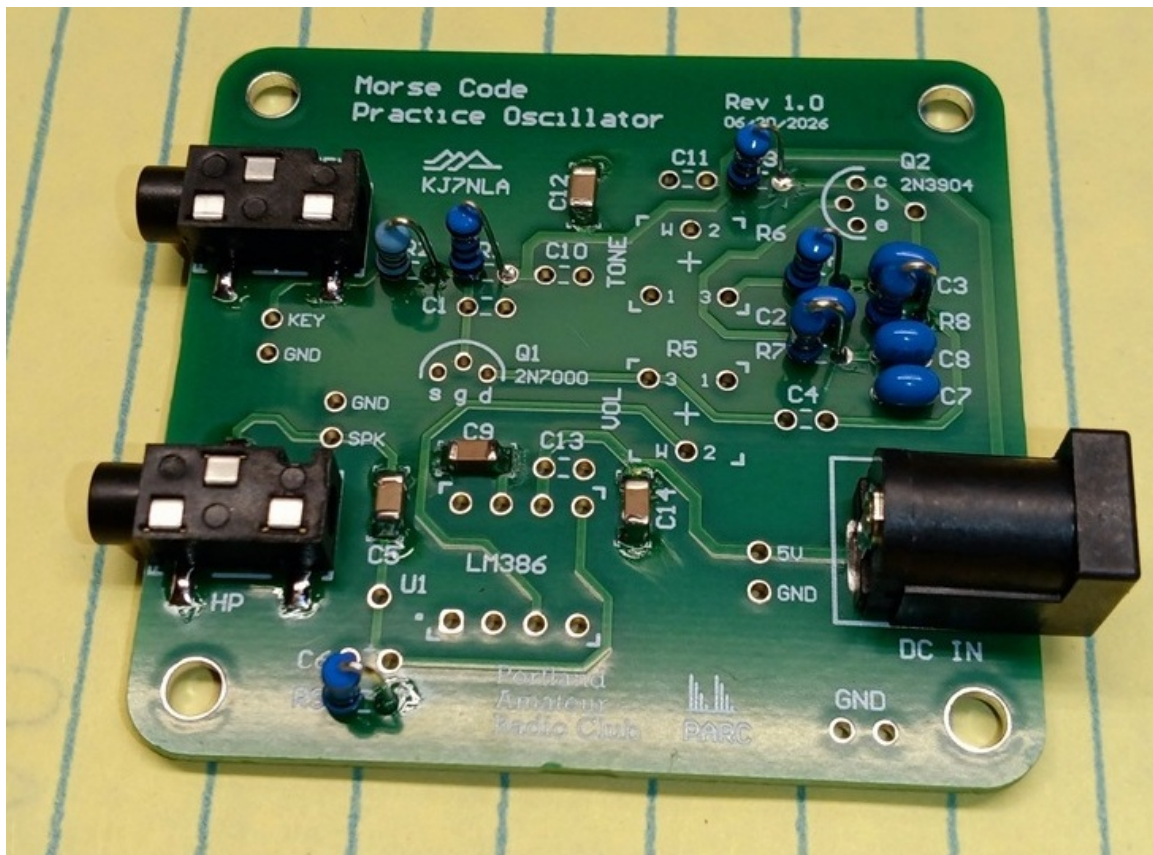
NOTE: Don't install R4 here .. wait until Step6b.

Step 5: Install 33k resistors R7, and R8

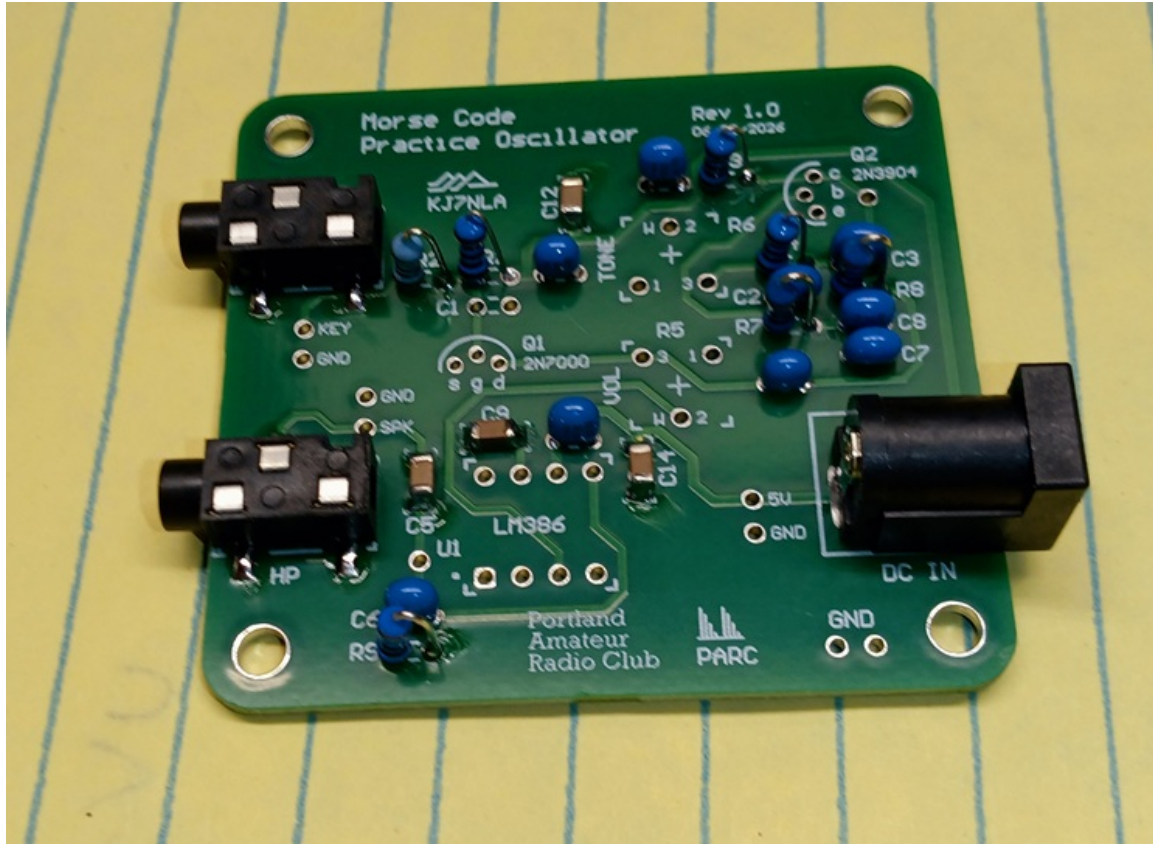


NOTE: Don't install R4 here .. wait until Step6b.

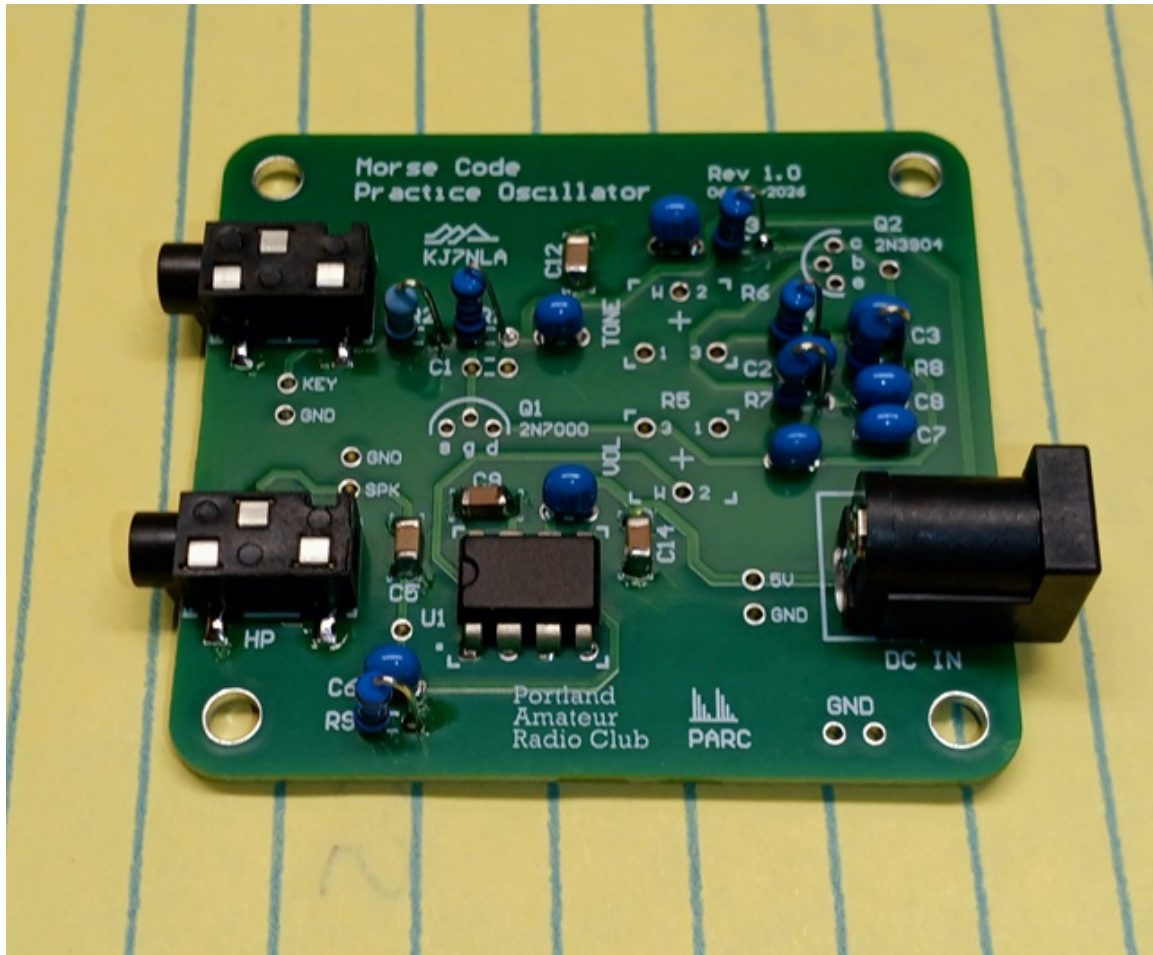
Step 6a: Install .01uF caps C2, C3, C7, and C8
Step 6b: Install 1k resistors R2 and R4



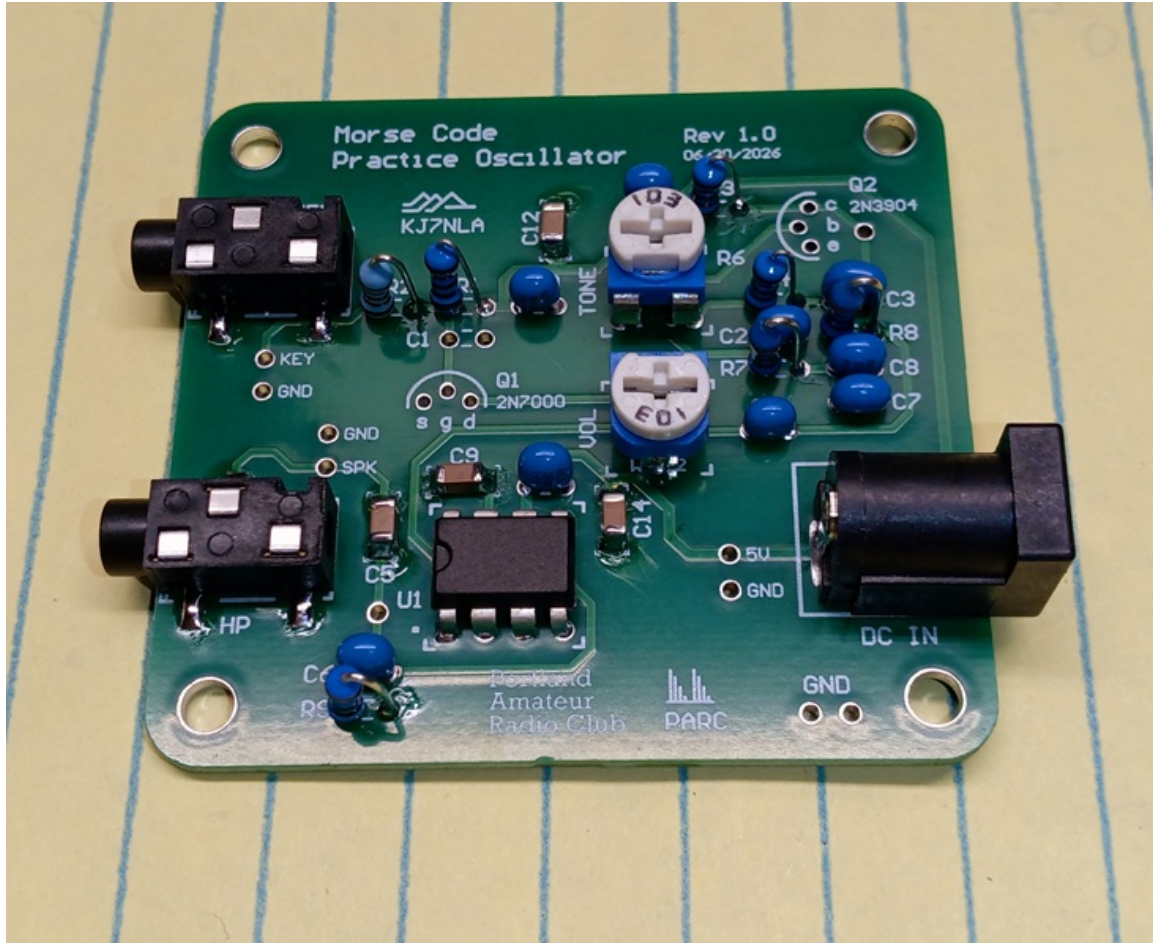
Step 7: Install .1uF caps C4, C6, C10, C11, and C13



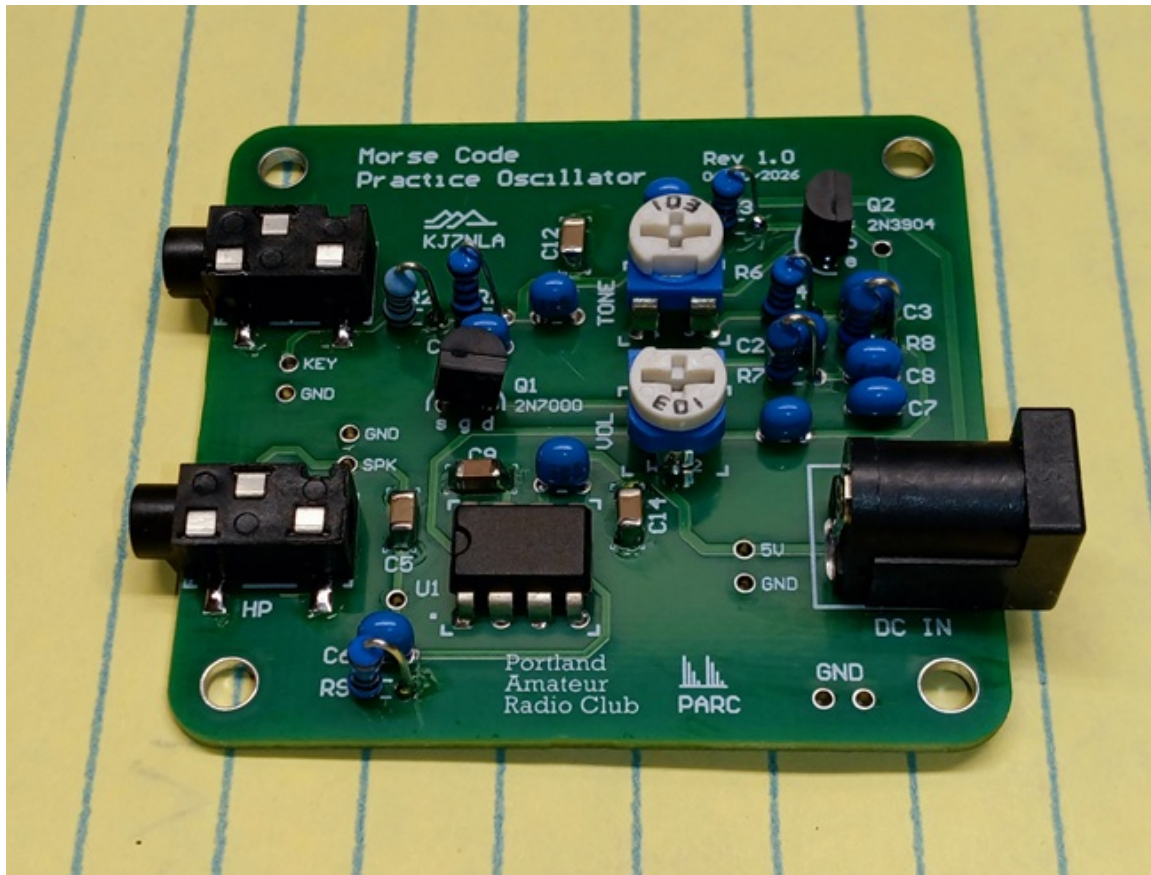
Step 8: Install the LM386 U1



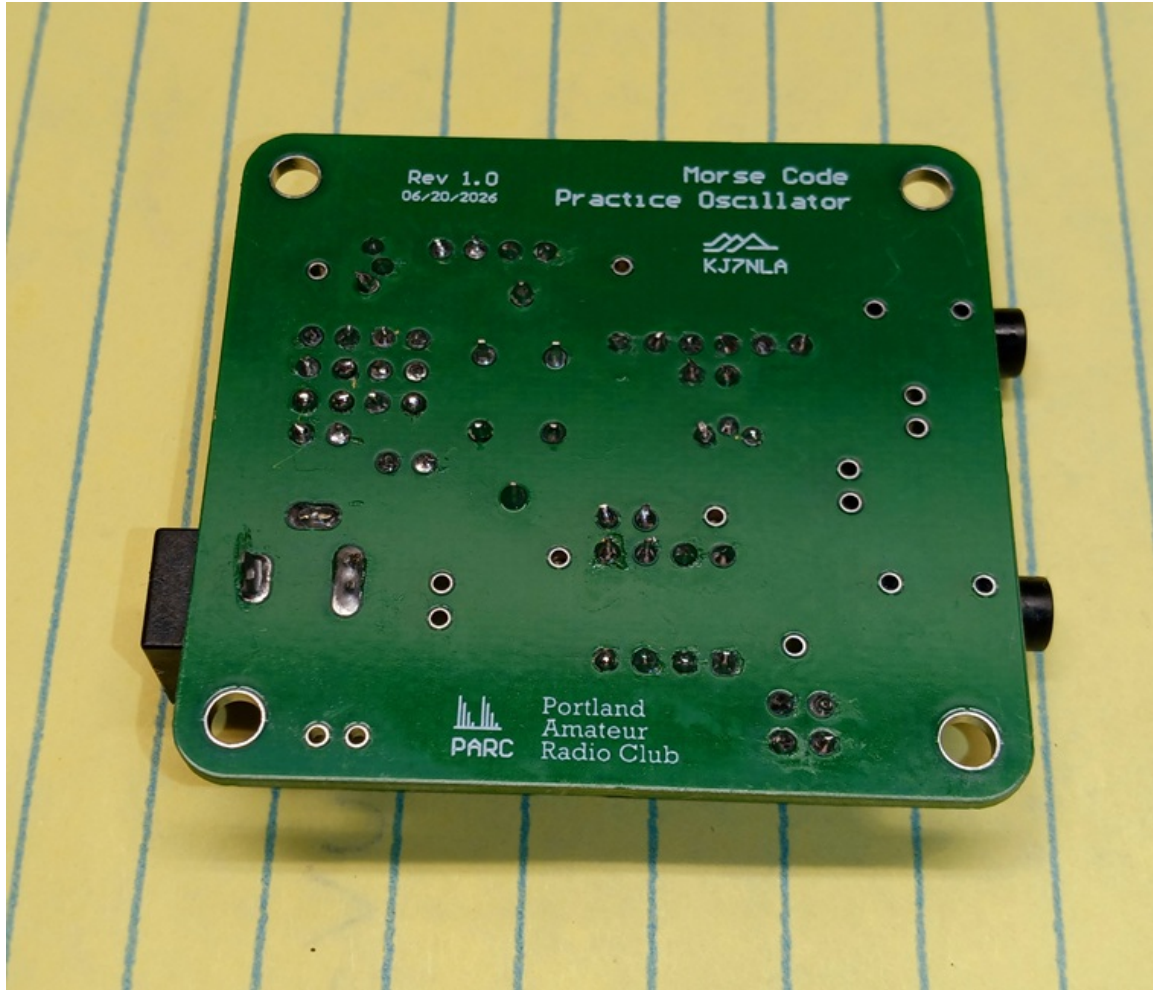
Step 9: Install 10k pots R5 and R6



- Step 10a: Install 1uF cap C1
- Step 10b: Install 10 Ohm resistor R9
- Step 10c: Install 2N7000 FET transistor Q1
- Step 10d: Install 2N3904 NPN transistor Q2



After all components are installed, here is what the back of the board looks like.



Case

A 3D-printed case is available. The .stl files are available at this URL:

https://drive.google.com/drive/folders/1R84DFMV7rr48Y6S06JiXNQzTbnnv7qxv?usp=drive_link



Adjustments

Start with trim pots R5 and R6 at their mid positions.

Rotating R5 clockwise will increase the volume.

Note: If you turn it too far clockwise, clipping will occur.

Rotating R6 clockwise will increase the tone frequency

The recommended tone frequency is ~600 Hz

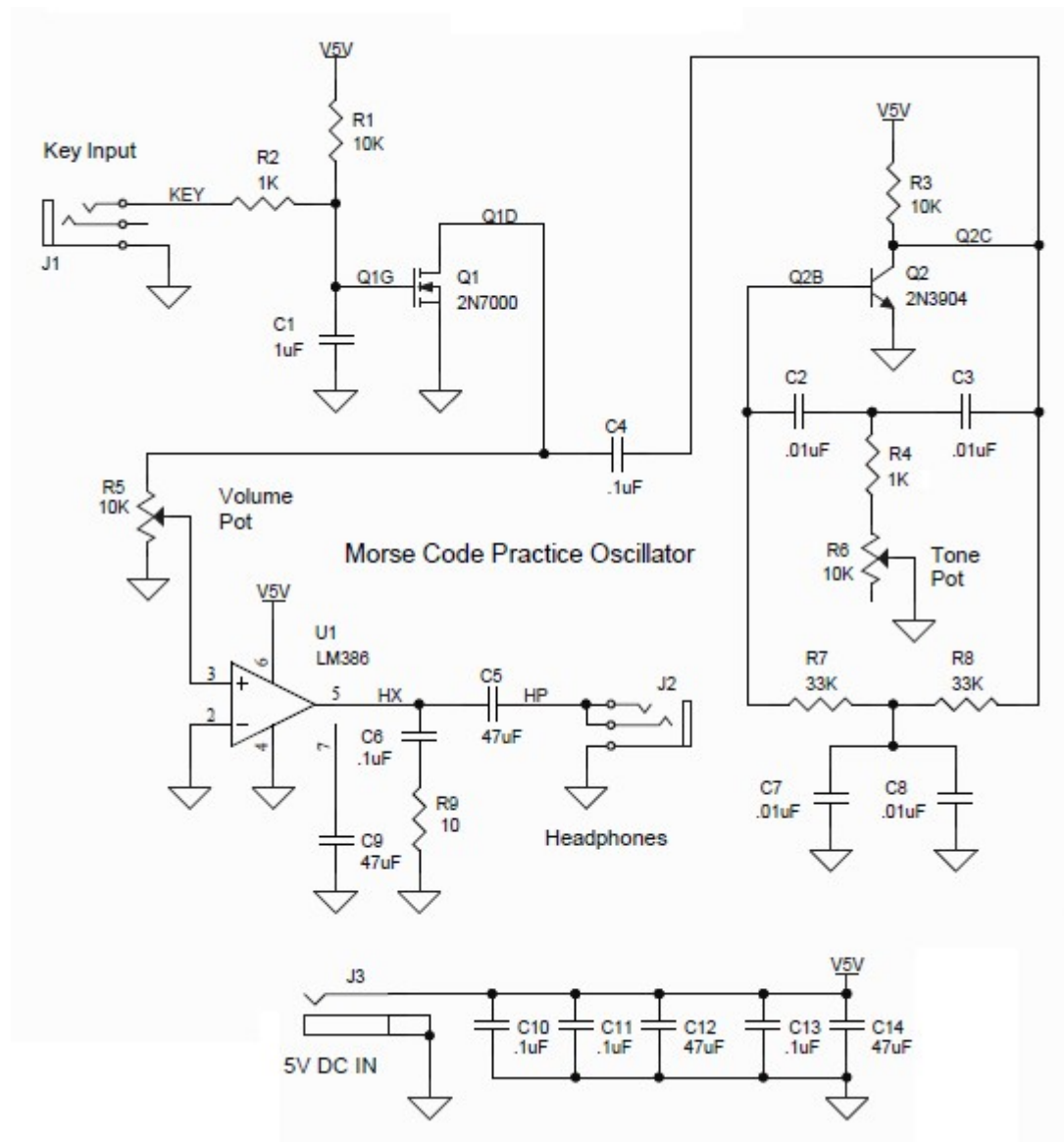
What if it doesn't work?

- a) Verify that all components are inserted correctly.
- b) Check for cold or missing solder joints.
- c) Using an oscilloscope, check each of these:
 - 1. The twin-T oscillator (Q2 and its associated components)
 - 2. The muting circuit (Q1 and its associated components)
 - 3. The audio amplifier (LM386 and its associated components)
- d) Phone a friend **

** Don't give up.

Debugging electronics is an art that takes time to develop.

Schematic



Assembly Drawing

