voltage input is at J2, with the POSITIVE pad located closer to the center of the board, and GROUND pad closer to the edge of the board. ***MAKE SURE THAT YOU DO NOT USE THE J4 BATTERY INPUT IF YOU ARE USING THE REGULATED SUPPLY INPUT!***

REGULATED 3-5V source: If your rig already has an internal regulated source, or you want to run off of a battery source for a stand alone application, then you may want to take advantage of this. The input for this regulated voltage is J4. If you decide on this option to power the unit, you do not need the following components: C1, C2 and U2.

(7). Audio feedback/sidetone:

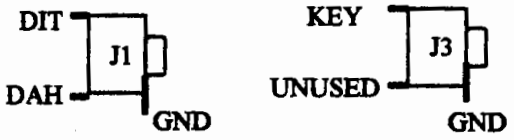
Piezo Method: We wanted to make the TiCK-4 kit as simple as possible, so we decided to provide a method of audio feedback and/or sidetone that would not require a connection to the radio audio chain. The way this is done is by providing an output for a piezo transducer to connect to. The piezo transducer connects between the two pins of J6. Polarity is not necessary. You will have to place a jumper for R3, and C4 and **NOT POPULATE** R2 or C5. Using two small pieces of resistor lead can do this. Bend the leads in a "U" and solder in place of R3 and C4. This jumpers pin 3 of the TiCK-4 to J6 pin 1. There should be continuity between pin 3 of the TiCK-4 and pin 1 of J6. This method allows for the easiest implementation of embedding a keyer into your rig. The ONLY connection required between the keyer and the rig is the keyline of the keyer (J3) to the keyline of your rig. This could be as simple as connecting to the front (or rear) panel key input of the rig.

Internal Audio Chain Method: We also decided to make it possible to experiment with adding the TiCK-4 to a radio and integrating it in the audio chain. We have set up the typical arrangement required to integrate the keyer into many rigs. This involves removing the current sidetone circuitry that is generated by your rig, and inputting the sidetone and feedback from the keyer (pin 3 TiCK-4). We included the following components to reduce the output voltage and couple it to the rig's audio chain: R2, R3, C4, and C5. For the Norcal-40A, we have been told that the value for R2 is 27K, and R3 is 1Meg, but we have not tried this implementation. We leave this up to the experimenter to determine values for the rig in question.

BUT REMEMBER, IF YOU DON'T WANT TO MAKE THIS COMPLICATED, JUST USE THE PIEZO!

(8). Now that the components have been placed and soldered on the board, the final wiring can take place. First jacks to be wired are paddle input (J1) and keyline output (J3). Both these jacks look identical, except that the keyline jack (J3) has a small spring inside it.

J1 and Paddle Input wires: requires 3 wires of equal length. The exact length should be sufficient to connect from the board to your choice of location for J1. J1 is the stereo, paddle input jack.



J3 and the keyline output wires: requires 2 wires of equal length. The exact length should be sufficient to connect from the board to your choice of location for J3.

J5 and S1: requires 2 wires of equal length. The exact length should be sufficient to connect from the board to your choice of location for S1.

(9). Install U1, the PIC microcontroller. Be careful to discharge yourself of any static electricity before handling the chip. Make sure the tab on the chip matches the location on the silk-screen, thus insuring correct orientation of the chip.

(10). At this point, hook up your paddles and supply power to the unit. When first powered up, the TiCK-4 will send "ST" (dit-dit-dit, dah) through its sidetone output. If there is no audio output on the piezo, go back and check for the following:

Solder Bridges - The most common mistake made. Check the bottom of the board for solder blobs, which serve to bridge two unconnected points. Use a magnifier and bright light if possible. Check for unsoldered pins and cold solder joints (these appear dull and somewhat rough).

Parts Placement - Go over the instructions and insure that each part is in its correct position on the board. Something as simple as an incorrectly placed resistor may cause the unit to malfunction. Verify that the microcontroller is oriented correctly, with respect to the tab on its end.