

Assembly Instructions

Indoor Thermometer

Thank you for your purchase of the Indoor Thermometer. These instructions are photo-based so the need for detailed textual descriptions, for proper assembly, is minimized. Photo 1 shows the unit fully assembled for reference purposes. Please note this photo shows R1 – R4 as 1% resistors. However, all Kits are shipped with 5% resistors as shown in Photo 2 and detailed in the BOM.

The following tools are required for assembly and calibration of unit.

1. 4" Wire cutters
2. 4" Needle nose pliers
3. 4" Flat blade screwdriver (Xcelite R181)
4. 20 to 40 watt Solder Iron or Solder Station
5. 60/40 Rosin core solder
6. Digital Multi-Meter (DMM)
7. Optional: Axial lead bender (Elenco BR010279)

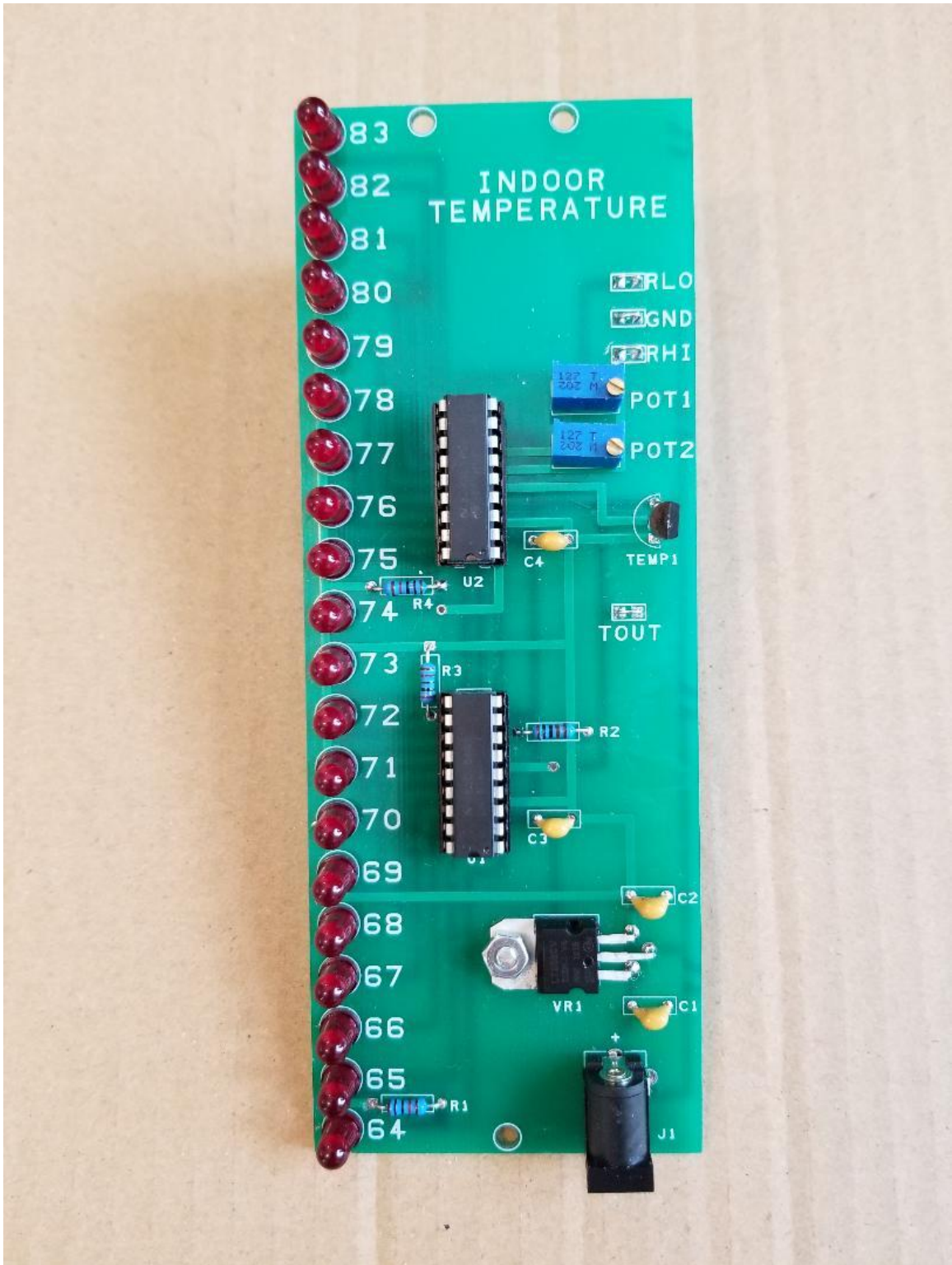


Photo 1 – Fully Assembled Unit

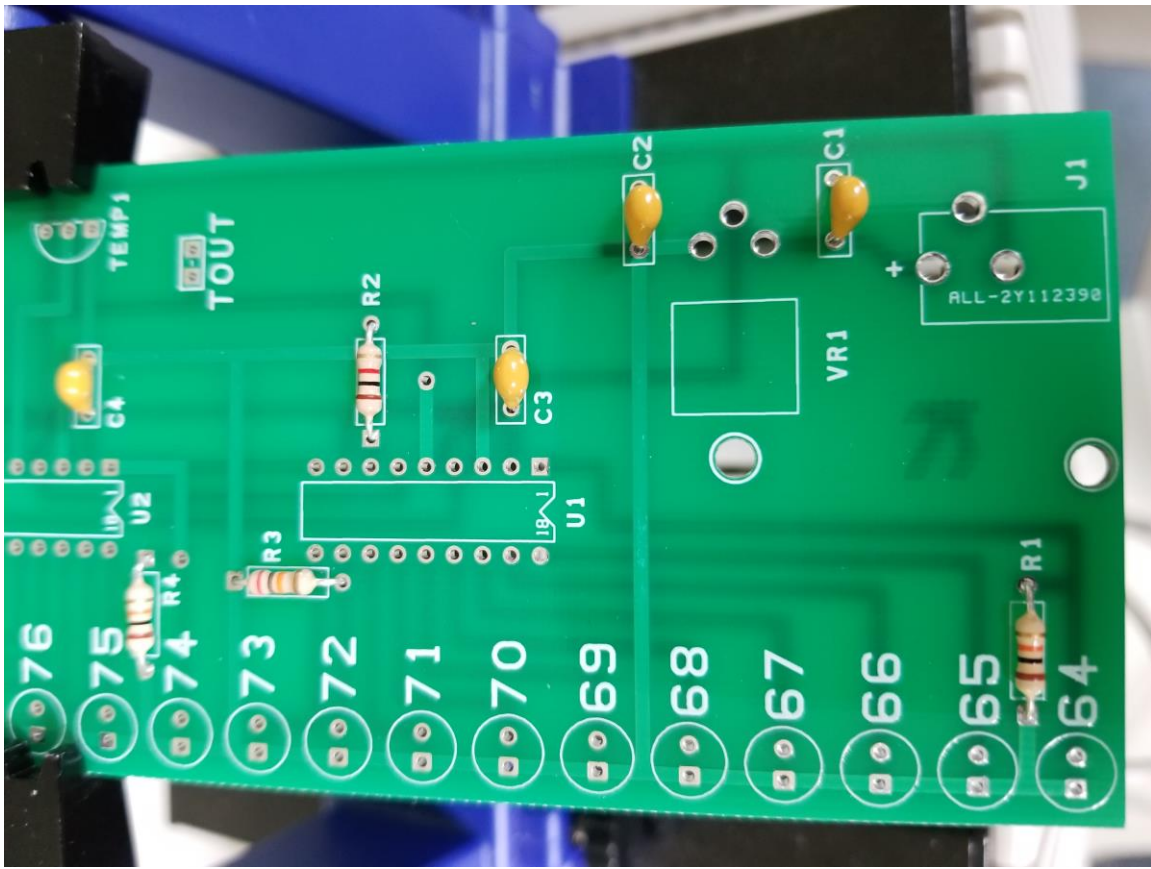


Photo 2 – Resistor/Capacitor Placement

These components do not have polarity and can be placed in either direction.

C1 - C4 = 0.1uf

R1 and R4 = 10K = Brown Black Orange Gold

R2 = 1K = Brown Black Red Gold

R3 = 20K = Red Black Orange Gold

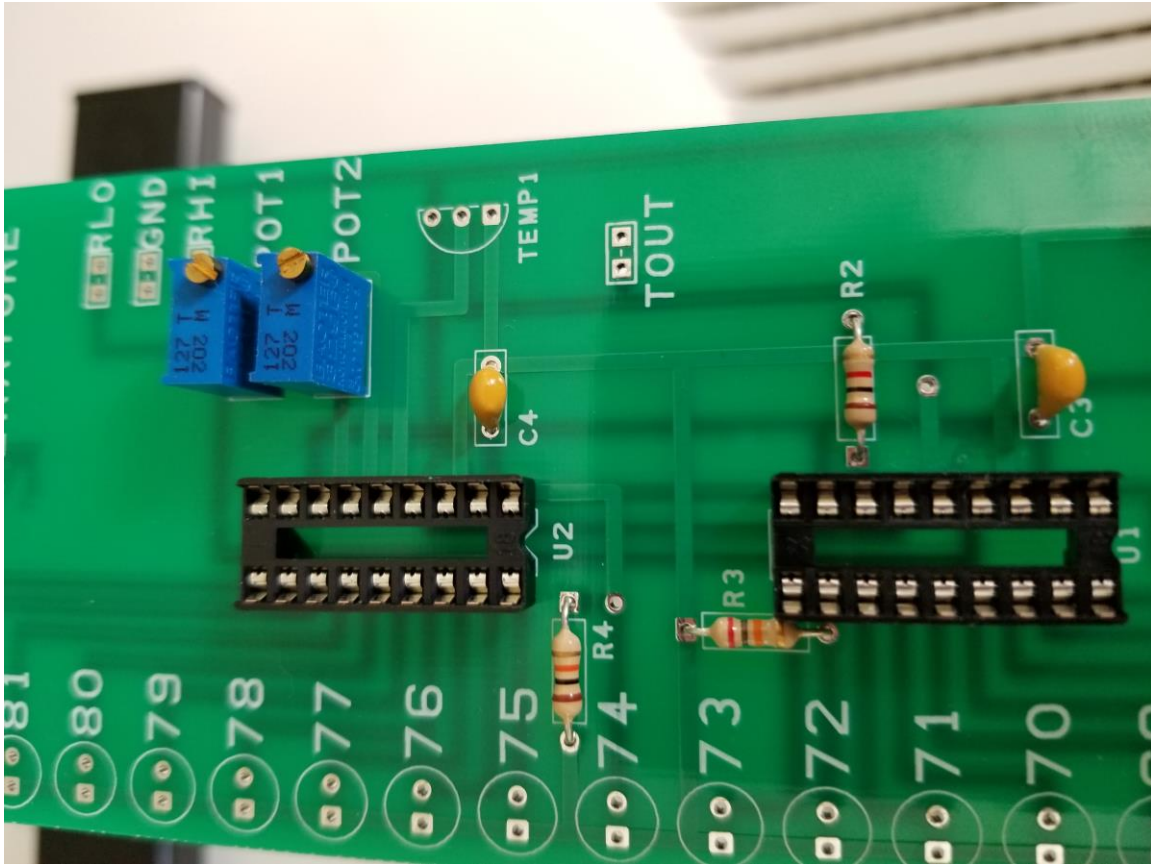


Photo 3 - IC Sockets and Pots

Place IC Sockets and Pots as shown above. Please note the small semicircle on the socket should be next to U1 and U2 designator. Additionally, U1 and U2 - Pin 1 is denoted as a square pad on the PCB.

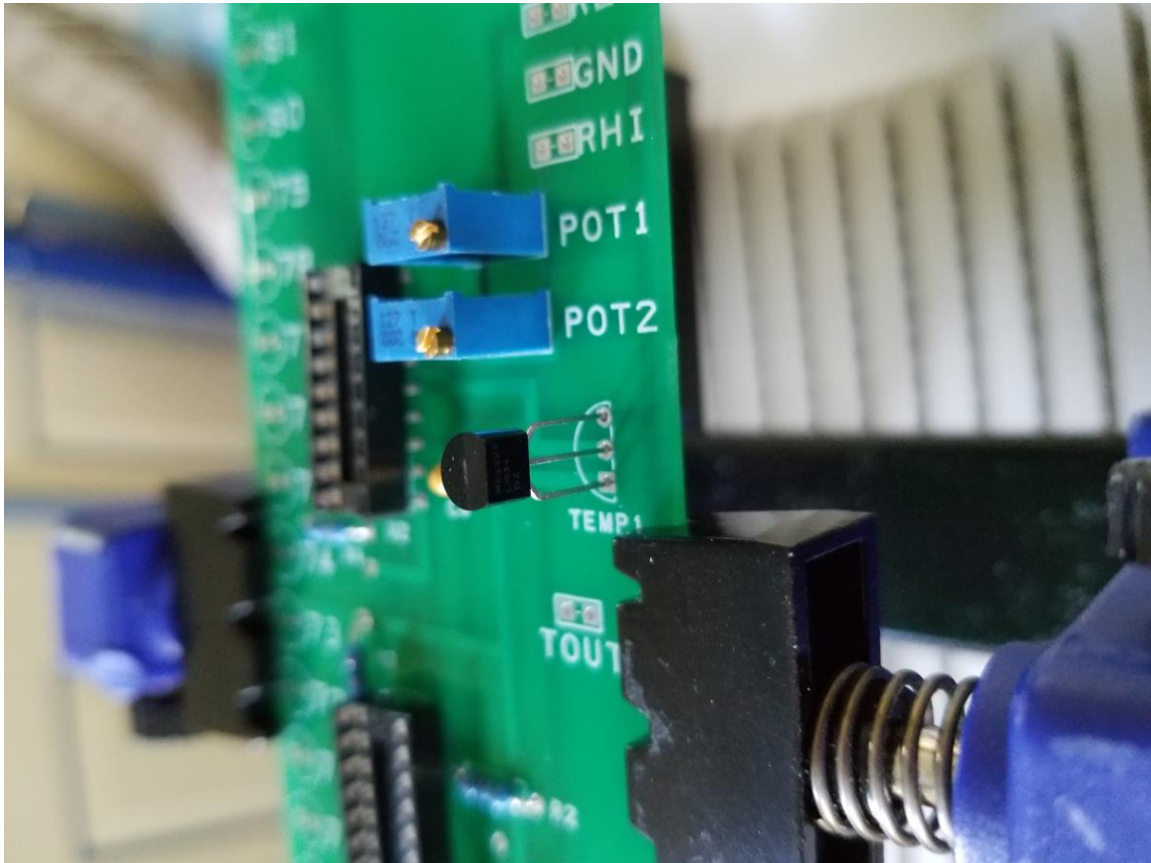


Photo 4 – Temp1 Sensor

Please note that this device is polarity sensitive.

The flat side of the Sensor should line up with board edge. Also match semicircle on Sensor to semicircle on PCB. This part should be elevated off the board, as shown. Solder center-lead first, verify component is level then solder two outside pins.

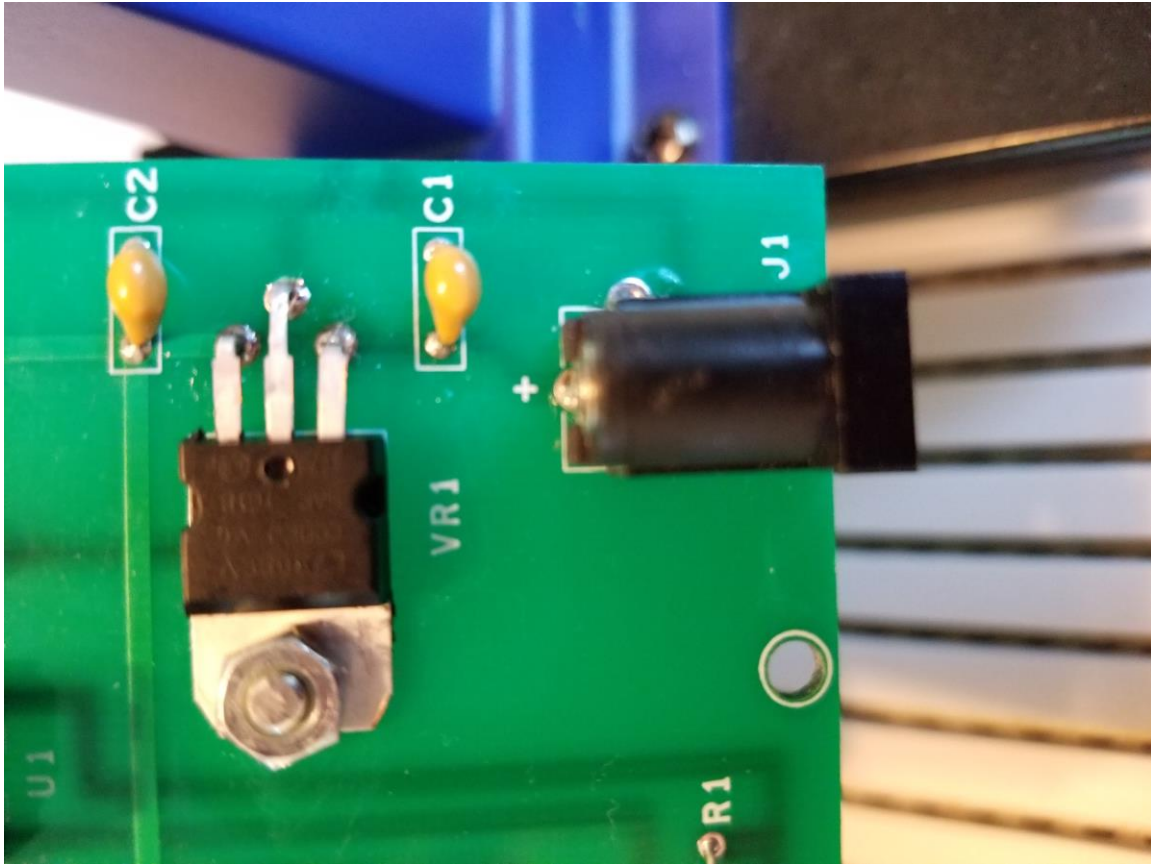


Photo 5 – Power Jack/Voltage Regulator

Place components as shown. Bend the two outer leads of VR1 at the shoulder then bend center lead to line up with center hole.

Optional: use 4-40 x ¼ inch screw and 4-40 nut to secure VR1.

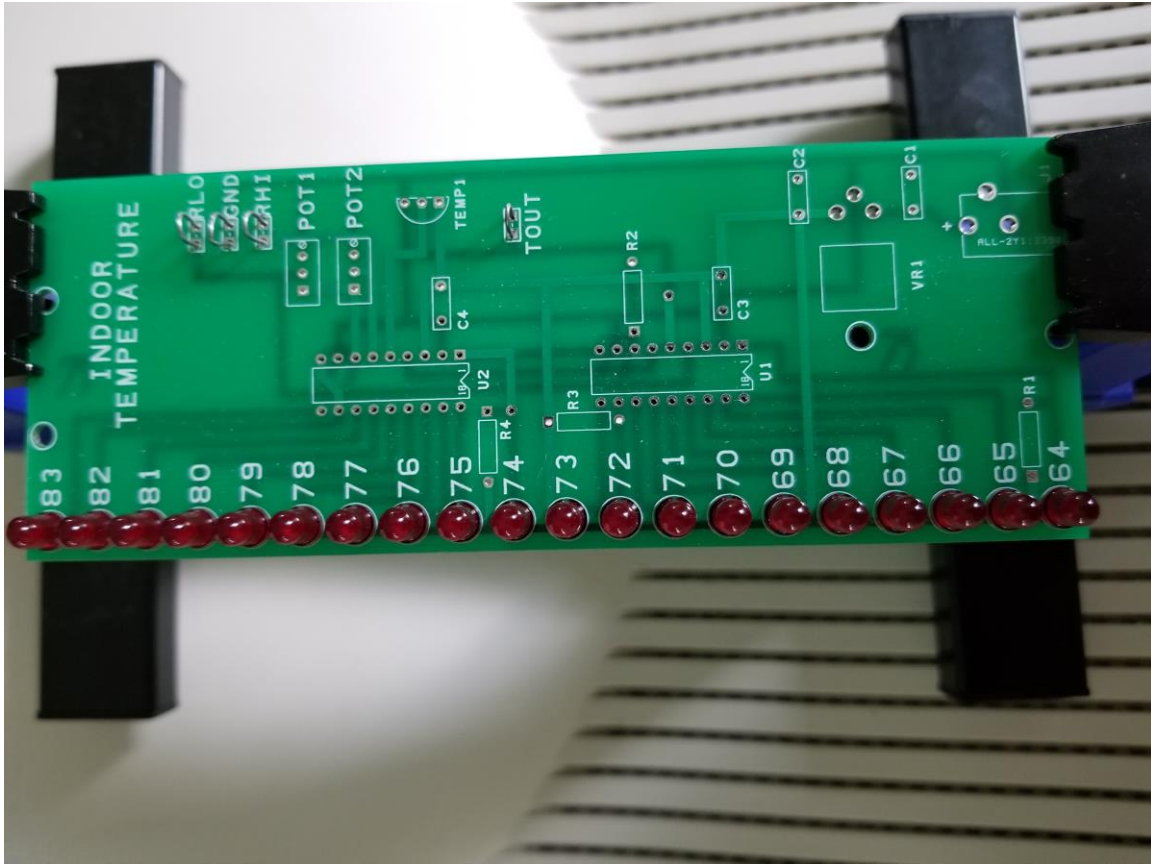


Photo 6 – Led 64 – 83

These devices are polarity sensitive. There are two ways to insure proper placement. The long lead on the LED denotes the positive side, commonly called the Anode. The long lead goes to the square pad on the PCB. The short lead, commonly called the Cathode, goes to the adjacent round pad.

Once the LED is placed, verify the small semicircle at the LED base is adjacent to the LED temperature designation on the silkscreen.

Please work slowly as you do not want to rework 40 PCB pads if LED's are inserted backwards!

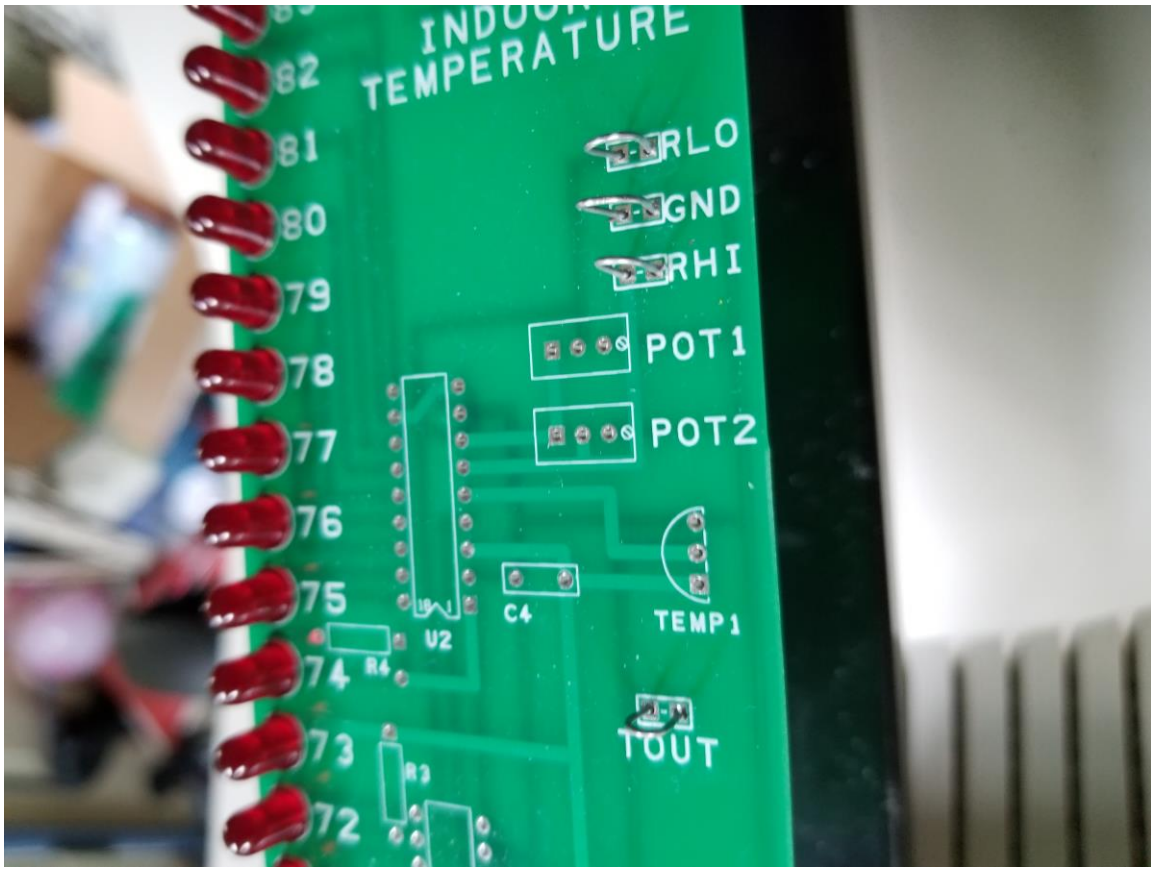


Photo 7 – Test Points

These test points are made from leftover resistor leads and installed as shown. These test points are used for the Calibration Procedure as described below.

Calibration Procedure

Pre-Tests

We have not instructed for the IC's to be installed so we can check the power supply and Temp1 sensor first.

Apply power – insert Wall Adapter Female plug into J1 and plug in Wall Adapter.

Set DMM to 20 vdc range.

Attach DMM negative lead to Test Point labeled GND. Leave connected for entire procedure.

Attach DMM positive lead to VR1 lead closest to C1, refer to Photo 5. Voltage should read +12 vdc $\pm 5\%$. For reference, VR1 center lead is ground (GND).

Move DMM positive lead to VR1 lead closest to C2, refer to Photo 5. Voltage should read +8 vdc $\pm 5\%$.

Move DMM positive lead to Test Point labeled TOUT. This measures the output of Temp1 sensor. Voltage should be Ambient Temperature times 10 as Sensor output is 10 millivolts per °F.

Example: If room temperature is 78 degrees the Voltage output at TOUT should read +0.780 vdc.

Remove power and install both IC's. The semicircle on one end of the IC should line up with the semicircle on one end of the socket. Both semicircles should be adjacent to U1 and U2 IC designator. Pin 1 is the square pad on the PCB for both U1 and U2.

Assembly and Pre-Tests are complete.

Calibration Procedure – continued

Apply power

Attach DMM positive to Test Point labeled RLO.
Adjust POT1 for a reading of +0.630 vdc.

Attach DMM positive to Test Point labeled RHI.
Adjust POT2 for a reading of +0.830 vdc.

Repeat above and verify both reading are exactly 0.630 vdc for RLO and 0.830 vdc for RHI.

This completes Calibration and you are now ready to use the Indoor Thermometer.

The LED string illuminates one LED at a time and the Temperature is read off of the adjacent scale. There is one exception to this rule and it is a function of the operation of the LM3914 IC. This unit operates in the Dot Mode and there is a small amount of overlap or fade between LED's. This assures that at no time all LED's will be "OFF" thereby eliminating ambiguous displays.

In this design, as Temperature moves up/down the scale, one LED will fade out as the next LED fades in. During this transition 2 adjacent LED's are illuminated. When both LED's are equally illuminated this actually provides a 0.5 °F indication.

For example: assume the Temperature is moving up from 75 to 76, as both LED's become equally illuminated, this indicates a Room Temperature of 75.5°.

End of Document
Enjoy!