

Gas Pressure Meter

Assembly Manual

KIT CONTENT

Your Pressure Meter Kit should contain the following:

- PCB
- Resistors (180 Ω , 220 Ω (2), 30 k Ω (2), 1.2 k Ω , 1.5 k Ω , 1k Ω , 5.1k Ω)
- Low Power Op-Amps (3)
- Potentiometers (5k Ω , 10k Ω)
- Wires (for pressure sensor (4) and switch)
- Pressure Sensor
- Microcontroller (Previously Programmed)
- Two 7-segment LED
- Battery Connectors (2)
- Mounts (6)
- Cardboard Casing
- Switch

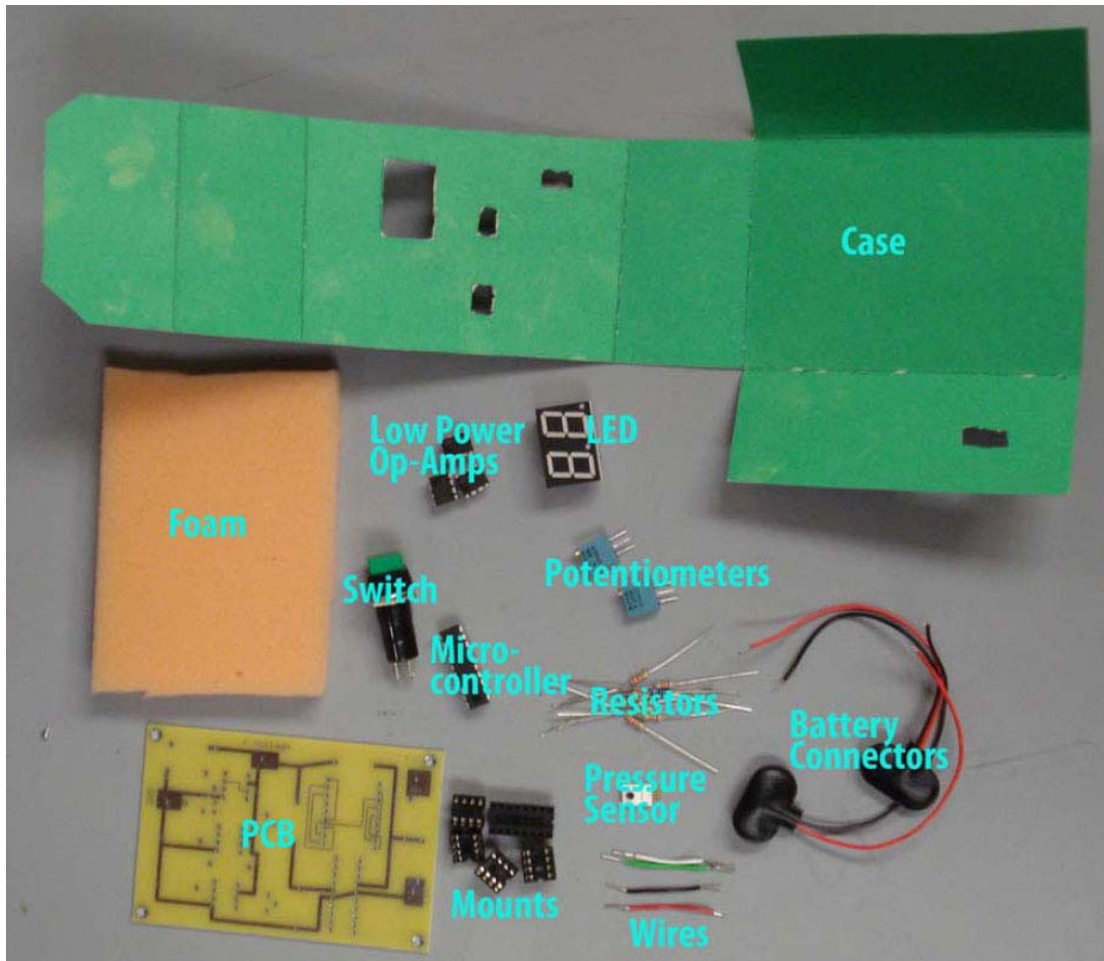


Figure 1 – Parts included in pre-compiled kit.

TOOLS YOU WILL NEED:

- Soldering Iron
- Solder (Low temperature if available)
- 9 – Volt Batteries (2)
- Wire Cutter
- Tape or Glue
- ~3mm Flathead Screwdriver
- Pressure Reference (Bourdon Gauge pictured)
- Blood Pressure Cuff
- IV Tubing
- T-Connector
- Y-Connector
- IV Tubing adaptor



Figure 2 – Soldering equipment included in Tools You Will Need to build the sensor.

Step 1 – Solder Wires onto Pressure Sensor:

Using the Low Temp Solder and a soldering iron (Figure 2), drip a small amount of solder onto each of the prongs of the pressure sensor. Repeat on the wires and connect by touching the solder iron to the wire and pressure sensor prong simultaneously. Ensure that the number of the wire matches the number of the prong (Figure 3). Once the two are attached, ensure that the attachment is secure and there is no solder connecting the prongs located next to each other. Set aside until the pressure sensor is needed. Glue IV tubing around the pressure sensor.

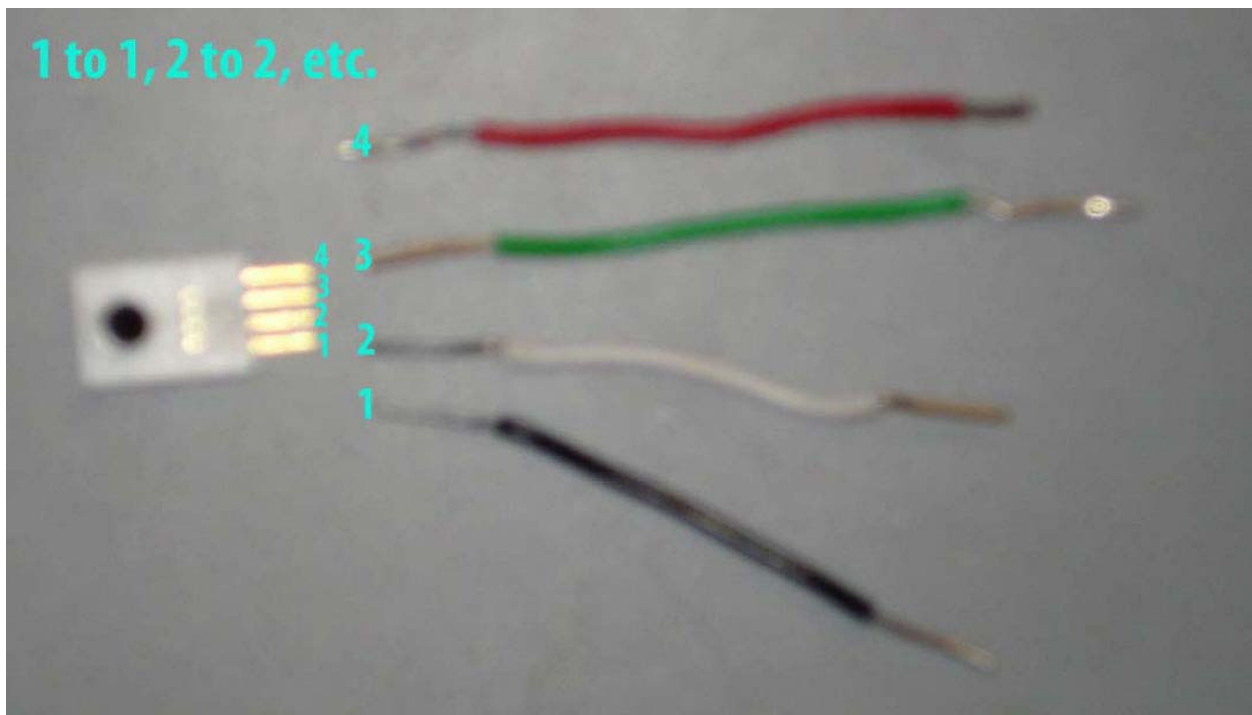


Figure 3 – Pressure sensor prongs corresponding to colored wires.

Step 2 – Solder Op Amp Mounts into PCB:

Note: if low temperature solder is available, you do not need to use mounts and should therefore solder in the PIC and op amps rather than the mounts..

Place three of the six mounts into the PCB slots as shown below. Turn the PCB over while holding the mounts in. Place a small amount of solder on each prong of mount on the backside of the PCB, ensuring that each prong becomes connected to the PCB. Repeat for all eight prongs on the three mounts and make sure that there is no solder connecting the prongs. Clip any extensions (Figure 4).

Step 3 – Clip and Solder Microcontroller Mounts into PCB:

Place two of the three remaining mounts into the microcontroller slots of the PCB (Figure 5). Clip four legs on the last mount using wire cutters (as shown below in Figure 4). Place this mount next to the other two. Ensure that the microcontroller can easily be placed inside the mounts. Solder the mount prongs similarly as above, again making sure that there are no overlapping connections. Clip any extensions.

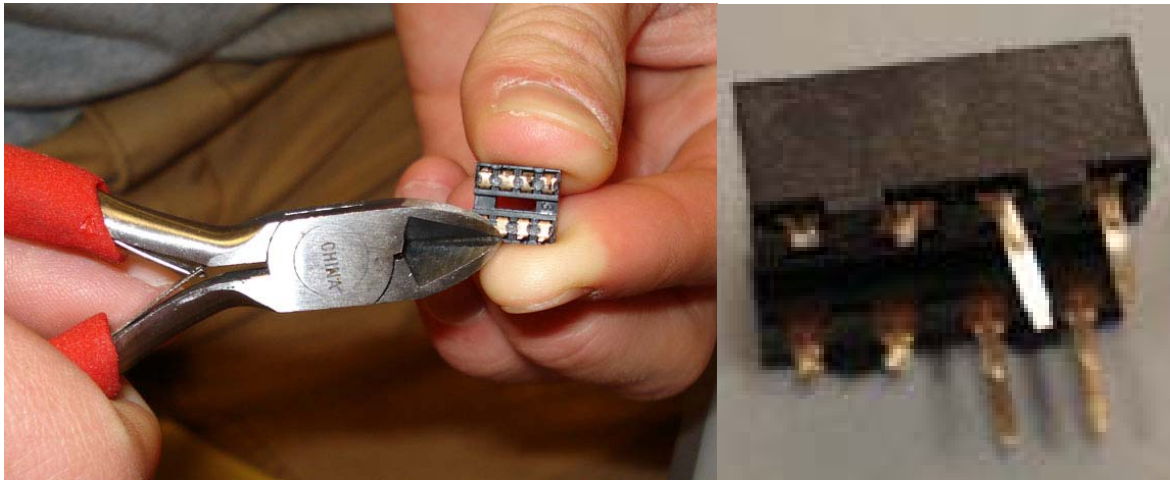


Figure 4 – Clipping prongs off of one microcontroller mount.

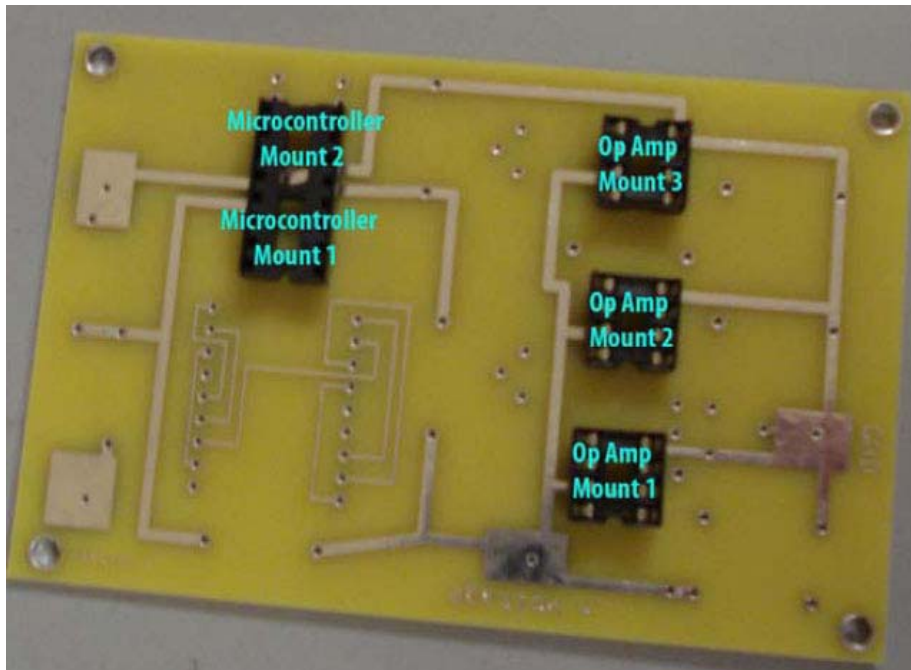


Figure 5 – All mounts except the third microcontroller mount with clipped prongs. Place this third mount adjacent to Microcontroller Mount 2.

Step 4 – Solder LED into PCB:

Place the LEDs into the PCB, with the decimals facing away from op amp mounts (Figure 6). Similarly as above, solder the LED prongs into the board, ensuring that they do not overlap. Clip any extensions.

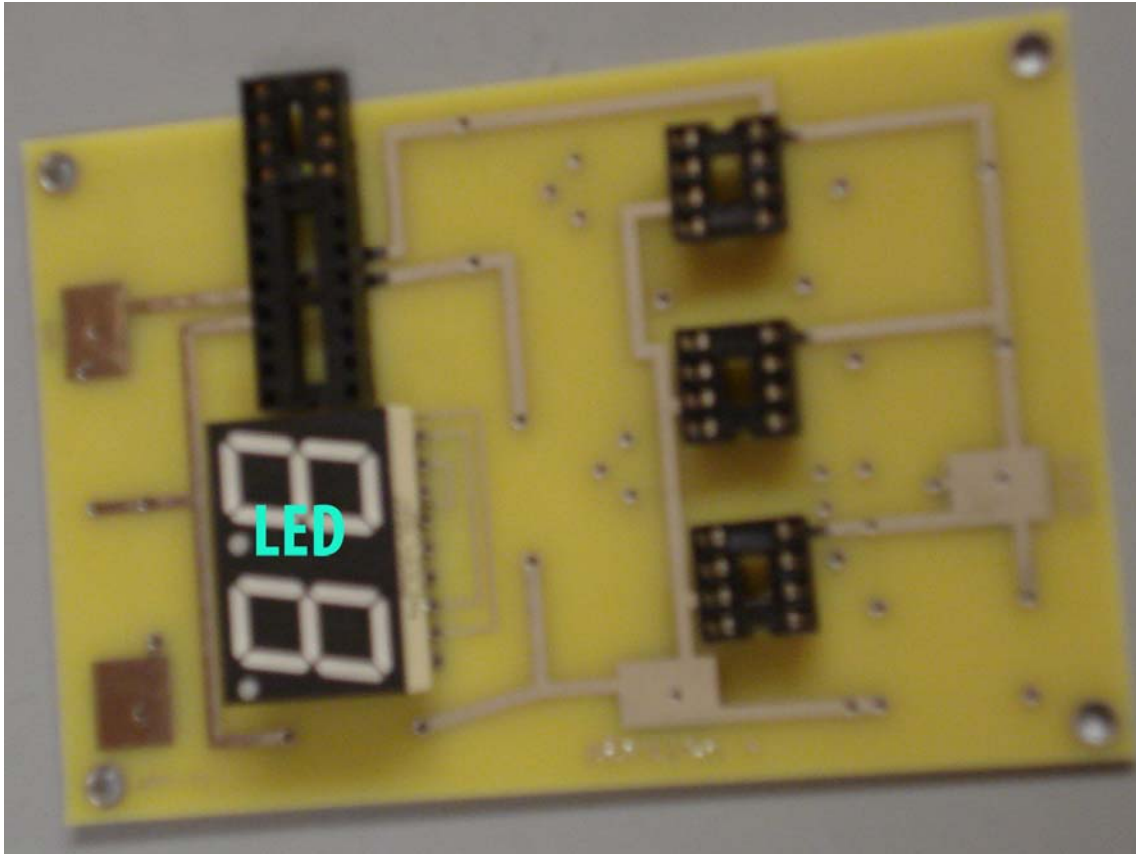


Figure 6 – Circuit including two 7-segment LED chip. Note the orientation of the chip.

Step 5 – Solder Potentiometers into PCB:

Place the 5k Ω potentiometer in the middle triangular slot on the PCB (Figure 7). Solder the prongs as above. Place the 10k Ω potentiometer in the edge triangular slot (across from the microcontroller mounts) (Figure 7). Solder similarly. Clip any extensions.

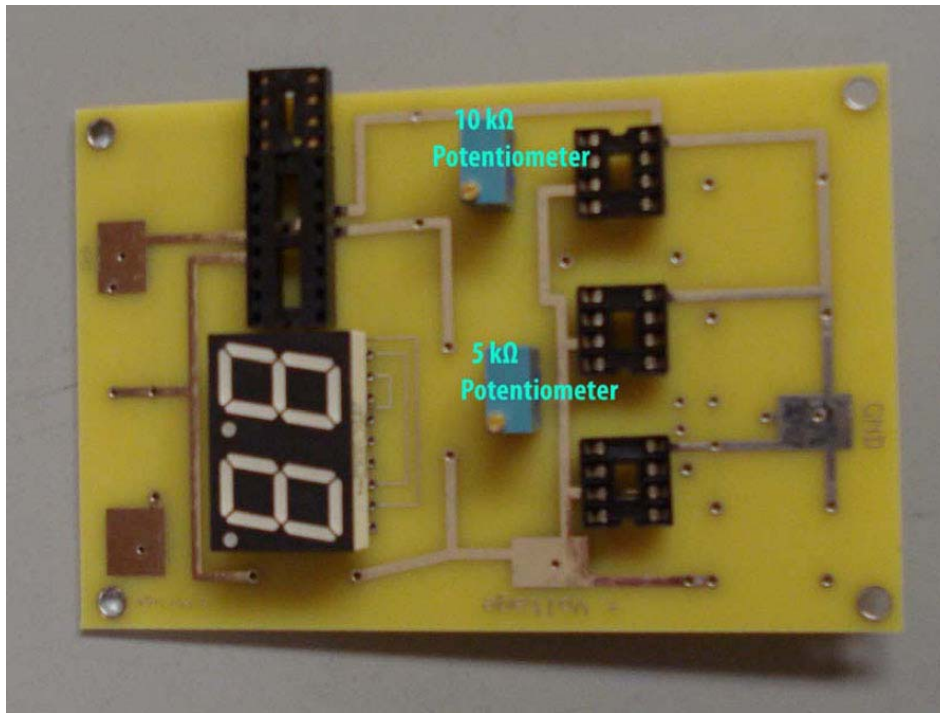


Figure 7 – Circuit including two potentiometers.

Step 6 – Solder Resistors into PCB:

Resistor value	Number of resistors	First 3 color bands
180 Ω	1	Brown, gray, brown
220 Ω	2	Red, red, brown
1 k Ω	1	Brown, black, red
1.2 k Ω	1	Brown, red, red
1.5 k Ω	1	Brown, green, red
5.1k Ω	1	Green, brown, red
30k Ω	2	Orange, brown, orange

Table 1: Contains all of the resistor values, number of the particular resistors and the colors on the resistors allowing for differentiation of different ones

Place the appropriate resistors in their slots (Figure 8). Determine which resistor is which by the color of the bands on the resistors. The first band refers to the first number of the resistor value,

second band refers to the second number of the resistor value, the third band refers to the decimal multiplier of the resistor value, and the fourth band refers to the tolerance. Table 1 delivers these values and the colors, thus there is no need to refer to outside charts. Once all of the resistors are placed in (Figure 8), solder them into the back of the PCB by placing a small amount of solder on connection between the wire and the small ring on the PCB around the hole through which the wire is placed. Ensure that the wire is soldered on tightly and that there are no connections with other parts of the board. Clip the leftover wire.

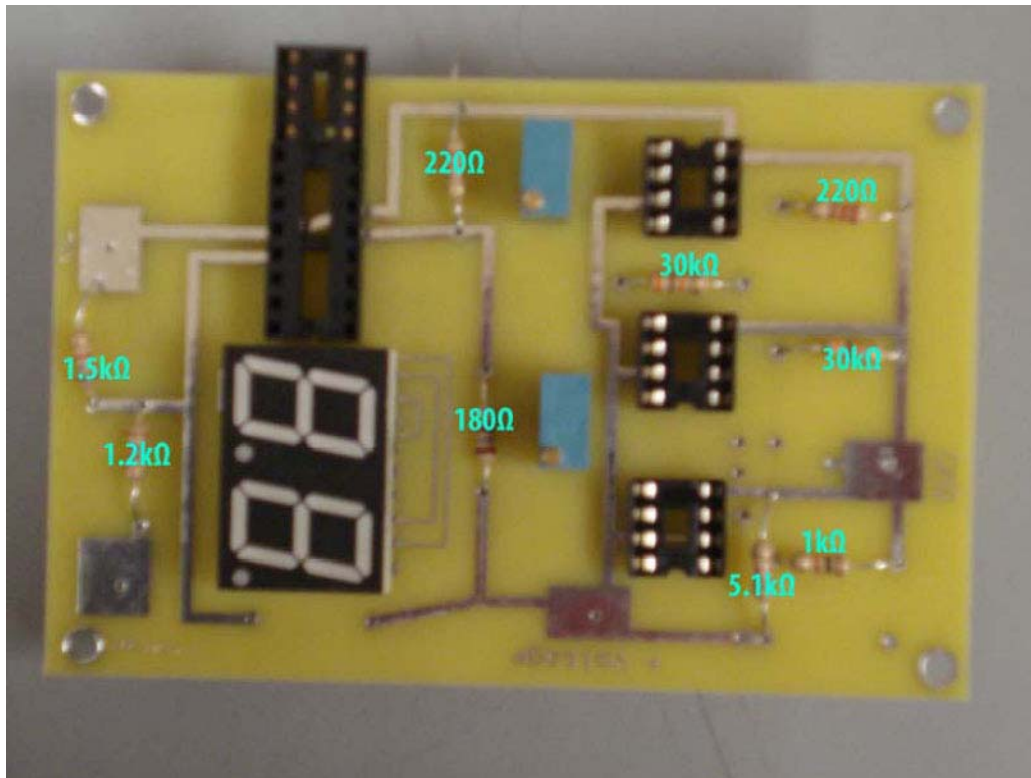


Figure 8 – Resistor placements after soldering.

Step 6 – Solder Red Wire of Battery Connector to PCB:

Place the RED wire of the battery connector into the board where it reads Voltage (Figure 9). Do this again with the other battery connector. Solder this in similarly to before.

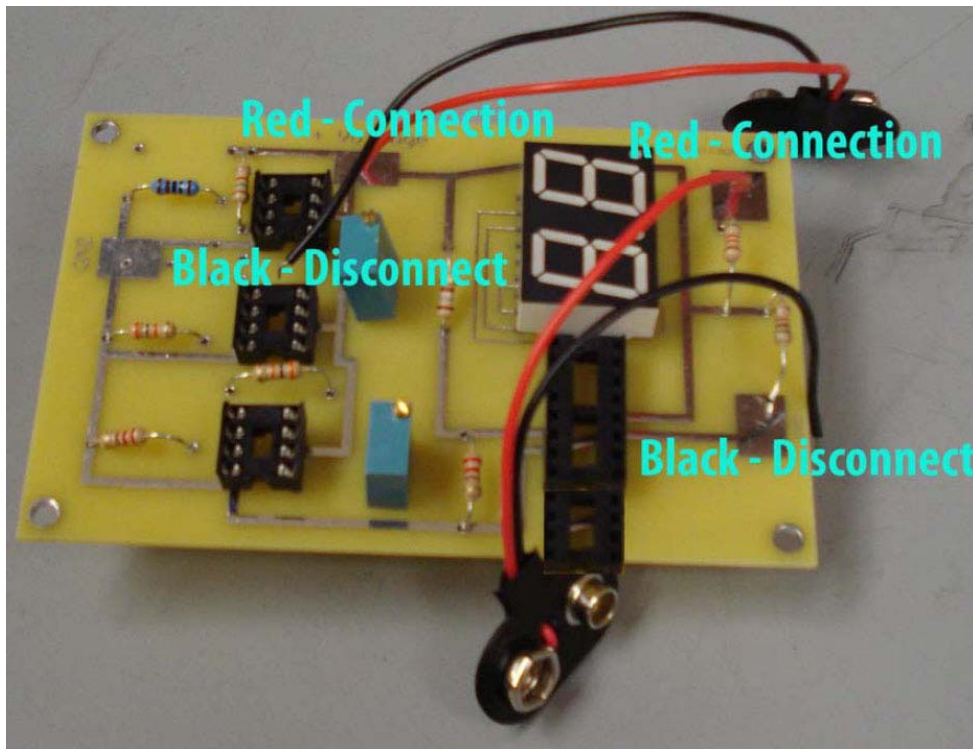


Figure 9 – Connecting RED battery connector wires to metal part of PCB labeled “Voltage.”

Step 7 – Solder Black Wire of Battery Connector to Switch:

Similarly as before, solder the black wires of the connectors to the switch.

Step 8 – Solder Green Wire to PCB and Switch:

Solder the green wire into the board where it reads Ground. Solder the other end of the wire to the switch, along with the other two black wires (Figure 10).

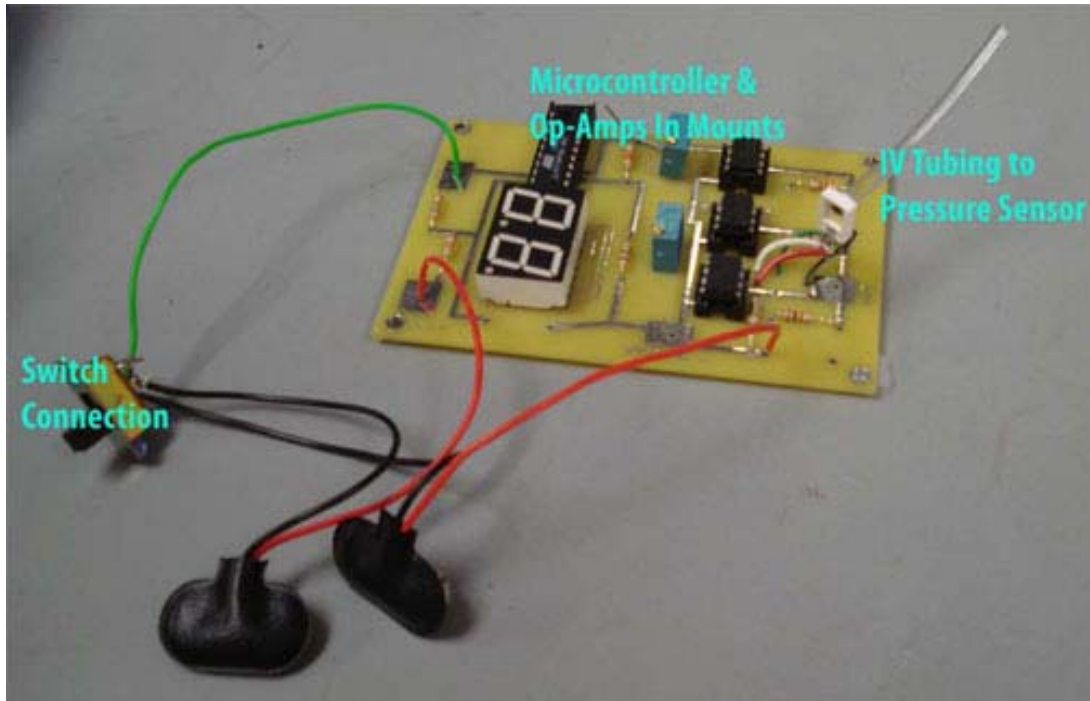


Figure 10 – Circuit including all components. Note the switch connection to both battery connectors and ground.

Step 9 – Solder Pressure Sensor into PCB:

Place the wires which have been soldered to the pressure sensor in the PCB such that the appropriate numbers match (Figure 11). Solder in as described above.

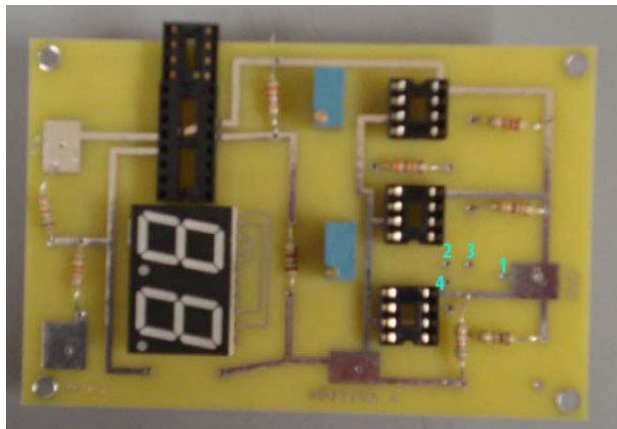
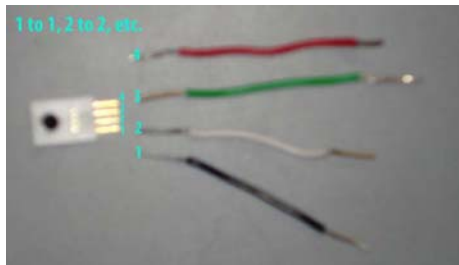


Figure 11 – Wires and PCB numbered to match.

Step 10 – Place Components into Case:

Place the batteries on the bottom, cover with foam and place the circuit on top. Ensure that the circuit is facing the same way as the cut-outs on the case, in order for the LEDs and potentiometers to be seen through the cut-outs (Figure 12).

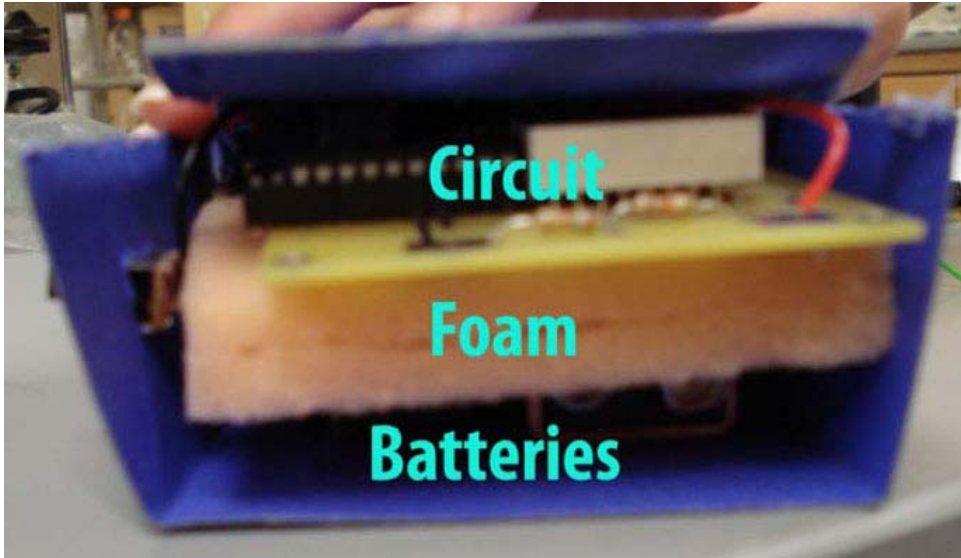


Figure 12 – Layers of device within casing.

Step 11 – Connect circuit to batteries and luer connector:

Connect the batteries with the battery connector.

Attach the luer connector on the outside of the box (Figure 13). Attach the luer connector to the IV tubing of the pressure sensor.

Place the switch through the hole on the side of the box (Figure 13).

Step 12 – Test:

Turn the circuit on and ensure that the LEDs light up not, they may not display coherent numbers until the device is calibrated.

Step 13 – Tape or glue the case shut

If glue is used, make sure that the case has at least 3 hours or more to dry, depending on the glue used.

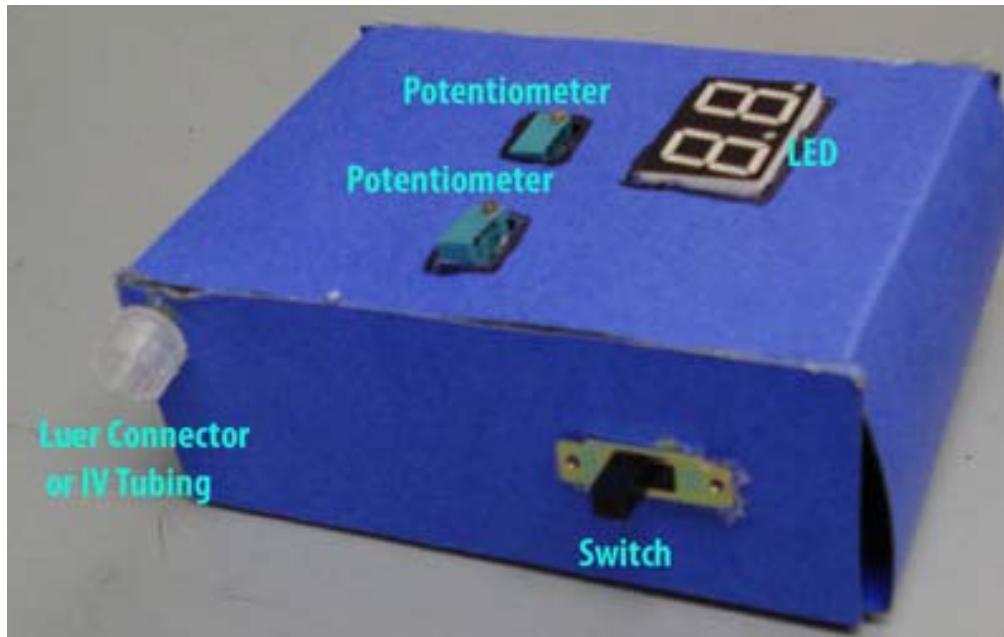


Figure 13 – Casing with the components placed inside.