Digital LED Flasher

Students will be assembling an LED Flasher assembled on a custom printed Circuit Board

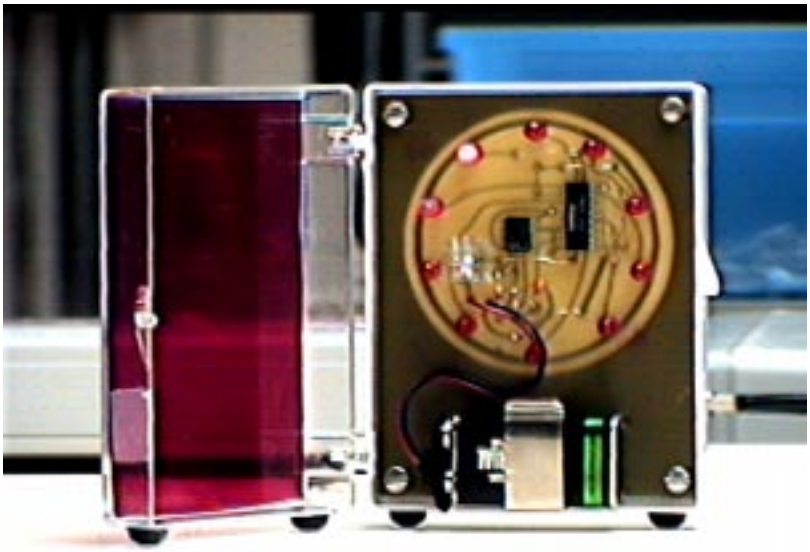


Figure 1

Abstract:

Students will be assembling a printed circuit board that contains the components necessary for a circular LED “chaser”. The finished project will be placed in a clear plastic box. The on / off function of the circuit is controlled by a printed circuit board mounted gravity switch.
When placed in upright position the circuit will activate. Almost any other position will deactivate the circuit. Location of the rubber feet determine the upright or “active” orientation of the plastic box.

The assembly process has been divided into parts that will extend this project into two class sessions. Part 1 is breadboarding the circuit on a solderless breadboard system. Part 2 will involve removing the parts from the solderless system and soldering them on a printed circuit board for final packaging.

Part 1: The Solderless Breadboard

Figure 2 is an example of a solderless breadboard system attached to a video tape storage box. This makes a nifty package for anyone interested in the farther exploration of building electronic projects for pleasure or course work. If you would like to build your own, please contact your instructor. All students enrolled in EE151 will be issued loaner breadboards to complete the prototype assembly of the LED Flasher.

Using the schematic diagram and photos provided assemble the circuit on the breadboard and test if for proper operation.

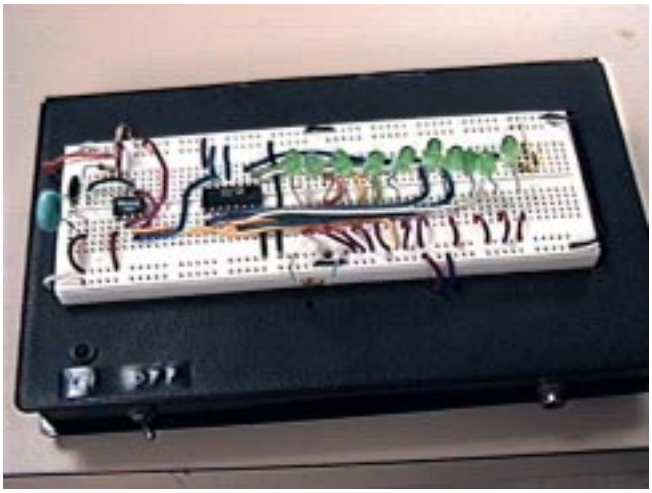
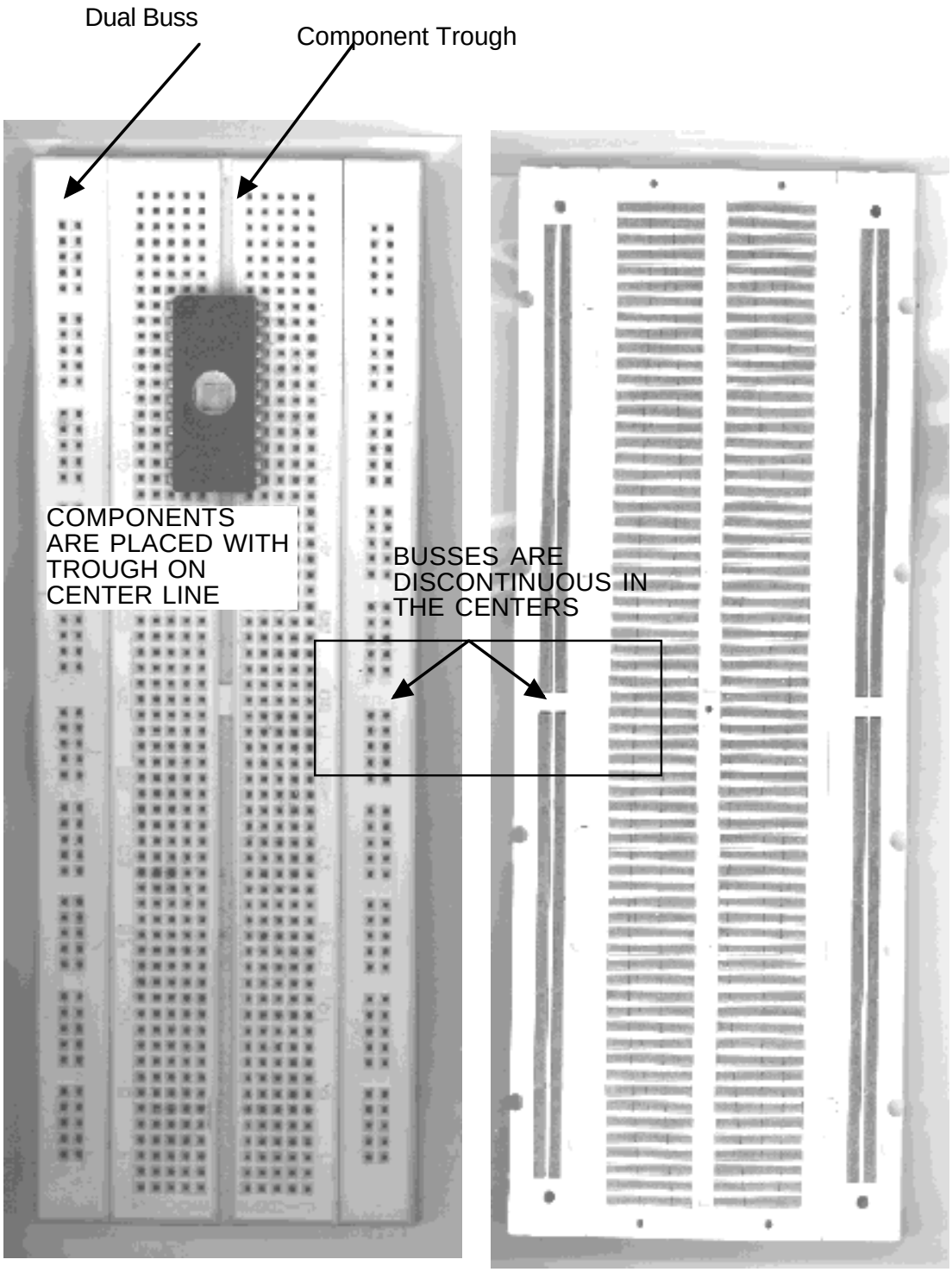


Figure 2

Anatomy of A Solderless Breadboard



Part 2: PC Board Assembly

Figure 4 shows the LED flasher fully assembled on a PC Board.

In part two of this project students will be removing components from the breadboard system and soldering them onto a printed circuit board.

Assembly has been divided into 3-parts. The intend of this procedure is to place the smallest components on the board first, as it is more difficult to insert these parts after larger ones are already in place on the board.

- Assembly Step 1 Installation of Jumpers.
- Assembly Step 2 Installation of passive and active components.
- Assembly Step 3 Installation of LED's and battery snap.

Figure 5 illustrates a fully assembled board with major components labeled. The final assembly requires that 4 .5" standoffs and screws be attached to the board, along with a metal battery clip.

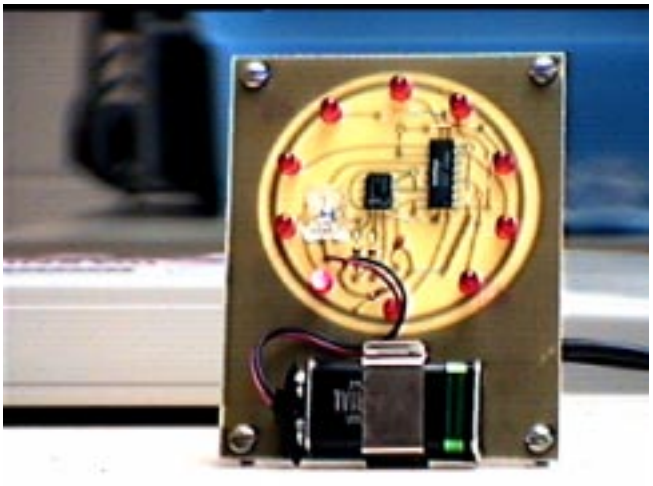


Figure 4

10 LED indicators

555 Timer I.C.

CMOS counter I.C.

Gravity Switch

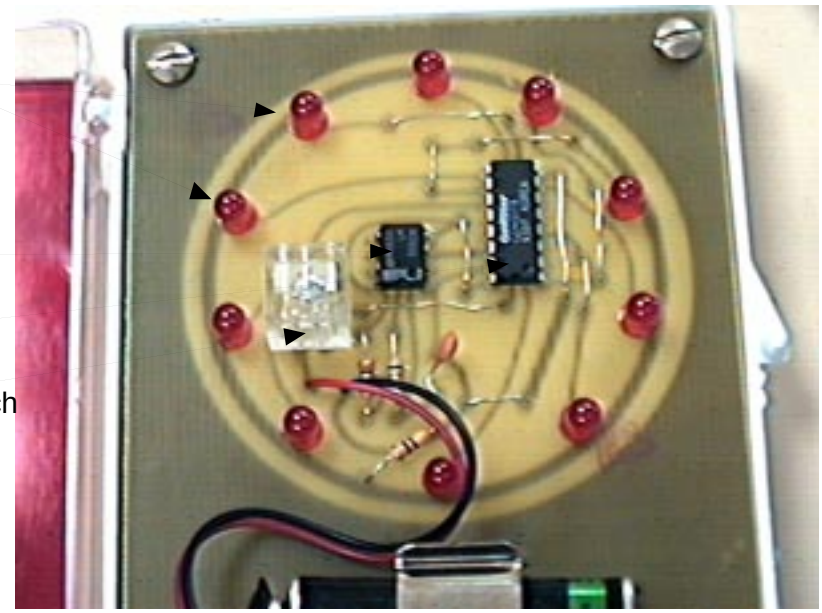
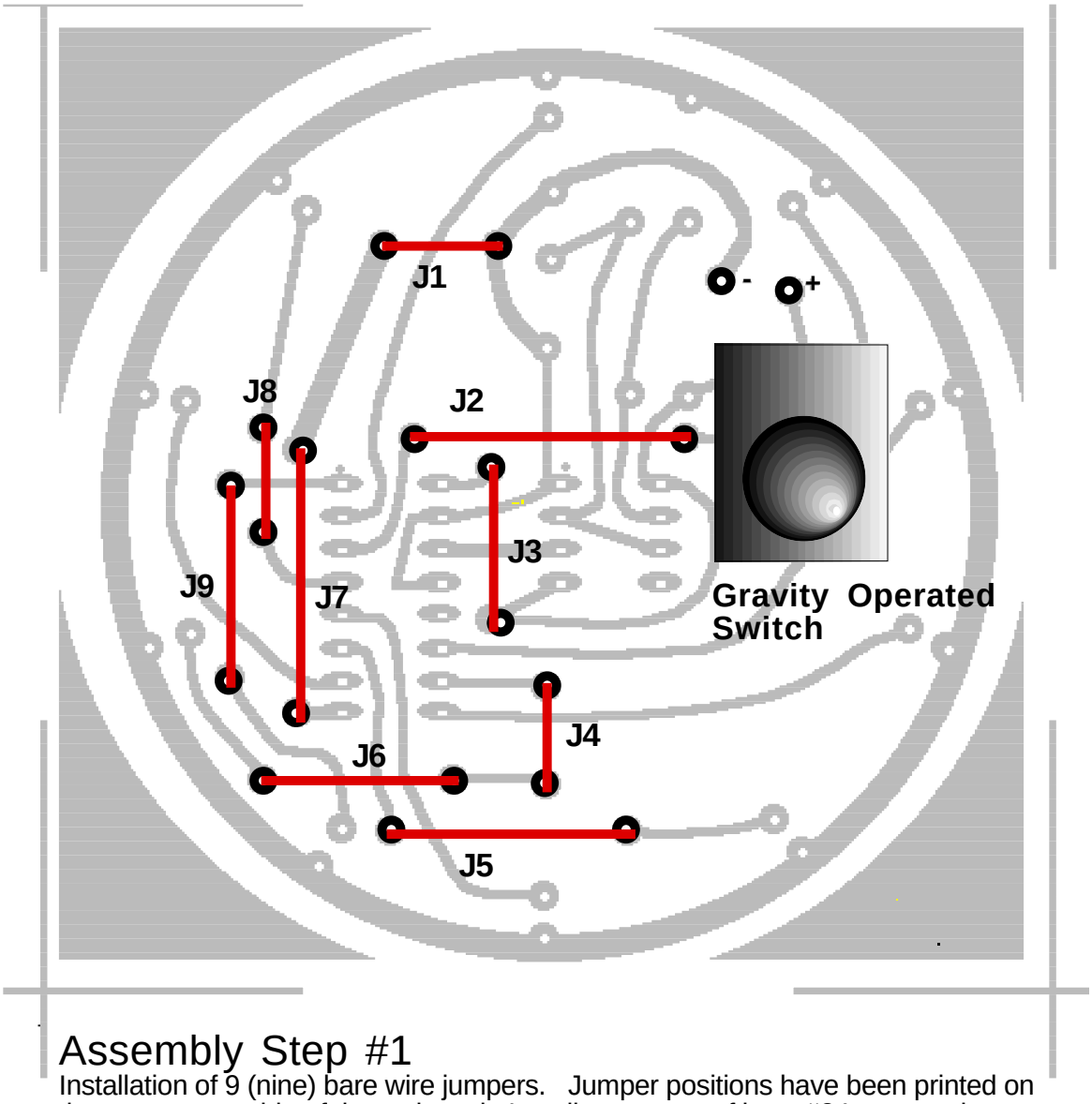
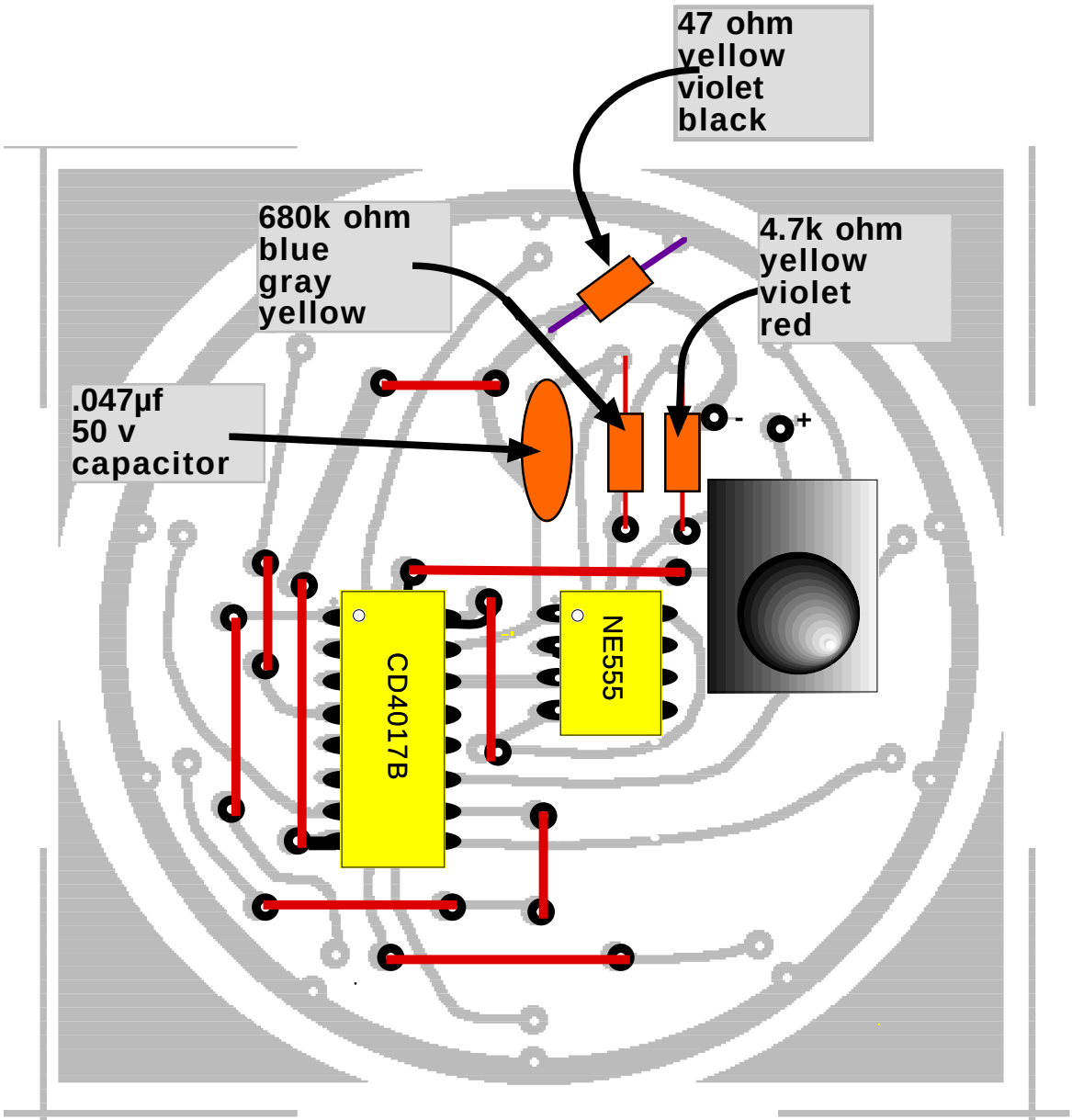


Figure 5



Assembly Step #1

Installation of 9 (nine) bare wire jumpers. Jumper positions have been printed on the component side of the pc board. Install segments of bare #24 gauge wire into the jumper locations and solder.

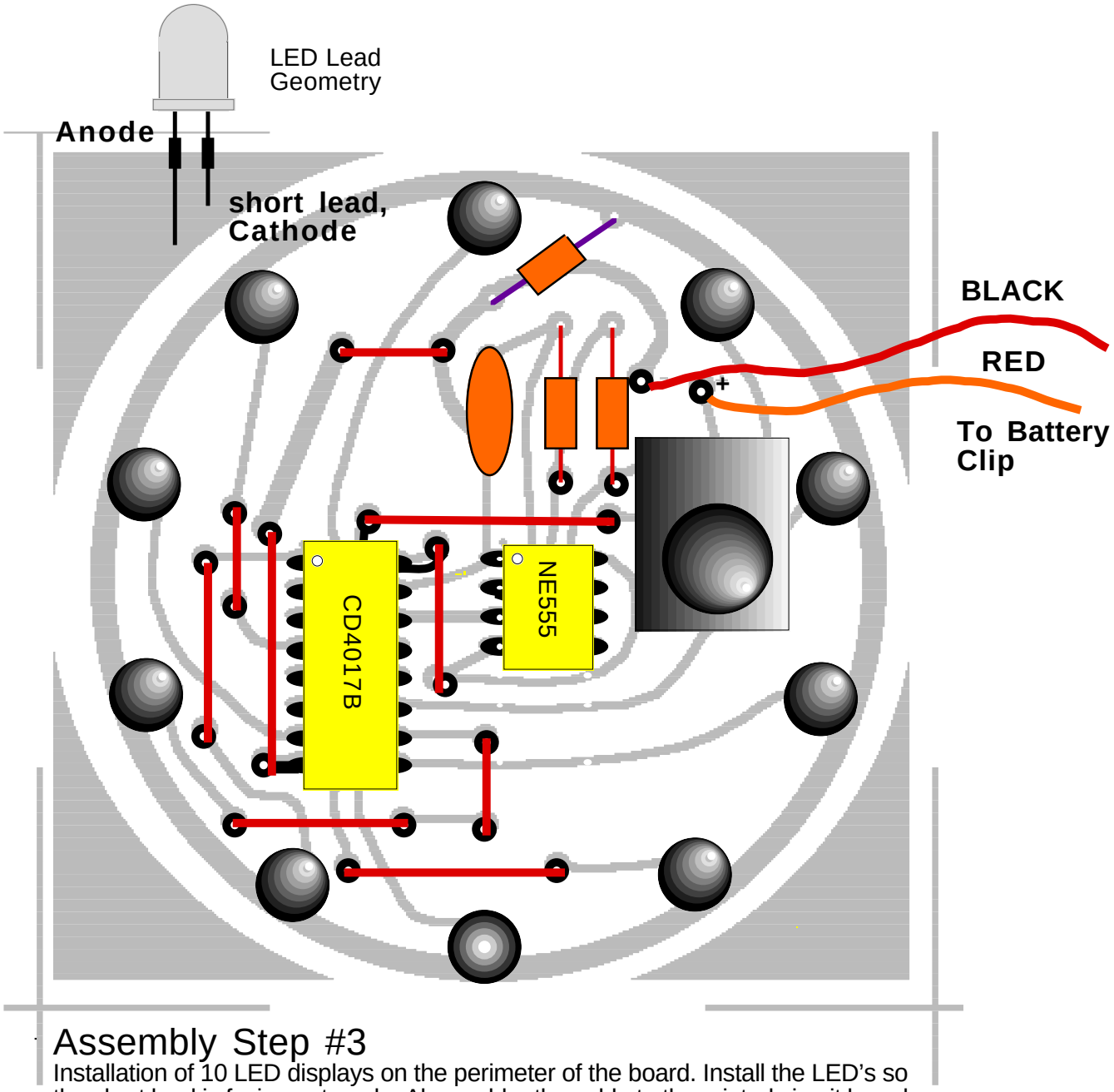


Assembly Step #2a

Install active components. Locate pin one (1) on the I.C. packages of the NE555 timer and CD4017BE. Make certain to place the I.C. package on the board as shown. The pins of the I.C. will need to be adjusted so they will pass through the circuit board. Once inserted slightly bend the pins so as to lock the I.C. into the board facilitating better soldering.

Assembly Step #2b

Install passive components. Three resistors, one capacitor,and a gravity switch will be installed next. None of the items are polarized, which means you can insert them in their proper positions without worry of direction.



Assembly Step #3

Installation of 10 LED displays on the perimeter of the board. Install the LED's so the short lead is facing outward. Also, solder the cable to the printed circuit board that attaches to the 9v battery.