



Lectro Candle

Kit Information & Instructions



The Lectro Candle is a perfect kit to add a bit of color to any enclosure you can dream up (we used it in our pumpkins at Halloween). Essentially, the Lectro Candle is exactly what it sounds like – an LED-based “candle” that cycles through all the colors of the rainbow. This is a great kit to start exploring physical computing and play around with LEDs!

Kit includes:

- ATtiny85
- 10K Resistor
- 330 Ohm Resistor (quantity: 3)
- Triple Output LED RGB
- 0.1 uF Cap
- 2x AA Battery Pack (Batteries Not Included)

STEP BY STEP INSTRUCTIONS

For this kit all components will be placed on the top of the board.

COMPONENTS WILL BE PLACED ON THE TOP SIDE OF THE BOARD BUT MAY BE SOLDERED FROM THE TOP OR THE BOTTOM.

1

ATTiny85 (microcontroller): Looking at the top of the board, insert the microcontroller. Make sure the notch on the chip is placed on the same side as the white circle on the PCB. You will need to gently bend the legs inward for the part to fit into the holes. Once the part has been placed flip the PCB over and solder the legs in through the front of the board.

2

0.1 μ F Cap (decoupling cap): Insert the capacitor into the front of the PCB so that the body of the capacitor fits into the rectangle with the line going through the middle of it. Flip the board over and solder the leads into place. After soldering, clip off the legs. Make sure to hold the legs while clipping them off.

3

10K Resistor (reset pull-up): Insert the resistor into the front of the PCB so that the body of the resistor fits inside the rectangle with the words '10k' inside of it. Flip the board over, bend the legs outwards to secure that part, and then solder into place from the back of the board. After soldering, clip off the legs. Make sure to hold the leg while clipping it off.

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4

330 Ohm Resistors (reset pull-up): Solder these resistors in one at a time. Insert the resistors into the front of the PCB so that the body of the resistor fits inside the rectangle with the words '330' inside of it; it doesn't matter which '330' rectangle is soldered first. Any of the 330 ohm resistors can go into any of the rectangles labeled 330. Flip the board over, bend the legs outwards to secure that part, and then solder into place from the back of the board. After soldering, clip off the legs. Make sure to hold the leg while clipping it off.

5

LEDs (light emitting diode): Insert the 3 LEDs into the front side of the board. Make sure that the longest leg of the LED goes into the hole that lines up with the small white circle. If you can't see the small white circle, check the bottom of the board.

6

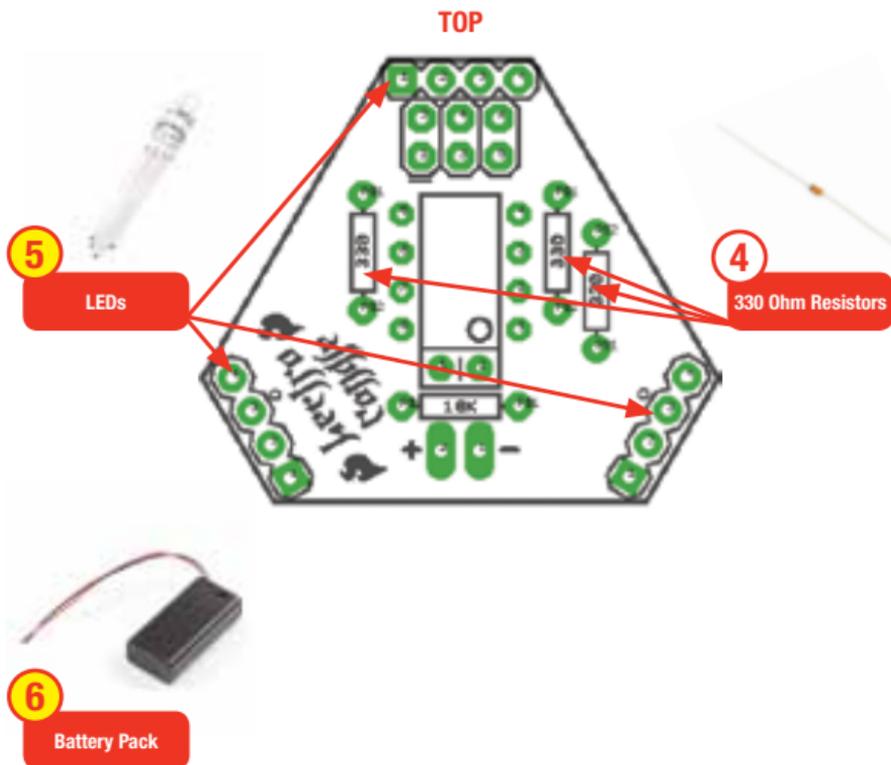
Battery Pack (power source): Insert the plus sign on the battery pack into the hole labeled 'Plus Sign' then solder it into place. Next insert the minus sign into the hole labeled 'Minus Sign' and solder it as well. You can tape the battery pack to the back of the PCB to hold it in place.

7

CAUTION: Make sure the batteries are NOT placed in the battery pack when you solder this into place.

Insert 2 AA batteries into the battery pack and you're ready to go! Turn the switch on the battery pack on and watch your new Lectro Candle light up!

However, read each part's specific directions as some components are more easily soldered from the back of the PCB.



Tips and Hints

Microcontroller and PCB

The microcontroller is the brain of the Lectro Candle. It's programmed to change the color of the LEDs. Bending the legs won't hurt the chip – it is designed to withstand the heat of the soldering iron as well as gentle bending.

Try to be gentle with the board, but a few scratches are not a big deal.

Soldering

The tip of the iron is normally 700 °F, hot enough to melt metal. It is normal for the handle of the soldering iron to heat up a bit. Hold it like a pencil and move your hand further away from the tip if the heat is uncomfortable. The solder smokes because the rosin inside the solder is burning off - it's not harmful.

LEDs

Light-emitting diodes (LEDs) are like light bulbs, but much smaller and more efficient. The LEDs in this kit are tri-color, meaning they light up in red, blue, and green.

Polarization

The LEDs and the microcontroller (ATtiny85) are polarized parts. This means they need to be placed into the PCB in a specific orientation. The components that are polarized are highlighted in yellow in the instructions to help you be mindful of their placement.

Resistors:

There are 4 resistors on the LectroCandle. Three of them are used as *current limiting* resistors to limit the brightness of the LED. The fourth resistor is used as a *pull-up* resistor, which keeps the microcontroller from resetting.

Capacitor:

The power for the LectroCandle comes from the battery and has a voltage of about 3.6 volts. However, the voltage from a battery will fluctuate up and down. If left alone, this *voltage ripple* will cause the microcontroller to reset. We put a capacitor on the board to smooth out the voltage fluctuations from the battery.



Use this picture of the populated LectroCandle board to help you see what each component should look like soldered in place.



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