

A Christmas CATastrophe

Oh no! The kitten is tangled up in the Christmas lights!
Simple! Easy to Build. A great first kit.



Tools:

Soldering iron.
63/37 tin/lead electronics solder.
wire cutters.
hot glue gun.

Parts Supplied:

- 1 - Cat-shaped printed circuit board.
- 1 - Resistor R1: A dogbone-shaped part with a wire on each end. The colored rings tell you its value. Orange-white-brown-gold means "390 ohms 5%".
- 2 - LED D1, D2: Clear, shaped like a little hat with two wires. **Polarity sensitive!** The short wire goes in the lower hole (toward the cat's head).
- 4 - LED (D7, D8, D10, D13): Same as D1 and D2, but Yellow.
- 4 - LED (D4, D5, D11, D14): Same, but Green.
- 4 - LED (D3, D6, D9, D12): Same, but Red.
- 1 - 9v battery connector, with wires.
- 1 - length of wire to wrap around the cat and LEDs (for appearance only).

Safety:

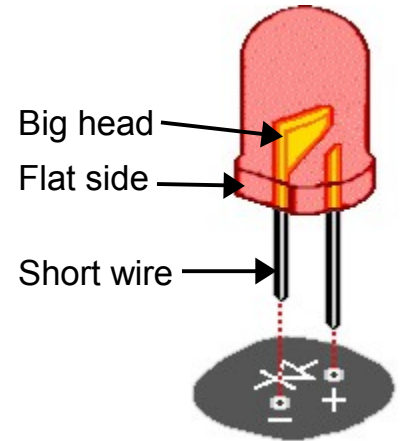
- Soldering irons are hot! Do not touch the tip, or a connection you just soldered.
- When you cut a wire, the cut piece can shoot off and hit you in the eye!
Cut it over a wastebasket to catch the flying piece.

Assembly:

Do you have all the parts and tools listed above? Then let's begin! Follow these step-by-step instructions. Install each part as shown. All parts go on the **top** side with the cat's face. Solder each part on the **bottom** side with the silver pads. Put an X in each box (X) as you finish each step. Take your time and check your work -- it is hard to remove a part if you put it in wrong!

LEDs are **polarity sensitive!** Install each LED as follows:

1. Put the short wire (with the flat side, and big head inside the case) in the **lower left hole** (toward the head of the Cat).
2. Place a toothpick (or something similar) between the LED and PC board. This makes room to add a decorative wire.
3. Solder ONE wire, and cut off the excess. Bend the LED so it is straight, then solder the other wire. Remove the toothpick once both wires are soldered in.



- () Resistor R1 390 ohms (orange-white-brown-gold):

Bend the wires, and put one in each hole. Solder the wires, and cut off the excess.

- () Battery connector:
Solder Black wire in hole marked "-".
Solder Red wire in hole marked "+".

- () D1: clear LED

- () D2: clear LED

- () D3: red LED

- () D5: green LED

- () D4: green LED

- () D6: red LED

- () D11: green LED

- () D10: yellow LED

- () D9: red LED

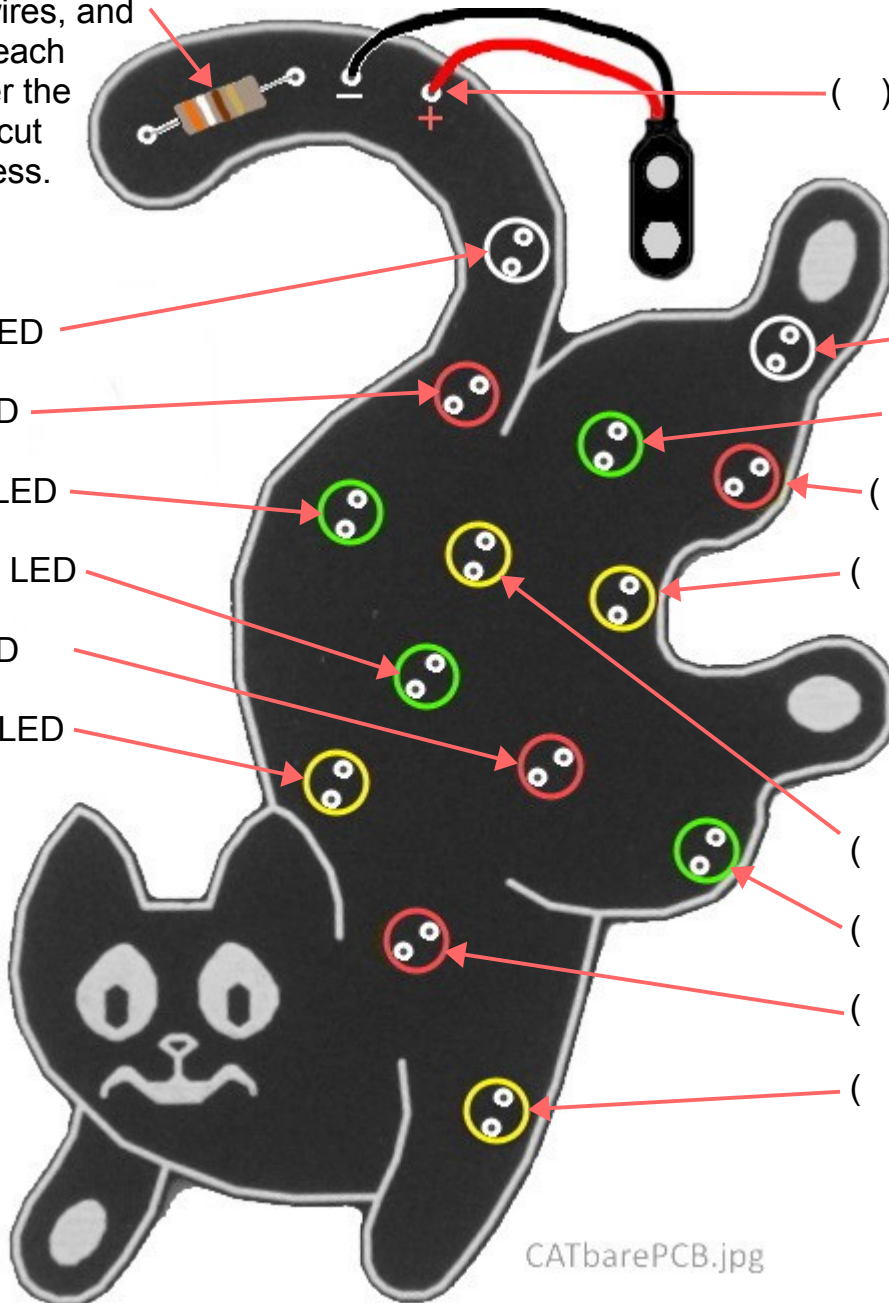
- () D8: yellow LED

- () D7: yellow LED

- () D14: green LED

- () D12: red LED

- () D13: yellow LED



CATbarePCB.jpg

Testing:

- () Time for a test! Plug a standard 9v battery onto the battery snaps. The + side of the battery should match the + on the board. **The LEDs should all start flickering!**

If it doesn't work, see if the battery is dead, or if the red and black battery wires are in the wrong holes. Look for LEDs that were put in backwards, or bad solder joints. If one string of 3 LEDs does not light, one of them is installed backwards. If half the LEDs don't light, D1 or D2 is backwards.

- () Finishing touches: Thread pieces of wire under the LEDs and around the cat to make it look like it is tangled up in a string of holiday lights. The illustration on the first page of these instructions gives you one example, but use your creativity!
- () When you like how it looks, use a hot glue gun to secure the ends of the decorative wire on the back. Also use a little hot glue to secure the wires to the battery connector. (They are fragile and can break off if flexed too much).

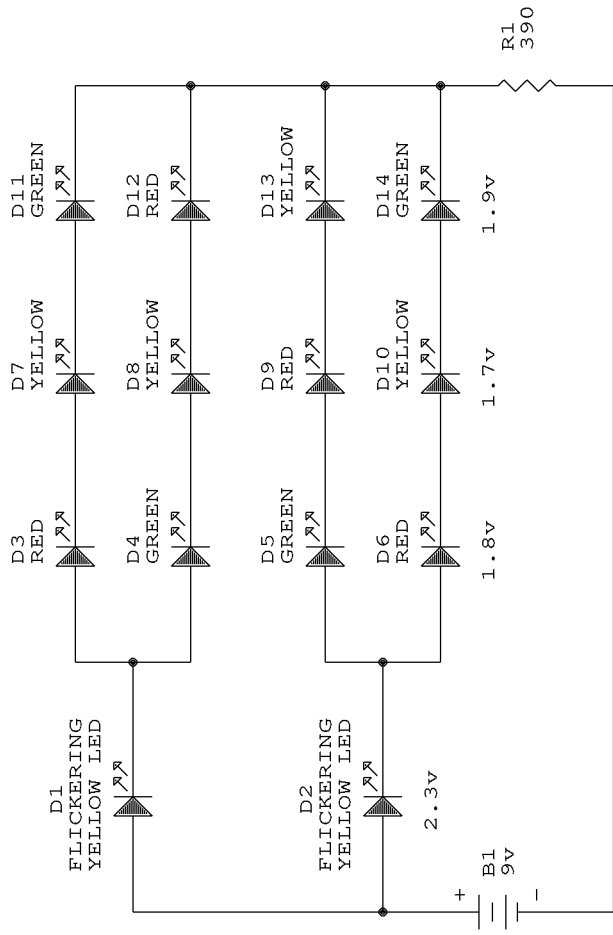
How to use it: Set the battery on a shelf, and let the cat hang over the edge. Or, drape it over a branch of your holiday tree and use it as an ornament. I'm sure there are other possibilities. Use your imagination!

How it works: The two clear LEDs at the top are special "flickering candle" LEDs. The other LEDs are wired in four series strings with them (two strings per "flickering" LED), so they all flicker as if there is a loose connection somewhere (but there's not).

Improvements? You can experiment with different color LEDs, or move them around to different locations to suit your artistic temperament. However, different color LEDs have a different brightness and voltage drop. Since the LEDs are in series strings, it can be tricky to select combinations that provide roughly equal brightness.

R1 sets the overall brightness and battery life. The supplied 390 ohm resistor sets the battery current to about 3-4 mA which is good for a couple hundred hours. Use more resistance for less brightness and longer life, or less resistance for more brightness and correspondingly shorter battery life.

Questions? Problems? Replacement parts? For help contact Lee A. Hart, 2521 19th St N, Saint Cloud MN 56303, phone 320-224-1054, or email leeahart@earthlink.net.



Theory of Operation

D1 and D2 are flickering yellow LEDs. The other LEDs are connected in two series so they flicker along with D1 and D2.

R1 limits the battery current to about 2-3mA.

The sum of the voltage drops of each series string of 3 LEDs should be the same for equal brightness.

Parts List:

- D1, D2 - Red T1 3mm "flickering candle" LED
- D7, D8, D10, D13 - Yellow T1 3mm LED
- D4, D5, D11, D14 - Green T1 3mm LED
- D3, D6, D9, D12 - Red T1 3mm LED
- R1 - 390 ohm 5% 1/4w resistor
- B1 - 9v battery connector with wire leads
- L2" - decorative insulated wire or string, any color

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