

An Electronic Christmas "Card"

This electronic Christmas Tree features nine blinking lights, and runs for weeks on a 9-volt battery. It's a great first project that is easy to assemble, even for beginners. Leave the parts in the bag until you actually need them; they are small and easy to lose! Follow these step-by-step instructions. Place a mark in the 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!

- Tools: Soldering iron, solder, wire cutters, small screwdriver.
 - Safety: Soldering irons are hot! Do not touch it, 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.
 - Look! The circuit board has printed lettering on top. All parts (except the battery) go on the **top** side. The other side has the wiring on it; all parts are **soldered** on this side. Install each part as described below.
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- R1 5.6 megohm resistors: Resistors are tan dogbone-shaped parts with a wire coming out each end. The
 - R2 color rings tell you its value (green-blue-green-gold means "5.6 megohms"). Install each one like this:
 - R3 - Bend the wires at right angles to the resistor's body.
 - R4 - Find the locations on the board marked "R1" through "R4".
 - Put a resistor in each location, with a wire in each hole. Push the body snug against the board.
 - On the copper side, bend the wires so the resistor won't fall off.
 - Turn the board over, solder each wire, and cut off the excess.
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- C1 0.1uF ceramic capacitors: These are small tan disks, marked "F" and "104Z" (this means 10,000 pF,
 - C3 which is the same as 0.1uF). Install each one like you did the resistors:
 - C5 - Cut each capacitor off the paper strip, and install it in its location.
 - C7 - Solder each wire, and cut off the excess.
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- C2 22uF electrolytic capacitors: These are little black tubes, with both wires coming out the same end.
 - C4 They are **polarity-sensitive**! See the big white stripe with the "-" sign on the case? This wire goes in
 - C6 the hole with the "-" sign on the board.
 - C8 - Solder each wire, as above.
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- D1 LEDs (red, yellow, and green): LEDs (Light-Emitting-Diodes) are brightly colored tubes with a
 - D2 rounded end, and both wires coming out the other end. You can put any color LED in any
 - D3 location D1-D9. LEDs are **polarity-sensitive**! Look closely; one side of the case has a flat
 - D4 spot or notch, and one wire is shorter than the other one. The FLAT or NOTCHED side with
 - D5 the SHORT wire goes toward the top of the tree, to match the flat side printed on the board.
 - D6
 - D7 - Solder **one** wire of each LED.
 - D8 - Check to be sure they are all straight.
 - D9 - Then solder the **other** wire.
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- U1 CD4093BE Integrated circuit: This part is easily damaged by static electricity. Keep it in its packaging until you are ready to use it. It is also **polarity sensitive**; install it so the end with the notch and "CD..." end of the part number is toward the TOP of the tree. Be sure all 14 pins of U1 go into the holes in the board, and that you don't have it upside-down. Then carefully solder all 14 pins.
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- +Battery snap: Find the **big** snap, a #2 screw, and #2 nut. Attach it to the back (solder) side of the board with a screw and nut at the "+" sign. The screw and snap go on the **soldered** side of the board. The nut goes on the **printed** side of the board. Only get it finger-tight for now.
 - Battery snap: Attach the **small** battery snap the same way, at the "-" sign. Only get it finger-tight for now.
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- Test: Connect a 9v battery to the snaps. The lights should all start blinking! **NOW** tighten the two nuts. The battery will hold them in exactly the right position so it snaps on and off easily.
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Doesn't work? See if the battery is dead, or the snaps are on backwards. Look for parts in the wrong place or backwards, or bad solder joints. If two LEDs don't work, see if one of them is backwards. For help, contact Lee A. Hart, 814 8th Ave N, Sartell MN 56377, 320-656-9574, leeahart@earthlink.net. Merry Christmas!

Electronic Christmas Tree Kit



Simple! Easy to Build. A great first kit.
Runs for weeks on a standard 9v battery.