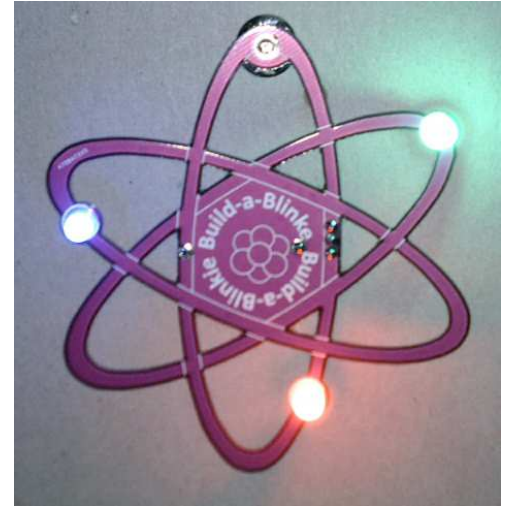


When done, please return these instructions for the next person to use. Thank you.

Kit 18, Atomic Build-a-Blinkie

The heart of this blinkie is a tiny chip embedded in each of the three LEDs. When power is applied, the chip tells the LED to turn on and off, or fade in a rainbow colors.

By building this blinkie, we hope you have a lot of fun, learn how easy it is to assemble and solder a circuit, and gain a desire to learn more!



First, open up the kit and review the contents. Looking from left to right, and top to bottom there should be the following parts:

Contents:

- CR2032 battery
- Battery holder
- Atomic Build-a-Blinkie circuit board, any color
- Tie tack (pin and clasp) – shown separated
- Power switch (handle and 3 wires)
- Three LEDs



Got everything to start? If not, give us a shout. Next, a few words on soldering... Skip right to “Assembly” if you are good at soldering.

Soldering Hints

Soldering is not like gluing. When the circuit board and the wire coming through the hole on the circuit board are hot enough, the solder melts and makes both an electrical connection and a mechanical connection. For the small connections on this project, a 25 or 30 watt soldering iron works well. Rosin core solder is used – the acid core solder sold for plumbing would eat your components in a short time.

Here’s how to make a good joint:

- Prepare the joint. Bend the component lead slightly after it passes through the printed circuit board (this helps hold it in place while soldering).
- Prepare the tool. The soldering iron should be up to temperature. Clean the tip plunging it into the jar of stainless-steel wool. Then melt a little solder (a 2mm length) onto the tip so it’s shiny. This is called “tinning”. The solder coating helps conduct heat from the tip to the joint.
- Place the tip in contact with the component lead and the printed circuit board pad for a few seconds to heat them up.

- Place the solder against the joint directly opposite the tool. It should melt within 2 seconds, and flow around the joint. If it takes longer than that, you're not getting enough heat into the joint.
- Keep the soldering iron in place until the solder flows freely and completely covers the joint – typically only about 2 seconds. If the heat is removed too soon, the solder will tend to “ball up” and not stick well to the conductors. The solder joint should look “wetted”, with concave shapes. If you see a “ball” maybe you didn't heat the circuit board pad and you only soldered to the wire. Re-melt, pushing the tip down on the board.
- Let the joint cool without movement at room temperature. This usually takes only a few seconds.
- If a joint is moved before it cools, it will take on a dull, satin look that is characteristic of a cold solder joint. A cold solder joint is fragile and conducts poorly – reheat the joint until the solder flows freely, and hold it still until it cools.
- Keep the tip of the soldering iron clean. Wipe off flux and excess solder regularly in the damp sponge or cloth, and re-tin if needed.

For the purposes of learning how to solder, you do not need to be perfect.

With a little bit of practice, your soldering skills will rapidly improve. The only thing that needs to be avoided is a solder bridge -- excess solder making an unwanted connection between LED or switch leads.

If you make a bridge, it is easy to fix. You can often just reheat and pull the tip of the soldering iron through the bridge, breaking it. Or, reheat all the solder and *gently* tap to the board on edge to shake off the excess. Beyond that, we are more than happy to demonstrate various techniques.

The goal is to have fun while learning, and your skill will develop as you have fun. Happy soldering!



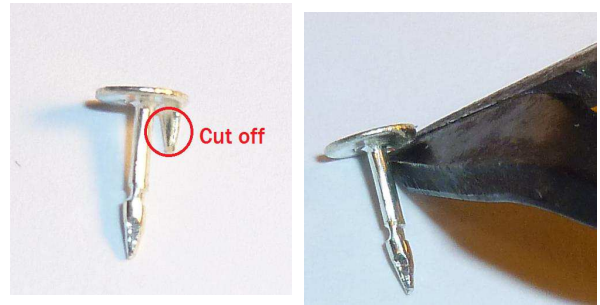
A bridge between the two leads of the LED. Electricity will flow through the bridge, and not the LED, thus the LED will not light up. Fortunately, this is easy to fix.

Assembly

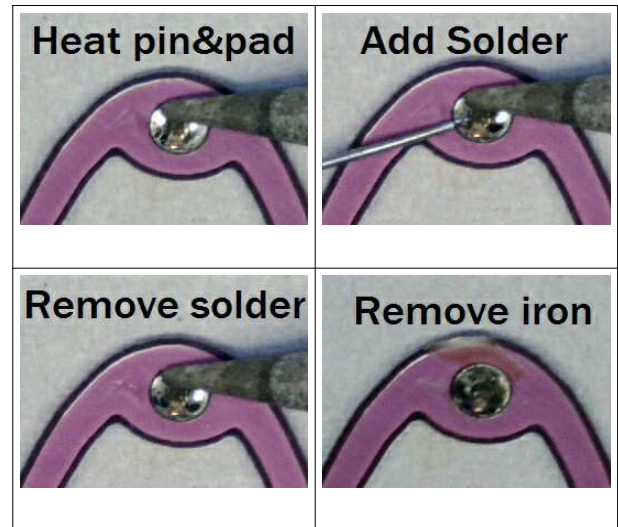
Take a look at the completed picture on the first page. The only components that will be visible on the front are the LEDs. All other components (power switch, battery holder, and tie-tack will be placed facing the back of the board and soldering will occur on the front of the board – the side with Build-a-Blinkie text on it.

First, orient the board so the silk screen printing of Build-a-Blinkie is seen. You are ready to begin.

1. **Separate the pin from the clasp** of the tie tack (pin and clasp). There is a small secondary post. **Use the cutters to remove the smaller post next to the big pin.** If there is a little stub left you can flatten it against the round base of the pin with your pliers.



2. Place the pin through the hole on the Build-a-Blinkie side, then hold the pin and set the blinkie on the table, thus Build-a-Blinkie side down.
3. Solder the pin. A soldering “how to” in 4 steps:
 - 1) Heat pin/wire and pad: soldering Iron tip on pad and touching pin/wire.
 - 2) Add solder – maybe 1/8”
 - 3) Remove solder – it should flow around the pin and the pad – NOT just on the pin/wire.
 - 4) Remove the iron .
4. After it cools (about 10 seconds) put the pin back on the pin so you don't forget it.

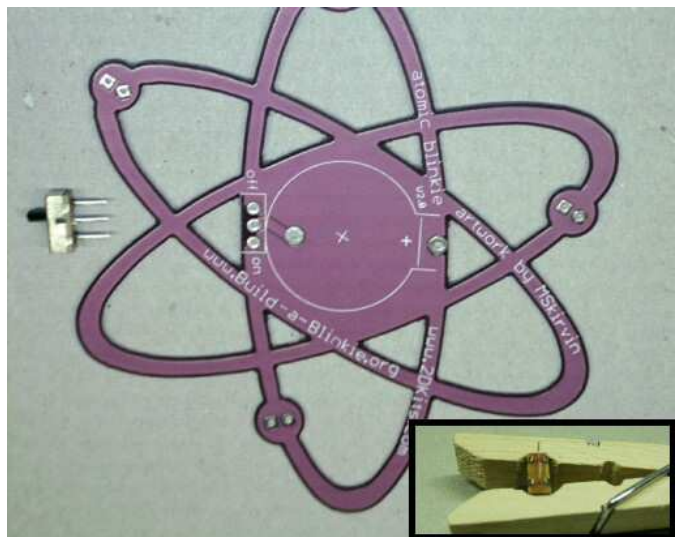


The above pictures also apply to soldering – the Switch, the battery holder, and the LEDs.

5. Holding the power switch by its 3 wires, insert it in the clothespin as shown in the inset.
6. Set the blinkie on the clothespin so the wires go through the holes from the rectangular outline side.
7. Solder **one** wire of the power switch - so you can check that the switch is not crooked, nor too far away from the board.

If it is crooked just heat the single solder connection and position the switch correctly then remove the iron and wait a few seconds for the solder to cool.

Then **solder the other 2 wires of the switch.**



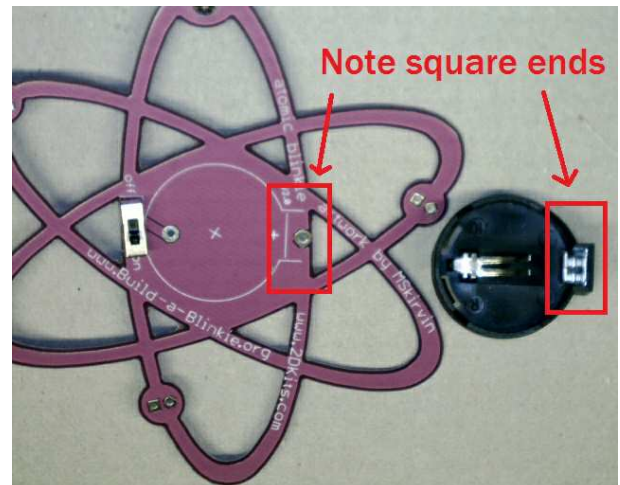
8. Flip the board over and insert the battery holder.

Remember, orientation is important for the battery holder.

Make sure the battery holder matches the printed outline.

Flip the board over to the Build-a-Blinkie side.

Solder the battery holder's 2 pins.

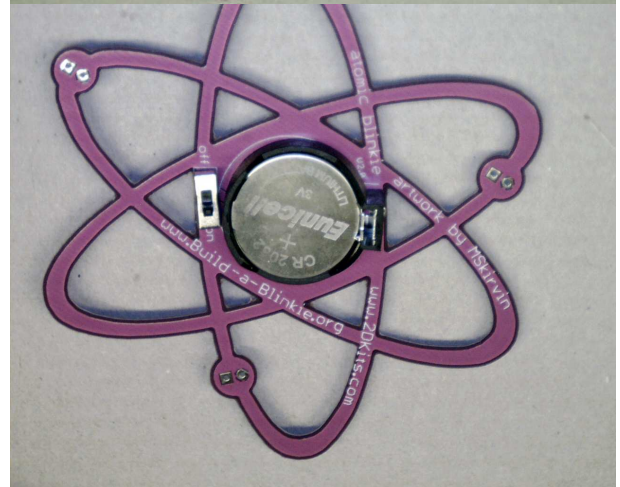


9. Insert the battery. The plus sign “+” will face up.

Angle the battery into the holder opposite the power switch, then press down or squeeze hard to get it past the black lip on the opposite side.

Turn the switch to the ON position.

In the next few steps, the LEDs will be inserted and tested before they are soldered into the board.



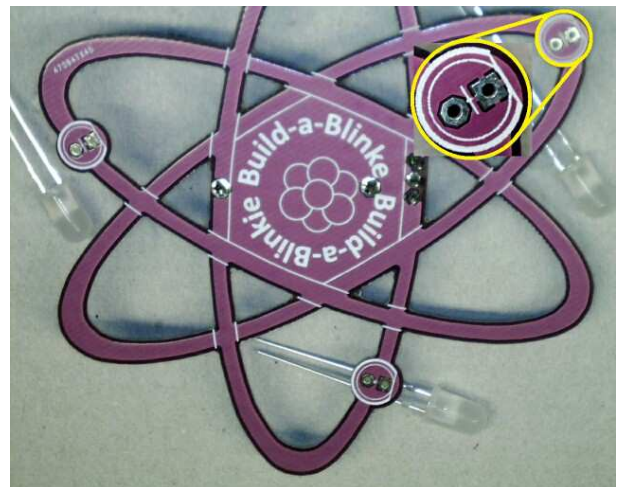
10. Insert one LED into the board from the Build-a-Blinkie side – the side with the slightly flattened circle outlines for each LED.

Orientation is important for LEDs.

Long lead, round pad hole.

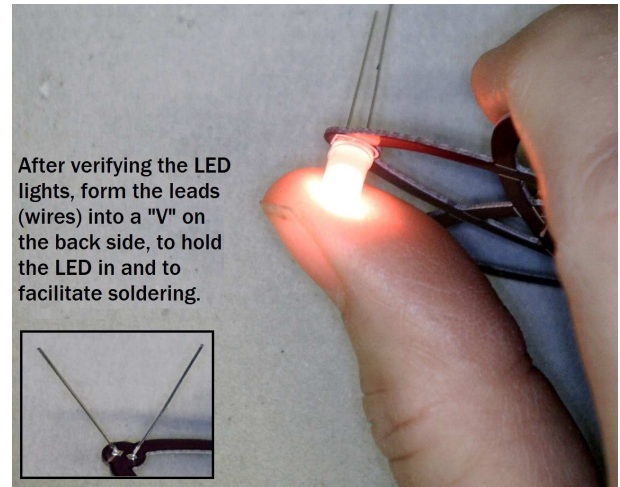
Short lead, square pad hole.

See the inset for an enlarged image of the two holes. If you can't tell the difference, ask to borrow a magnifying glass.



11. Check the LED. Does it blink/fade? You may need to gently wiggle so it makes contact. If not, check – LONG lead in ROUND pad hole. If that still doesn't work, let us know.

Then spread the wires on the back side of the board into a “V”, (See Inset picture) pulling the led tightly to the front of the board. This will keep it from falling out.



12. Insert, test, and “V” the second LED
13. Insert, test, and “V” the third LED

14. Turn the power switch off. Flip the board over and solder the LEDs.

Use only a little solder – be sure to avoid a “short” or “bridge” between the wires as was discussed earlier.

Each wire must be soldered individually, so just a little mound of solder shows – study the picture to the right.

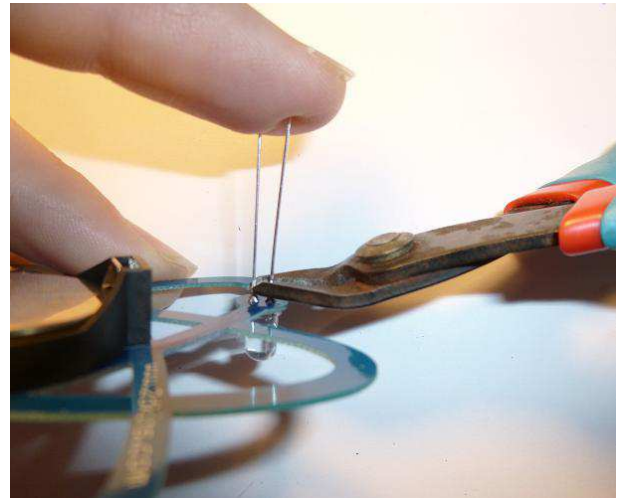


15. Trim the excess leads (wires) with the cutters.

Note the 2DKits supplied cutters have an angled tip, so you can cut the wires quite close to the circuit board.

Please hold your finger over the ends of each lead when cutting, to keep it from flying away.

16. You may also want to trim the leads on the front of the board from the power switch and battery holder, as they may be fairly sharp



17. Turn on the switch! Your Build-a-Blinkie should begin blinking or color fading.
18. Make sure the switch turns OFF. If it doesn't, contact a blinkie tech – solder may have gotten under the switch and needs to be fixed.
19. Enjoy!

Troubleshooting

If the LEDs don't flash or fade, then you'll need to do a little troubleshooting to finish your project. The following steps should isolate most problems.

- Recheck your solder connections. 80% of all problems are traced to this. Cold solder joints and broken joints will cause erratic performance or failure. Reheat any questionable solder connections until they flow and look shiny and secure.
- Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring.
- LEDs reversed. You will need to remove the LED by desoldering, and then solder it in the correct way. This should not happen since we tested them before soldering – but perhaps one fell out AFTER testing and before spreading the leads to a “V” - and you forgot and inserted it backwards.
- The battery is incorrectly inserted. The “+” side of the battery should always be inserted facing up.
- Bad part – it does happen. In the hundreds of boards assembled, we've seen two or three parts fail. Send us email, and we will send a replacement part.
- A part got lost/melted/damaged/destroyed while building the kit. It happens – you're not the first (or second, or fiftieth). If you are doing this at a convention, seminar, or class, just let us know. Otherwise, send us email, and we'll see what we can do. We have no problem selling just the parts you need to get it working.

Use

Once built, the use of this blinkie is fairly straightforward. Don't get it wet. Don't stick it in a pocket, drawer, box, bag, etc with anything metal, such as coins in your pocket, where it might short out.

And if you are at a 2dkits.com event that can sell things, buy spare batteries now, very inexpensively!