# BSA Atomic Blinkie


The heart of this blinkie is a tiny electronic chip embedded in each of the three LEDs. When power is applied, the chip tells the LED to turn on and off, or fade different 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
- BSA Atomic Blinkie circuit board, with QR-code graphic to use with a smartphone to go to web site. We will often refer to the front of the circuit board as the QR-Code side.
- Tie tack (clasp and pin – shown separated)
- Power switch
- 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 solder connection:

- Prepare the joint. Bend the component lead slightly after it passes through the printed circuit board (this helps hold it in place while soldering).

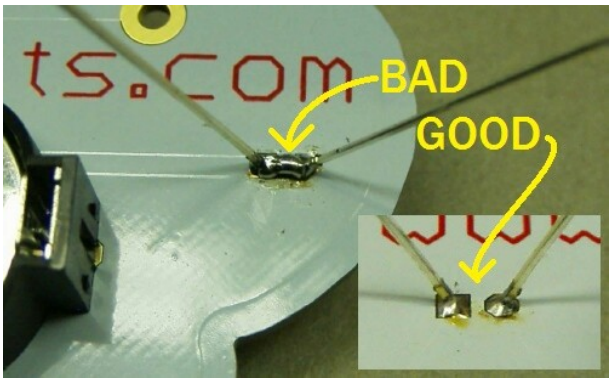
- Prepare the tool. The soldering iron should be up to temperature. Clean the tip plunging it into the jar of stainless-steel wool several times. Then melt a little solder (a 2mm length) onto the tip so it's shiny. This is called "tinning". The solder coating helps conduct heat from the tip to the joint.
- 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.
- Pull the solder back from the connection.
- 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.
- Remove the soldering iron tip, and let the joint cool for a few seconds 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, or by plunging it into the jar of steel wool, 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. That being said, the only thing that needs to be avoided is solder bridges, which are excess solder making an unexpected connection on the board.

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. Ask for help if you need it.

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



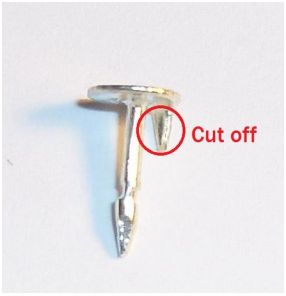

Take care to avoid a bridge of solder between the two leads of the LED. Current will flow through the bridge, and not the LED, thus the LED will not light up. This will also quickly drain the battery Fortunately, this is easy to fix – see details in the left column.

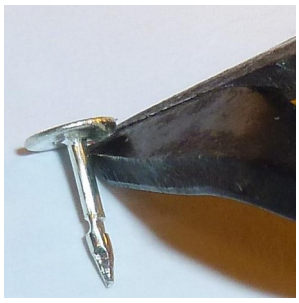
## Assembly

Take a look at the completed picture on the first page. The only components that will be visible on the front are the LEDs. The power switch and the battery holder will be placed on/facing the back of the board and soldering will occur on the front of the board – the side with QR-code graphic on it.

First, orient the board so the silk screen printing of QR-code is seen. You are ready to begin.

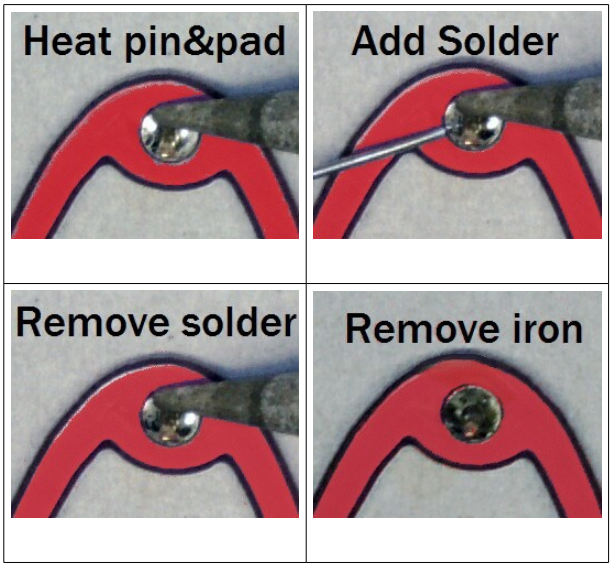
1. Separate the pin from the clasp of the tie tack (pin and clasp). The pin has a small secondary post. **Use the cutters to remove the smaller post next to the big pin.** If there is a little stub left you can flatten it against the round base of the pin with your pliers.



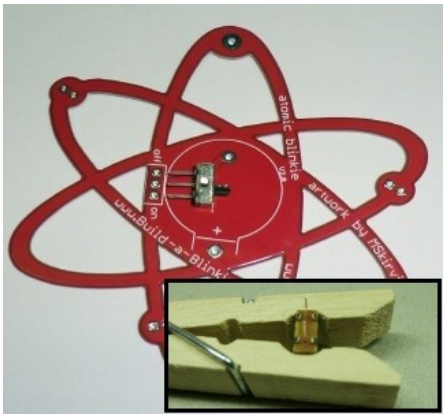
2. Place the pin through the hole on the QR-code side, then hold the pin and set the blinkie on the table, thus QR-code side down.

3. Solder the pin. A soldering review – **4 steps:**
   - Heat pin/wire and pad: soldering Iron tip on pad and touching pin/wire.
   - Feed in some solder – about 1/8" or less
   - Remove solder, keeping tip in place until it flows around the pin and the pad – NOT just on the pin/wire.
   - Remove the iron .

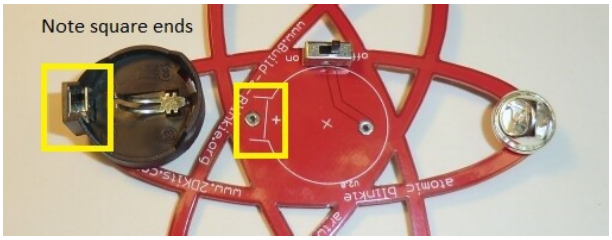



4. After it cools (about 10 seconds) put the pin back on the pin so you don't forget it.

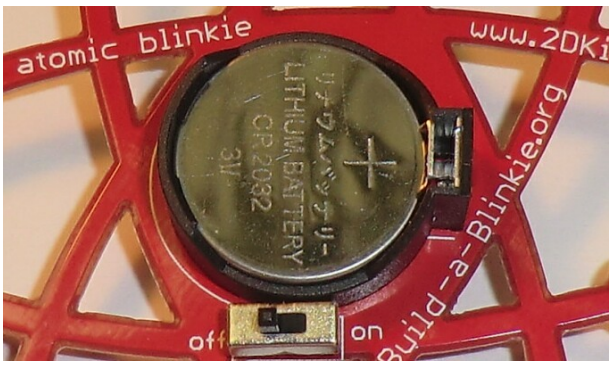
4. **IF** you have a clothespin available, you can make soldering the switch easier, by placing the switch in the clothespin as shown in the inset.
5. Insert the power switch where the white rectangle outline shows. It does not matter which way top-to-bottom. Then flip the board over to the QR-code side. Solder **<u>one</u> wire**, then check the switch position.
   - If it is crooked, heat the single solder connection and position the switch correctly then remove the iron and hold it in place until the solder cools.
   - Then **solder the other 2 wires of the switch.**



6. Flip the board over and insert the battery holder.
   - Orientation is important for the battery holder. Line up the square end with the printed outline. Press it down in contact with the circuit board – it may hit the switch a bit. Flip the board over to the QR-code side. Solder the battery holder.




7. Insert the battery. The plus sign "+" will face up. Angle it down into the battery holder on the metal clip side first, and then press down on the whole battery. It will snap in place.
   - In the next few steps, the LEDs will be inserted and tested before they are soldered into the board,
   - so set the switch to "on".

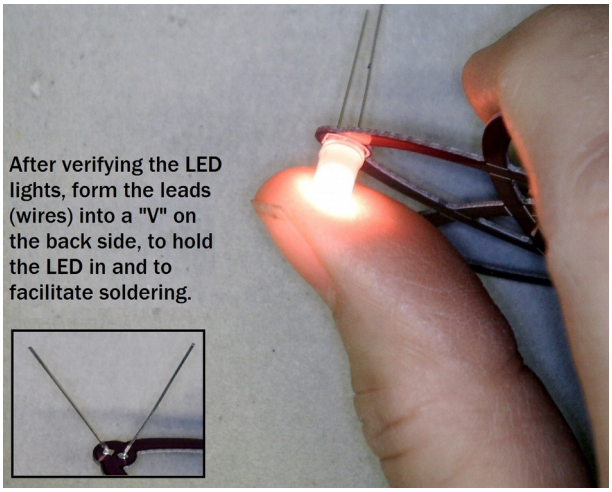



8. Insert one LED into the board from the QR-code side – the side with the circle outlines for the LEDs.

   **Orientation is important** for LEDs.
   - **Long lead, round pad hole.**
   - **Short lead, square pad hole.**

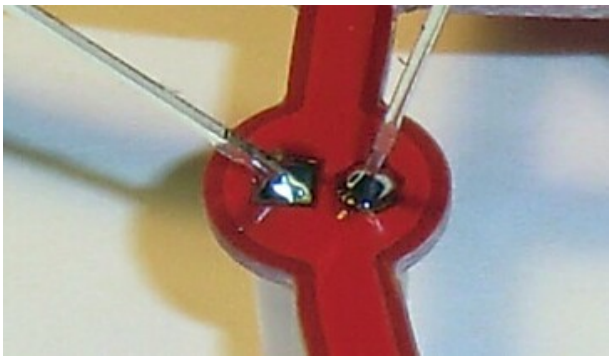
9. Be sure the switch is "on".

   Check the LED. Does it light up? You may need to gently wiggle so it makes contact. If not, reverse the wires on the LED. 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.
10. Insert, test, and "V" the second LED
11. Insert, test, and "V" the third LED



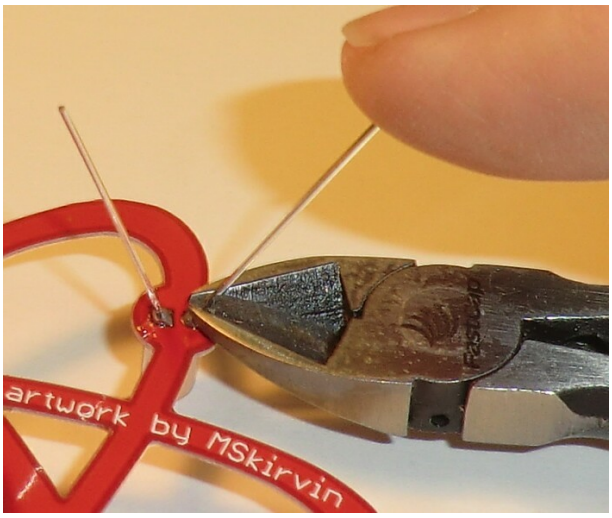
12. Turn the power switch off. Flip the board over and solder the LEDs. Keep the LED tight against the circuit board so it looks nice. That also means holding it down for a bit after removing the soldering iron, until the solder cools – just a few seconds.

    Use only a little solder – be sure to avoid a “short” or “bridge” between the wires: each wire must be soldered individually.



13. Trim the excess leads (wire) with the cutters. Hold your finger over the ends of each lead to keep it from flying off when cut.

14. You may also want to trim the leads on the front of the board from the power switch and the battery holder, as they are rather sharp.




15. Turn on the switch! Your BSA Atomic Blinkie should begin blinking or color fading.

16. 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, or the switch was too close to the board and the metal case is contacting the printed circuit.

17. Enjoy!

## Troubleshooting

If the LEDs don't flash, 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.
- 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. You may wish to put it in the plastic bag the kit came in while not using it.