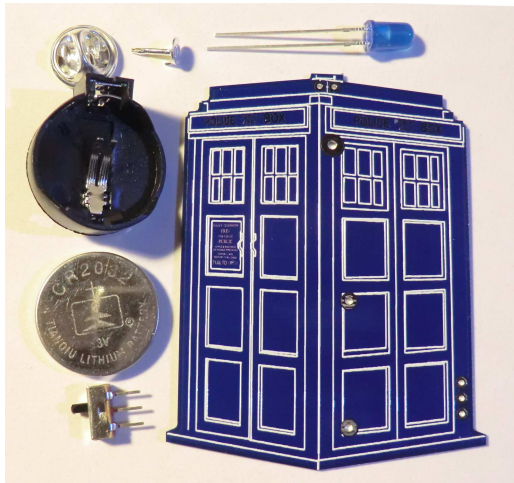


Kit 50 - Tardis Blinky - 2Dkits.com

This **Blinky** is made with a circuit board, a light emitting diode (LED), a battery in a battery holder, a switch, and a tie tack pin so you can wear it. You will make it yourself by soldering the parts onto the circuit board.

We hope you have fun building this blinkie, learning or improving your skills in soldering.

Start with a bag of parts:



End with a Blinky you can wear!



First, open up the kit and review the contents below, comparing to the parts picture above:

- A Tie Tack, separated into its **back**, and **pin**
- A CR2032 battery holder (above the battery)
- A CR2032 battery
- A power switch
- A flashing blue LED (light emitting diode)
- The “Tardis” printed circuit board

Are you ready to start? Do you have all the parts? If not, give us a shout.

“How to solder” will be covered briefly in “Assembly”, but a detailed description may be found at the end of these instructions.

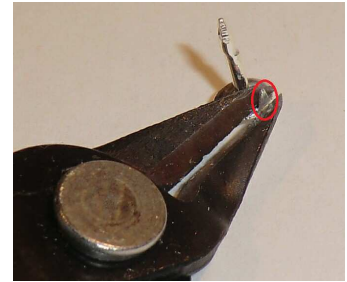
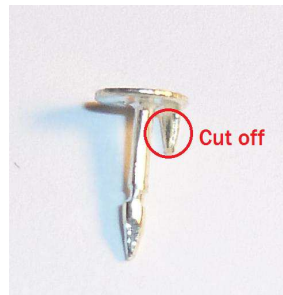
TERMS:

Solder	A metal alloy that melts easily, holds things together, and conducts electricity. You will have a “coil” of it.
Leads	(rhymes with “seeds”) The wires that comes out of the LED, that you solder to the circuit board
Pin	Like a lead, but comes out of the battery holders, tie tack pin or switch
Pad	Small shiny areas on the circuit board, usually circles or squares, that you'll be connecting The LED and other components leads or pins to, by soldering.

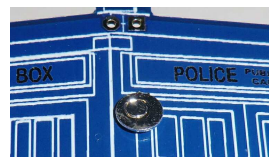
Assembly

We're going to solder the tie tack pin, then the switch, then the battery holder, and finally the LED.

1. Separate the pin from the clasp of the tie tack (pin and clasp). The pin has a small secondary post we need to remove before soldering.
2. **Use the cutters to remove the smaller post next to the big pin.** Catch it so it doesn't fly off! If there is a little stub left you can flatten it against the round base of the pin with your pliers.



3. Inserting the tie tack pin:
 - Insert the pin on the front, top center.
 - Hold the pin, and flip the board onto its back for soldering. **If you are on a plastic table, put it on cardboard or the business card to protect the table from the soldering heat.**



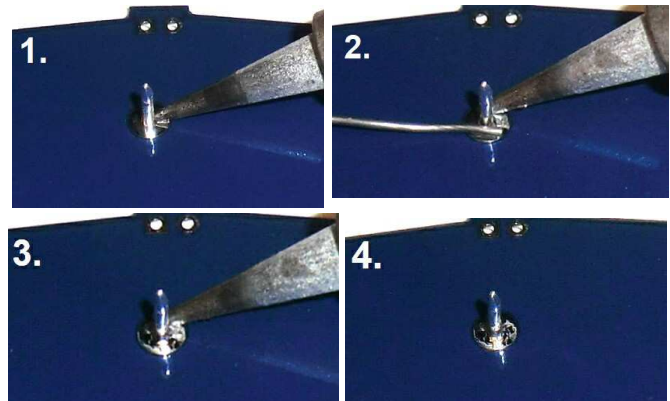
Insert pin on the
Front, top center



Flip to the **Back** to
solder the pin

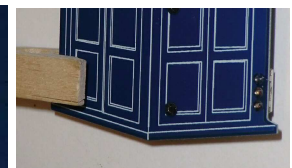
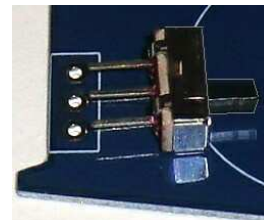
Follow the next 4.1) through 4.4) steps for all soldering.

4. Solder the pin. **Use these 4 soldering steps:**
 - 1) Heat pin and pad: the soldering iron tip must touch **both** for the solder to connect them.
 - 2) Melt solder into connection – about 1/8"
 - 3) Remove solder, but **keep heating the pin and pad to flow the solder around them.**
 - 4) Remove the iron. Wait 10 seconds to harden so the entire round pad is covered by solder, going up on the pin a little.



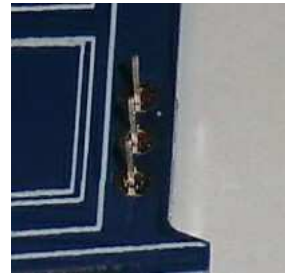
Now put the clasp on the pin so you don't lose it.

5. Installing the switch
 - 1) [Left Picture] Flip the board over to the back side, and insert the switch wires into the 3 holes with the rectangular outline.
Tip: if your switch handle is long like in the picture, snip it down to about half height. This may prevent it breaking accidentally.
 - 2) Hold the switch pins, flip the board to the front, and balance it with a clothes pin clipped opposite the switch [Right Picture]



By the way, "ON" is up, "OFF" is down.

- 3) With the switch handle resting on the table, and the clothespin supporting the opposite edge of the board, you can slide the board a little to get the pins standing straight up as shown in this picture. The switch will be flat against the back of the board.

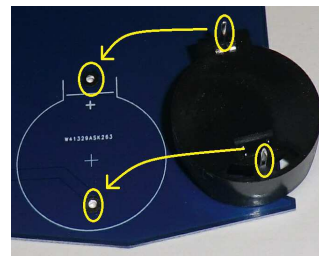


6. **Solder ONLY ONE PIN** - then check...

- If the switch is crooked (left picture), re-melt the solder and straighten it.
- Then **solder the other two switch pins**. (right picture)

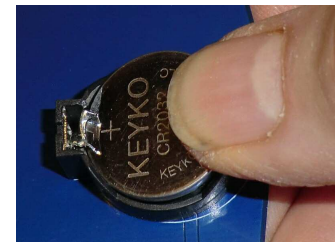


7. On the back side, flip the battery holder over the printed outline, inserting the pins in the board.
- Keep it in place, and flip the board over
 - Solder the top pin, then solder the bottom pin.
 - Press down between the two pins, then re-melt the bottom connection, so the pin goes all the way through the board, and the holder is flat against the circuit board



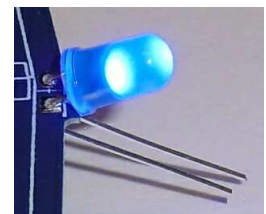
9. Install the battery

- Turn the switch off (down).
- Hold the battery with the “+” sign facing up.
- Angle it into the battery holder against the metal tab, and then squeeze down hard, so it snaps in place.
- Turn the power switch on (up)
- In the next few steps, **the LED will be tested before soldering**



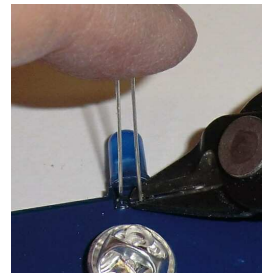
10. Installing and testing the LED:

- Hold the LED with the long lead up as shown in the top left picture
- Bend the LED away from you forming a bend as shown in the bottom left picture
- Insert the LED from the front.
- The LED should blink as you wiggle the leads. If not it may have been bent the wrong way.
- If it doesn't blink even when wiggled, check that the battery pins are soldered well.



11. Soldering the LED

- Flip the board onto the back, and with the LED sticking out just above the top of the Tardis on the front.
- Solder the LED leads.
- Trim the leads, keeping them from flying off, as shown in the picture



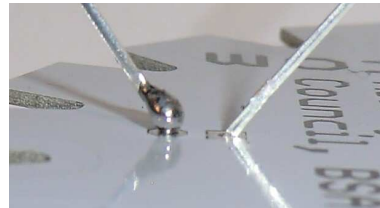
That's it – you should have a working blinkie now!

Troubleshooting

If the LED doesn't flash, then you'll need to do a little troubleshooting to finish your project. The following steps should isolate most problems. Be sure the power is off to save the battery.

If you've made a solder **bridge**, as shown on the previous page, it is easy to fix. You can often just re-melt the solder and pull the tip of the soldering iron through the bridge, breaking it, then shake any captured solder off the iron. Or, reheat all the solder and tap to the board on edge to shake off the excess while it is still melted. Ask a tech if you need help.

- **A common soldering problem** is to have solder on the pin or lead but NOT connecting it to the pad. Notice the pad UNDER the solder in the picture:
- Re-heat the connection, being sure to press DOWN on the pad with the soldering iron tip and wait for the solder to “puddle” around the pad and pin.



- Recheck your solder connections. 80% of all problems are traced to this. Cold solder connections – dull, not shiny – and broken connections will cause erratic performance or failure. Reheat any questionable solder connections until they flow and look shiny and secure.
- Check for bits of solder, lead ends, or other foreign matter which may be lodged in the wiring.
- LED reversed. You will need to remove the LED by having a tech desolder it, and then solder it in the correct way. Trying to remove it yourself CAN break the circuit board.
- The battery is incorrectly inserted. The “+” side of the battery should always be inserted facing up.
- The battery holder is inserted backwards – and if you tested the LED, so is it. This actually “works”, and is usually left alone.
- Bad part – it does happen. In over a thousand boards assembled, we've seen two or three parts fail. If bought online, 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.

Caring for and using your blinkie

Once built, the use of this blinkie is fairly straightforward. Don't get it wet. Don't stick it in a pocket with a bunch of coins or metal where it might short out. Don't set it on a metal table top or in a metal dish, etc. To prevent it shorting out, you may want to keep it in the bag it came in.

Soldering Hints

Soldering is not like gluing: Both the “pad” (shiny circle or square on the circuit board) and the component (lead coming up through the hole) must be hot enough so the solder flows around them, making an electrical connection.

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

Here's how to make a good solder connection:

- Prepare the connection. Bend the component lead slightly after it passes through the printed circuit board (this helps hold it in place while soldering). Ex: Bend LED leads into a “V”.
- Prepare the tool. The soldering iron should be up to temperature. Clean the tip by plunging it into the stainless steel wool in the jar. 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 connection. If the iron doesn't get shiny, contact a Tech who has special tip cleaner.
- Place the tip in contact with the component lead AND the printed circuit board pad.
- Place the solder against the connection directly opposite the tip. It should melt within 2 seconds, and flow around the connection. If it takes longer than that, you're not getting enough heat into the connection. Use only a TINY bit of solder.
- Pull back the solder, but keep the soldering iron in place until the solder flows freely and completely covers the connection. If the heat is removed too soon, the solder will tend to “ball up” and not stick well to the conductors. The solder connection should look “wetted”, with concave shapes.
- Let the connection cool without movement at room temperature. This usually takes only a few seconds.
- If a connection is moved before it cools, it will take on a dull, satin look that is characteristic of a cold solder connection. A cold solder connection is fragile and conducts poorly – reheat the connection until the solder flows freely, and hold it still until it cools.
- Keep the tip of the soldering iron clean. Jab it into the steel wool tip cleaner jar several times until it is shiny.

Directions by Ward Christensen, WardC@2dkits.com. Feedback welcome!