

Kit 44 - Three Fires Council Blinky

You will make this Blinky from a circuit board, four light emitting diodes (LEDs), a battery, a battery holder, a switch, and to wear it, either a tie tack or sash loop. You will make it yourself by soldering the parts onto the circuit board.

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

From a bag of parts:

to a Blinky you can wear!



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

On the left, you'll see:

- A CR2032 battery
- A CR2032 battery holder
- A power switch
- 4 LEDs, which either flash a color or fade colors, each one individually, by itself!
- For using as a Scouting Sash Slide: A wire loop
- -or- for wearing on a shirt: A Tie Tack, separated into its **back**, and **pin**

and on the RIGHT you'll see

- A "Three Fires Council" circuit board – in any of several colors.

Got everything to start? 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.

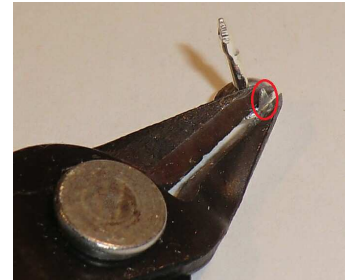
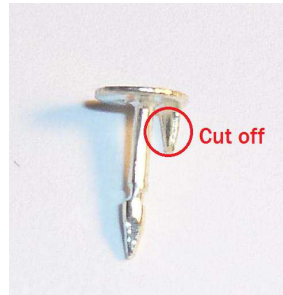
Assembly

DECIDE:

If you want to wear your blinkie by pinning it onto your clothing: Go to step 1.

If you want a Scouting Neckerchief (Sash) slide blinkie, go to step 5.

1. Separate the pin from the clasp of the tie tack.
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 as shown.
 - Hold the pin, and flip the board onto its back for soldering. If you are on a plastic table, put it on the business card to protect the table.



Insert pin in **Front**



Flip on **Back** to solder

The following soldering steps apply to ALL your 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**NOTE** in the inset picture how the entire round pad is covered by solder, and it goes a little bit up on the pin.

1.



2.



3.



4.



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

5. Installing the switch
 - [Left Picture] Flip the board over to the back side, and insert the switch wires into the 3 holes with the rectangular outline.
 - Hold the wires and flip the board to the front.
 - [Right Picture] With the switch handle resting on the table, you can slide the board a little to get the pins standing straight up.
 - **Solder ONLY ONE PIN- then check...**
 - If the switch is crooked, re-melt the solder and position it straight, and let it cool.
 - **Then solder the other two switch pins.**



Insert switch into the **holes inside the rectangular outline**



On the front, make make sure the pins are vertical



6. On the back side, insert the battery holder over the printed outline, facing the direction shown in the printed outline.

- **Orientation is important** for the battery holder. Make sure the battery holder matches the printed outline. Line up the **square** ends.
- Flip the board over to the front side, and set it flat on the table to be ready for soldering.



7. Solder the battery holder pins.

- Solder each of the battery holder pins to the circuit board. Repeating “how to solder”:
 - 1) Heat pin and pad with soldering iron
 - 2) Add solder – maybe 1/8”
 - 3) Remove solder, but keep heating pin and pad to flow the solder around the pad.
 - 4) Remove the iron



Close-up of soldered battery holder pin. Pad is covered with solder.

8. Install the battery

- Place the switch in the “off” position.
- Hold the battery with the “+” sign facing up:
- Angle it into the battery holder – against the black end – and then press. It will snap in place.
- Turn the power switch to the “ON” position.
- In the next few steps, **the LEDs will be inserted and tested before soldering**



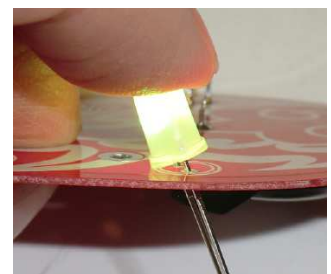
9. Inserting and testing the LEDs:

Orientation is important for LEDs.

- Insert the **long lead** through the hole with the **round pad**, thus the **short lead** goes into the **square pad** hole.
- The LED should blink as you wiggle the leads. If not it may be inserted the wrong way.
- If it doesn't blink even when wiggled:
 - Check that the battery pins are soldered well, as in step 7's picture.
 - If you soldered the battery holder in backwards, you will have to insert the LEDs backwards – Long lead, square hole!



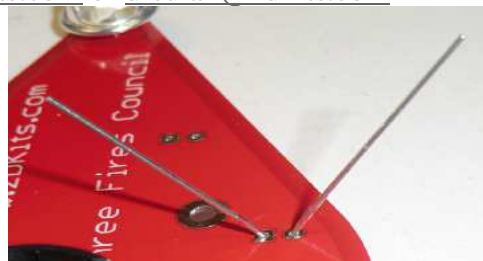
Inserting the LED:
Long lead, **round** hole,
short lead, square hole,



then test by holding the LED to the side

10. Turn the board over to the back. Ensure the LED is flat against the front, then spread the leads out into a “V” as shown

- This will hold the LED in, and give you a nice angle for soldering



11. Repeat the above steps for the remaining three LEDs: Insert it from the front where the double circle pattern shows, **long lead, round hole**, and make sure it blinks. “V” the leads.

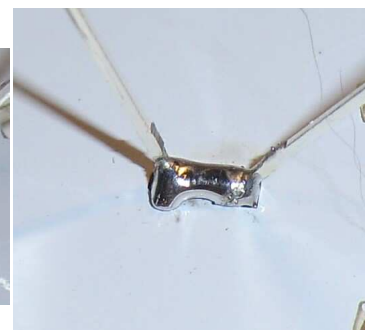
12. Turn OFF the switch. IF the LEDs continue to blink, have a Blinky Tech help you with the switch.

13. Now solder the LEDs.

- See the pictures at the right for “good” and “bad” soldering.



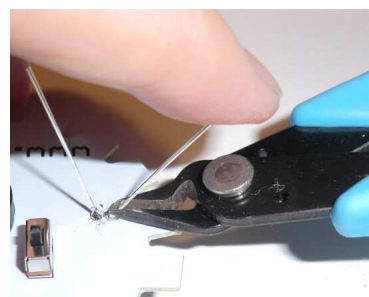
Good soldering



“Bridge” = short = Bad

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

15. You may also want to trim the leads from the power switch and battery holder. Again, catch the pieces that might fly off.



IF you soldered in the pin to wear on your clothing, **you are done**, turn it on, and enjoy it / wear it!

IF you want the Scouting neckerchief slide, continue on here:

- **Installing Neckerchief Slide**

A piece of 12 gauge copper wire will be used to make a Neckerchief slide.

Place the wire as shown in the picture – just **BARELY** poking above the board. If the wire does not hold itself in place for soldering, take it out and spread the two ends a little to make it a tighter fit, then squeeze it to put it in place.

Solder **one** side of the wire. It will take a while to get hot as the copper conducts the heat away – and the **wire gets very hot – do not touch.**



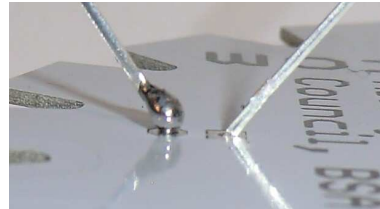
- Before soldering the 2nd side, make sure the wire is perpendicular to the board – remember **don't TOUCH the HOT wire**, hold with a **clothespin** or **pliers**, heating the SINGLE solder connection until it can be moved to perpendicular if it was not.
- Once the loop is perpendicular, solder the 2nd end of the wire.

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. 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 joints – dull, not shiny – 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, lead ends, or other foreign matter which may be lodged in the wiring.
- LEDs 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 LEDs, so are they. 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 joint or 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). 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 joint. 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 joint directly opposite the tip. 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. 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 joint. 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.
- 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. Push it into and pull it out of the tip cleaner jar several times until it is shiny.