

# Kit 43 – 555 Blinkie

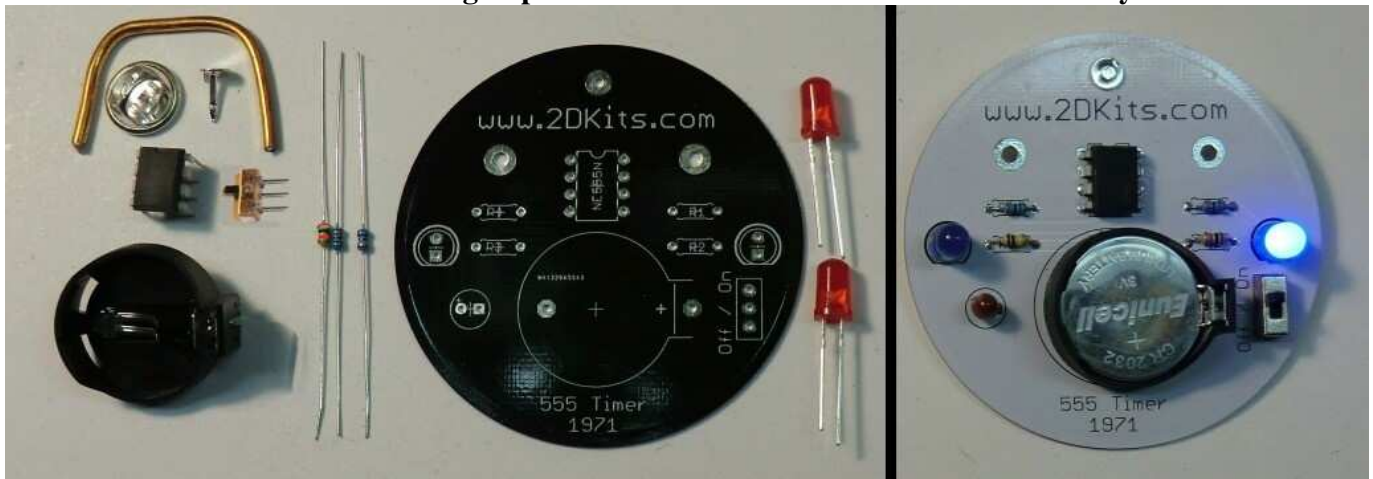
## History in the making!!!

The heart of this blinkie is a timer chip called the 555. It was invented by Hans Camenzind in 1971. It became commercially available in 1972! Now, in spite of its age, over a billion 555 timer chips are produced every year!!! A little history of the 555 is printed on the back of the circuit board. All the parts are on the front to “show them off”.

We hope you have fun building this blinkie based upon a chip with so much history, that you learn some things, that you gain an interest in electronic circuits, and learn how easy it is to solder.

From a bag of parts:

to a Blinkie you can wear!



First, open up the kit and review the contents as shown in the left picture above, and the parts options pictures shown below

From left to right, and top to bottom there should be the following parts:

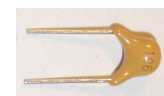
- A scout neck sash copper loop: rarely done, you can skip the tie tack and solder in the loop
- A Tie Tack: How most people wear the blinkie, showing separated back and pin
- 555 timer chip
- Power switch
- CR2032 Battery holder. The CR2032 Battery is usually NOT packed with the kit – ask for it.
- 1 1K ohm resistor (brown, black, red)
- 2 56 ohm resistors (green, blue, black)
- 555 circuit board – in any of several colors. “Silkscreening” is the contrasting print on the board.
- 2 LEDs – they come in various colors

**Then either** of these pairs of components, each calculated to give about 1.5 blinks per second:

- A 100K ohm resistor (brown, black, yellow)
- A small dark red 4.7uf capacitor
- **-OR-**
- A 43K ohm resistor (yellow, orange, orange)
- A small dark yellow 10uf capacitor “106”



(The oranges might look somewhat red)



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.

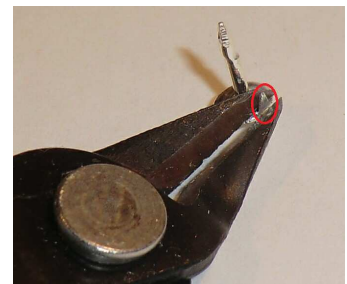
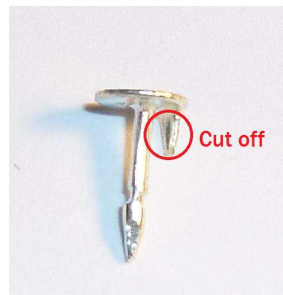
### Assembly

Take a look at the completed picture above right. All components are inserted from the front, and are soldered on the back.

**DECIDE** how you want to wear the blinkie: PIN back or Neckerchief Slide:

- If you want to pin the blinkie to your clothing: Go ahead to step 1.
- For a Neckerchief (Sash) slide blinkie, start with step 9.

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:
  - Find the hole on the **front** of the circuit board, above the notch in the chip outline.
  - Insert the pin from the front, hold the pin, flip the board onto its back for soldering.

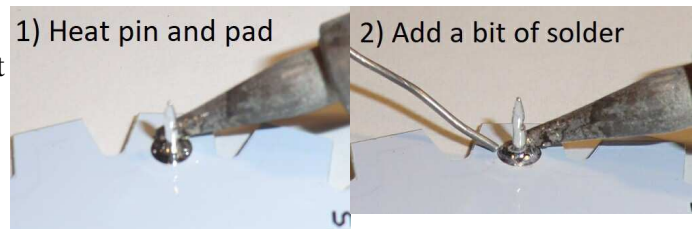


Front showing pin hole

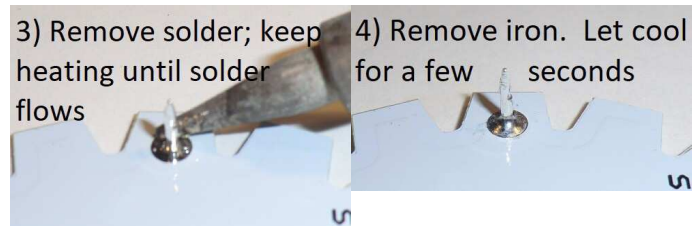


Back after inserting

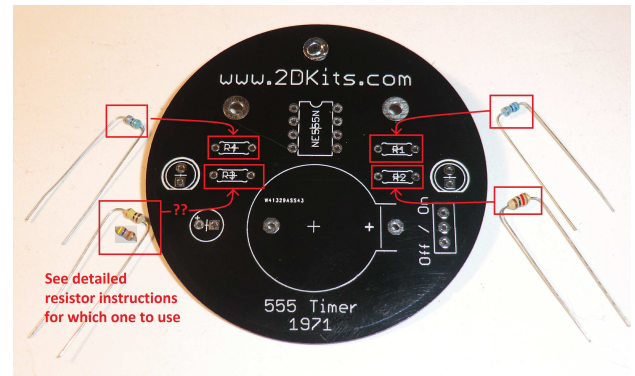
4. Solder the pin. **Use these 4 soldering steps:**
  - 1) Heat pin and pad: the soldering iron tip must touch both to heat them both.
  - 2) Add solder – maybe 1/8”
  - 3) Remove solder, but keep heating the pin and pad to flow the solder around the pad.
  - 4) Remove the iron



**Put the pin clasp on the pin so you don't lose it.**



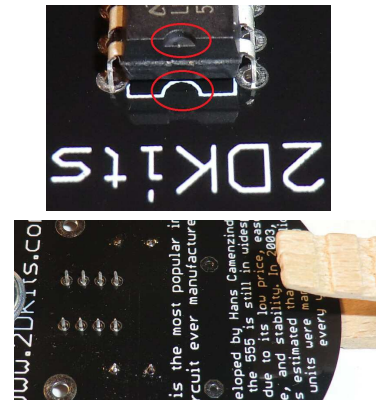
5. Bend the resistors as shown, inserting as follows:
- Insert the two “top” resistors – 56 ohm (green, blue, black) where R4 and R1 are printed
  - Insert the 1K ohm resistor (brown, black, red) where R2 is printed
  - Insert the remaining resistor where R3 is printed
  - If you have the dark red capacitor, it will be the 100K ohm resistor (brown, black, yellow)
  - If you have the dark yellow capacitor, it will be the 43K ohm resistor (yellow, orange, orange)



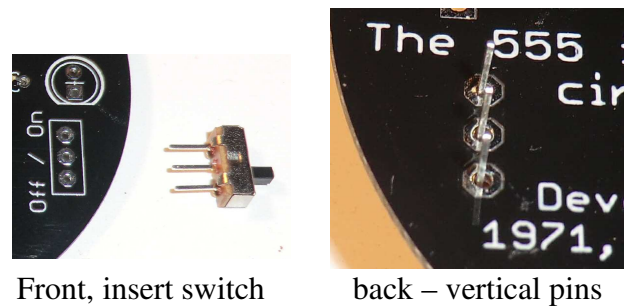
6. To hold the resistors in for soldering, form them into a vertical “V” on the back side (meaning **NOT** flat against the board).
- Solder the resistor leads
  - Trim the resistor's leads



7. From the front, insert the 555 chip so the notch in the chip matches the notch in the silkscreen, as shown in the top picture:
- Flip the board over to the back side.
  - Press a finger down in the middle of the pins so the 555 is flat on the table. Then slide one handle of the clothespin in, to keep the board from tilting, as shown in the bottom picture:
  - Then solder the 555's pins.



8. Insert the power switch from the front where the printed rectangle shows. The **DIRECTION** of the switch doesn't matter.
- Flip the board over to the back side.
  - With the switch handle resting on the table, you can slide the board a little to get the pins standing straight up.
  - Solder **ONE** PIN.
  - If the switch is crooked, re-melt the connection and position it straight, and let it cool.
  - Then solder the other two switch pins.



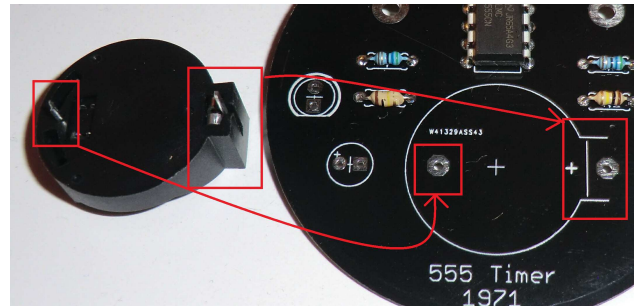
Front, insert switch

back – vertical pins

9. Insert which ever capacitor you have in your kit.
- For the **red** capacitor, the **long** leads **must** go into the **round** hole.
  - For the **yellow** capacitor, you'll have to bend the leads with a pliers to get them narrow enough.
  - The yellow capacitor can be installed either way – direction doesn't matter like with the red one.
  - Holding the capacitor in, flip over to the back side and spread the leads into a V to hole
  - Solder the capacitor leads, and trim them off.



10. From the front side, insert the battery holder.
- Orientation is important for the battery holder. Make sure the battery holder matches the printed outline. Line up the **square** ends.
  - Use the clothespin to hold the battery holder in place.
  - Flip the board over to the back side.



11. 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 pin

12. 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 vertical metal tab, then press in and down over the black rim. 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



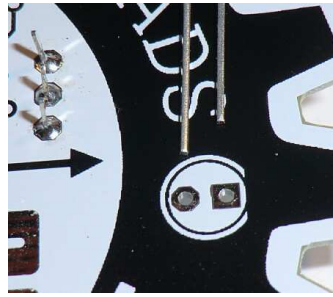


13. Inserting and testing the LEDs:

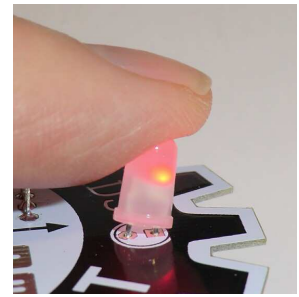
Turn the power switch to the “on” position.

**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 you can't get it to blink, contact a tech.



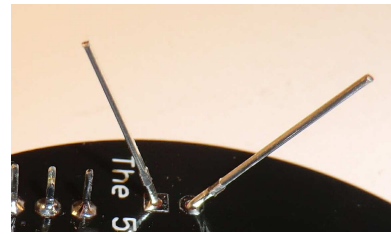
Long lead, round hole,  
short lead, square hole,



then test by holding  
the LED to the side

14. 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



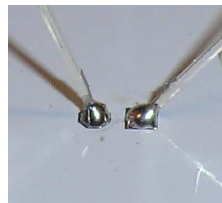
15. Repeat the above steps for the other LED: Insert it from the front where the double circle pattern shows, **long lead, round hole**, and make sure it blinks.

16. Turn OFF the switch. IF the LEDs continue to blink, have a Blinky Tech help you with the switch – you didn't do anything wrong.

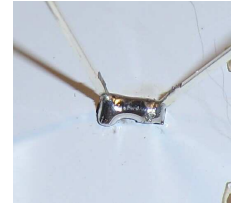
17. Now solder the LEDs.

- See the pictures at the right for “good” soldering, and an example of bad – a “bridge” or “short”.

Good soldering



“Bridge” = short = Bad

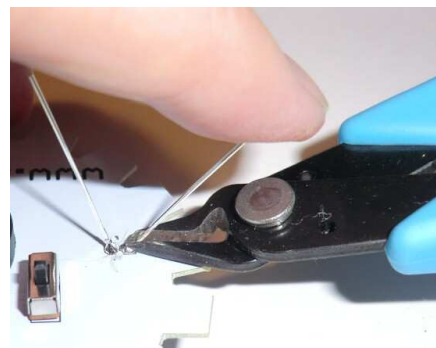


18. Trim the excess leads with the cutters. Hold your finger over the ends of each lead to keep it from flying off when cut.

19. You may also want to trim the leads from the power switch and battery holder. Again, catch the flying leads.

20. If you are doing the scout neckerchief slide, ask a tech for help.

21. Turn on the board! 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. 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 reheat 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. Beyond that, we are more than happy to demonstrate various techniques.

- **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.