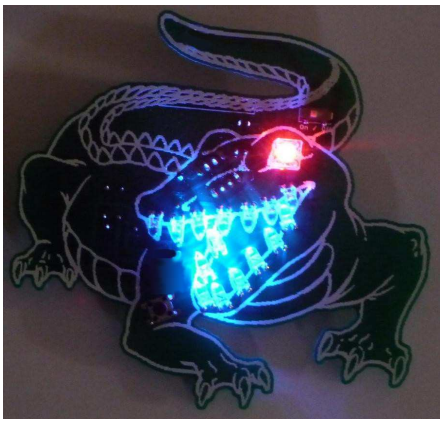
When done, please return these instructions for the next person to use. Thank you.

Kit 11B, Alligator Blinkie

This blinkie has a little computer in it called a PIC, made by Microchip. A PIC is a tiny, yet surprisingly powerful little computer.

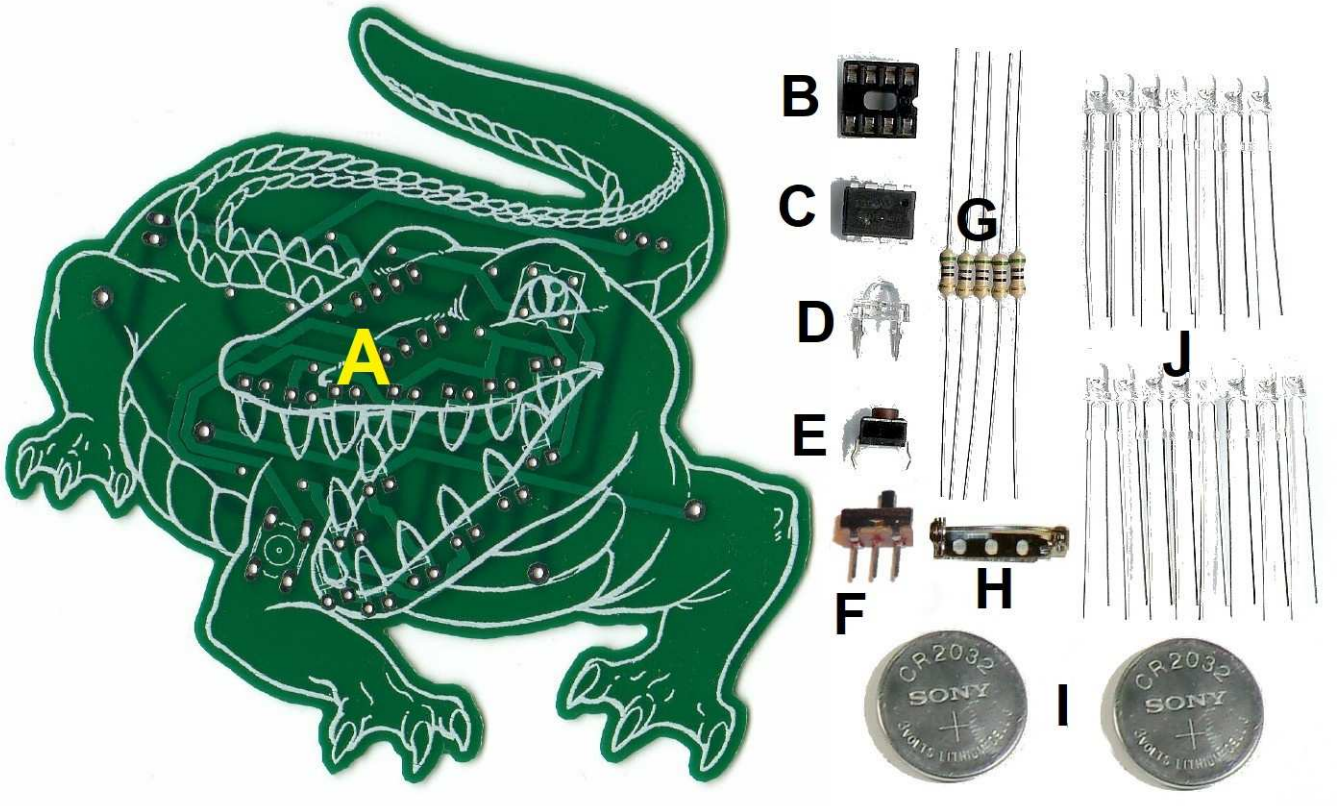
This blinkie has:

1) 15 small (3mm) light emitting diodes (LEDs). Many colors are available.
2) An RGB (Red-Green-Blue) LED for the eye
3) A push-button to change to another of many stored flashing patterns



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

First, open up the kit and review the contents. You should have the following parts, whose names are shown below with their letters. At an event, the batteries "I" and/or chip "C" may be given out later.



A) Alligator Circuit board
B) Eight pin socket
C) 12F1822 PIC (may have to ask for it))
D) One RGB LED
E) Push button
F) Power switch
G) Five 56 ohm (**green**, **blue**, **black**) resistors
H) Pin Back so you can wear your 'gator
I) Two CR2032 batteries (may have to ask for them)
J) 15 LEDs

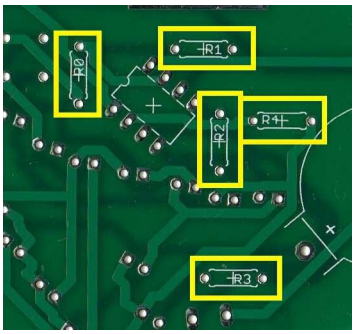
Soldering: you will be soldering the various parts to the circuit board. The wires or leads (rhymes with "seeds") of each part, and the little silver pad on the circuit board that it comes through, need to be heated with the tip of the soldering iron FIRST, then feed some solder in. Steps shown below. Details at end.

Assembly

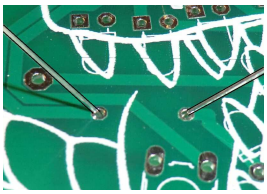
The **back** is the side that says "www.2Dkits.com", the **front** has the picture of the alligator on it

1. Flip the board to the back
   - If the resistors are taped together, cut them from the tape
   - Bend the leads like this to make them ready to insert:

   - Insert the resistors in the "R1" through "R5" locations as outlined in the picture to the right.

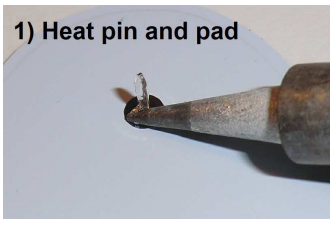
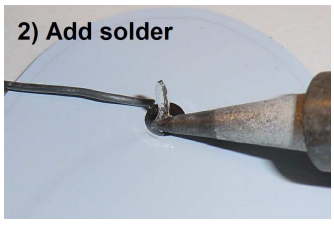
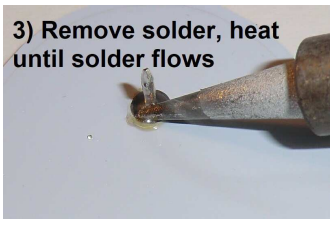


2. Form the leads into a "V" on the back to prepare for soldering. This will hold the resistors in.



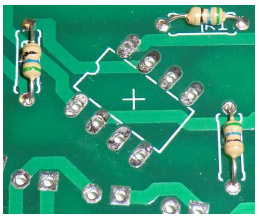
3. Flip the board to the front and set it on the table
   - Since these are your first things being soldered, **clean the soldering iron tip** by plunging it into the jar of steel wool several times, or wiping it on a damp sponge or paper towel.
   - **Use the following steps to solder the leads, and all other parts as you come to them:**
     1) Heat the lead and the pad with the tip of the soldering iron – maybe 2 seconds.
     2) Feed in a bit of solder, it should melt and start to puddle around the pad on the board
     3) Remove the solder, letting the solder in the connection cover the pad and go up the lead a bit
     4) Remove the iron

While these pictures are not for the 'Gator blinkie, they DO illustrate the steps to good soldering:

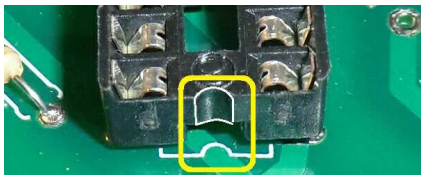
			
Press DOWN on pad and OVER on wire lead, hold the iron there for a few seconds for them to get hot.	If it won't melt, it is OK to touch the iron tip, but you want the solder to flow around the wire lead and the pad	You can see the solder flow from where it started, to cover the entire pad and go up the lead a little bit	

4. TRIM the leads on the resistors after soldering them.

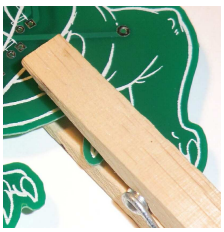
5. Insert the eight pin *socket* (page 1 inventory reference B) into the board. Note the small notch on one end of the socket. It must face the left (↖) side of the board upward toward the tail.



See the photo at the right for how the notches line up.
The socket notch has been outlines in white in the picture

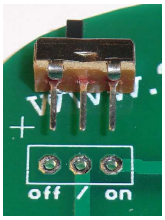


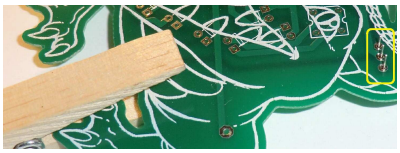
6. Hold the socket pins underneath the board, and flip the board over to the front.
   - Placing the clothespin as shown will keep the socket level as you solder.
   - Solder the 8 socket pins.



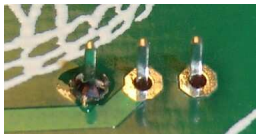
7. Flip the board over to the back

8. Insert the power switch into the board at the base of the tail. The left picture shows where.





9. Hold the switch's pins, and flip the board over. Again use the clothespin to level the board, then Solder **one** pin of the switch – see bottom right picture. Note how LITTLE solder was needed!



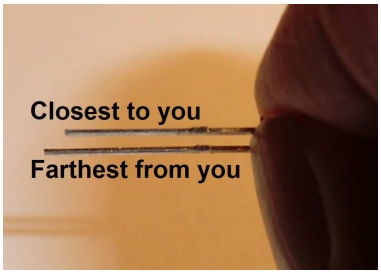
10. Now look at the switch on the BACK of the board – is the switch straight and vertical? If not, you can melt the solder on the one pin while straightening the switch.
11. Solder the other two pins of the switch

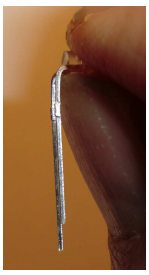
Installing the LEDs – VERY VERY important to follow carefully:

You **can** install the LEDs without bending, but it probably looks best with the LEDs bent in to follow the teeth. Here's how:

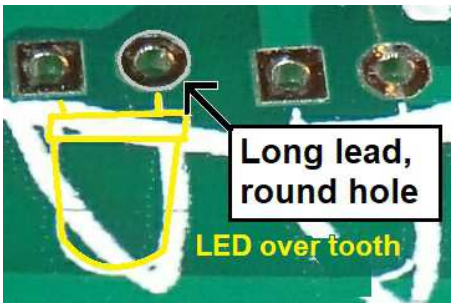
12. Hold each LED between your **RIGHT** thumb and forefinger, up against your **RIGHT** thumbnail, with the **LONG LEAD facing AWAY from you**

13. Then bend the leads down along your thumbnail (right picture)





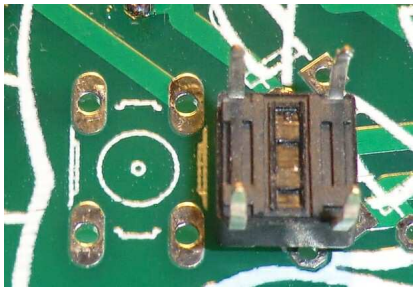
14. Insert the bent-lead LED over one of the teeth (yellow highlighted outline in picture), **long lead through round pad hole**. This double-checks that you bent it the right way
15. Solder the LED. **Tip:** if you solder just one lead, you can check that the LED is down against the board and lined up. If not you can melt the solder, reposition the LED, then solder the 2nd lead.
16. Continue bending the leads as in steps (12.-13.) and soldering them into the board. See first page left picture for example.



17. Trim off the LED leads after soldering, being sure to "catch" them so they don't fly off.

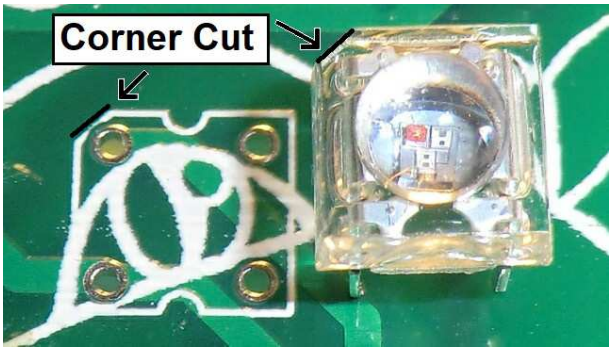
18. Flip the board over to the front.

19. Insert the push button into the 4 holes as shown in the picture – (That's the bottom of the push-button next to where it goes)
    - It will "snap in" and hold itself in place.



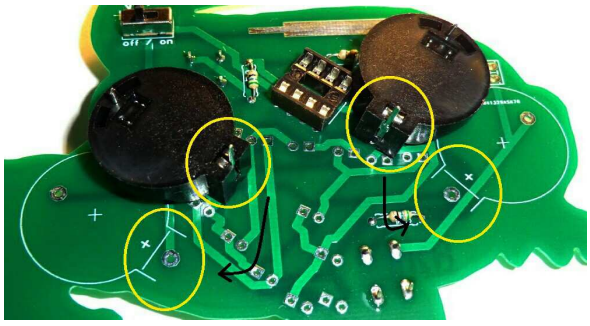
20. Insert the square RGB LED. **Orientation is important**. On the board, the RGB LED is inserted at the eye. There is a small corner cut on the LED. This goes into the upper left corner (↖) – it will also match the white outline on the board.

21. Hold the RGB LED in and flip to the back of the board, and solder it in
22. Also solder in the push-button's four pins.



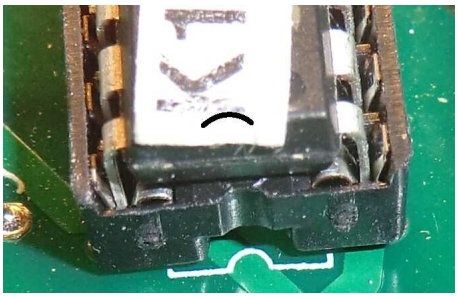
23. On the back, insert the battery holders, being careful to line up the **square end** with the square end printed on the board:

24. Holding them in, flip to the front and solder the two pins on each.

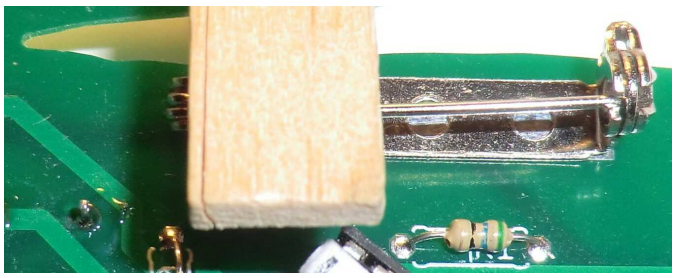


25. Insert a battery into each holder, with **the "+" on the battery facing up**.
    - It is easiest to angle the battery in against the metal tab, then push it in and down the other side. It may take a very firm squeeze to snap it into place.

26. Flip the board over to the back and insert the PIC (Inventory reference C) into the eight pin socket.
27. The PIC has a **notch** on one end, that **must line up with the notch printed on the board.**
28. The paper label may COVER UP the notch, but you can "feel for it" with a fingernail.
29. See the small black arch shown in picture.



30. Place the pinback over its silver outline on the back of the board, and hold it in place with the clothespin as shown.
31. Clean the soldering iron tip, and place it in the right hole in the pinback, so that it heats the pinback and the board underneath.
32. Wait about 15 seconds for the parts to get hot, then feed in solder.
33. Remove the solder but keep heating until the solder flows in and under the pinback.
34. Remove the iron and let it cool for about 10 seconds.
35. Move the clothespin over the soldered part, then solder the left hole as above.



Turn on the board! Enjoy.

Use

Once built, the use of this blinkie is fairly straightforward. Don't get it wet. Don't stick it in a pocket, drawer, purse, etc with a bunch of coins, keys, etc where it might short out.

This blinkie has additional patterns stored in the PIC. To change patterns, press and hold the push button. The LEDs will count up in a binary sequence. Each binary number represents a stored pattern. If the push button is released, the pattern associated with that particular binary number will then be displayed on your blinkie.

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 connections and broken connections will cause erratic performance or failure. Reheat any questionable solder connections until they flow and look shiny and secure.
- Avoid solder bridges across LED leads. If you make a bridge, it is easy to fix. You can often just melt and pull the tip of the soldering iron through the bridge, breaking it. Or, melt the solder and **gently** tap to the board on edge to shake off the excess. Ask for help if you need it.

- 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.
- Batteries 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). 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.

Soldering Hints

Soldering is not like gluing; the solder forms an alloy with the metals to be connected that creates a stable electrical path and a certain amount of mechanical attachment. 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 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).
- Prepare the tool. The soldering iron should be up to temperature. Clean the tip by quickly brushing it against a dry wire pad, or damp sponge, or damp cloth. 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.
- Place the tip in contact with the component lead and the printed circuit board pad.
- Place the solder against the connection directly opposite the tool. 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.
- 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. Wipe off flux and excess solder regularly in the damp sponge or cloth, and re-tin if needed.