Kit 35b – F35 Fighter Jet Blinkie

This "Blinkie" is made with a circuit board, three light emitting diodes (LEDs), a battery and 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 by soldering, learning or improving your skills, **including your skills at following directions.**

From a bag of parts:	**to a Blinkie you can wear!**

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

- A CR2032 <u>battery holder</u>
- A <u>Tie Tack</u>, separated into its **back**, and **pin**
- 3 <u>LED</u>s: a 3mm red, a 3mm green, and 1 milky color fading or "rainbow" for the tail
  Airplane and boat standards: red is on the left, or "port" side, green on the right or "starboard" side
- A CR2032 <u>battery</u>
- An <u>"F35" circuit board</u>
- A <u>power switch</u>

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.

Assembly

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

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.

Cut off

3. Inserting the tie tack pin:
   - Insert the pin on the front, on the **right wing**.
   - 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.**
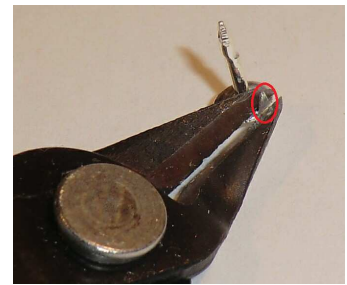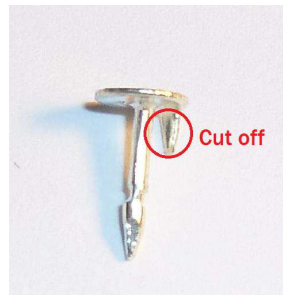

Insert pin in **Front** of the RIGHT wing   Flip to **Back** to solder

<u>**Follow the next 4.1) through 4.4) steps for all soldering.**</u>

4. Solder the pin.   <u>**Use these 4 soldering steps:**</u>
   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 **[Inset Picture]** the entire round pad is cov-ered by solder, going up on the pin a little.
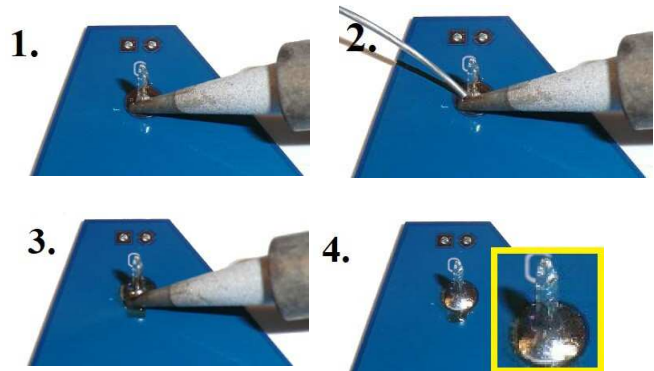
   Now put the clasp on the pin so you don't lose it.

1.   2.   3.   4.

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 wires and flip the board to the front.
   3. [Right Picture] With the switch handle resting on the table, **you can slide the board a little to get the pins standing straight up.**
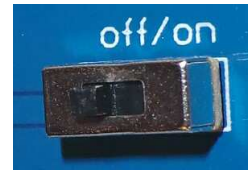

off/on
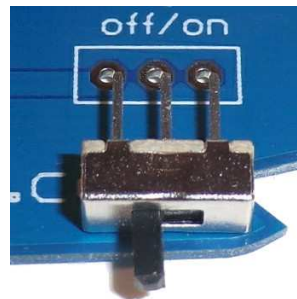
Insert switch into the holes inside the rectangular outline   make sure the pins are vertical before soldering

6. 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.**
- **Note** this picture has the **snipped** handle

7. 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.
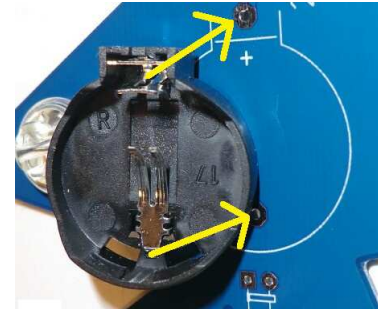
8. Solder the battery holder pins.
- Solder each of the battery holder pins to the circuit board.
- See the picture for a close-up of soldered battery holder pin. Note the pad is covered with solder, and it goes up the pin a bit.

9. 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**

NOTE: the battery must go INSIDE (to the left of) the little metal tab circled in yellow

10. Installing and testing the **RED** LED:
    Orientation is important for LEDs.
- On the **left wing**, insert the **long lead** of the **RED LED** through the hole with the **round pad**, and the short lead in 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.
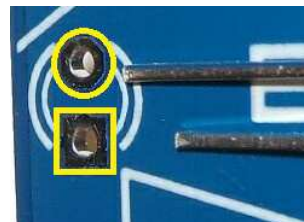
RED LED, Left Wing   then test by holding
**Long** lead in **round** pad,   the LED to the side
short lead in square pad,
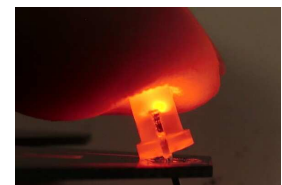
If you soldered the battery holder in backwards, you will have to insert the LEDs backwards – Long lead, square pad!

HINT: RED LED, left wing, GREEN LED, right wing – OBSERVE the "R" and "G" on the back!!!

11.   Turn the board over to the back.
   - Confirm: Is there an "R" next to the holes the **RED** LED leads came through?
   - Ensure the working 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
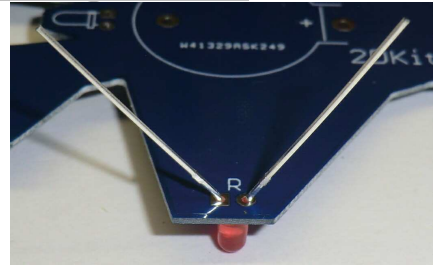
12. Repeat the above steps for the **GREEN** LED: Insert it from the front, on the **right wing**, where the double circle pattern shows, **long lead, round hole**, and make sure it blinks.
Flip to the back, ensure the LED wires come up next to the letter "G" on the back.
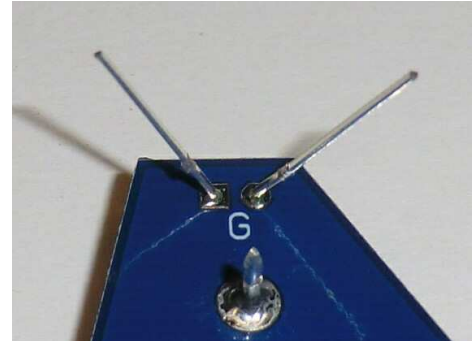
13. Turn OFF the switch. IF the LEDs continue to blink, have a Blinkie Tech help you with the switch.

14. Temporarily remove the pin back to make soldering the green LED easier, and solder both LEDs.
      The picture at the right shows how the soldering should look.
      Be careful to leave a **gap** between the two solder connections.

15. Trim the excess leads with the cutters.
      Hold your finger over the ends of each lead to keep it from flying off when cut.
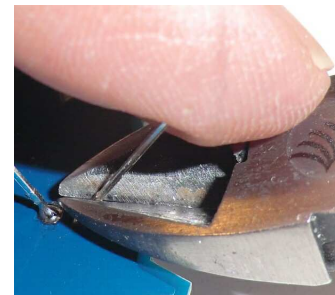
16. You may also want to trim the leads from the power switch and battery holder. Again, catch the pieces that might fly off.

17. Installing the **tail** LED:
   - The remaining, "milky" LED will be inserted from the **bottom of the board and points backwards**.
   - Start by bending the LED leads as shown: **make sure the long lead is as shown-** top picture
   - Turn the switch back ON for testing the LED.
   - Then insert the LED – **long** wire in **round** hole, **short** in the **square** hole in the back of the engine **from the bottom as shown.**
   - It will look like the picture to the right – but lit up.
   - Form the leads on the front into a "V" and solder ONE wire, then make sure the LED is pushed down tight from the back, melting the solder if necessary.
   - Then solder the second wire, and trim it

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

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.
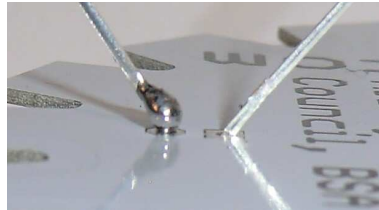
- Recheck your solder connections. 80% of all problems are traced to this. Cold solder joints – dull, not shiny – and broken joints will cause erratic performance or failure. Reheat any questionable solder connections until they flow and look shiny and secure.
- Check for bits of solder, lead ends, or 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. Jab it into the steel wool tip cleaner jar several times until it is shiny.