

learn to solder: Pirate Badge Kit

WITH FLASHING LED EYE



Thank you for purchasing the Pirate Badge Kit. This kit is a great way to get started with soldering, learn a little about electronics, and end up with a really fun wearable badge at the end!

This kit is part of a range of wearable badges designed exclusively by Jaycar. Each project is powered by a small CR2032 Lithium coin battery (Not included. We recommend, SB2522), and the badges include a lapel pin so you can wear it too.

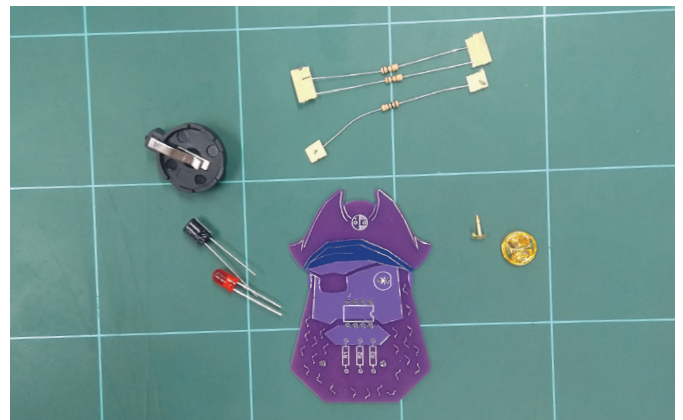
Each of the designs has a different look and feel, while the electronics involved is slightly different in each one, so you'll learn more about electronics and how it works even if you build them all!

Kit contents:

QTY	CAT. NUMBER	PRODUCT	PCB MARKING
1		Circuit Board	
1		Lapel Pin	
2	ZD0150	5mm LED REDs	
1	PH9238	CR2032 Battery Holder	
2	RR0596	10K Resistors (Brown-Black-Orange-Gold)	R1, R2
1	RR0548	100Ω Resistors (Brown-Black-Brown-Gold)	R3
1	ZL3455	7555 Timer IC	
1	PI6500	8 Pin IC Socket	
1	RE6130	100µF Electrolytic Capacitor	C1
ADDITIONAL PARTS REQUIRED (Not included)			
1	SB2522	CR2032 Battery	

Disclaimer: Content can change without prior notice. Please visit the website page for the most up-to-date information.

Before you start:



Before you start building your project, open up the package and lay out the contents to ensure you have them all based on the parts list.

You should also prepare a clean workspace and get all of the tools needed, which we will discuss on the next page.

RECOMMENDED MAKER TOOLS

You will need the usual Maker essentials, including a soldering iron, solder, and side cutters. A soldering iron kit is a good place to start if you are new to electronics, such as the one we show here.



TS1652 25W Soldering Iron Starter Kit with Multimeter

A third-hand PCB holder like the one shown here is also recommended to make soldering easier. This product also includes a soldering iron holder to securely hold your soldering iron when you are not using it, a light to make sure you can see what you are doing, and also a sponge to clean the soldering iron tip.

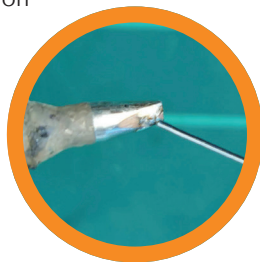


TH1987 PCB Holder with LED Magnifier

Soldering guide:

Before you solder for the first time, read the following instructions. We also recommend you watch our Soldering tutorial video on our YouTube Channel or by visiting: www.jaycar.com.au/safe-soldering-for-kids

First, a note about safety. A soldering iron can get very hot and can easily burn you if you touch the hot end. Make sure you only have the soldering iron turned on when you need it and off when you don't. Keep it in a soldering iron stand when not in use to avoid it falling off your workbench.



Keeping the soldering iron tip clean is important to create a reliable solder joint.

To prepare your soldering iron tip, turn on the iron and give it a few minutes to get sufficiently hot enough to melt solder. Touch some solder onto the iron tip so that the solder and flux (a component of the solder responsible for keeping the joint clean and "flowy") cleans any rust or dirt off the tip of the iron. Once you have some solder on the soldering iron tip, you need to remove it so you are left with a simple clean and shiny soldering iron tip. You can do this by wiping the tip onto a damp sponge or rag. (Don't use a plastic sponge as it will melt).



TS1510 Soldering Iron Tip Cleaner

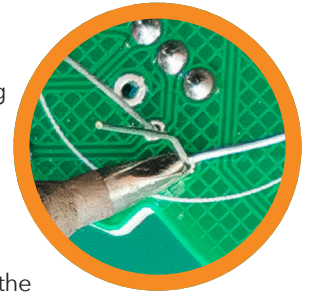
If you have a soldering iron tip cleaner that has a curly brass type cleaner, then stab the tip into that to clean the tip.

You should now have a clean and shiny soldering iron tip ready to solder. Use the above tip cleaning process during the soldering process to keep your soldering iron tip clean.

Jaycar stocks a wide range of solder should you run out. For example, the NS3013 Hobby Tube.

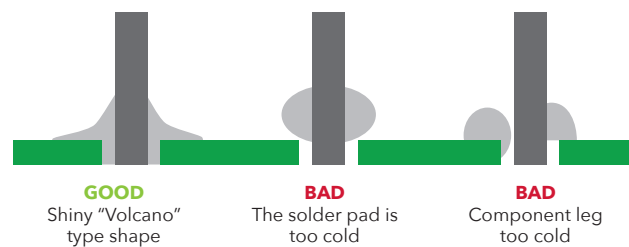
A GOOD SOLDER JOINT

In simple terms, soldering is joining two metals together with solder. In our case, we are soldering each leg of the components to the solder pads on the circuit board. Soldering a component to the circuit board is a matter of placing the soldering iron tip against the component's leg and the solder pad on the circuit board for a couple of seconds. This will allow the metals to reach the required temperature for soldering. You can then quickly add solder by touching the solder to the pad or lead of the component you're soldering (not to the soldering iron tip).



This process needs to be done within a few seconds as you can damage the component you're trying to solder if heat is applied for too long. If the solder joint isn't great move on to a different component and let the bad joint cool down before trying to solder it again.

A bad solder joint may cause your project not to work. If the leg of the component you are soldering doesn't reliably join to the circuit board's solder pad, the electrical current won't be able to flow when you apply power.



The diagram here shows you a good solder joint and two bad solder joints. A good solder joint is clean and shiny with a "volcano" shape, which means the component's leg is fully soldered to the entire solder pad on the circuit board. If your solder joint is like the one shown in the middle, it means you have not applied enough heat to the solder pad on the circuit board. If your solder joint looks like the one on the right, it means the component leg was not heated enough by your soldering iron for the solder to join properly.

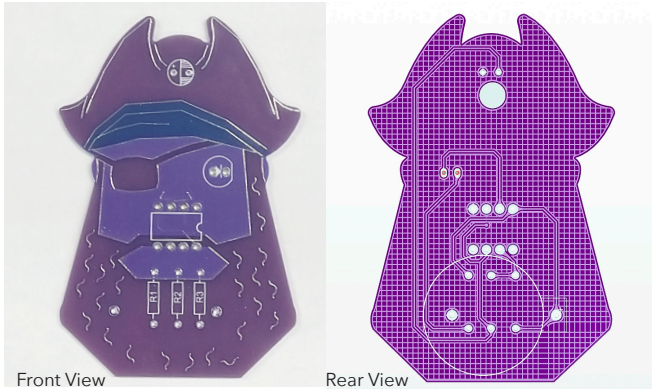
TRIMMING THE COMPONENT LEGS

Once you are confident you have a reliable solder joint, you need to cut off the leg of the component that you just soldered. If you don't cut away the component legs it can cause a short circuit when you apply power to your project. Using sharp cutters (We recommend TH1897), trim off the component leg just above the solder joint.

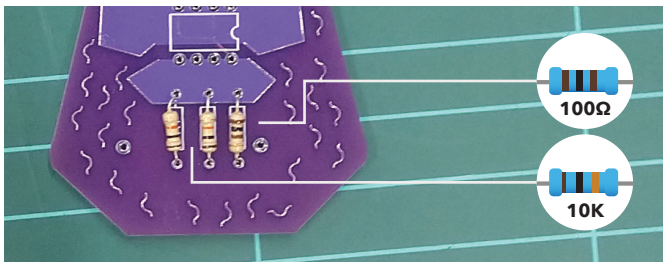


Note: Make sure you're holding the lead as you're cutting as the cut lead can fly off when trimming causing an eye injury.

Construction:



STEP 1: RESISTORS



A resistor works both ways so it can be inserted into the circuit board in either direction. To work out which resistor is which, you can use a multimeter set to resistance Ω , or use the coloured bands printed on them. The 100 Ohm resistors are Brown-Black-Brown-Gold and the 10K Ohm resistors are Brown-Black-Orange-Gold. The Jaycar catalogue also has a handy colour code chart on the resistors page.

One at a time, bend the two legs of each resistor with your hand or long nose pliers, and then insert the resistor in through the front of the circuit board. Spread the legs out a little bit so that the resistor won't fall out when you turn the circuit board around.

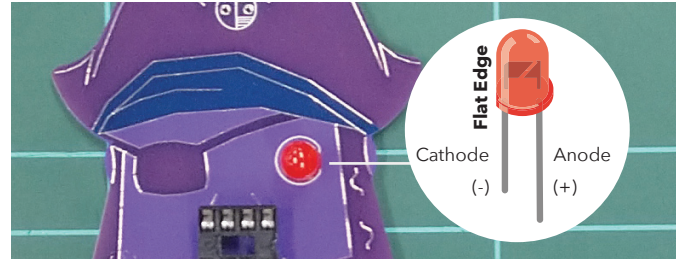
Turn the board around and solder the resistor legs. Make sure the solder joints look like the "volcano" shape we described on the previous page. Once you have soldered both legs, trim them off above each solder joint.

STEP 2: IC SOCKET



Instead of soldering the 8-pin IC directly into the circuit board, we have supplied an IC socket. Solder the IC socket into the circuit board, making sure you match the notch in the socket to match what is printed on the circuit board.

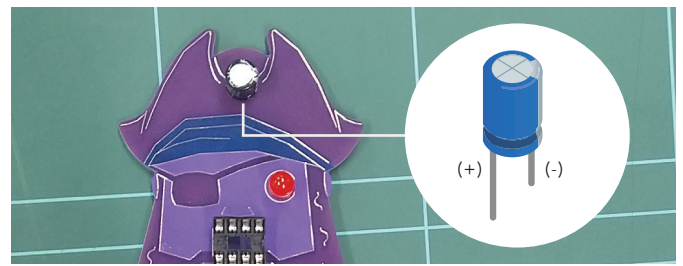
STEP 3: LEDs



LEDs only work in one direction. The long leg is positive (+), and the short leg and side with the flat edge on the LED's body is the negative (-) side. Insert the LED into the front side of the circuit board so that the flat edge on the LED matches what is printed on the circuit board.

Turn the board over and solder the two legs. Make sure the LED is sitting flush on the circuit board before you solder it in. Trim off the legs once you have finished soldering it in.

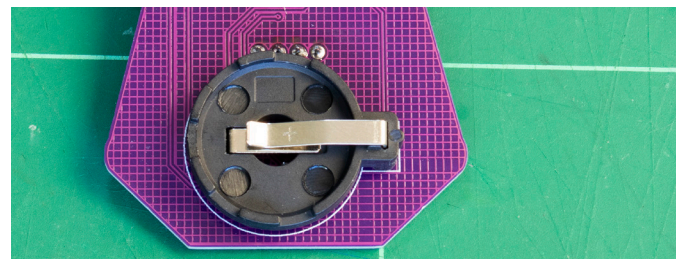
STEP 4: CAPACITOR



An electrolytic capacitor only works in one direction, so we need to solder it in the right way. The longer leg on an electrolytic capacitor is the positive leg and the side with the white stripe is the negative leg. Insert the capacitor so that the long leg (+) goes into the hole marked with the + symbol.

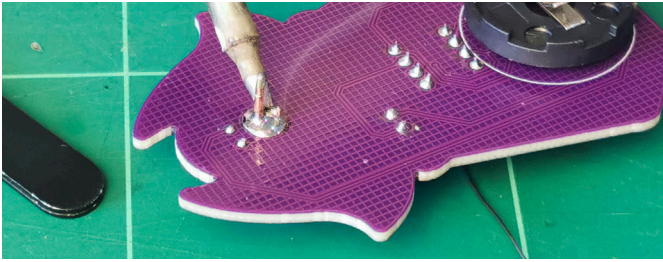
Turn the circuit board over, solder the capacitor's legs, then trim them off just above the solder joint.

STEP 5: BATTERY HOLDER



Insert the battery holder firmly into the rear side of the circuit board, matching the diagram printed on the circuit board. Turn the board around and solder the two legs on the front side of the circuit board.

STEP 6: LAPEL PIN



If you plan to wear this circuit board as a badge on your clothes, you need to solder on the lapel pin onto the rear side of the circuit board. You will need to apply enough solder here to make sure it holds securely to the circuit board.

STEP 7: INSERT IC

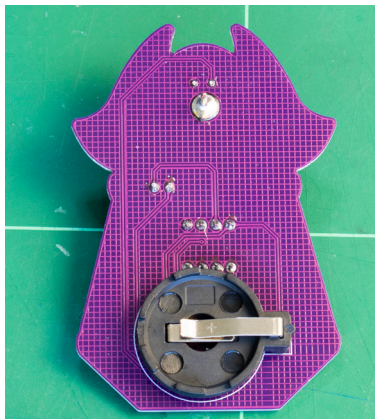
Gently insert the 555 IC into the IC socket, making sure the notch in the IC matches the notch in the IC socket.

Testing & troubleshooting:

DOUBLE-CHECK

Before you apply power, it is good practice to double-check that you have the components in the right spot and soldered correctly.

Make sure the IC, capacitor and LED are in the circuit board the correct way. If not, you need to de-solder the component and solder it in the right way. See our instructions opposite about de-soldering.



Look closely at all of your solder joints and make sure they all look like "volcanos" as we described on page 2. If not, apply the soldering iron again and add a tiny bit of solder to make the solder joint reliable. Make sure all of the component legs are trimmed so they are not short-circuiting each other.

Finally, make sure you don't have any bridged solder joints where one solder joint has joined with another because of too much solder. If this is the case, follow the de-solder instructions opposite to remove the solder, and then solder again.

POWERING IT UP

Insert a CR2032 lithium battery (We recommend, SB2522) into the battery holder so it clicks firmly in place. Your LED should start to flash straight away. Congratulations. You can now pin the badge to your clothes and show it off to your family and friends.



TROUBLESHOOTING GUIDE

If your badge doesn't work:

1. Make sure your battery is not flat. Try using a fresh battery.
2. Recheck all of your solder joints (review the soldering guide on page 2)
3. Make sure you don't have any short-circuits because of component legs touching or solder pads on the circuit board bridged together.

If the red LED is dim, make sure you are using a fresh battery. If the LED is still dim with a fresh battery, double-check that you inserted the resistors into the right spots. If you still can't get the badge to work, you can show the circuit diagram (shown below) to an electronics enthusiast who can help fault-find it with you.

DE-SOLDERING

In the unfortunate event that you need to remove a component, you need to de-solder it from the circuit board. You will need a solder sucker (We recommend, TH1862) or Desolder braid/Solder Wick (We recommend, NS3020) to do this. If you are using a solder sucker, heat the solder joint to melt the solder and use the pump to suck the solder away. If you are using de-solder braid, you place that over the solder joint, apply heat, and you will see the solder be soaked up into the braid. Insert the component the correct way and solder again.

