

Simple Component and Continuity Tester

This simple project may be used for testing components, as well as checking circuit board tracks, wires and connections for continuity (conduction). It tries to pass a small current through the item being tested and the LED will light brightly, dimly or not at all according to the resistance of the item:

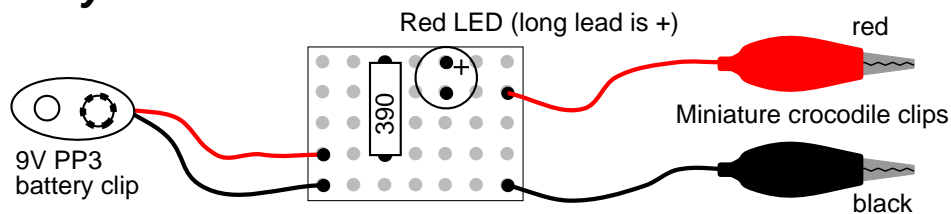
- **LED bright** means the resistance is **low**, less than about $1\text{k}\Omega$
- **LED dim** means the resistance is **medium**, a few $\text{k}\Omega$
- **LED off** means the resistance is **high**, more than about $10\text{k}\Omega$

When not in use the 9V PP3 battery should be unclipped or the crocodile clips attached to a piece of card or plastic to prevent them touching. You could add an on-off switch in the red wire from the battery clip and this may be the best option if you mount the simple tester in a box.

Parts Required

- resistor: 390Ω
- red LED 5mm diameter, standard type
- battery snap for 9V PP3
- crocodile clips: miniature red and black
- stripboard: 5 rows \times 7 holes

Stripboard Layout



Testing stripboard, PCB tracks, wires and connections

Connect a crocodile clip on each side of the suspected fault:

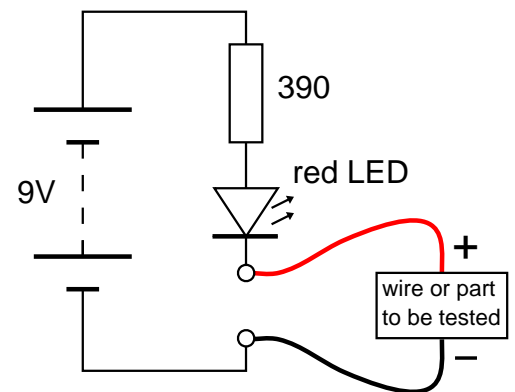
- **LED bright** means there is a **connection**.
- **LED off** means there is **no connection**.

If you are testing a stripboard or PCB which has components soldered in place, beware of possible connections via the components and allow for this when interpreting the results.

Stripboard circuits can suffer from two common problems: solder bridging between adjacent tracks making a connection where there should be none, and tracks broken with a track cutter which have an almost invisible thread of copper conducting across the break.

If a **PCB** has etched poorly the tracks may be very thin in places or there may be traces of copper bridging between adjacent tracks.

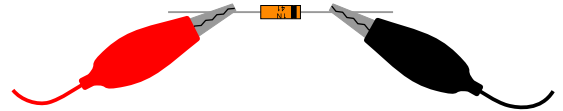
Wires and connections may be checked for continuity (conduction).

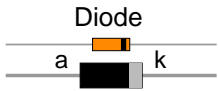

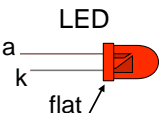
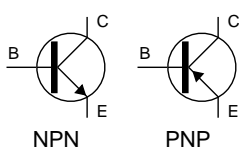


Please see the next page for information about testing components...

Testing components

Connect a crocodile clip on each side of the component. They can be connected either way round unless stated otherwise in the table below.



Component	Test results for a component in good condition
Resistor	LED bright for low resistance, less than about 1kΩ. LED dim for medium resistance, a few kΩ. LED off for high resistance, more than about 10kΩ.
Variable Resistor	Across the two ends of the track the LED brightness will depend on the resistance value (see above). Between one end of the track and the wiper you should see the LED brightness vary as you adjust the variable resistor. However, for high resistances (>10kΩ) the LED will only light near one end of the track.
 <p>Diode</p>	LED bright with red lead to anode and black lead to cathode (stripe). LED off with black lead to anode and red lead to cathode (stripe). a = anode, k = cathode (the end with a stripe)
 <p>Zener Diode</p>	LED bright with red lead to anode and black lead to cathode (stripe). LED dim with black lead to anode and red lead to cathode (stripe) if the zener diode voltage is less than about 7V. LED off with black lead to anode and red lead to cathode (stripe) if the zener diode voltage is greater than about 7V. a = anode, k = cathode (the end with a stripe)
 <p>LED</p>	LED bright with red lead to anode and black lead to cathode (short lead) - the LED being tested will also light. LED off with black lead to anode and red lead to cathode (short lead). a = anode (long lead), k = cathode (short lead, flat on body)
 <p>Transistor</p> <p>NPN PNP</p> <p>B = base, C = collector, E = emitter</p> <p>Please refer to a book or supplier's catalogue to identify the leads.</p>	For each pair of transistor leads connect the tester leads first one way, then the other way. These are the results for an NPN transistor in good condition: CE pair: LED off both ways. BC pair: LED bright with red lead on B, LED off the other way. BE pair: LED bright with red lead on B, LED off the other way. These are the results for a PNP transistor in good condition: CE pair: LED off both ways. BC pair: LED bright with black lead on B, LED off the other way. BE pair: LED bright with black lead on B, LED off the other way. <i>Note that you can use the tester to identify the B lead (the one which always conducts one way) and to distinguish NPN and PNP transistors (by the tester lead colour when B conducts). However, the tester cannot distinguish the C and E leads.</i>
Capacitor less than 1μF	LED off. <i>Please bear in mind that a broken connection will give the same result.</i>
Capacitor 1μF and greater	If the capacitor is polarised (most will be) connect the red lead to positive (+) and the black lead to negative (-). The LED will flash briefly when first connected. Reverse the connections: the LED will give another brief flash . <i>With low values like 1μF the flash will be almost too brief to see, but larger values such as 100μF will give longer flashes. Electrolytic capacitors may leak a little when connected the wrong way round, making the LED light dimly continuously.</i>
LDR Light Dependent Resistor	LED bright when the LDR is in bright light. LED dim when the LDR is in normal room light. LED off when the LDR is in darkness.
Thermistor	LED dim when the thermistor is warm. LED off when the thermistor is cold. <i>These are typical results, exact results depend on the thermistor's resistance.</i>
Lamp	LED bright. <i>Note that the lamp itself will NOT light because the test current is too small.</i>
Switch	LED bright when switch contacts are closed (on). LED off when switch contacts are open (off). <i>Note that you can use the tester to identify the switch contacts if necessary.</i>
Fuse, Motor, Loudspeaker, Inductor, Relay coil, Wire	LED bright.