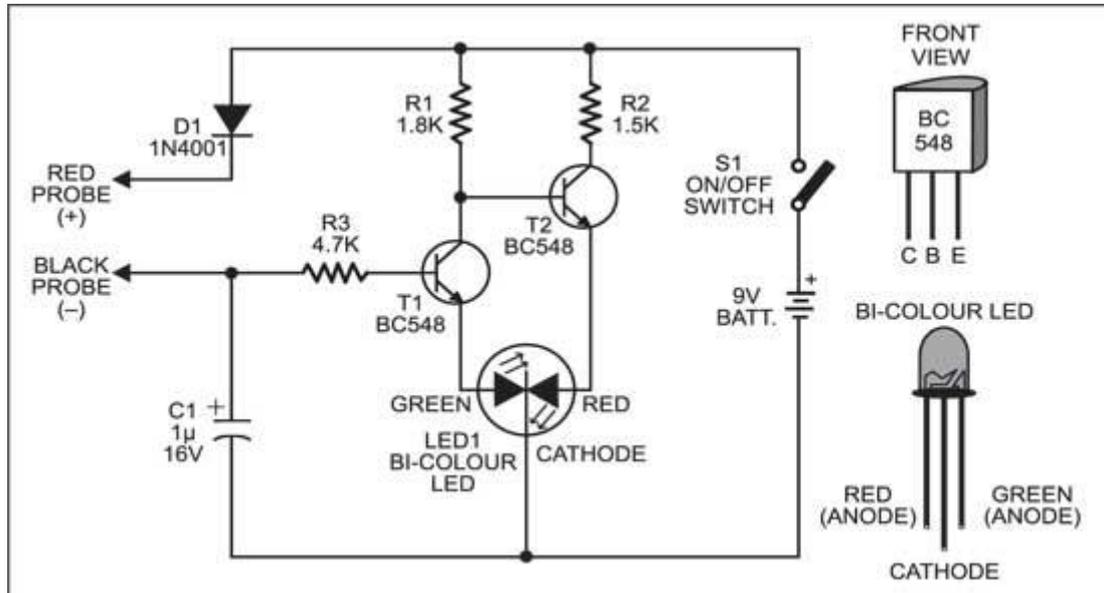


Handy Tester

By Kevin Mc Donald ZS6KMD

This month we build a simple Handy Tester, a small piece of equipment that everyone should have in the shack for testing the condition of components, from resistors to IC's. The original article was provided by D Mohan Kumar and the PCB designed by ZS6KMD.

The circuit diagram below is simple to read and the explanation that follows explains how it works.



The circuit is extremely simple and exploits the biasing property of bipolar transistors. Transistors T1 (Q1) and T2 (Q2) act as transistor switches driving the red and green halves of bicolour LED1 independently to give results of the test.

When power is applied to the circuit by pressing switch S1; transistor T1(Q1) stops conducting due to the lack of forward bias. At the same time, transistor T2 (Q2) gets a base bias voltage from the battery through resistor R1 and conducts. This allows the red half of the Bicolour LED to become illuminated.

When the base of transistor T1 (Q1) gets positive voltage through resistor R3, it conducts to light up the green half of bicolour LED1. When transistor T1 (Q1) conducts, the base of transistor T2 (Q2) is grounded and it cuts off to turn off the red half of bicolour LED1. The functioning of the circuit thus depends on the signal obtained at the base of transistor T1 (Q1).

The table gives the testing procedures for various components with the expected indications/results.

Bi-Colour LED Status for Various Tests

Component/test	Test procedure	LED1 status	Result	Note
Continuity	Red and black probes to the test points	Green 'on'	Continuity	
		Red 'on'	No continuity	
Polarity	Red probe to the positive of the circuit and black probe to the test point	Green 'on'	Positive	Circuit should be 'on'
		Red 'on'	Negative or no power	
Logic	Red probe to the circuit's positive and black probe to the output	Green 'on'	High	Circuit should be 'on'
		Red 'on'	Low	
IC	Red probe to the circuit's positive and black probe to the output	Green 'on'	High	Circuit should be 'on'
		Red 'on'	Low	
Multivibrator IC 555	Red probe to the circuit's positive and black probe to the output	Colour changes from red to yellow to green cyclically	IC oscillating	Circuit should be 'on'
		Red 'on'	No oscillation	
Electrolytic capacitor	Red probe to the positive and black probe to the negative lead	Green gradually turns red	Capacitor good	Capacitor should be discharged
		Red 'on'	Capacitor faulty	
Diode (LED/ Photodiode/IR diode)	Red probe to the anode and black probe to the cathode	Green 'on'	} Good	1-kilo-ohm resistor should be connected to the anode of LEDs
	Red probe to the cathode and black probe to the anode	Red 'on'		
	In both conditions	Colour remains the same (either green or red)	Open/short	
Resistor (1 ohm to 500 kilo-ohms)	Red and black probes to the ends of the resistor	Green 'on'	Good	
		Red 'on'	Faulty	
Transistor	Red probe to the base of the transistor and black probe first to the collector and then to the emitter	Green 'on' and again green 'on'	Transistor conducts	Circuit should be 'on'
	Black probe to the base of the transistor and red probe first to the collector and then to the emitter	Green 'on' and then red 'on'	Transistor doesn't conduct	

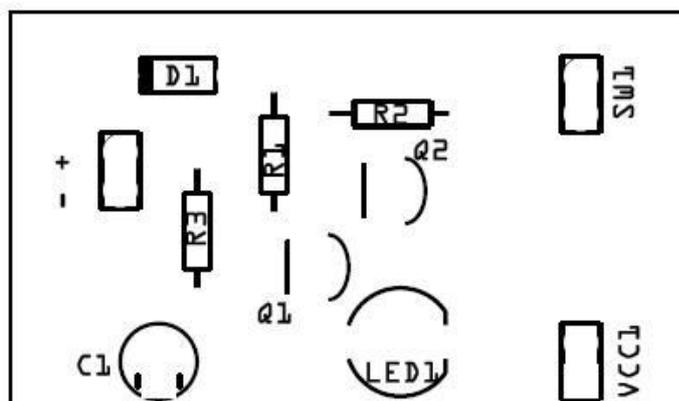
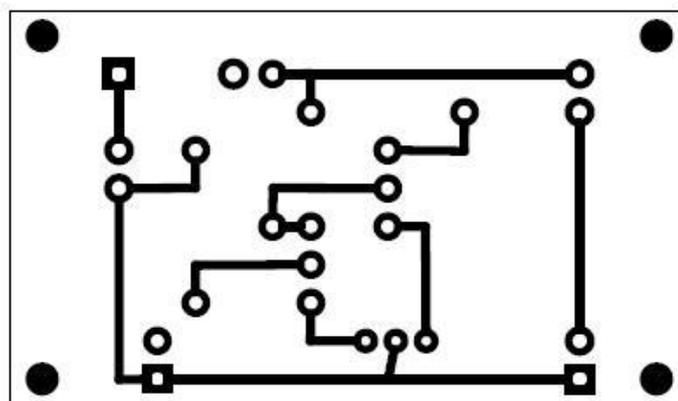
Construction:

The component count for this project is very low and construction is straightforward. The project can be built on a small piece of Vero Board or a PCB can be purchased or made using the artwork provided on the link at the end of the article.

Components:

2 X BC548, 1 X 1.5K Ω , 1 X 1.8K Ω , 1 X 4.7K Ω , 1 X 1 μ F 16V Electrolytic Capacitor, 1 X 1N4001 Diode, PCB, Probes, Switch and 9V battery.

PCB Layout:



The PCB files are available on the ZS6KMD website on the following link. A complete kit is also available containing all components and a PC board.

Links:

http://www.zs6kmd.za.net/handy_tester.rar

Please send us pictures of your Handy Tester so we can show them in future articles, mails can be sent to projects@zs6kmd.za.net – If you have a project idea or contribution please submit it to the same email address.

Happy Building

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