

Transistor and LED Tester

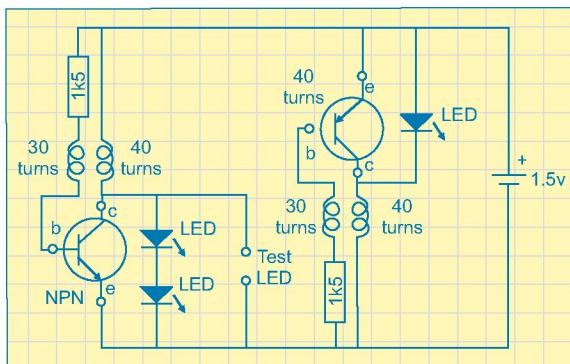
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This handy transistor and LED tester can be built in an evening using spare parts on a small piece of Matrix Board.

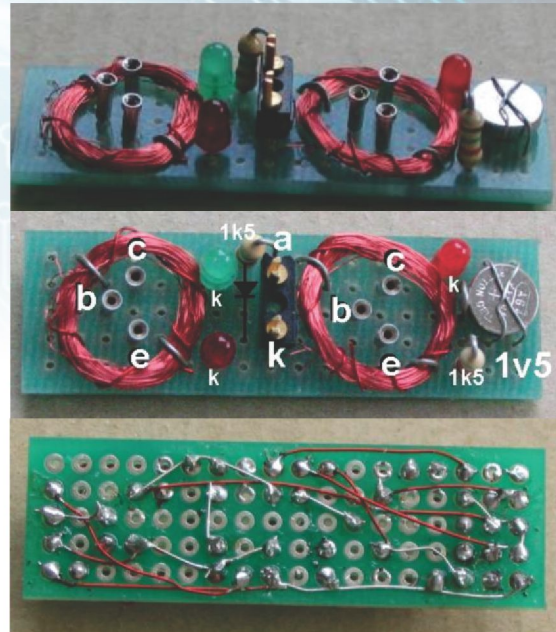
It also highlights an amazing fact about a transformer. When the voltage (actually the current) is switched off the 40 turn coil in either of the circuits in this project; the voltage across the coil rises to more than the 1.5v supply and is in the opposite direction to the voltage of the supply.

The circuit looks to be very simple but it uses an air-cored transformer to produce the voltage needed to illuminate the LED indicators and the circuit only works when the transistor is connected correctly. There are two separate circuits, one for NPN transistors and one for PNP transistors. We will cover the NPN section:

The circuit turns ON when the NPN transistor is fitted and the current through the 30 turn coil and 1k5 resistor turns ON the transistor and produces expanding flux in the 40 turn coil. This flux cuts the turns of the 30 turn coil and produces a voltage in the coil that adds to the supply voltage and increases the current into the base. This turns the NPN transistor ON more. This action continues until the transistor is fully turned ON. At this point the current in the 40 turn coil is a maximum but it is not expanding flux and the 30 turn coil ceases to see the extra voltage. Thus the current into the base reduces and this turns the transistor OFF slightly. The flux produced by the 40 turn coil now becomes collapsing (or reducing) flux and it produces a voltage in the opposite direction to greatly reduce the current into the base. In a very short period of time the transistor becomes TURNED OFF and it is effectively removed from the circuit. The flux in the 40 turn coil collapses quickly and it produces a voltage in the 40 turn coil that is higher than the supply voltage and is in the opposite direction. This means the voltage produced by the 40 turns ADDS to the supply voltage and is delivered to the



This handy piece of test equipment will test NPN transistors and PNP transistors as well as LEDs.



The components are fitted on a small piece of Matrix Board 5 holes x 18 holes.

LEDs to illuminate them.

The NPN circuit has two LEDs in series so that a LED of any colour (including white) can be connected to the TEST LED terminals and it will illuminate. You can use any colour LED for any of the LEDs, however it is best to use either green or yellow or white for the single LED.

The two "coils" are wound on a 10mm dia pen with 0.1mm wire (very fine wire). The loops of tinned copper wire holding the coils on the board are connected to separate lands under the board and MUST NOT produce a complete loop as this will create a "Shorted Turn" and the circuit WILL NOT WORK.

If the LEDs do not illuminate, simply reverse the wires to the 30 turn coil.

The circuit does not need an ON/OFF switch because the LEDs require a voltage of over 2v to illuminate (the orange LED) and the supply is only 1.5v. A red LED needs about 1.5v to 1.7v to operate but when it is in series with a green LED, this voltage is over 3.5v.

There are a lot of "design-features" in this simple circuit and it will be very handy to test transistors as well as LEDs with a low current that will not damage them.

All the components fit on a small matrix board 5 holes x 18 holes. A kit of parts for the project is available for \$4.00 plus \$3.00 postage and ordering details can be found on ElectronicsMaker.info website, where you will find more projects and lots of other helpful information: <http://www.electronicsmaker.info>