

LED Voltage Tester

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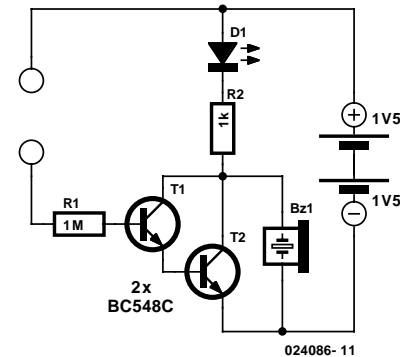
A universal voltage tester should respond to both dc and ac voltages. The usual types with glow-discharge lamps only work with voltages greater than around 100 V. The circuit shown in **Figure 1** uses a Darlington circuit formed by two NPN transistors and can detect voltages of less than 1 V. It can also be used to test continuity. Here the positive terminal of the battery serves as the 'ground' connection. Consequently, an input current flows even with a high-impedance connection, but this current increases when a voltage source with the proper polarisation is included in the loop. A supplementary piezoelectric buzzer allows the circuit to also be used as an audio-frequency signal tracer.

The tester can be used in the following manners:

- Continuity between the two terminals or connection via the fingers: the LED lights.
- Testing a battery with the positive terminal connected to the input: the LED becomes brighter.
- Testing a voltage with the negative terminal connected to the input: the LED becomes darker or is off.
- With an ac voltage, the LED current is modulated, so the LED flickers and the buzzer sounds.

All of this can be built into the enclosure of a key finder, since the essential components are already present: a battery holder, a LED and a piezoelectric transducer. Alternatively, the tester can be fitted into the case of a ballpoint pen

1

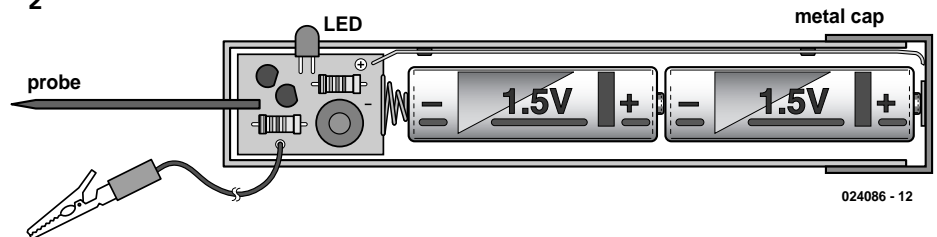


or a length of plastic tubing (see Figure 2).

An interesting experiment can be performed using this circuit. One person holds the probe tip, while a second person holds the opposite terminal. If they walk over a carpet or synthetic floor covering, the LED lights up with each step. This is a consequence of charge separation between the floor and the shoes.

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