# BENCH TEST

**The final stage of any assembly operation is its testing – and that does not mean switching it on to see if it works. One cross-connection could mean the destruction of one of the more delicate devices. A simple continuity tester will cost you under £1 to make yourself, and a sophisticated multi-mode tester will be less than £10.**

The first stage in the testing of any assembly of components into a working circuit is concerned with the efficiency of the soldered joints. A joint made at too low a temperature may look acceptable externally, but inside it may be making no connection at all. A gentle pull may reveal this – if the joint was properly made it won't come apart in your hands, and if that does happen, better it should fail at this stage.

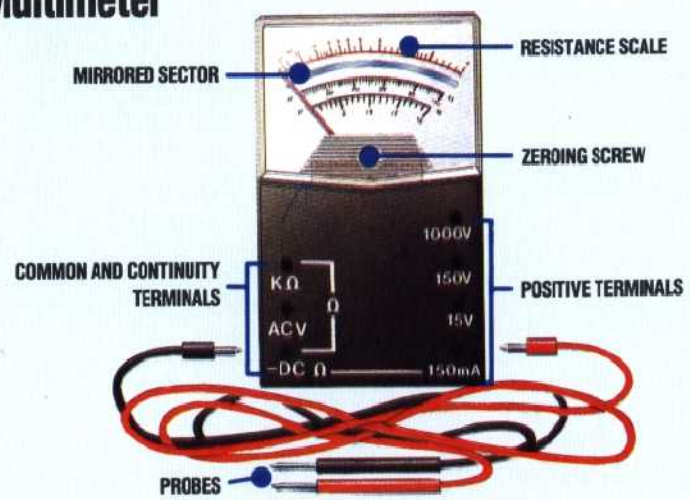
Now we are ready to apply a tester of some sort. The simplest sort of contact tester is available from hardware and car accessory shops. Sold as an 'ignition probe' or some similar name, it is used for determining when the contact points in the distributor are open and closed.

For our purposes, the crocodile clip usually found on one end of the probe is not terribly useful, so fix a spare soldering iron tip into it with insulating tape to use as a probe. Of course, it's an easy matter to make up a tool to do the same job using a couple of 1.5 volt dry cells, a three volt bulb and a length of wire.

A better alternative, however, is a small multimeter. In its role as an ohmmeter, it can test not only continuity but also resistance. The unit of resistance is called an 'ohm', named after the 19th-century German physicist, Georg Ohm (1787-1854), who discovered the phenomenon. Resistance is a function of the cross-sectional area of the wire carrying a current, but it can also be introduced artificially by the use of components known as *resistors*. For our task, a properly made joint will offer negligibly small resistance to the passage of the small current used by the meter or continuity tester, and so the light will come on strongly, or the needle on the dial deflect fully. Any lesser reaction is an indication of a poor joint that should be remade.

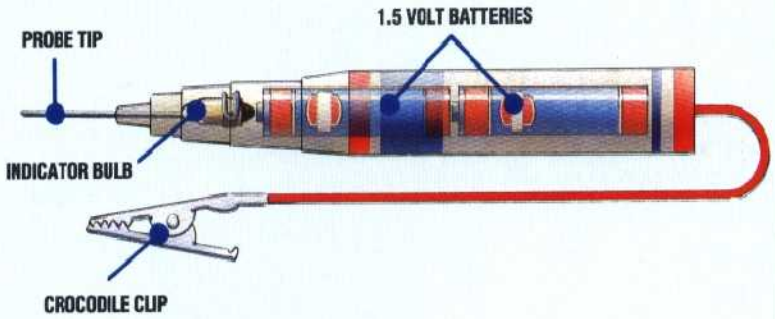
In addition to measuring conductivity, the multimeter has two other functions: the measurement of current in amperes, and of electrical potential in volts. These two units are closely related — the potential difference between two points on a circuit carrying one ampere of current and dissipating one watt of power is one volt.

## Multimeter

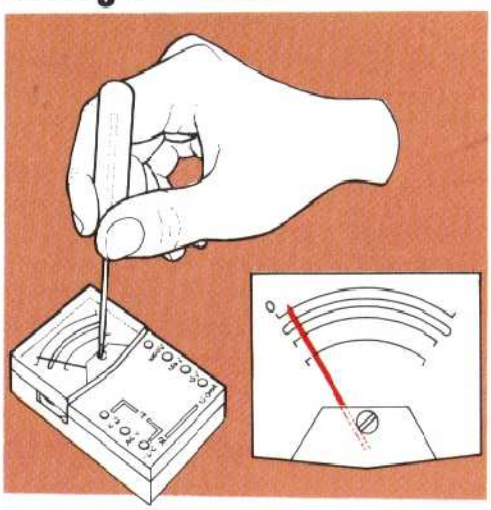



Multimeters — which typically test continuity and resistance, measured in ohms; the magnitude of the current flowing, measured in amperes (amps); and the amount of potential (sometimes described as 'pressure'), measured in volts — vary in price from less than £10 to many hundreds of pounds. However, there are only two methods of representing their results — analogue or digital. In general, moving-coil instruments that display their data by moving (deflecting) a needle across a scale in a manner analogous to the increase or decrease of the value being measured, are considerably cheaper than digital versions

## Circuit Tester




## Zeroing The Meter



**Zeroing The Meter**
Analogue meters, which require the indicator needle to move physically across a dial, must have some provision for adjustment. This is normally in the form of a screw, mounted at the fulcrum of the needle. A mirrored sector behind the needle allows the observer to be sure of an accurate reading. In addition, the resistance measuring circuit must also be adjustable to take account of other variations and inaccuracies