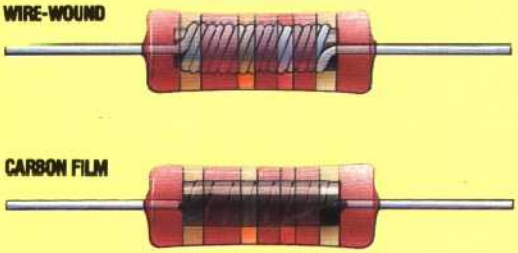
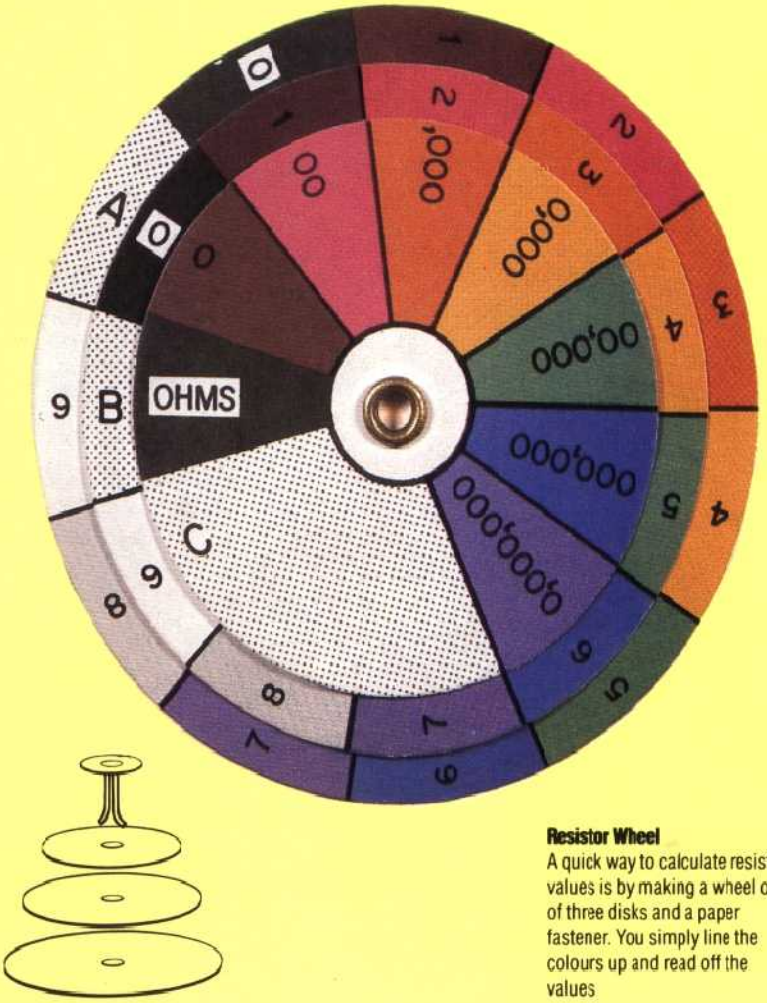
Resistors



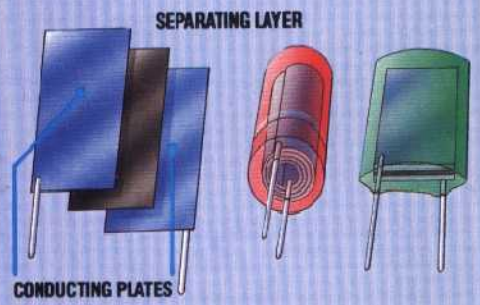
Resistors are one of the simplest electronic components — the two common types are wire-wound and carbon film. Wire-wound resistors are made from long lengths of wire wound tightly around an insulating cylinder and encased in an insulating cover. This current must flow along the entire length of the wire, resulting in a suitable reduction in the current. Carbon film resistors work in the same way, but the path for the current is a spiral cut in a carbon film around the insulating cylinder.

Both types of resistors are marked with coloured bands to identify their values. Reading these is a simple trick to learn. The first two bands represent a figure for the resistance in ohms and the third a value to multiply this figure by. The final gold or silver band tells you the tolerance the component is made to and can be used to tell which way round to read the other bands. You always read towards the gold or silver band. To save you learning the colours off by heart, a short program such as the one listed here can be used to calculate resistor values



Resistor Wheel
A quick way to calculate resistor values is by making a wheel out of three disks and a paper fastener. You simply line the colours up and read off the values

Capacitors



Capacitors resist alternating current. High frequency AC currents flow through capacitors more easily than lower frequency ones, making them useful for cleaning up or filtering an electrical signal. Many microprocessor boards are dotted with capacitors serving just this purpose. Capacitors are essentially two conducting plates separated by an insulating layer either of various special salts (for high voltages) or of a ceramic material (for low voltages). The plates can be quite large and the actual size of the component is reduced by rolling the layers up into a tight spiral

Transistors

The transistor is the most complex of these components — it's a semiconductor device and its invention marked the start of modern electronics. A transistor has two basic uses. As an amplifier, it can take a small input current and produce a high output current. As a switch, one current can be used to turn another current on or off. This ability to act as an electronic switch is the basis of all digital electronics and is essential to the operation of computers

Like diodes, transistors are made of semiconductor materials but have two junctions inside them rather than just one. There are three leads to the semiconductors, usually called the base, collector and emitter. It is how these leads are fitted into the circuit that determines whether the transistor acts as an amplifier or as a switch. Unlike resistors and diodes, there are no standard ways of identifying the leads on a transistor or their specifications. The usual method is to resort to the manufacturer's reference book for that particular part number

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