

TRANSISTORS

Transistors have three terminals which are referred to as emitter (e), base (b) and collector (c). Fig 1 shows the symbols used for the two types of transistors in common use.

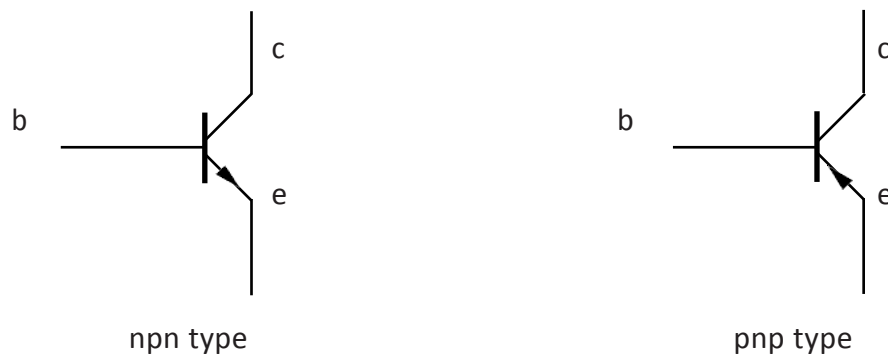


Fig.1 Transistor symbols

Both types operate in a very similar way but differ in the polarity of the power supply required to power them. We shall concentrate our study and practical investigations upon **npn types**.

Operation

A transistor is a device that amplifies current; it should not be confused with the operational amplifier that amplifies voltage.

A small current in the base is amplified to produce a larger current in the collector. The amplification or gain of the transistor is dependent upon the type used.

A transistor can be considered as a diode that has a method of current control from the base. As with a diode a 'turn-on' voltage of approximately 0.6V is required between the base and the emitter to allow any collector current to flow.

CURRENT FLOW THROUGH A TRANSISTOR

The arrow on the emitter shows the direction in which conventional current can flow through a transistor. In our switching circuits, the emitter will be connected to the 0V line. There are two current paths through the transistor. They are from base to emitter (I_B), and from collector to emitter (I_C).

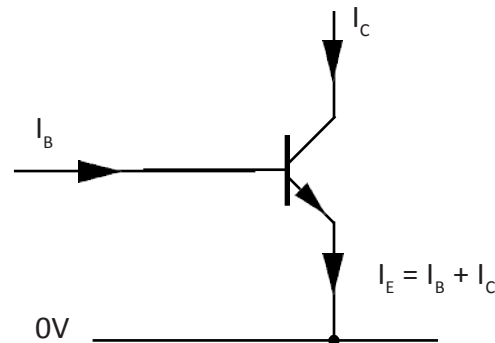
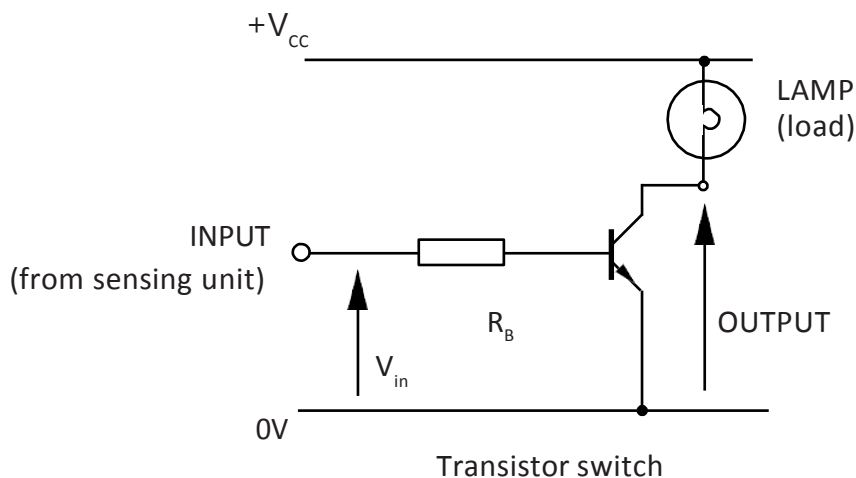


Fig.2

SWITCHING ACTION OF A TRANSISTOR

This diagram shows a circuit where a transistor is being used as a switching device.



Current can only flow through the output transducer in the collector circuit when a small current flows in the base circuit. A small base current is used to switch a much larger current in the collector circuit.

The voltage provided by an input signal sensing unit can be used to drive the small base current. Resistor R_B protects the transistor by limiting the base current.