

**Amplifier Connections**

An amplifier has two input and two output terminals, so a three terminal transistor used as an amplifier must have one of its terminals common to both input and output as shown (left). Which terminal is used as the common connection has a marked effect on the performance of the amplifier.

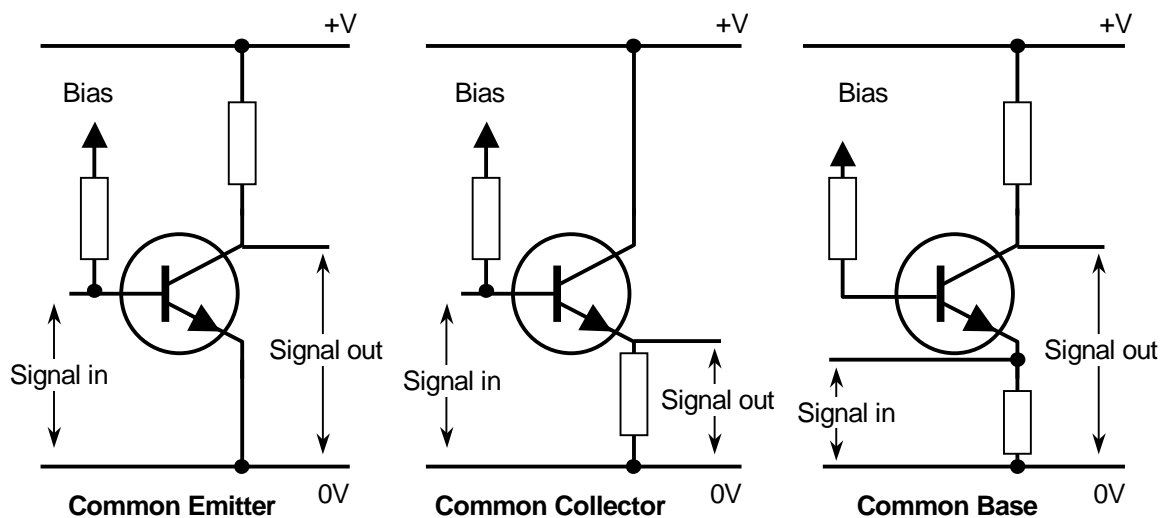
These differences can be exploited by the circuit designer to give an amplifier that most suits a particular purpose.

In common emitter small changes in base emitter current cause large changes in collector emitter current. The circuit is that of a CURRENT amplifier. For VOLTAGE amplification, we connect a load resistor (or an impedance such as a tuned circuit) in the collector circuit so that the change in collector current causes a change in the voltage across the load resistor. The value of the load resistor will affect the VOLTAGE GAIN of the amplifier.

In COMMON COLLECTOR (emitter follower) mode the transistor is normally used as a BUFFER AMPLIFIER for matching impedances between two other circuits. This mode gives the amplifier high input impedance and low output impedance. The voltage gain is unity (1). It is a useful CURRENT AMPLIFIER and is often used for driving high current devices such as motors etc.

COMMON BASE MODE is usually used for VHF and UHF amplifiers. The voltage gain is not high, but there is little chance (unlike other modes) of some of the output signal being fed back into the input circuit (otherwise a problem at these frequencies) as the base, being grounded forms an effective earthed screen between output and input. As the collector current in this mode will be the emitter current minus the base current, the current gain ( $h_{fb}$  in common base mode) is less than unity ( $<1$ ).

Parameter	Common Emitter	Common Collector	Common Base
Voltage gain $A_v$	High (about 100)	Unity (1)	Medium (10-50)
Current Gain $h_{fe}$	High (50 - 800)	High (50 - 800)	Unity (1)
Input Resistance	Medium (about 5K)	High (several K)	Low (about 50R)
Output Resistance	High (about 40K)	Low (a few ohms)	High (about 1M)



**The Three Modes Of Connection For Transistor Amplifiers**