



EEE 241
ANALOG ELECTRONICS
CLASS 12
DR NORLAILI MOHD NOH

Multiple-Transistor Amplifier Stages

Most amplifier circuits consist of a number of stages, each of which provides voltage gain, current gain, and/or impedance – level transformation from input to output.

Such circuits can be analyzed by considering each transistor to be a stage and analyzing the circuit as a collection of individual transistors.

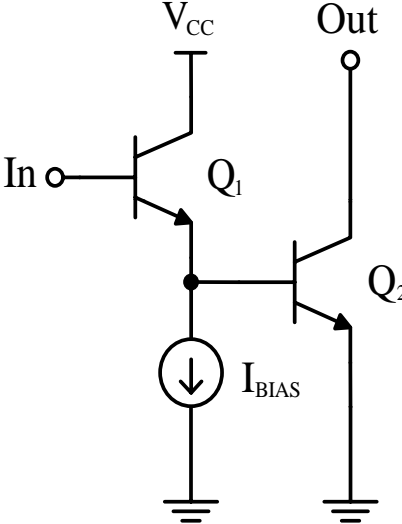
However, certain combinations of transistors occur so frequently that these combinations are usually characterized as subcircuits and regarded as a single stage.

For example, the Darlington two-transistor connection is widely used to improve the effective current gain and input resistance of a single BJT.

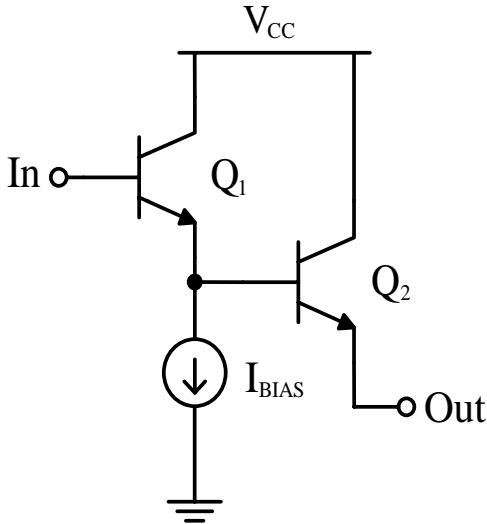
However, since the current gain and input resistance are infinite with MOS transistors, this connection finds little use in pure MOS circuits.

The cascode connection achieves a very high output resistance and is useful in both bipolar and MOS circuits

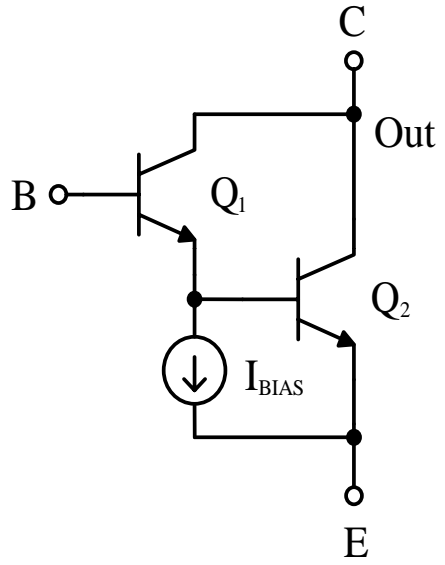
CC-CE, CC-CC and Darlington Configuration



CC-CE cascade

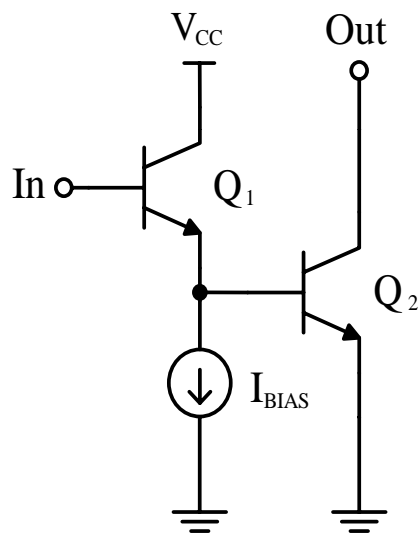


CC-CC cascade



Darlington configuration

All three configurations has additional transistor to boost the current gain and input resistance of the basic BJT

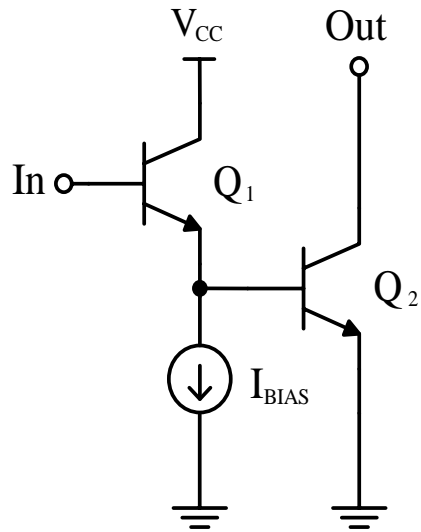


CC-CE cascade

I_{BIAS} :

To establish the quiescent dc operating current in the CC (or emitter follower) Q1.

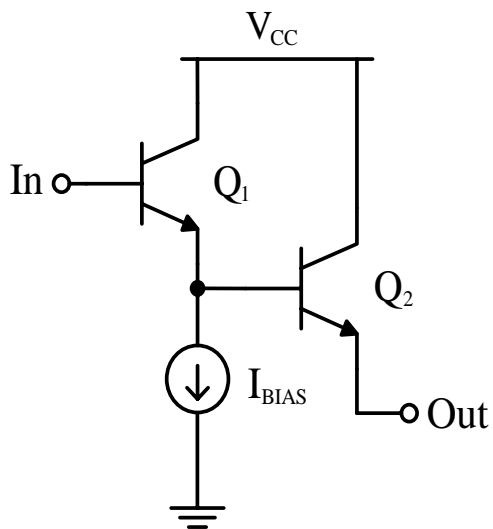
This current source maybe absent in some cases or maybe replaced by a resistor



CC-CE cascade

In both CC-CE and CC-CC cascades, Q1 is to increase current gain through the stage and to increase the input resistance

The two transistors, Q1 and Q2, can be thought of as a single composite transistor shown below



CC-CC cascade

