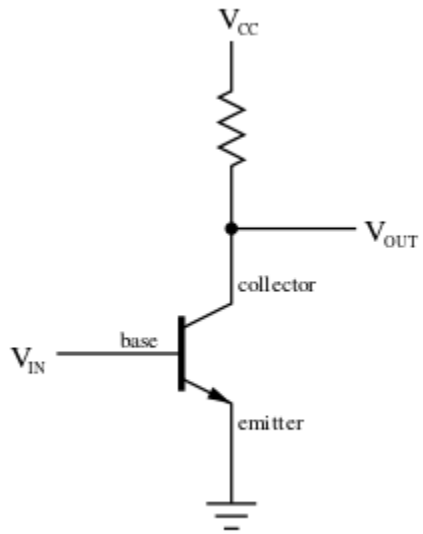


Topic 1 - RF Components and Basic Concepts
1.7 - Active versus Passive

Active and Passive Components

- An **active** device is any type of circuit component with the ability to electrically control electron flow.
 - Vacuum tubes, transistors, etc.
- Components incapable of controlling current by means of another electrical signal are called **passive** devices.
 - Resistors, capacitors, inductors, transformers, and even diodes are all considered passive devices.

Active



Passive



Resistor



Capacitor



Inductor

Active and Passive Components

- All **active** devices control the flow of electrons through them.
- Some active devices allow a voltage to control this current while other active devices allow another current to do the job.
- Devices utilizing a static voltage as the controlling signal are, not surprisingly, called **voltage-controlled** devices. Devices working on the principle of one current controlling another current are known as **current-controlled** devices.
- Transistors are made as either voltage-controlled or current controlled types.

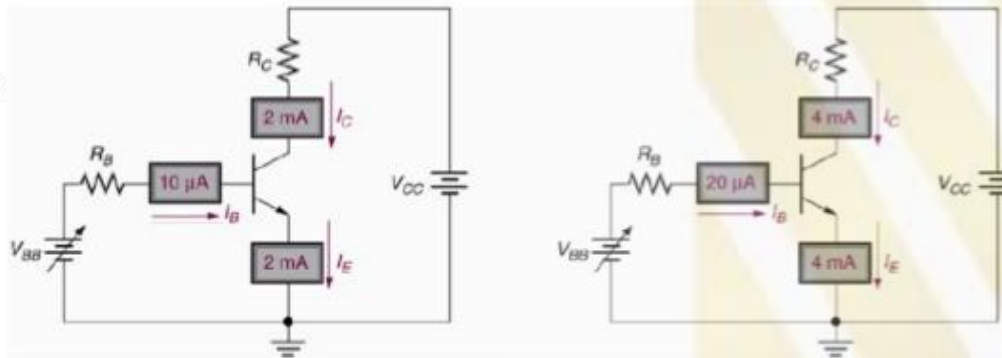
Current Controlled

Voltage Controlled

BJT - Current-controlled device

- The values of the collector and emitter currents are determined primarily by the value of the base current.

$\beta = 200$



- The small increase in base current (from 10 μ A to 20 μ A) produces a larger increase in I_C and in I_E (from 2 mA to 4 mA).

