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What is multivibrator?

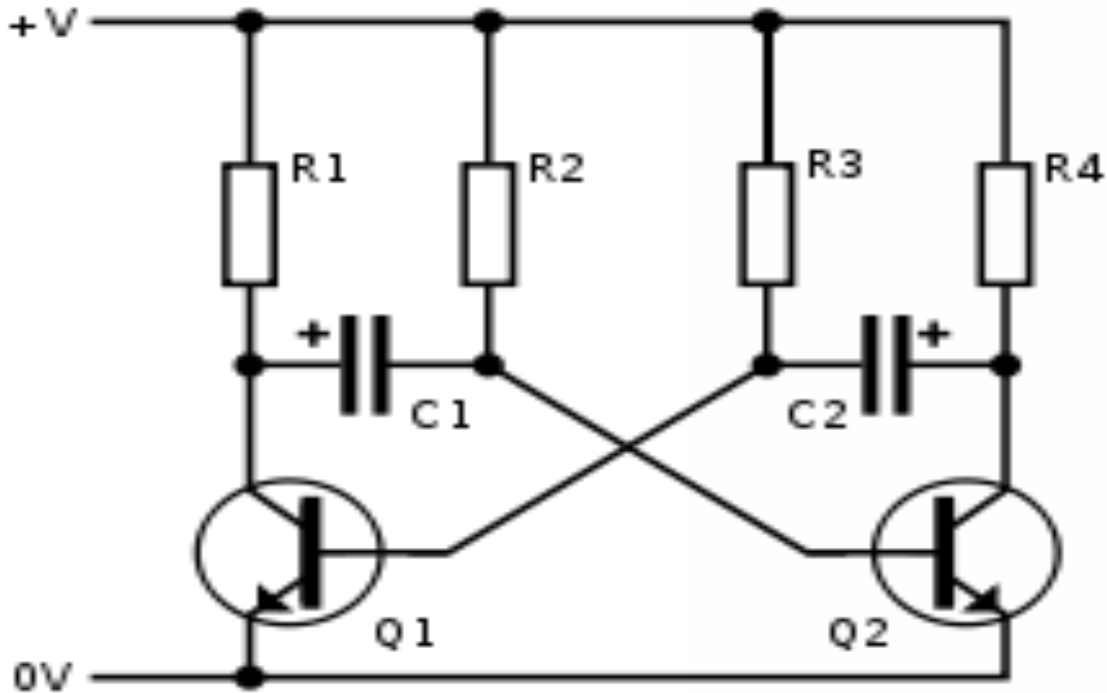
Multivibrator

A multivibrator is an electronic circuit used to implement a variety of simple two-state systems such as oscillators, timers and flip-flops. It is characterized by two amplifying devices (transistors, electron tubes or other devices) cross-coupled by resistors or capacitors. The name "multivibrator" was initially applied to the free-running oscillator version of the circuit because its output waveform was rich in harmonics

There are three types of multivibrator circuits depending on the circuit operation:

- **astable**, in which the circuit is not stable in either state—it continually switches from one state to the other. It functions as a relaxation oscillator.
- **monostable**, in which one of the states is stable, but the other state is unstable (transient). A trigger pulse causes the circuit to enter the unstable state. After entering the unstable state, the circuit will return to the stable state after a set time. Such a circuit is useful for creating a timing period of fixed duration in response to some external event. This circuit is also known as a one shot.
- **bistable**, in which the circuit is stable in either state. It can be flipped from one state to the other by an external trigger pulse. This circuit is also known as a flip flop. It can be used to store one bit of information.

Astable Multivibrator



Operation

The circuit has two stable states that change alternatively with maximum transition rate because of the "accelerating" positive feedback. It is implemented by the coupling capacitors that instantly transfer voltage changes because the voltage across a capacitor cannot suddenly change. In each state, one transistor is switched on and the other is switched off. Accordingly, one fully charged capacitor discharges (reverse charges) slowly thus converting the time into an exponentially changing voltage. At the same time, the other empty capacitor quickly charges thus restoring its charge (the first capacitor acts as a time-setting capacitor and the second prepares to play this role in the next state). The circuit operation is based on the fact that the forward-biased base-emitter junction of the switched-on bipolar transistor can provide a path for the capacitor restoration.

Advantages

Astable multivibrators continuously switch between one state and another. This allows astable multivibrators to power themselves and perform work at a consistent rate without influence from any outside forces or events. Additionally, astable multivibrators are inexpensive to produce, are relatively simple in design, and can remain functional for extraordinary amounts of time.

Applications

Astable multivibrators are used in amateur radio equipment to receive and transmit radio signals. Astable multivibrators are also used in morse code generators, timers, and systems that require a square wave, including television broadcasts and analog circuits

Thank you for attention!