MONOSTABLE MULTIVIBRATOR

LECTURE-3

TDC PART I

PAPER II (GROUP- B)

CHAPTER 3

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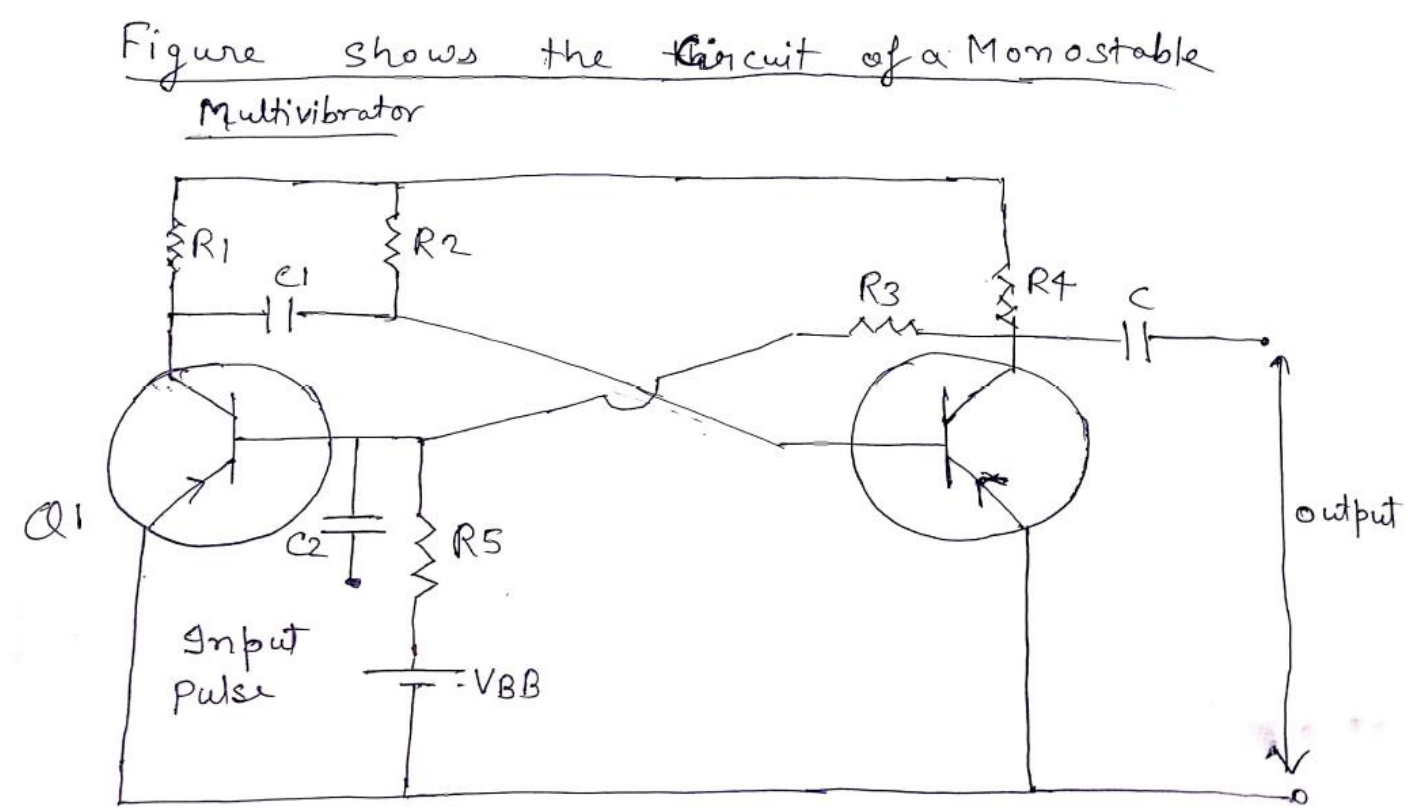
MONOSTABLE MULTIVIBRATOR

Monostable multivibrator has one stable state and one quasi stable state [astable state]. When an external trigger applied to the circuit, the multivibrator will jump to quasi-stable state from astable state. After the period of time it will automatically set back to the stable state, for returning to the stable state multivibrator does not require any external trigger.

The time period to returning to stable state circuit is always depends on the passive elements in the circuit (resistor & capacitor values) thus a monostable multivibrator cannot generate square wave of its own like an astable multivibrator. Only external pulse will cause it to generate the square wave.

In other words, a multivibrator in which one transistor is always conducting (i.e in the ON state) and the other is non-conducting (i.e in the OFF state) is called monostable multivibrator. It is also called a single shot or single Swing or a one shot multivibrator.

MONOSTABLE MULTIVIBRATOR (Circuit Diagram)



MONOSTABLE MULTIVIBRATOR (Construction)

It consists of two similar transistor Q1 & Q2 with equal collector loads. i.e R1=R4. The values of VBB & R5 are such as to reverse Q1 and keep it at cut-off. The collector supply VCC and R2 forward bias Q2 and keep it at saturation. The input pulse is given through C1 to obtain the square wave. The output can be taken from Q1 or Q2.

MONOSTABLE MULTIVIBRATOR (Operation)

Let Q1 is at cut-off & Q2 is at saturation. This is the stable state for the circuit and it will continue to stay in this state until a triggering pulse is applied at C2. When a negatoive pulse off short duration and sufficient magnitude is applied to the base of Q1, through C2, the transistor Q1 starts conducting and positive potential is established at its collector.

Positive potential at the collector of Q1 is coupled to the base of Q2 through capacitor C1.This decrease the forward bias on Q2 and its collector current decrease. The increasing negative potential on the collector of Q2 is applied to the base of Q1 through R3.This further increase the forward bias on Q1 and hence its collector current with this set of actions taking place, Q1 is quickly driven to saturation and Q2 to cut-off.

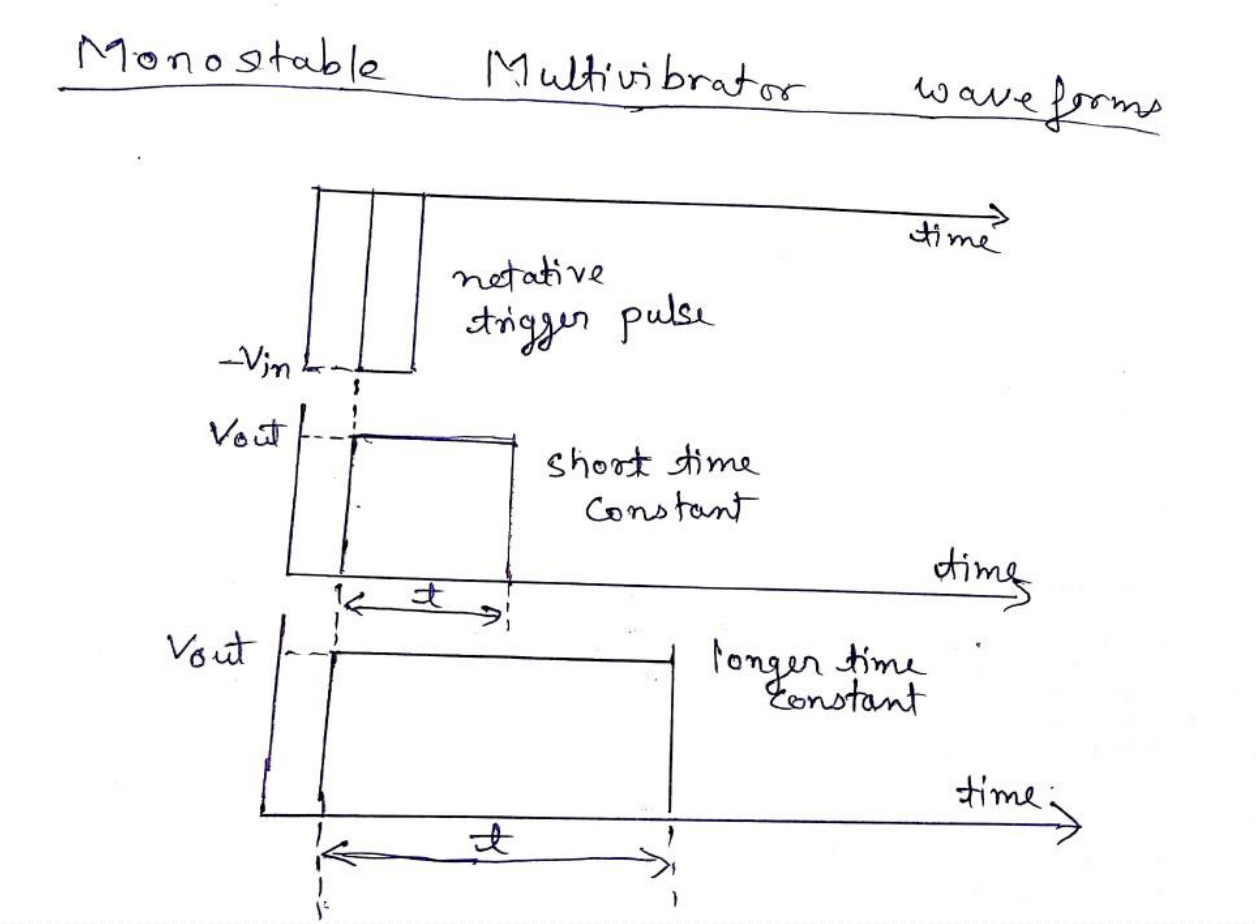
With Q1 at saturation and Q2 at cut-off the circuit will come back to its original state (i.e Q2 at saturation and Q1 at cot-off) after some time because the capacitor C1 discharges through the path R2, VCC, Q1. As C1 discharges it, a voltage to the base of Q2 to make it less positive. This goes on until a point is reached. When forward bias is reestablished on Q2 and collector current starts to flow in Q2. The step-by step-event will make Q2, saturated and Q1 to cut-off.

This is the stable state for the circuit and remains in this condition until another pulse causes the circuit to switch over the states.

Monostable multivibrators can produce a very short pulse or a much longer rectangular shaped wave form whose leading edge rises in time with the eternally applied trigger pulse and whose trailing edge is dependent upon the RC time constant of the feedback components used.

This RC time constant may be varied with time to produce a series of pulses which have a controlled fixed time delay in relation to the original trigger pulse as shown below.

MONOSTABLE MULTIVIBRATOR (Wave forms)



The time constant of monostable multivibrators can be changed by varying the values of the capacitor and resistor or both. Monostable multivibrators are generally used to increase the width of a pulse to produce a time delay within a circuit as the frequency of the output signal is always the same as that for the trigger pulse input, the only difference is the pulse width.