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## ⑦ The 555 IC timer



The 555 timer is an IC timer device. It can operate both as monostable and astable multivibrator. This monolithic device has advantages over discrete circuits of monostable and astable multivibrator. It has fewer circuit connections and provides improved performance. It generates a pulse whose width can be varied by varying externally connected resistance and capacitance ( $R$  and  $C_T$ ).

### Circuit of the 555 timer :-

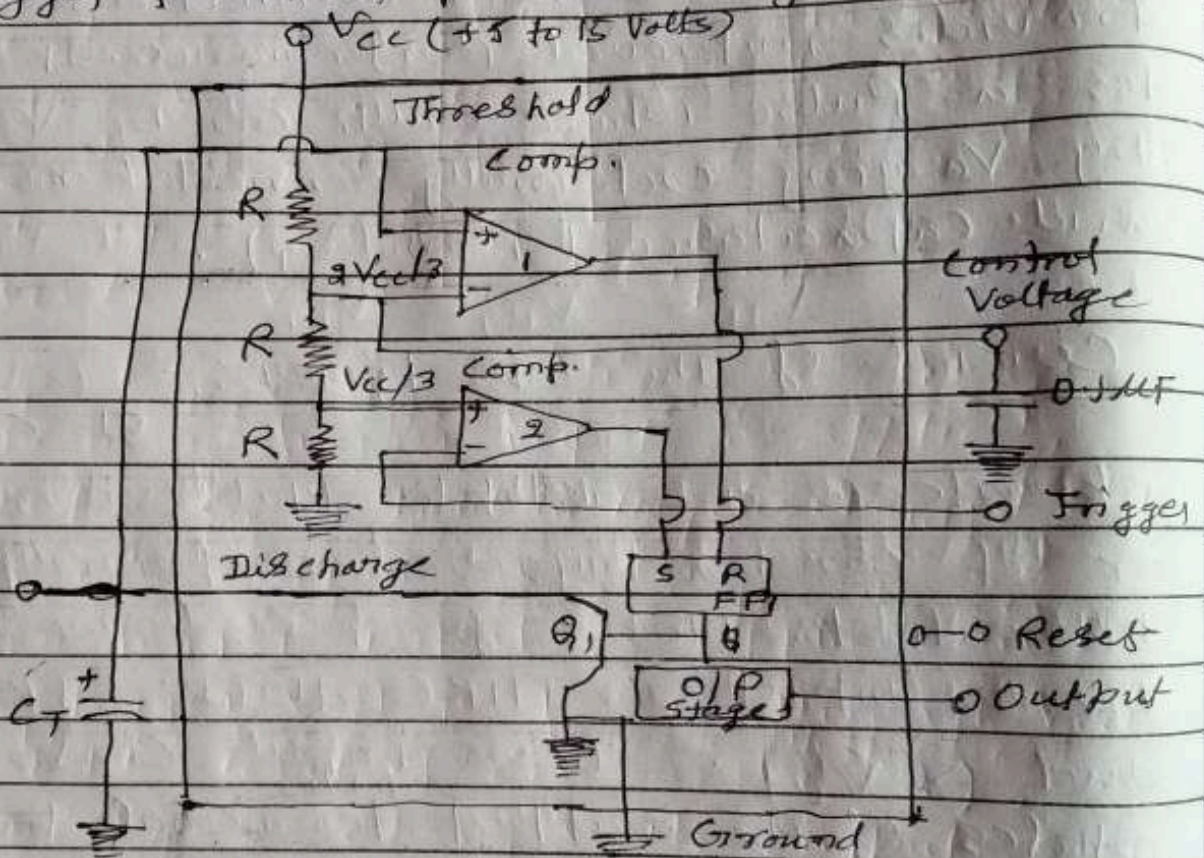
It can operate as an astable multivibrator or it can be triggered externally for monostable mode of operation. It has three inputs: THRESHOLD, TRIGGER and RESET. These inputs control the states of the output terminal. ~~through an~~ and discharge terminal. The output of the flip-flop is  $\bar{Q}$  which is also used as an output terminal taken through an output stage, fig-①. The three equal resistances  $R$  establish reference voltage levels  $V_1 = 2V_{CC}/3$  for comparator-1 and  $V_2 = V_{CC}/3$  for comparator-2.

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These reference levels are required to control the timing as explained ahead.

1.) SET state of FF (Flip Flop): on a -ve transition of pulse applied at the trigger terminal and when the voltage at the trigger terminal passes through  $V_{cc}/3$ ,



Functional diagram of the type 555 timer  
Fig-(1)

The output of the comparator -2 changes state because its +ve input terminal is fixed at  $V_{cc}/3$ . This change of state sets the flip-flop. The output at the output terminal is high (logic-1 state).

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(ii) RESET state of FF :-

When Voltage applied at the Threshold terminal of Comparator-1 goes +ve and passes through reference level  $2V_{cc}/3$ . The output of Comparator-1 changes state. This change of state resets the flip-flop. The output at the output terminal is low (logic-0 state). A separate reset terminal is provided for the times and is used to reset the flip-flop externally.

Since a high current of the order of 200 mA is sourced by the output stage, a capacitor,  $C_T$ , is connected between discharge terminal and ground. When  $Q_1$  is OFF the capacitor charges and when  $Q_1$  is ON, it discharges quickly. The top of  $C_T$  is also ~~the capacitor~~ connected to THRESHOLD so that capacitor voltage is applied to threshold input.