

Experiment 9

Objective: To implement astable multivibrator and alternating LED flasher using 555 timer.

Equipment Required: CRO, 5V DC Power supply

Components Required: LEDs (green and red), Resistances (1 K Ω , 10 K Ω , 220 Ω (2)), and Capacitors (0.1 μ F, 1 μ F, 100 μ F, 220 μ F), 555 Timer chip.

Theory:

- **555 Timer:**

555 Timer is 8 pin IC chip used in variety of timer, pulse generation, and oscillator applications. The 555 is the most popular integrated circuit ever manufactured. The internal block diagram of 555 Timer IC is shown in Fig. 1 and the pin diagram is shown in Fig. 2

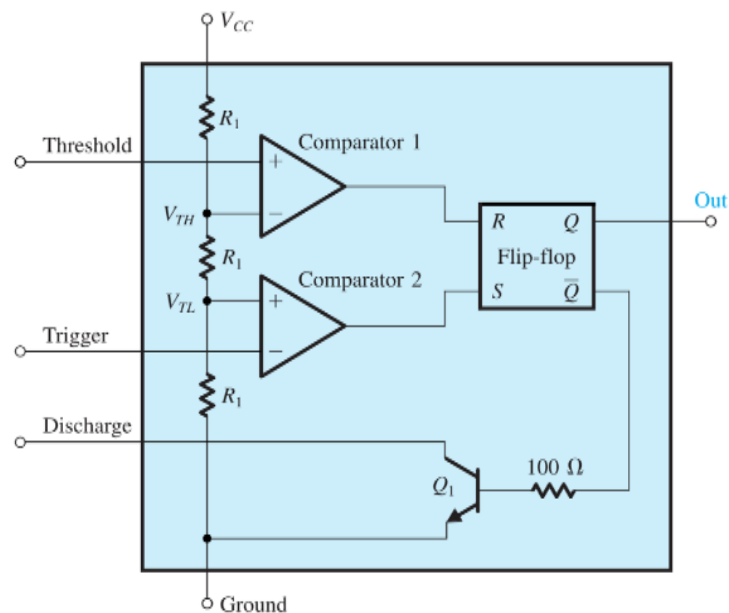


Fig. 1: Internal Circuit Diagram

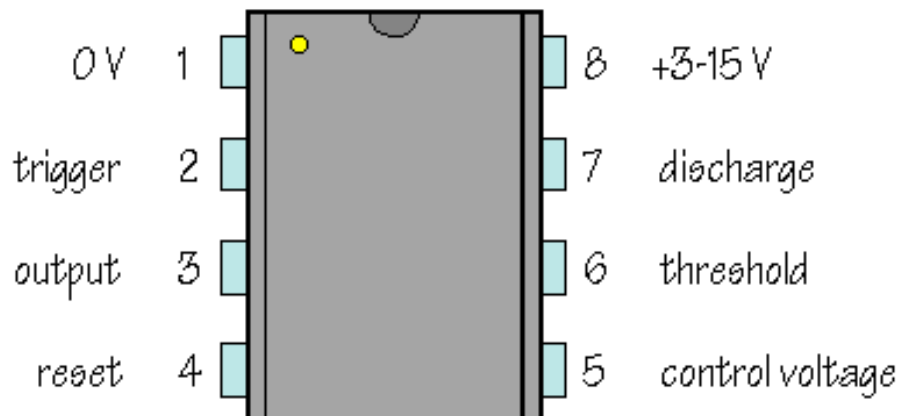


Fig. 2: Pin Diagram

- **Procedure to build Astable Multivibrator**

The circuit for implementing astable multivibrator is as shown below.

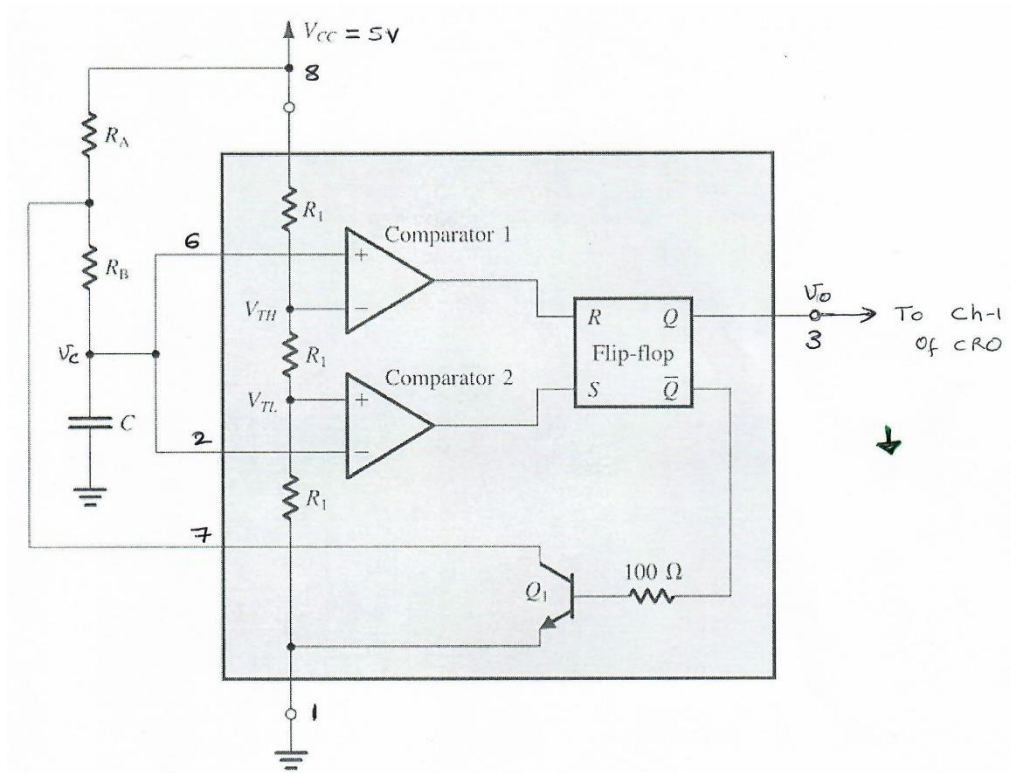


Fig. 3 Astable Multivibrator using 555 Timer

1. Connect the circuit as shown in Fig. 3 with $R_A = 1\text{ k}\Omega$, $R_B = 10\text{ k}\Omega$, $C = 0.1\text{ }\mu\text{F}$ and $V_{CC} = 5\text{ V}$.
2. Observe the output voltage at pin 3 and the voltage across capacitor on channel-1 and 2 of the oscilloscope.
3. Measure T_{ON} and T_{OFF} and the time period $T = T_{ON} + T_{OFF}$ and thus calculate the Duty Ratio (T_{ON}/T)
4. Compare the measured value with the theoretical value $T = 0.69(R_A + 2R_B)C$ and the duty ratio $= (R_A + R_B)/(R_A + 2R_B)$.
5. Repeat the steps 1 to 4 with a different value of C with $C = 1\text{ }\mu\text{F}$.

- **Procedure to build Alternating LED Flasher**

The circuit for implementing LED flasher is as shown in Fig. 4

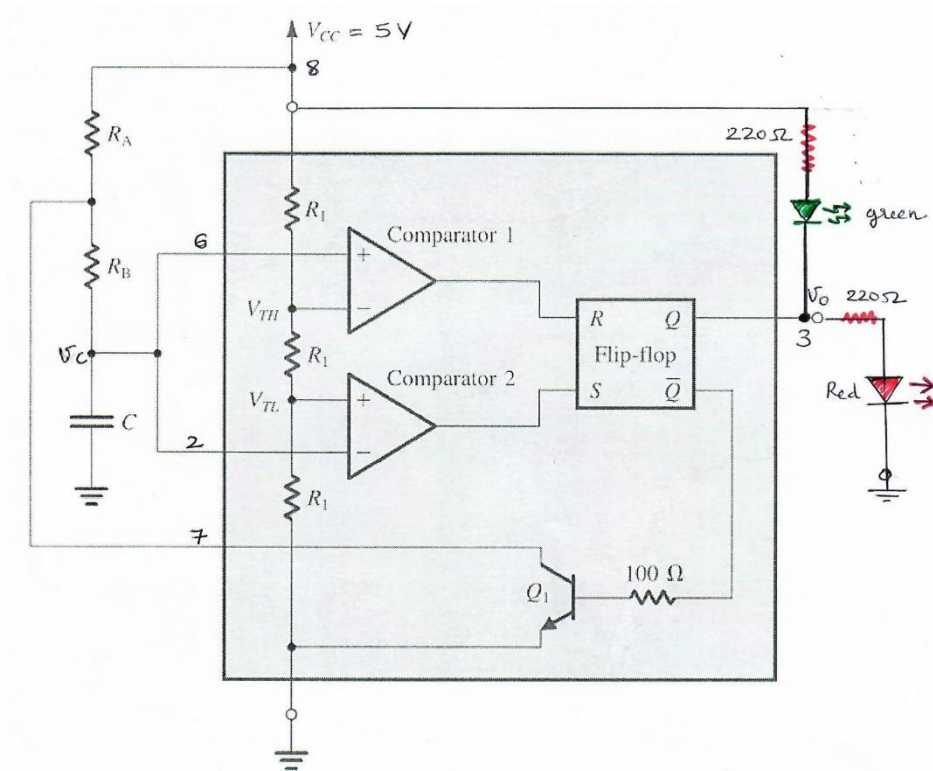


Fig. 4: Alternating LED Flasher

1. Connect the circuit as shown in Fig. 3 with $R_A = 1\text{ k}\Omega$, $R_B = 10\text{ k}\Omega$, $C = 100\text{ }\mu\text{F}$ and $V_{CC} = 5\text{ V}$.
2. Observe the flashing of LEDs.
3. Repeat the steps 1 and 2 for a different value of C (with $C = 220\text{ }\mu\text{F}$).

Precautions to be taken:

1. Ensure that all the discrete components are working properly.
2. Make sure all the connections in the circuit are correct before giving supply to circuit.
3. Remove the supply before changing any connections in circuit.