Astable Multivibrator Operations And Applications

An astable multivibrator, often called a free running multivibrator, is a rectangular wave generator. Unlike monostable multivibrator , this circuit does not require an external trigger to change one state of the output. However the time during which the output is either high or low is determined by the two resistors and a capacitor, which are externally connected to the 555 timer.This is the free running mode and the trigger is tied to the threshold pin. At power-up, the capacitor is discharged, holding the trigger low. This triggers the timer, which establishes the capacitor charge path through Ra and Rb. When the capacitor reaches the threshold level of 2/3 Vcc, the output drops low and the discharge transistor turns on.

The timing capacitor now discharges through Rb. When the capacitor voltage drops to 1/3 Vcc, the trigger comparator trips, automatically retriggering the timer, creating an oscillator whose frequency is determined by the formula in figure 2.

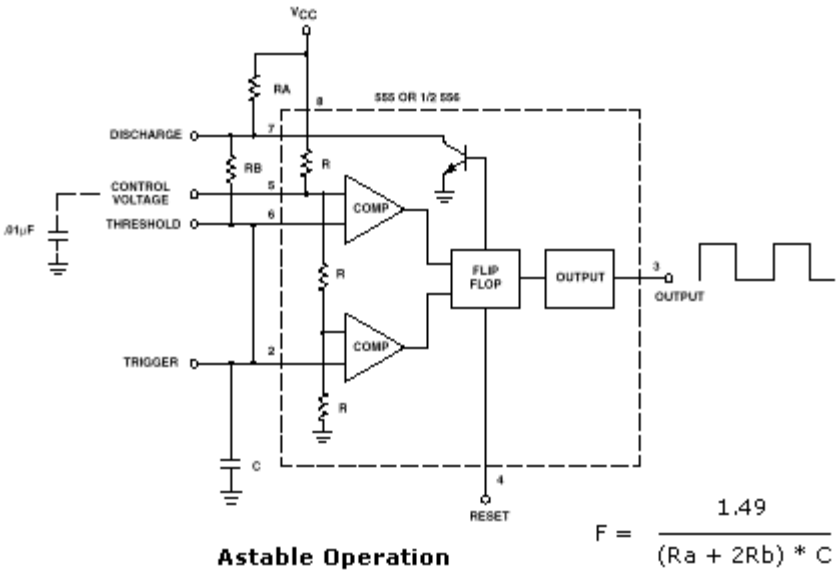

Figure 4.6

In astable mode, the '555 timer ' puts out a continuous stream of rectangular pulses having a specified frequency. Resistor R_1 is connected between V_{CC} and the discharge pin (pin 7) and another resistor (R_2) is connected between the discharge pin (pin 7), and the trigger (pin 2) and

threshold (pin 6) pins that share a common node. Hence the capacitor is charged through R_1 and R_2, and discharged only through R_2, since pin 7 has low impedance to ground during output low intervals of the cycle, therefore discharging the capacitor

In the astable mode, the frequency of the pulse stream depends on the values of R_1, R_2 and C

$$f = \frac{1}{\ln(2) \cdot C \cdot (R_1 + 2R_2)}$$

$$\text{high} = \ln(2) \cdot (R_1 + R_2) \cdot C$$

Applications of astble multivibrator:

1. Square wave oscillator
2. Free running ramp generator