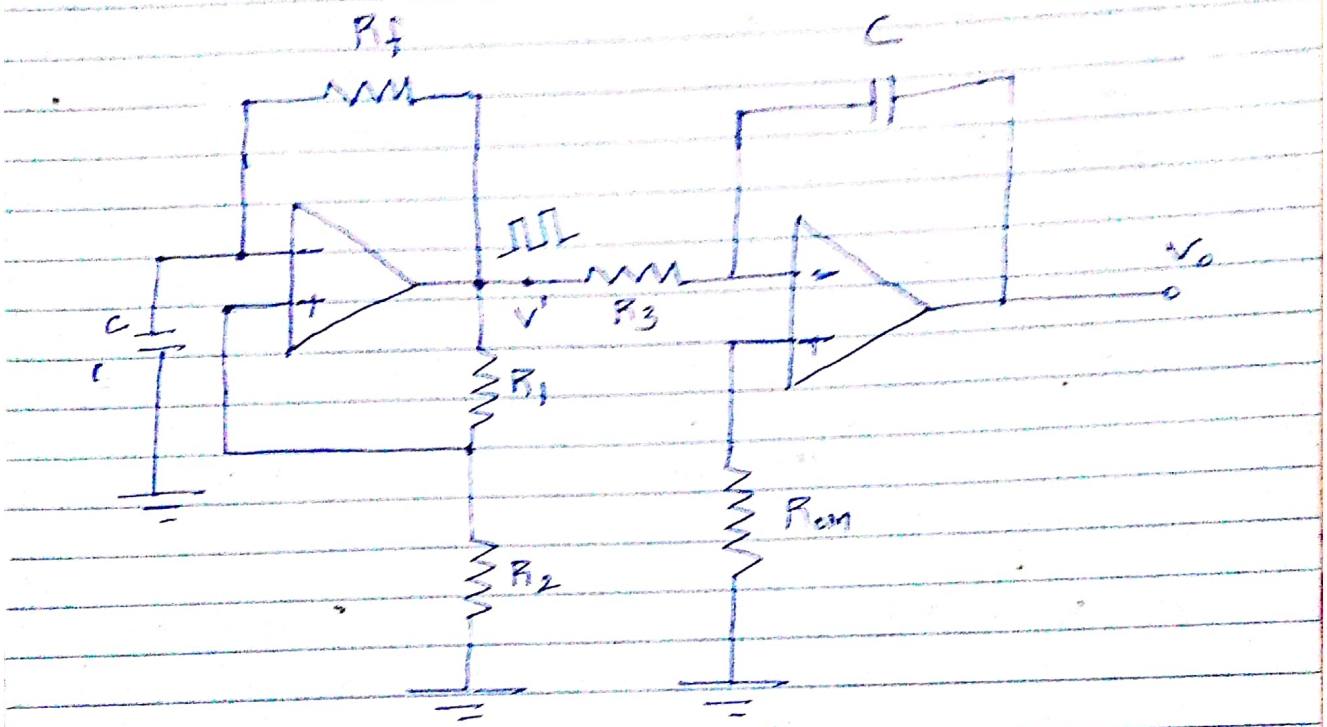
Mono-stable

AA-stable

schmitt Trigger

Triangular wave generator

Triangular Wave Generator



← Schmitt Trigger → ← Integrator →

Determination of frequency and Amplitude :-

The frequency and amplitude of the triangular wave can be determined as order

When comparator output is at $+V_{sat}$, the effective voltage at point "p" is given by

$$-V_{ramp} + \frac{R_2}{R_2+R_3}\left[+V_{sat} - (-V_{ramp})\right]$$

effective voltage "p" equal to zero then

$$-V_{ramp} + \frac{R_3}{R_2+R_3}(V_{ramp}) + \frac{R_2}{R_2+R_3} + V_{sat} = 0$$

$$-V_{ramp} = 0$$

$$-\frac{R_3}{R_2+R_3} V_{ramp} = \frac{R_2}{R_2+R_3}(+V_{sat})$$

$$-V_{ramp} = \frac{R_2}{R_2+R_3} \times \frac{R_2+R_3}{R_3} (+V_{sat})$$

$$-V_{ramp} = \frac{-R_2}{R_3} (+V_{sat})$$

$$V_{ramp} = \frac{-R_2}{R_3} (-V_{sat})$$

If $|+V_{sat}| = |-V_{sat}|$ then, we can write

$$V_{o(pp)} = \frac{R_2}{R_3} V_{sat}$$

$$V_{o(pp)} = +V_{ramp} - (-V_{ramp})$$

$$V_{o(pp)} = \frac{-R_2}{R_3} (-V_{sat}) - \left(\frac{-R_2}{R_3}\right) (+V_{sat})$$

$$V_{o(pp)} = \frac{R_2}{R_3} V_{sat} + \frac{R_2}{R_3} V_{sat}$$

$$V_{o(pp)} = \frac{2R_2}{R_3} V_{sat} \quad \text{—— (1)}$$

time taken by output to swing from $-V_{ramp}$ to $+V_{ramp}$ is equal to half of time period $T/2$

$$V_{O(PP)} = \frac{-1}{R_1 C_1} \int_0^{T/2} (-V_{sat}) \cdot dt$$

$$= \left(\frac{V_{sat}}{R_1 C_1}\right) \cdot \frac{T}{2}$$

Substitute V_{opp} value in eq①

$$\frac{2R_2}{R_3} V_{sat} = \frac{V_{sat}}{R_1 C_1} \frac{T}{2}$$

$$\frac{T}{2} \frac{\cancel{V_{sat}}}{R_1 C_1} = \frac{2R_2}{R_3} \cancel{V_{sat}}$$

$$T = \frac{4 R_2 R_1 C_1}{R_3}$$

The frequency of oscillation can be

$$f_0 = \frac{1}{T} \Rightarrow \boxed{f_0 = \frac{R_3}{4 R_1 R_2 C_1}}$$