



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



19EET202 / ANALOG ELECTRONICS

II YEAR / III SEMESTER

UNIT-4: FEEDBACK AMPLIFIERS AND OSCILLATORS

HARTLEY OSCILLATOR



What We'll Discuss



TOPIC OUTLINE

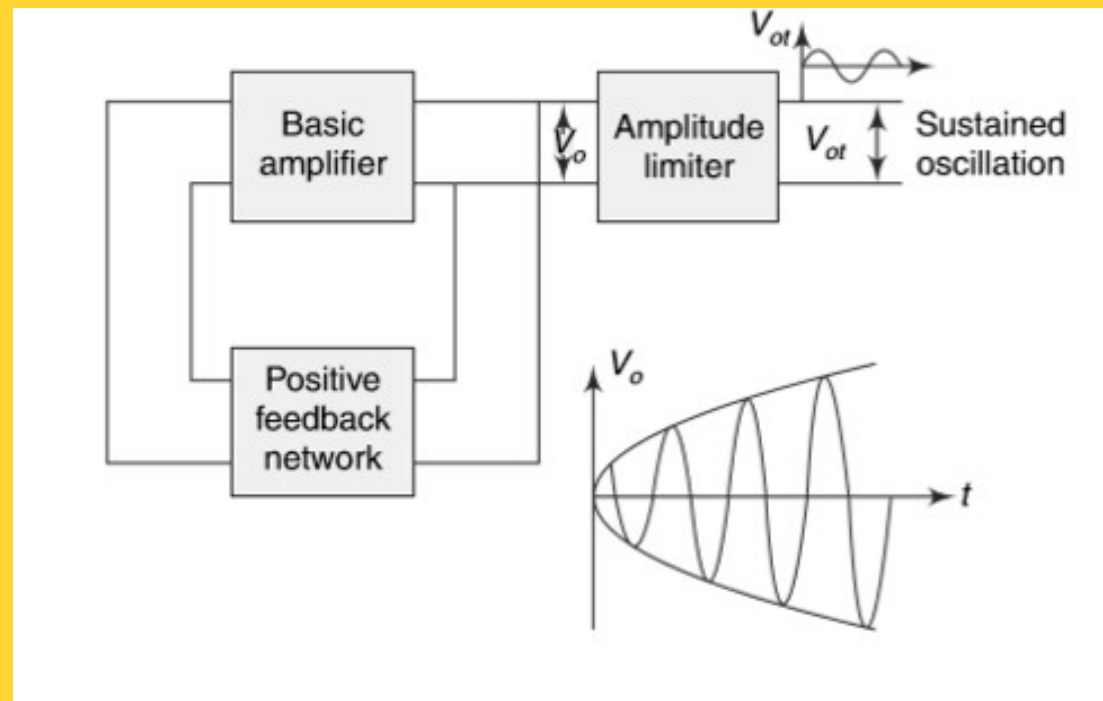
Introduction
Classification
Working
Applications



Need for Oscillators



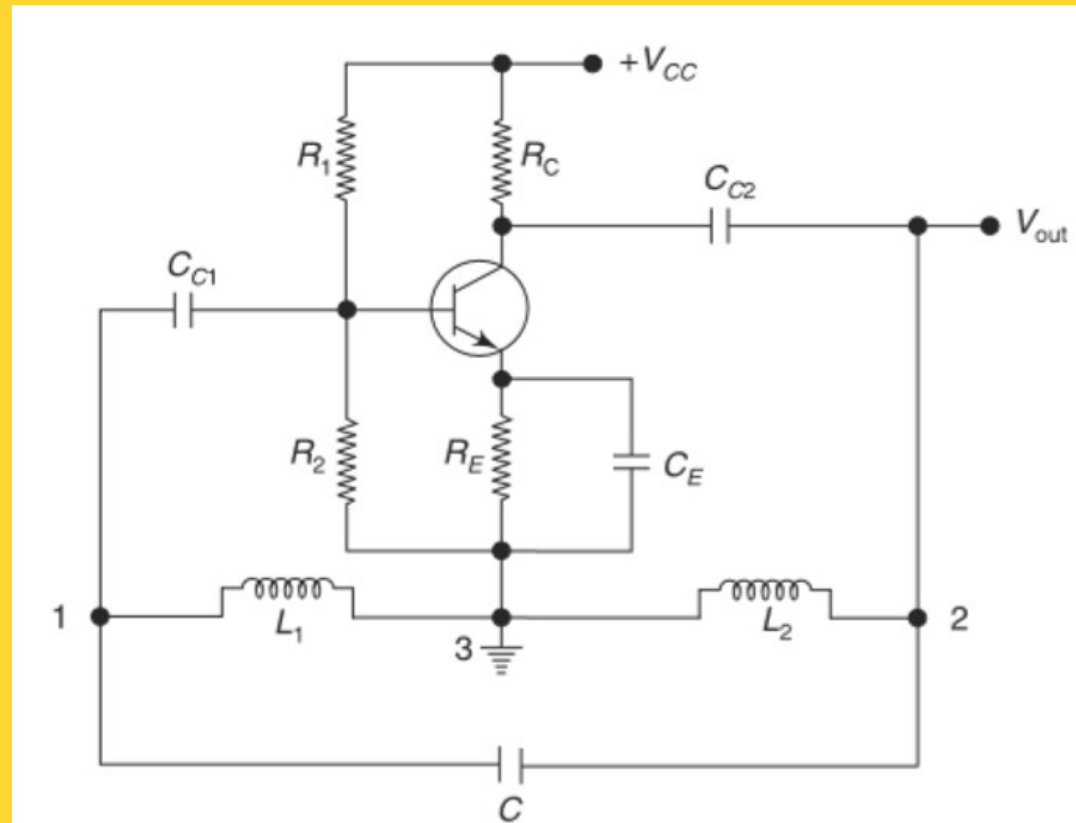
- Communication Systems
- Control signal





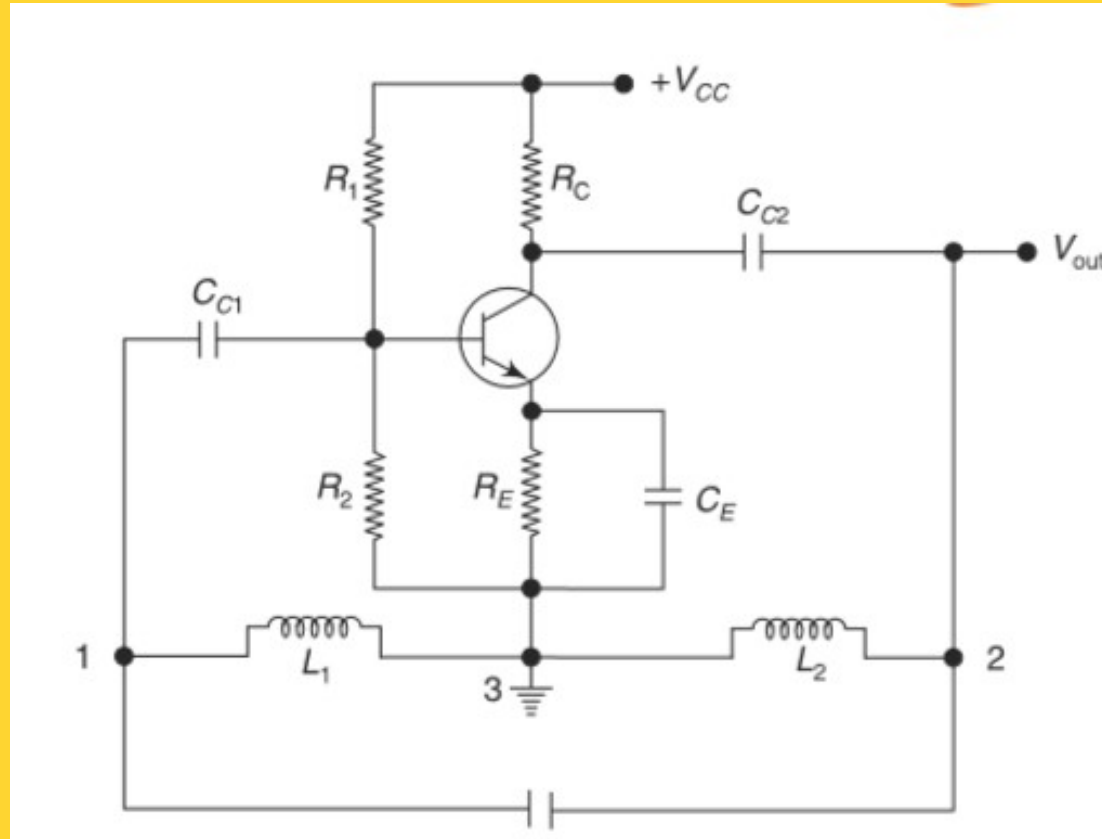
Hybrid Oscillator Circuit

- NPN transistor
- Conditions for oscillations
- Positive- Feed back





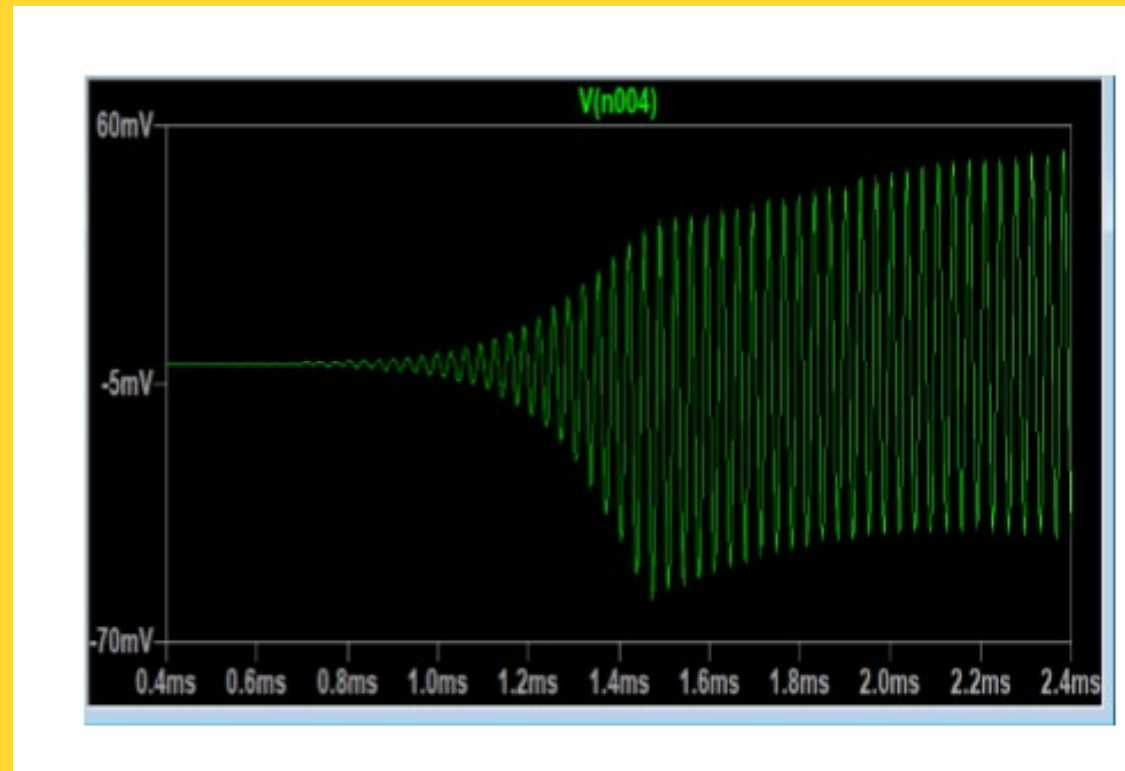
Mechanism of Start of Oscillation





Stabilization of Amplitude

- Amplitude Limiting





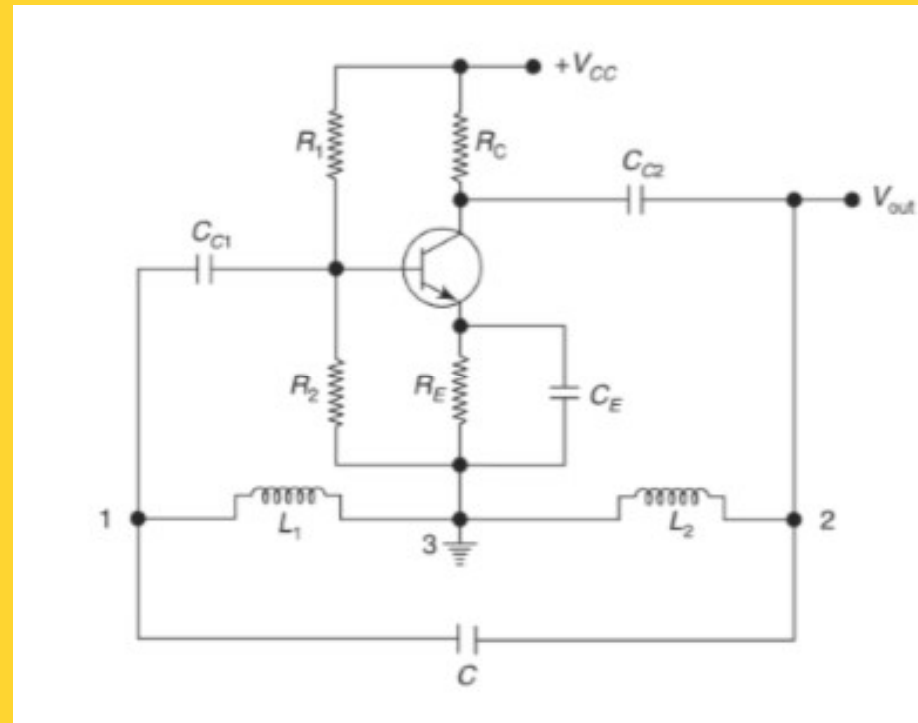
Frequency of Oscillation



$$Z_1 = j\omega L_1 + j\omega M$$

$$Z_2 = j\omega L_2 + j\omega M$$

$$Z_3 = \frac{1}{j\omega C} = \frac{-j}{\omega C}$$



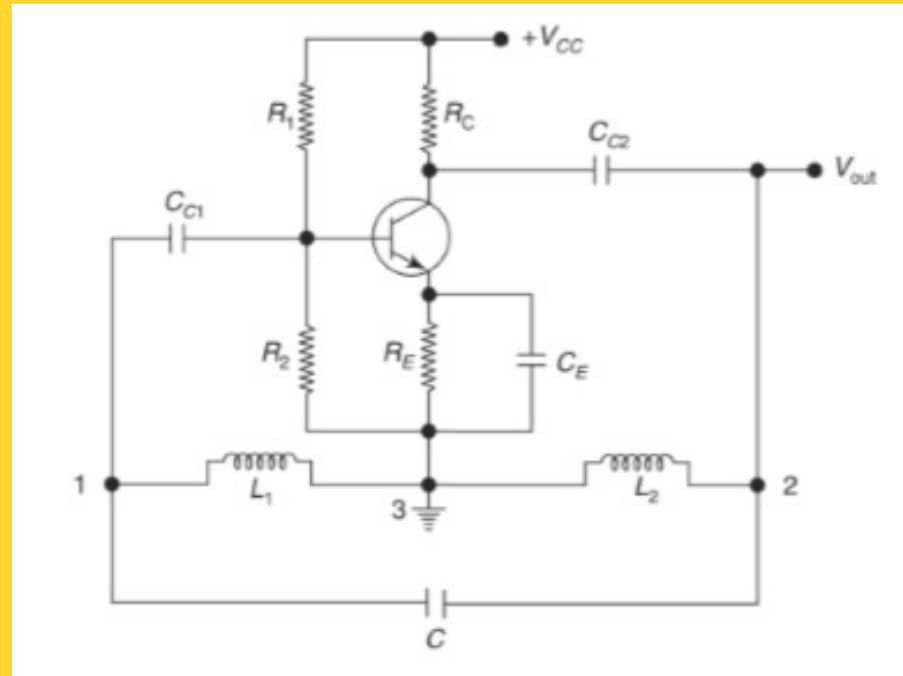


Frequency of Oscillation



General Equation of Oscillation

$$h_{ie}(Z_1 + Z_2 + Z_3) + Z_1Z_2(1 + h_{fe}) + Z_1Z_3 = 0$$





Frequency of Oscillation

$$j\omega h_{ie} \left[L_1 + L_2 + 2M - \frac{1}{\omega^2 C} \right] - \omega^2 (L_1 + M) \left[(L_2 + M) (1 + h_{fe}) - \frac{1}{\omega^2 C} \right] = 0$$



Fréquency of Oscillation

- For calculating the frequency of oscillation Equate the imaginary part of the basic equation to zero



$$f_o = \frac{\omega_o}{2\pi}$$

$$\left[L_1 + L_2 + 2M - \frac{1}{\omega_o^2 C} \right] = 0$$

$$f_o = \frac{\omega_o}{2\pi} = \frac{1}{2\pi\sqrt{(L_1 + L_2 + 2M) C}}$$



Conditions for Maintenance of Oscillation

For obtaining the conditions for maintenance of oscillation equate the real part of the basic equation to zero



$$\left[(L_2 + M) (1 + h_{fe}) - \frac{1}{\omega_o^2 C} \right] = 0$$

$$h_{fe} = \frac{L_1 + M}{L_2 + M}$$



Reference

Electronic Devices and Circuits By Salivahanan





THANK YOU