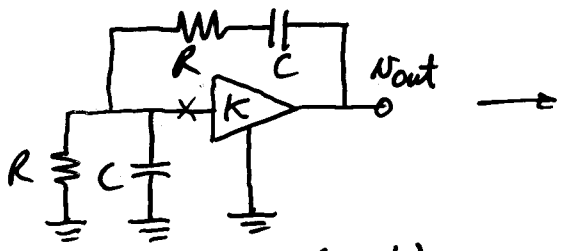
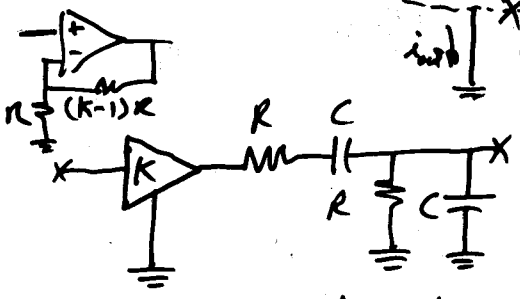
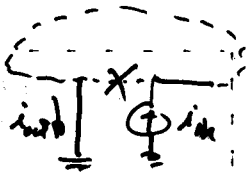
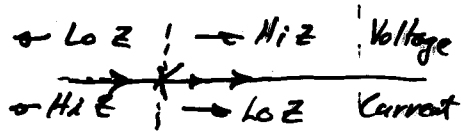
Wien Bridge Oscillator









$$T(s) = \frac{K(R \| \frac{1}{sC})}{R + \frac{1}{sC} + R \| \frac{1}{sC}} = \frac{sKRC}{s^2R^2C^2 + 3RCs + 1}$$

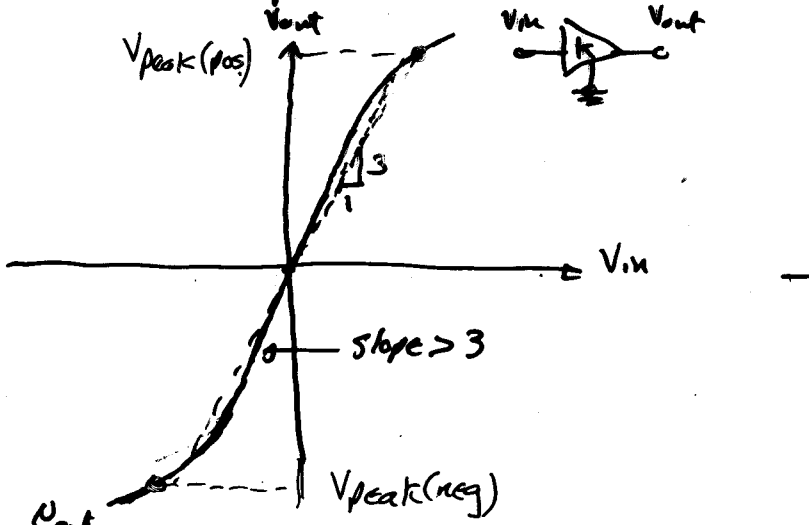
$$T(j\omega) = \frac{j\omega KRC}{(1-\omega^2R^2C^2) + j\omega 3RC} = 1 + j0 \Rightarrow \omega_{osc} = \frac{1}{RC} \text{ & } K = 3$$

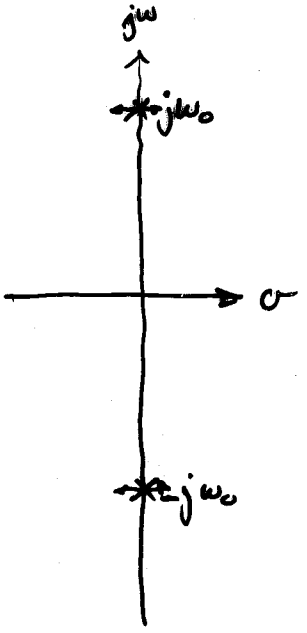
Example: Let $R = 10k\Omega$ and $C = 0.1\mu F$

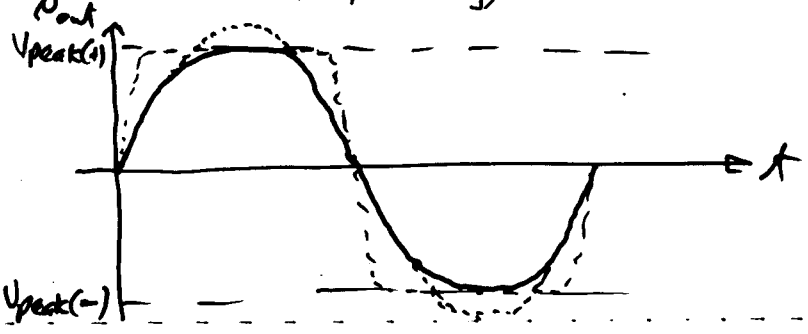
$$\omega_{osc} = \frac{1}{10^4 \cdot 10^{-7}} = 10^3 \rightarrow f_{osc} = \frac{1000}{2\pi} = 159Hz$$

* Amplitude Stabilization in Oscillators

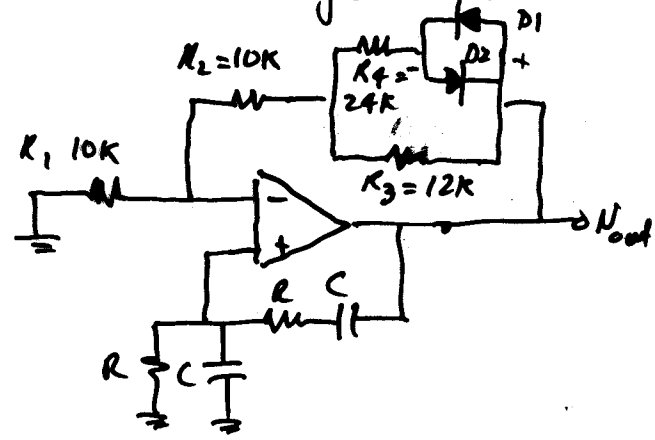
Look at the amplifier transfer function.







Modified Wien Bridge Oscillator -



Gain with the diodes off:

$$\frac{R_1+R_2+R_3}{R_1} = \frac{32K}{10K} = 5.2$$

Gain w. the diodes on:

$$\frac{R_1+R_2+R_3 \| R_4}{R_1} \simeq \frac{25K}{10K} = 2.8$$

Hewlitt-Packard