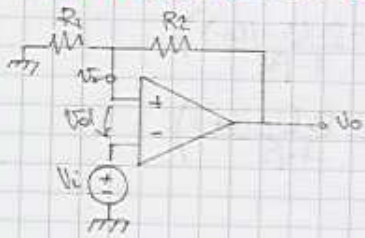


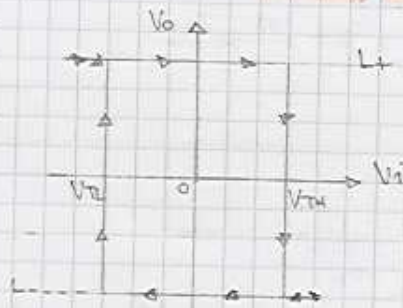
MULTIPLICATORI

MULTIPLICATORI BISTABILI



$$\beta = \frac{R_1}{R_1 + R_2}$$

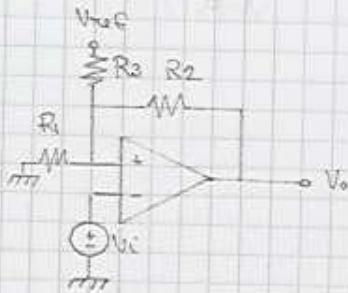
$$V_{TH} = \beta L_+ \quad V_{TL} = \beta L_-$$



$$V_o = V_i \frac{A(s)}{1 + A(s)\beta}$$

$$A(s) = \frac{A_{DC}}{1 + s/\omega_u}$$

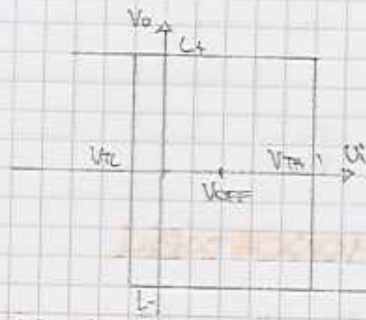
per $s = -\omega_u (1 + A_{DC}\beta)$
 è stabile
 oppure stabile per $1 - A_{DC}\beta > 0$



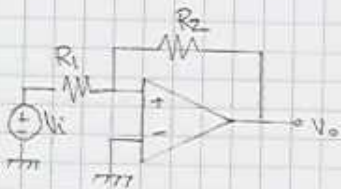
$$\beta = \frac{R_1}{R_1 + R_2}$$

$$V_{TH} = \beta L_+ + V_{REF} \quad V_{TL} = \beta L_- + V_{REF}$$

$$V_{REF} = \frac{V_{REF} R_1 / R_2 / R_3}{R_3}$$

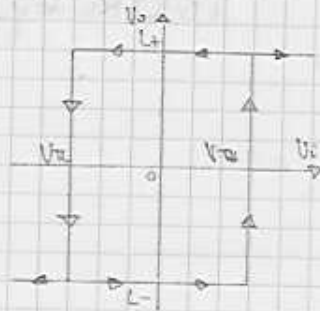


$$V_i = \left(\frac{V_{REF} + V_o}{R_3} \right) R_1 / R_2 / R_3$$



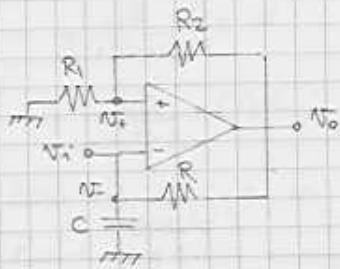
$$\beta = \frac{R_1}{R_1 + R_2}$$

$$V_{TH} = -\beta L_- \quad V_{TL} = -\beta L_+$$



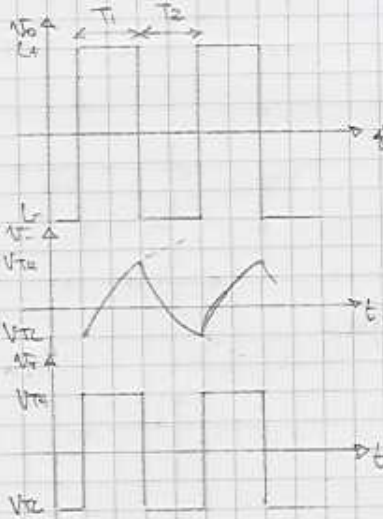
$$V_i = -\frac{R_1}{R_2} V_o$$

MULTIVIBRATORI ASTABILI



$$\beta = \frac{R}{R+R_2}$$

$$V_2 = \beta V_0$$



$$T_1 = 2CR \ln \left(\frac{1-\beta(V_0-)}{1-\beta} \right)$$

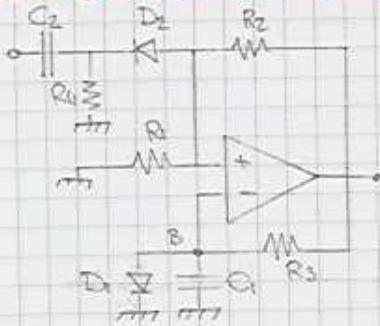
$$T_2 = 2CR \ln \left(\frac{1-\beta(V_0+)}{1-\beta} \right)$$

$$\tau = CR$$

$$\approx V_+ = -V_-$$

$$T = T_1 + T_2 = 2\tau \ln \left(\frac{2+\beta}{1-\beta} \right)$$

MULTIVIBRATORI MONOSTABILI



$$V_0(t) = L - (L - V_{DS}) e^{-\frac{t}{CR_3}} = \beta L -$$

$$T = CR_3 \ln \left(\frac{1}{1-\beta} \right)$$