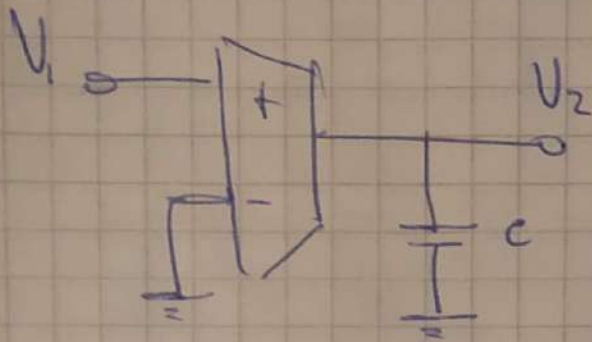


Ger OTA:

Integrador



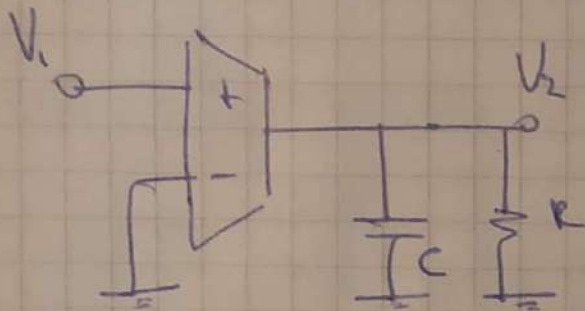
$$\omega_t = g_m / C$$

$$I_2 = g_m \cdot V_1$$

$$V_2 = I_2 \cdot \frac{1}{sC}$$

$$V_2 = V_1 \cdot g_m \cdot \frac{1}{sC}$$

$$\frac{V_2}{V_1} = \frac{g_m}{sC} = \frac{g_m/C}{s}$$



$$I_2 = g_m \cdot V_1$$

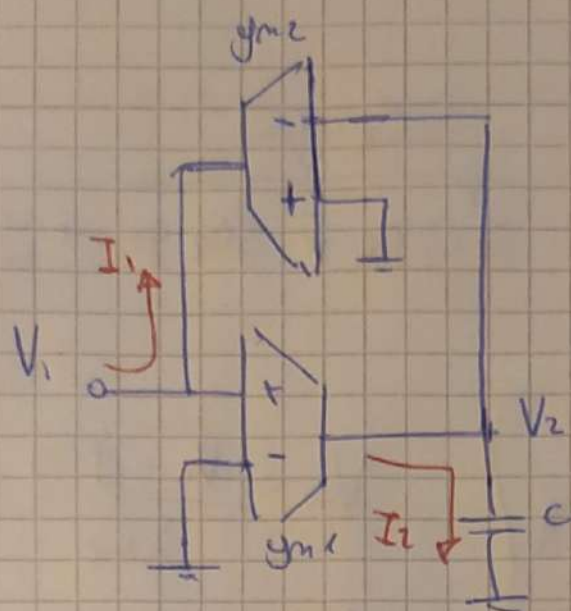
$$Z_2 = \frac{1}{\frac{1}{R} + sC} = \frac{R}{sCR + 1}$$

$$V_2 = I_2 \cdot Z_2 =$$

$$V_2 = V_1 \cdot g_m \cdot \frac{R}{sCR + 1}$$

$$\frac{V_2}{V_1} = \frac{g_m \cdot R}{sCR + 1}$$

$$\frac{V_2}{V_1} = \frac{g_m/C}{s + \frac{1}{CR}}$$



$$\begin{cases} I_2 = V_1 \cdot g_{m1} \\ I_1 = V_2 \cdot g_{m2} \end{cases}$$

$$V_2 = I_2 \cdot \frac{1}{sC}$$

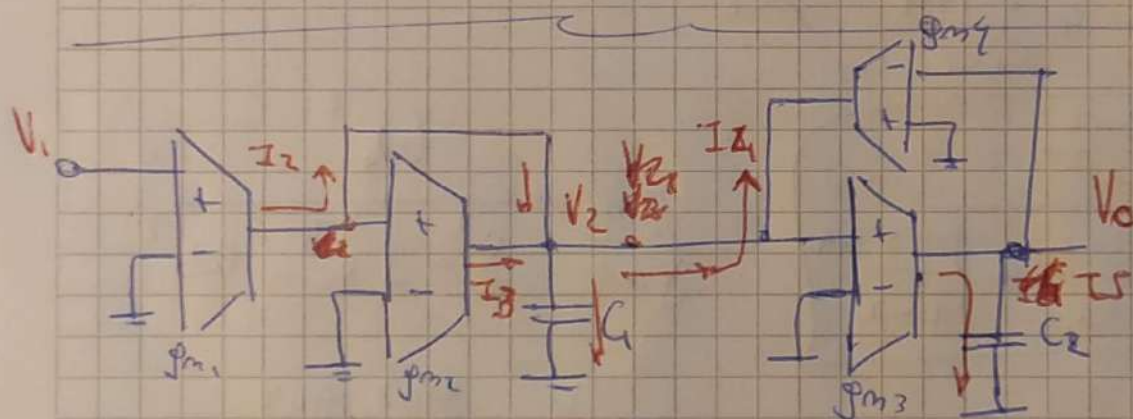
$$V_2 \cdot sC = V_1 \cdot g_{m1}$$

$$\left[ \frac{V_2}{V_1} = \frac{g_{m1}}{sC} = \frac{g_{m1}/C}{s} \right]$$

$$Z_1 = \frac{V_1}{I_1} = \frac{I_2 / g_{m1}}{V_2 \cdot g_{m2}}$$

$$Z_1 = \frac{I_2}{g_{m1} g_{m2} \cdot I_2 \cdot \frac{1}{sC}}$$

$$\rightarrow Z_1 = \frac{sC}{g_{m1} g_{m2}} = \frac{s}{\frac{g_{m1} \cdot g_{m2}}{C}}$$



$$I_2 = V_1 \cdot g_{m1}$$

$$I_3 = V_2 \cdot g_{m2}$$

$$I_2 + I_3 = I_{C1} + I_4$$

$$I_5 = V_2 \cdot g_{m3}$$

$$I_5 = V_0 \cdot sC_2$$

$$I_4 = V_0 \cdot g_{m4}$$

$$V_1 \cdot g_{m1} + V_2 \cdot g_{m2} = V_2 \cdot sC_1 + V_0 \cdot g_{m4}$$

$$V_0 = \frac{I_5}{sC_2}$$

$$V_1 \cdot g_{m1} = V_2 \cdot sC_1 - V_2 \cdot g_{m2} + \frac{V_2 \cdot g_{m3} \cdot g_{m4}}{sC_2}$$

$$V_0 = \frac{V_2 \cdot g_{m3}}{sC_2}$$



$$V_1 g_{m1} = V_2 \left( SC_1 + \frac{g_{m2} g_{m4}}{SC_2} - g_{m2} \right)$$

$$\frac{V_2}{V_1} = \frac{g_{m1}}{SC_1 + \frac{g_{m2} g_{m4}}{SC_2} - g_{m2}} = \frac{SC_2 g_{m1}}{SC_1 SC_2 - SC_2 g_{m2} + \frac{g_{m2} g_{m4}}{C_2}}$$

$$\frac{V_2}{V_1} = \frac{S \frac{g_{m1}}{C_1}}{S^2 - S \frac{g_{m2}}{C_1} + \frac{g_{m2} g_{m4}}{C_1 C_2}}$$

$$V_0 = \frac{V_2 \cdot g_{m3}}{SC_2}$$

$$\frac{V_0}{V_2} = \frac{g_{m3}}{SC_2}$$

$$\frac{V_0}{V_1} = \frac{V_2}{V_1} \cdot \frac{V_0}{V_2}$$

$$\frac{V_0}{V_1} = \frac{\cancel{S} \frac{g_{m1}}{C_1}}{S^2 - S \frac{g_{m2}}{C_1} + \frac{g_{m2} g_{m4}}{C_1 C_2}} \cdot \frac{g_{m3}}{\cancel{S} C_2}$$

$$\frac{V_0}{V_1} = \frac{\frac{g_{m1} g_{m3}}{C_1 C_2}}{S^2 - S \frac{g_{m2}}{C_1} + \frac{g_{m2} g_{m4}}{C_1 C_2}} = \frac{g_{m1}}{g_{m4}} \cdot \frac{\omega_0^2}{S^2 - S \frac{\omega_0}{Q} + \omega_0^2}$$

NOTA: Si se cambia el segundo OTA y entro por pata "-" en vez de "+"

$$\omega_0^2 = \frac{g_{m3} g_{m4}}{C_1 C_2}$$

$$\frac{\omega_0}{Q} = \frac{g_{m2}}{C_1}$$

$$Q = \frac{\omega_0 \cdot C_1}{g_{m2}}$$

$$\frac{V_0}{V_1} = \frac{\frac{g_{m1} g_{m3}}{C_1 C_2}}{S^2 + S \frac{g_{m2}}{C_1} + \frac{g_{m2} g_{m4}}{C_1 C_2}}$$

↑  
CAMBIO