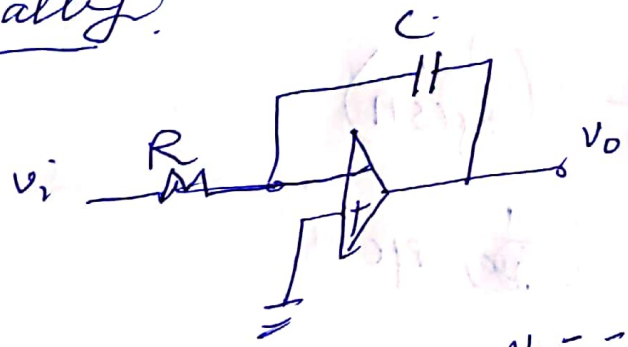
Issues with integrator:

Theoritically:



$$v_o = -\frac{1}{RC}\int v_i dt$$

Let $v_i = \cos\omega t$

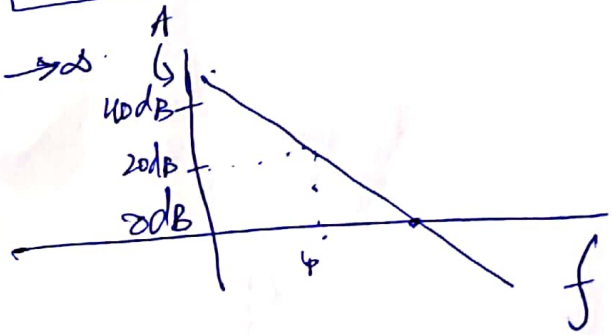
$$\Rightarrow v_o = -\frac{1}{RC}\left(\frac{\sin\omega t}{\omega}\right)$$

$$v_o = \frac{-1}{RC\omega} \sin\omega t \Rightarrow \frac{1}{RC\omega} = \frac{X_c}{R}.$$

$$\boxed{A_c = \frac{1}{RC\omega}} \quad \text{or} \quad \boxed{A_c \propto \frac{1}{\omega}}$$

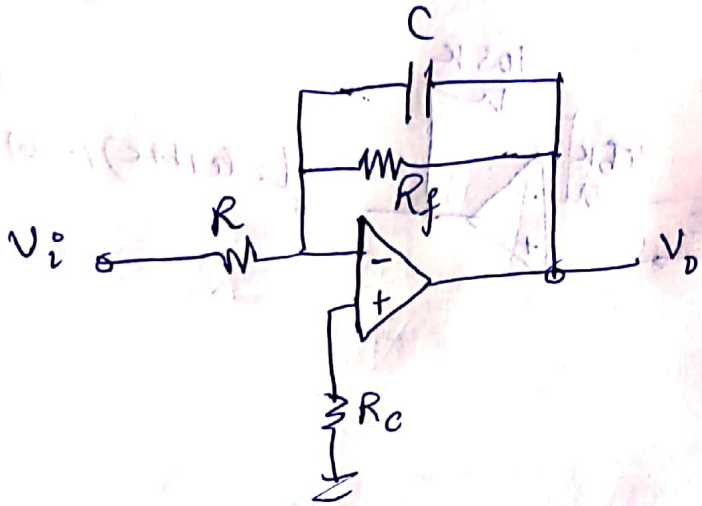
~~$\omega = 0$~~, $\omega \to 0$, $A_c \to \infty$

($\uparrow$ DC)



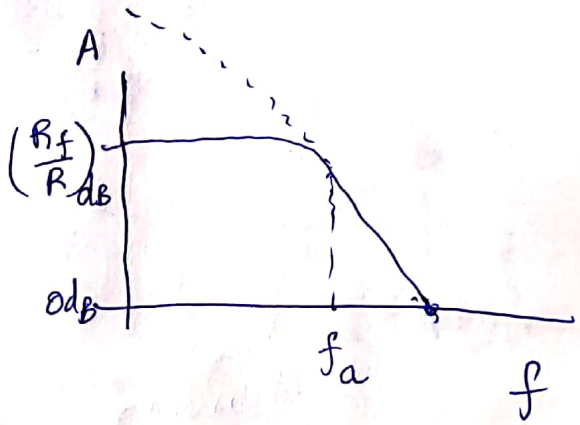
we we need some circuitry to solve the issue.

Practical Integrator (Design).



usually $R_C = R$.
$R_f \gg R$.
let $R_f = 20R$.

DC gain, $A_d = \frac{R_f}{R}$



~~DC~~ I choosed,

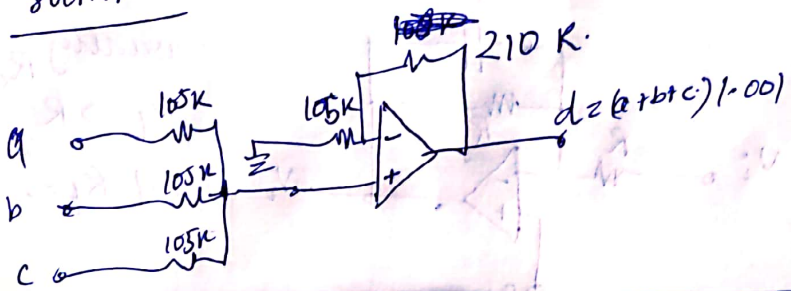
$C = 0.22\,\mu F$.

$R_C = R = 27\,K\Omega$.

$R_f = 390\,K\Omega$.

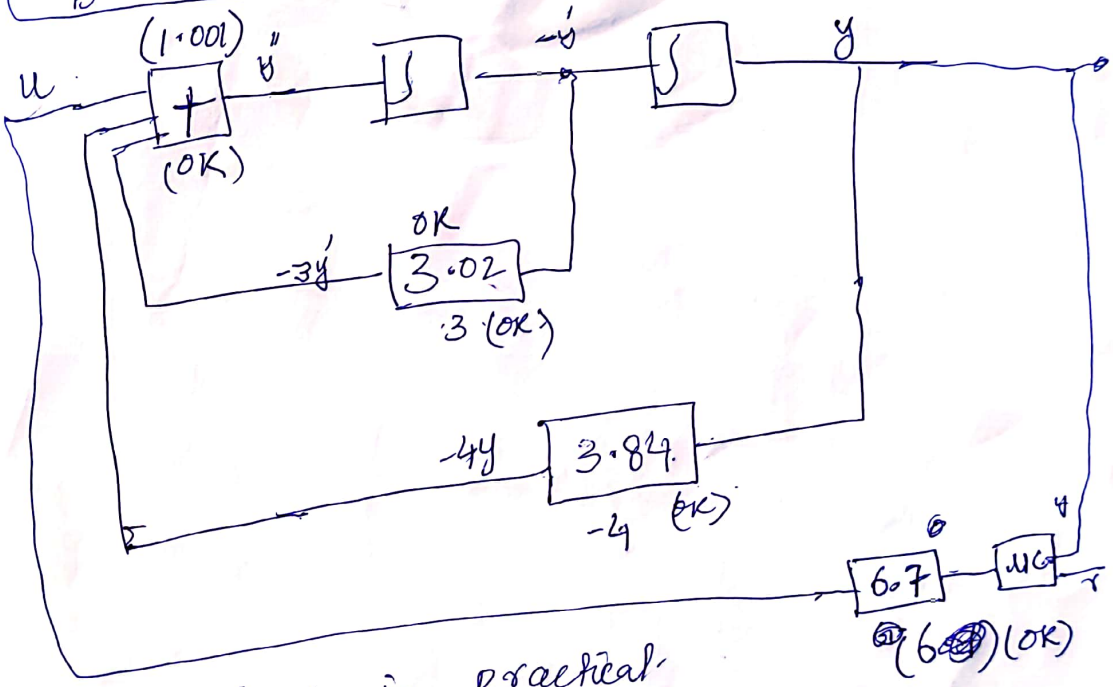
modifying the compounds as well.

Summer



Physical on Bread Boards

$y'' = u - 3y' - 4y$.



we have in practical:

$y'' = (u - 3.02y' - 3.84) \times (1.001)$

$\Rightarrow y'' + 3.023y' + 3.844y = u(1.001)$

Taking Laplace:

$s^2Y + 3.0023Y + 3.844Y = U(1.001)$

$\Rightarrow$ $G = \dfrac{1.001}{s^2 + 3.0023 + 3.884}$ ← practical

our original was:

$G = \dfrac{1}{s^2 + 3s + 4}$ ← theoritical.