Block diagram amplifier

Tuesday, January 26, 2021 11:00

• high gain amplifier G, want $y = \alpha r$.

Open-loop:

$\Rightarrow K = \alpha / G$

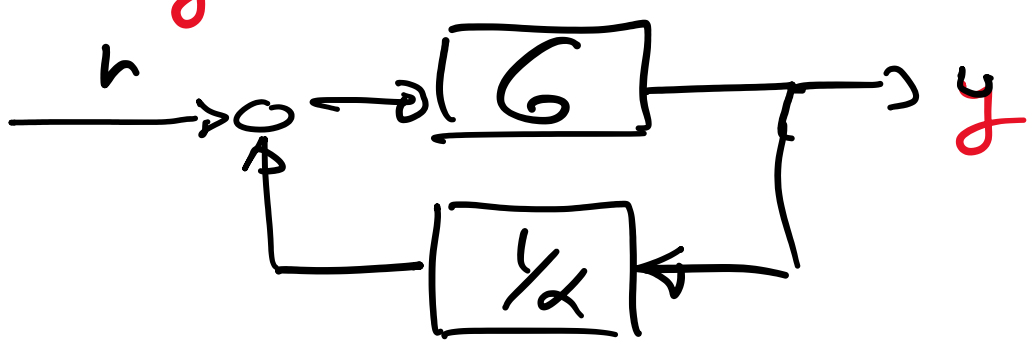
Closed-loop: $y = G(r - \frac{1}{\alpha} y)$.

high gain

Black's idea.

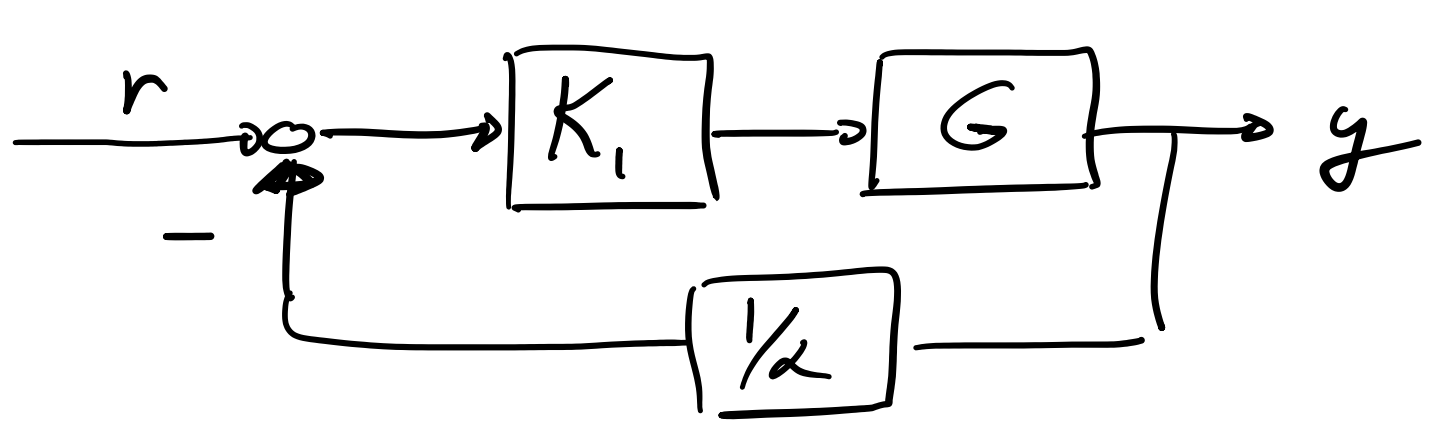
$$y = \frac{G}{1 + G/\alpha} \; ; \; \text{if } \frac{G \text{ large}}{(G \gg \alpha)} :$$

$\Rightarrow y \cong \alpha r$



• Remark (Important!).

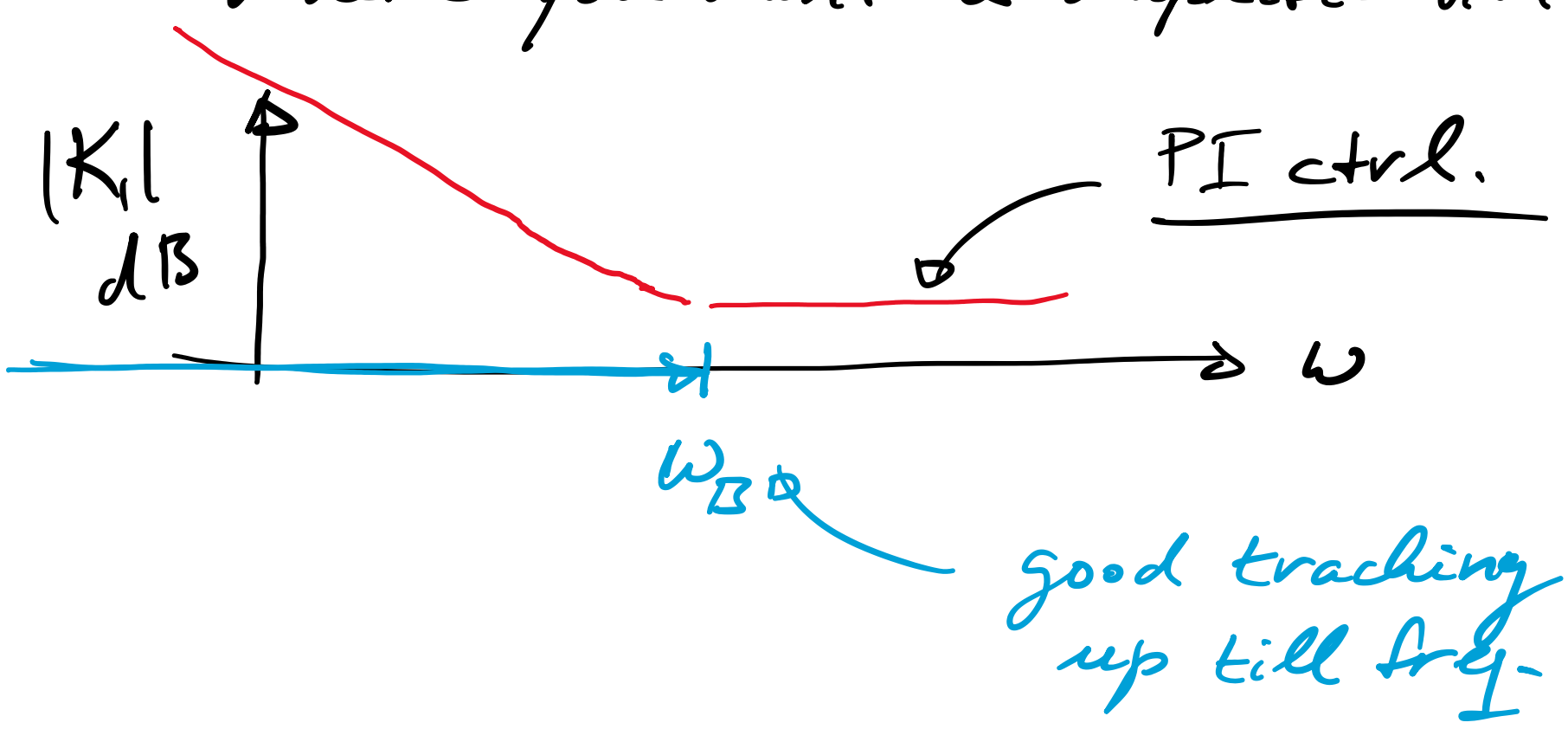
To relax condition $G \gg \alpha$, add another controller, K_1:



$$y = \frac{GK_1}{1 + GK_1 \frac{1}{\alpha}} r \qquad y \approx G r$$

$\Rightarrow$ now need $\left| \frac{GK_1}{\alpha} \right| \gg 1$ at freq. ← make this large in freq. range of interest.

where you want α amplification:



NOTE: CL stability ↓

need high gains ↑