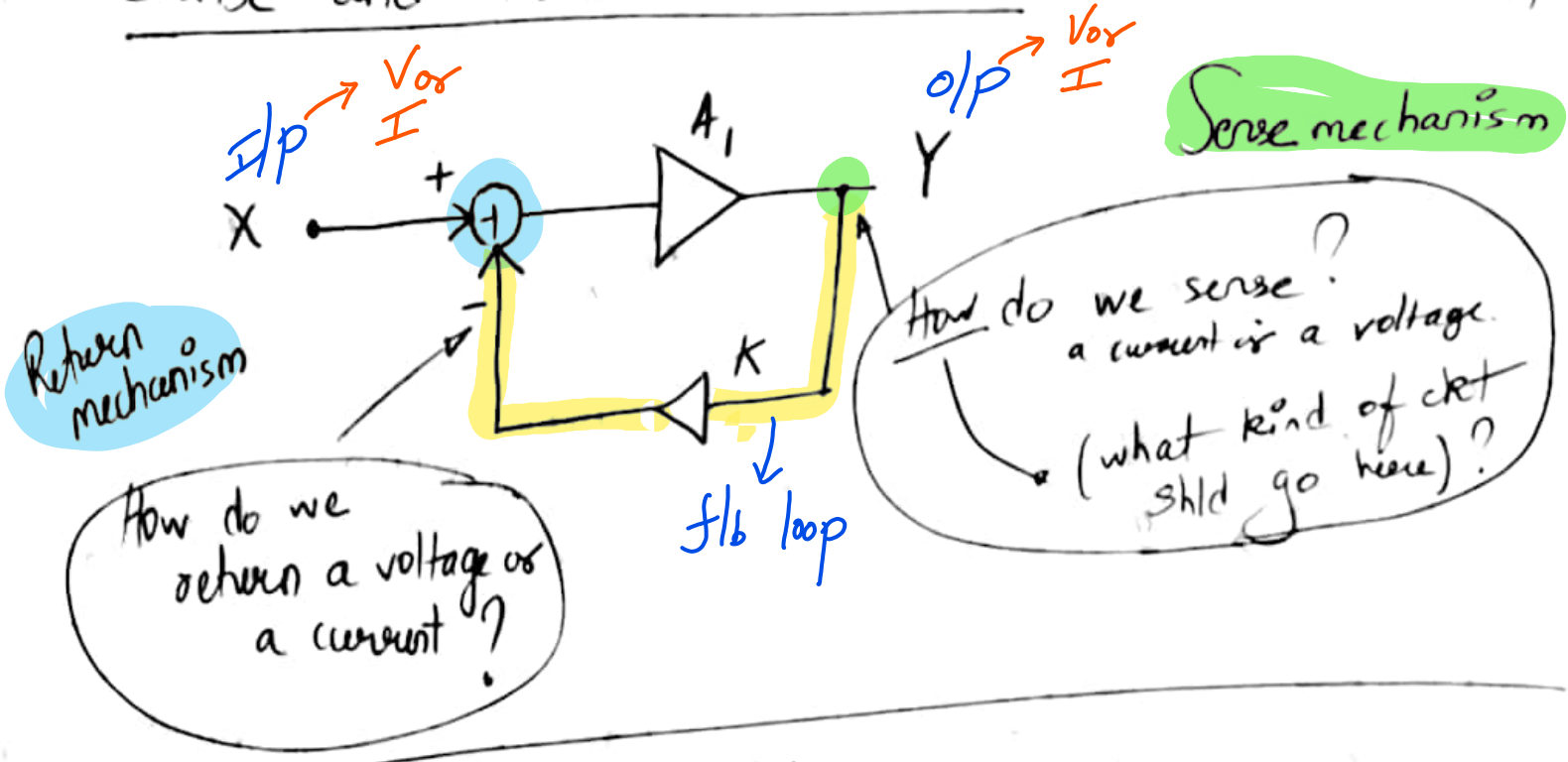
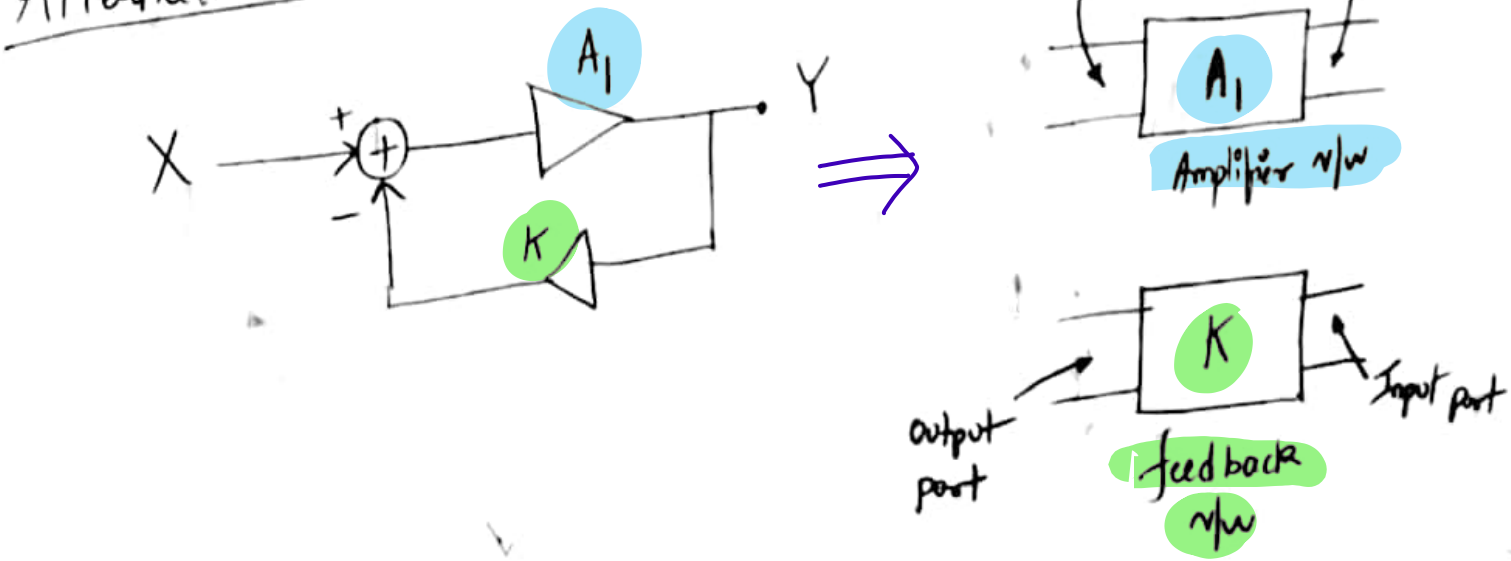
AEC 34.1 22/4/22

7. Sense and Return Mechanisms :-



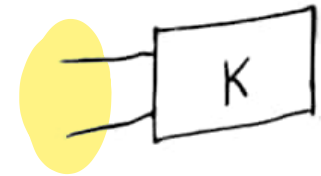
Alternative Feedback Model :-

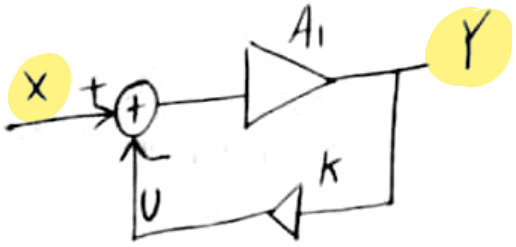


Scanned with CamScanner

Return mechanisms :

How to subtract two voltages or two currents. ?

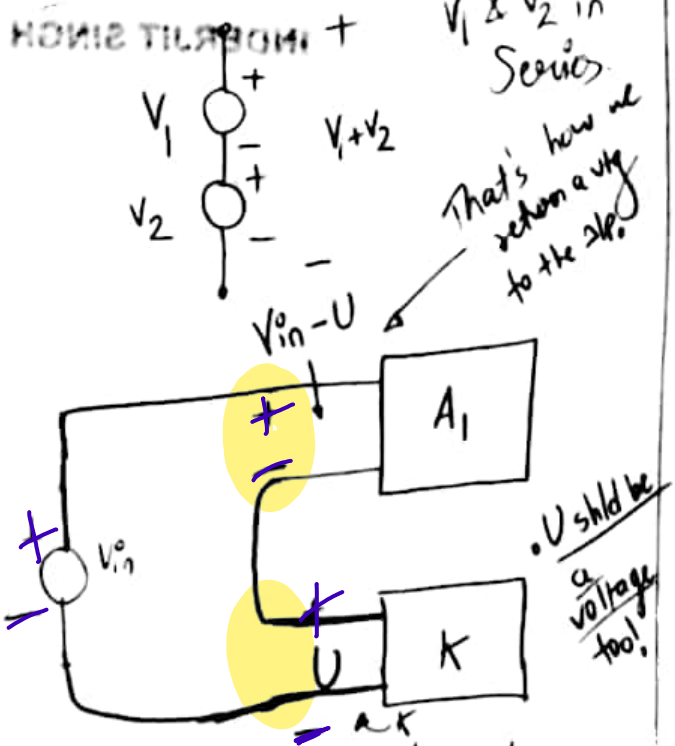




→ X & Y can be a vtg or a current

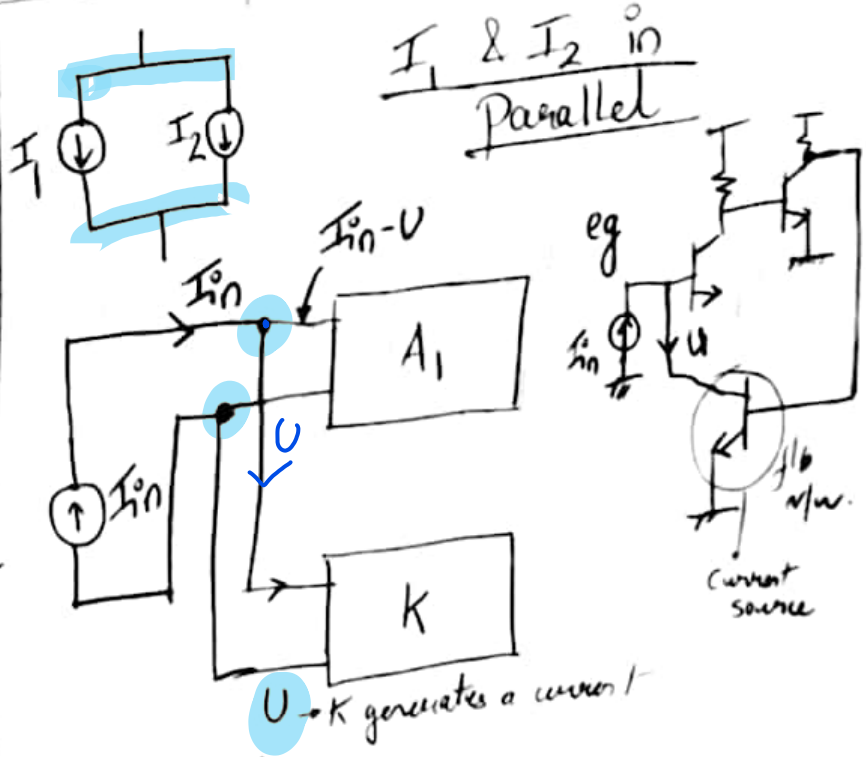
→ X & U should have same dimension

Voltage



→ That's how we built a subtractor at the i/p of a system.

Current



• U is a current

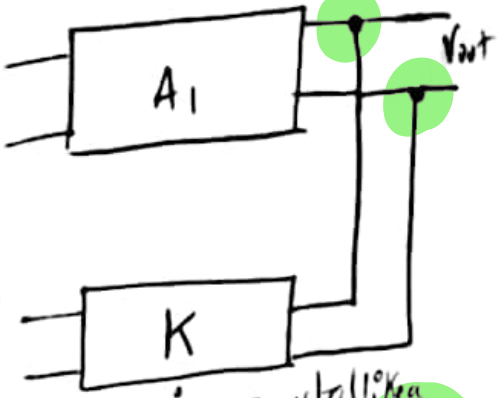
→ That's how we return a current to the i/p.

INDERJIT SINGH

Scanned with CamScanner

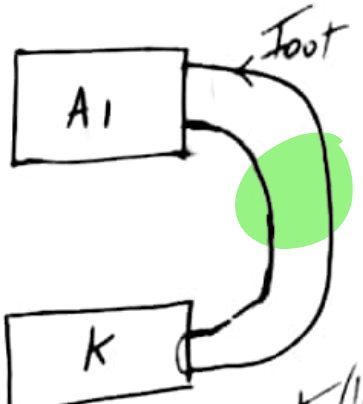
Review of Sense and Return mechanisms:-

Voltage



sensing a vtg (like a voltmeter)

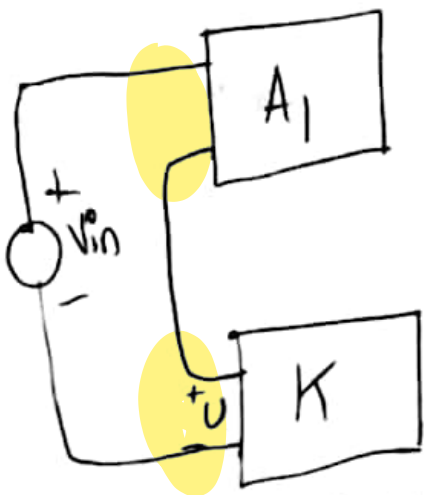
Current



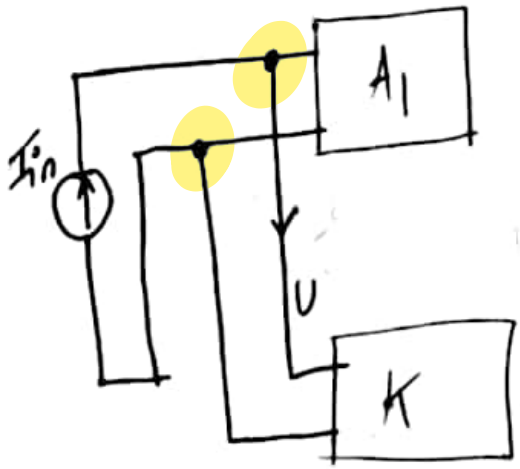
sensing a current (like a current meter)

Sense mechanism (Sampling)

- Voltage sampling
- current sampling



add two vtgs: Put them in series

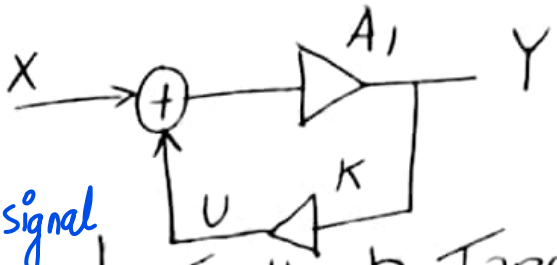


add two currents. Put them in parallel

Return mechanism (Mixing)

- Series mixing
- Shunt mixing

Scanned with CamScanner



I/p X	o/p Y	flb signal U	Feedback Topology
V	V	V	① Voltage-Voltage Feedback (what we sense at the o/p: output; what we return to i/p: input) ② (Shunt-Series feedback) ③ [Voltage-Series feedback]
I	V	I	Voltage-current Feedback (Shunt-shunt feedback) [Voltage-shunt feedback]
V	I	V	(current-voltage feedback (series-series feedback) [Current-series feedback]
I	I	I	(current-current feedback (series-shunt feedback) [Current-shunt feedback]

→ Why 4 flb Topologies ?

Negative flb gives us interesting & different features for these 4 flb topologies.

INDERJIT SINGH

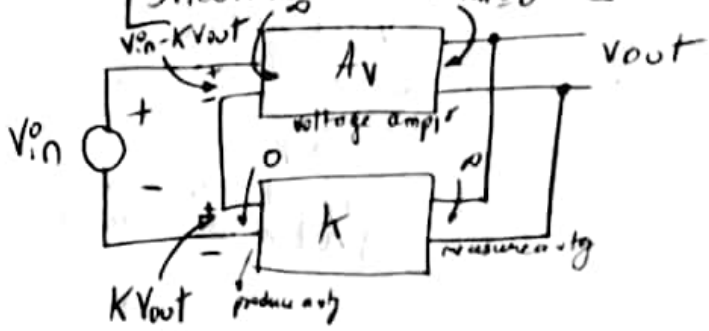
Scanned with CamScanner

Objective: To find the closed-loop gain (A_f) and the closed-loop input (R_{inf}) & o/p impedance (R_{outf}).

v. important

Analysis of Voltage-Voltage feedback :- (Voltage-series topology)

[shunt $R_{in}=\infty$, series $R_{out}=0$ flb]

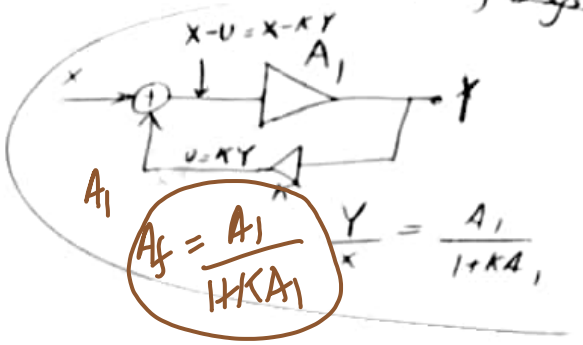


∞ & 0 ideal situation

A_v — open loop gain = A_v

closed loop gain = $\frac{V_{out}}{V_{in}}$

General flb system



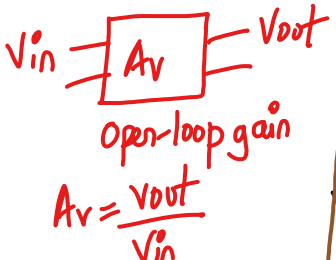
$$\rightarrow V_{out} = A_v(V_{in}-KV_{out})$$

$$V_{out} + A_vKV_{out} = A_vV_{in}$$

$$V_{out}(1+KA_v) = A_vV_{in}$$

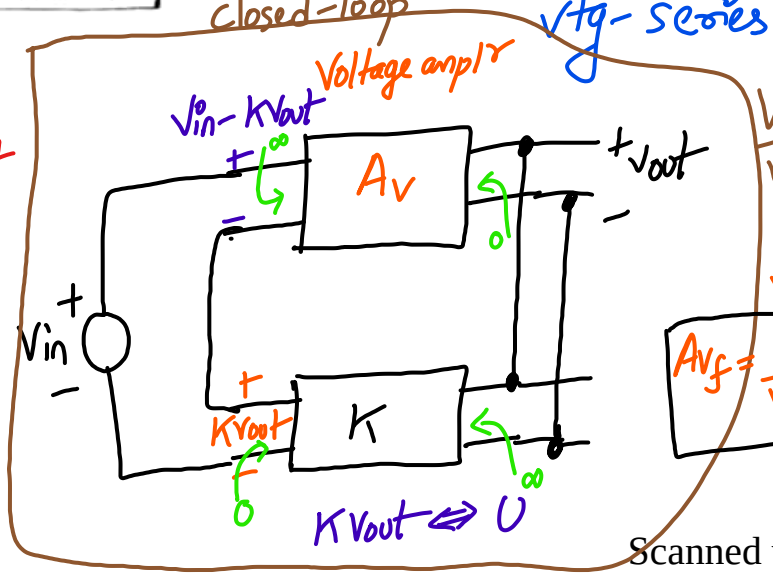
$$A_{vf} \rightarrow \boxed{\frac{V_{out}}{V_{in}} = \frac{A_v}{1+KA_v}}$$ → closed-loop gain

Closed-loop vtg-series flb topo



open-loop gain

$A_v = \frac{V_{out}}{V_{in}}$



$\frac{V_{out}}{V_{in}} = ?$

$\Rightarrow V_{out} = A_v[V_{in}-KV_{out}]$

$V_{out}(1+KA_v) = A_vV_{in}$

$$A_{vf} = \frac{V_{out}}{V_{in}} = \frac{A_v}{1+KA_v}$$

↳ closed-loop gain

Scanned with CamScanner