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Expt9

Q1. Measuring input offset voltage

Circuit diagram:

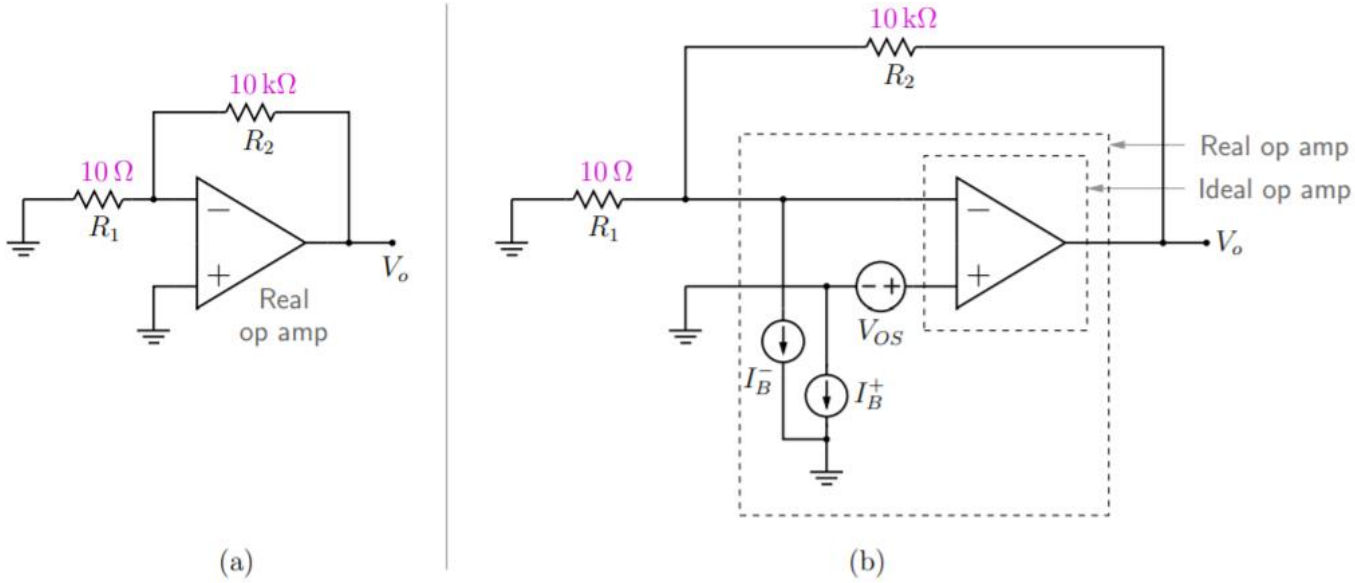

Figure 4: (a) Circuit for measurement of V_{OS}, (b) equivalent circuit.

Formula obtained:

$$V_{OS} = \frac{V_o}{1 + R_2/R_1} \approx \frac{V_o}{R_2/R_1}.$$

Q2. Measuring input bias current

Circuit diagrams:

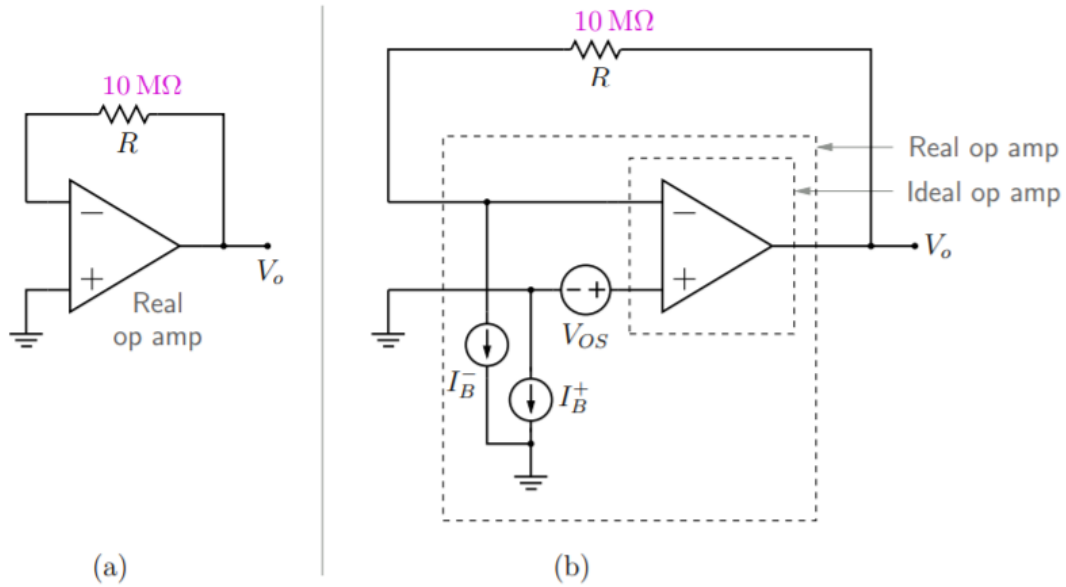

Figure 5: (a) Circuit for measurement of I_B^-, (b) equivalent circuit.

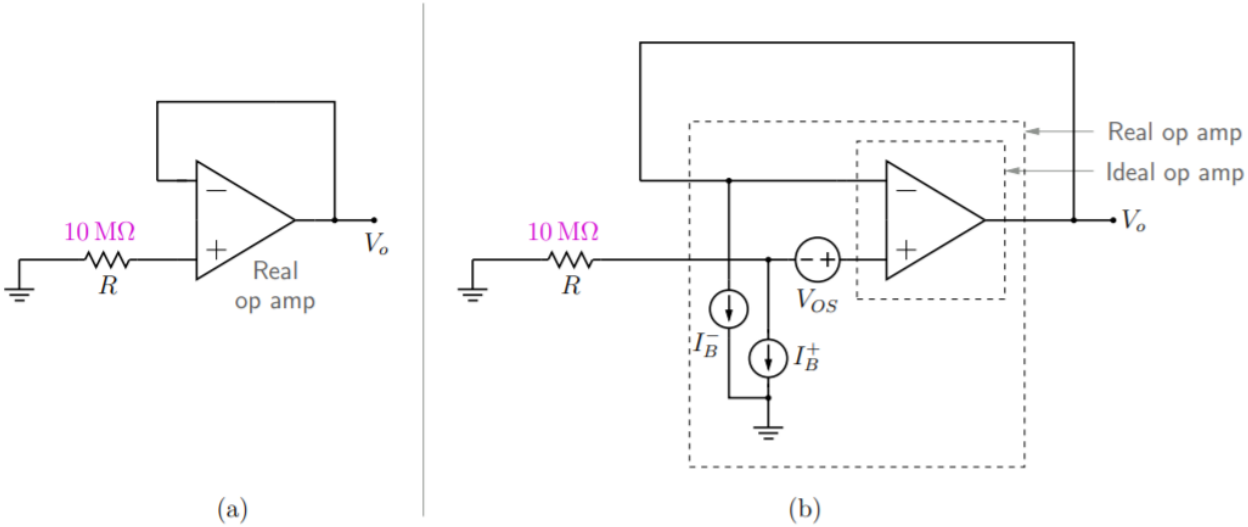

Figure 6: (a) Circuit for measurement of I_B^+, (b) equivalent circuit.

Formulae obtained:

$$I_B^- = V_o/R\,.$$

$$I_B^+ = V_o/R\,.$$

Learnings:

The idea of inverting/non-inverting amplifiers is used perfectly to magnify the effect of exactly one imperfection, so that it can be measured.

Q3. Measuring DC open loop gain

Circuit diagram:

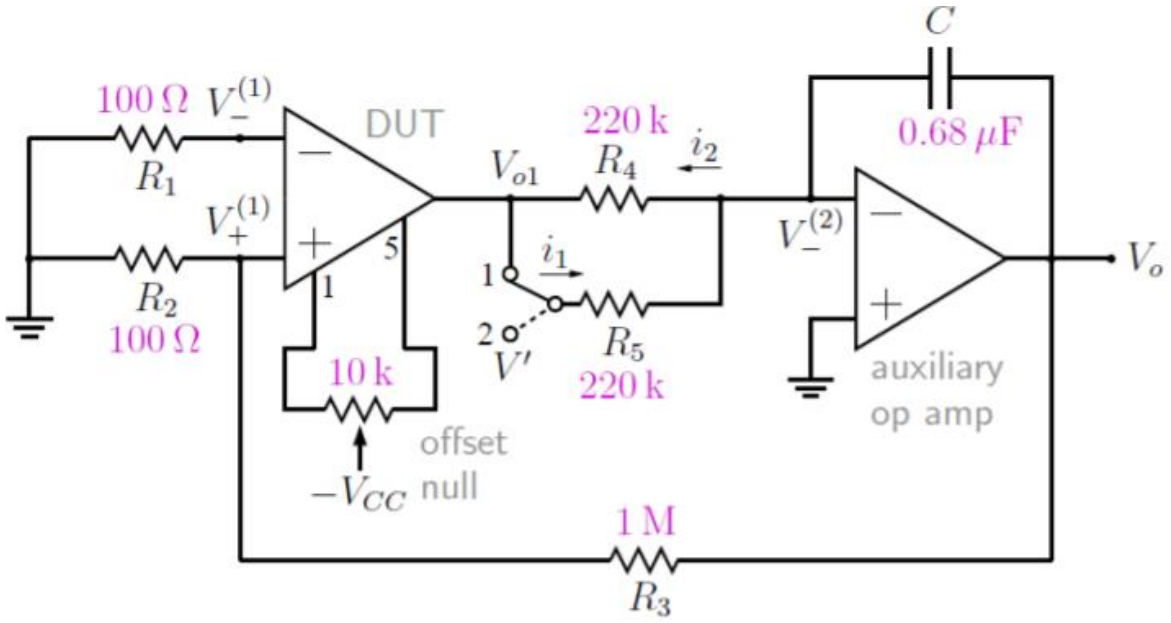

Figure 8: Measurement of DC open-loop gain A_{OL}.

Formula for open loop gain:
A_ol = (Vo1/Vo) * (R3 / R2)

Learnings:
The opamp is kept in linear region via the feedback loop, and then open loop gain measurement becomes straightforward. A_ol = Vo1/V+(1)

Q4. Comparison of DC parameters

Parameter	uA741	LM324	TL084
Input Offset Voltage	1mV	3mV	3mV
Input Bias Current	80nA	20nA	20pA
Input Offset Current	20nA	2nA	5pA
DC Open Loop Gain	200 V/mV	100 V/mV	200 V/mV