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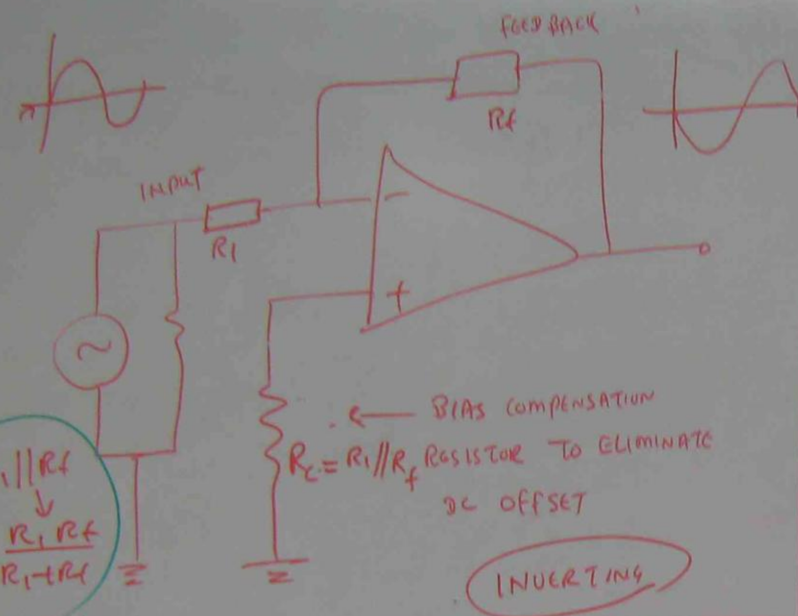
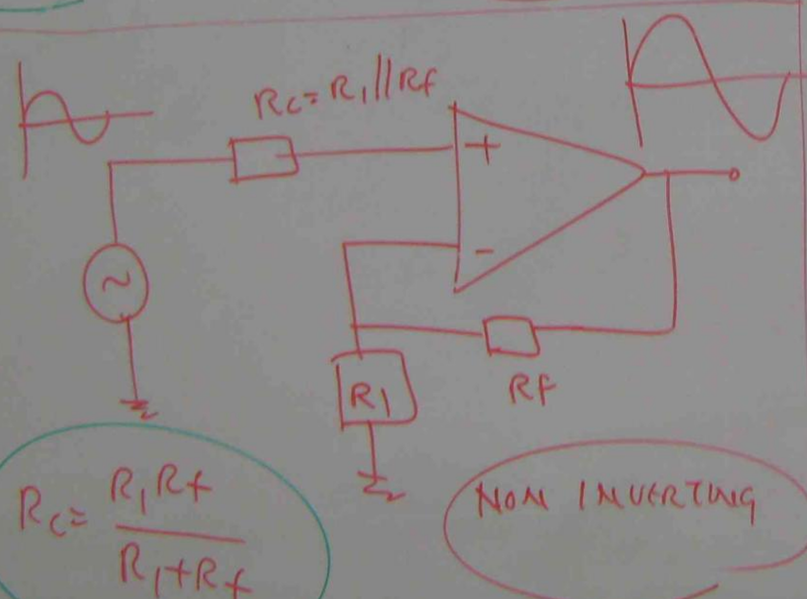


$R_1 || R_f$

$R_c = \frac{R_1 R_f}{R_1 + R_f}$



$R_c = \frac{R_1 R_f}{R_1 + R_f}$

DRIFT IN OUT PUT DC OFF SET DUE TO CHANGE IN TEMPERATURE

DUE TO TEMPERATURE CHANGE, THE OPERATION CHARACTERISTICS OF TRANSISTORS IN OP-AMP ARE CHANGED CAUSING OFF SET DC VOLTAGE.

DUE TO OFF SET, OUT PUT DC MAGNITUDE DRIFTS.

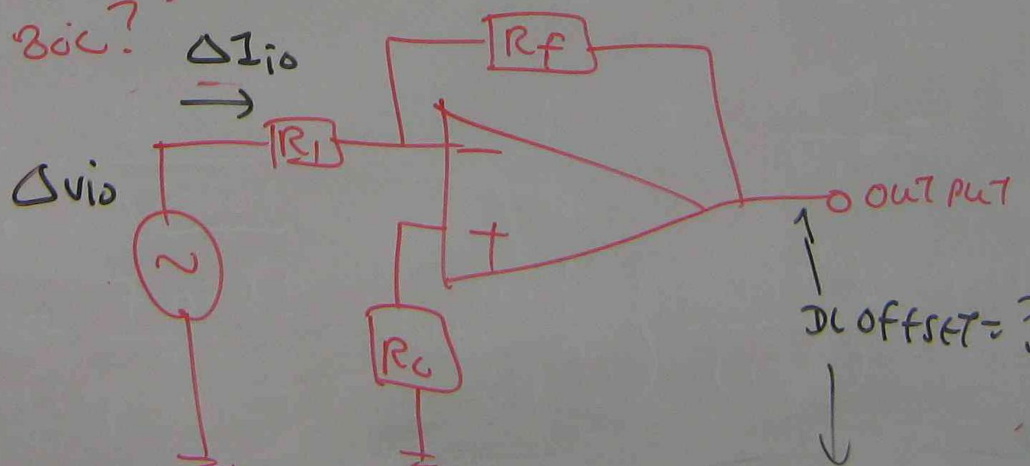
CHANGE IN INPUT VOLTAGE

ΔV_{io} = INPUT OFFSET VOLTAGE $\times (T_2 - T_1)$

(mV) $\mu V/^{\circ}C$

CHANGE IN INPUT CURRENT (nA) ΔI_{io} = INPUT OFFSET CURRENT (pA/°C) $\times (T_2 - T_1)$

Pb/ A BIASED COMPENSATED AMPLIFIER HAS $R_F = 100\,k\Omega$ AND $R_1 = 1600\,\Omega$. THE MAXIMUM DRIFT IN INPUT OFFSET VOLTAGE IS 30 μV/°C AND THE MAXIMUM DRIFT IN INPUT OFFSET CURRENT IS 300 pA/°C. IF THE CIRCUIT IS NULLED AT 20°C, WHAT IS THE WORST CASE OUTPUT DC OFFSET VOLTAGE AT 30°C?



$\Delta V_{io} = \underset{\text{VOLTAGE}}{\text{INPUT OFFSET}} (T_2 - T_1)$

$= 30 \mu V/^\circ C \, (80 - 20)$

$= 30 \times 60 = 1800 \mu V = 1.8 mV$

$\Delta I_{io} = \underset{\text{CURRENT}}{\text{INPUT OFFSET}} (T_2 - T_1)$

$= 300 pA/^\circ C \, (80 - 20)$

$= 300 pA \times 60$

$= 18000 pA = 18 nA$

$1 pA/^\circ C = 10^{-12} A/^\circ C$

$$\boxed{\text{WORST CASE OUTPUT DC OFFSET} = \Delta V_{IO} \times \left(1 + \frac{R_f}{R_1}\right) + \Delta I_{IO} \times R_f}$$

$$\text{WORST DC OFFSET} = 1.8 \times 10^{-3} \times \left(1 + \frac{100 \times 10^{3}}{1600}\right) + 18 \times 10^{-9} \times 100 \times 10^{3}$$

$$= 0.116\ V$$

POWER SUPPLY REJECTION RATIO (PSRR)

V_{io} FOR 1 V CHANGE IN SUPPLY VOLTAGE

VOLTAGE DRIFT

$dB = 10 \log_{10} V$

Pb IN ABOVE PROBLEM, THE OP-AMP HAS PSRR OF 95 dB.

IF THE SUPPLY VOLTAGE CHANGES BY 2V, WHAT WILL BE THE CHANGE IN OUTPUT DC VOLTAGE.

CHANGE IN OUTPUT DC VOLTAGE = CHANGE IN $V_{io} \times \left(1 + \frac{R_f}{R_1}\right)$

$$\Delta V_{out} = \frac{\text{SUPPLY VOLTAGE CHANGE}}{\log^{-1} \frac{PSRR(dB)}{20}} \times \left(1 + \frac{R_f}{R_1}\right)$$

$$\Delta V_{out} = \frac{2}{\log^{-1} \frac{95}{20}} \times \left(1 + \frac{100 \times 10^3}{1600}\right)$$

$$\Delta V_{OUT} = \frac{2}{\log^{-1} 4.75} \times 63.5$$

$$= \frac{2}{10^{4.75}} \times 63.5$$

$\boxed{10}$ $\boxed{x^y}$ $\boxed{4.75}$ $= 56234$

$$= \frac{2}{56234} \times 63.5$$

$$= 2.25 \times 10^{-3}\,V = 2.25\,mV$$