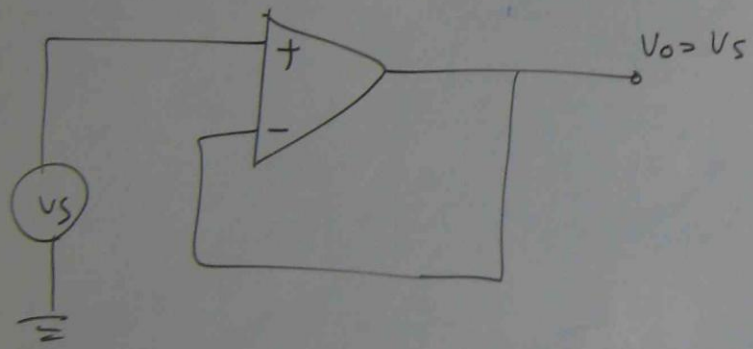
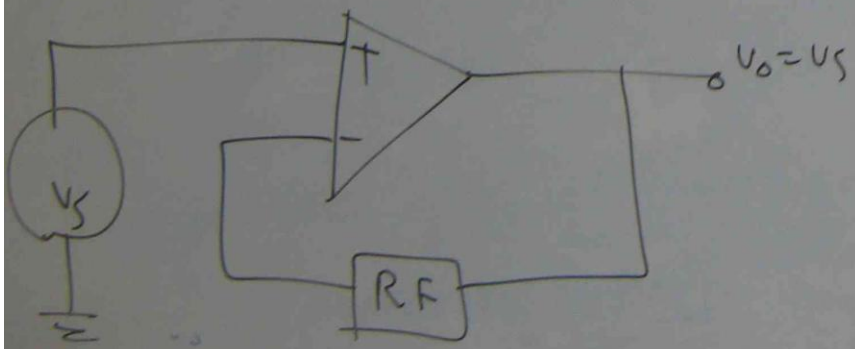
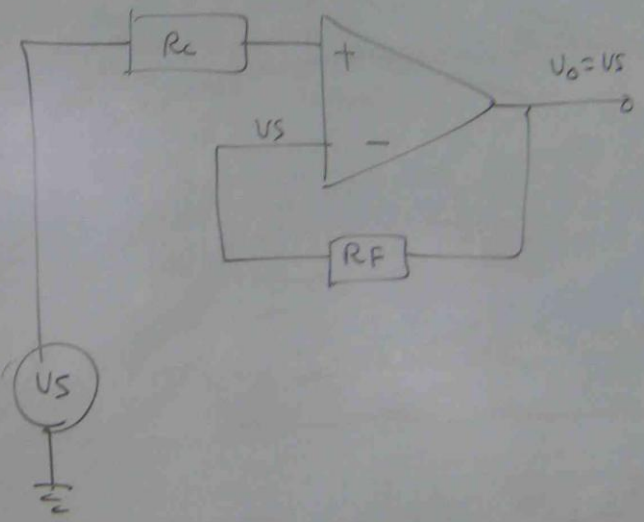
ANALOGUE AMPLIFIER CONFIGURATION

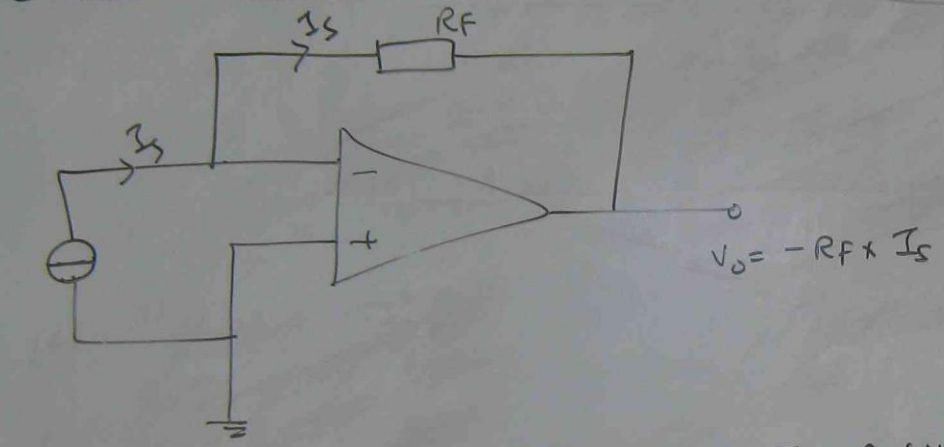
VOLTAGE FOLLOWER



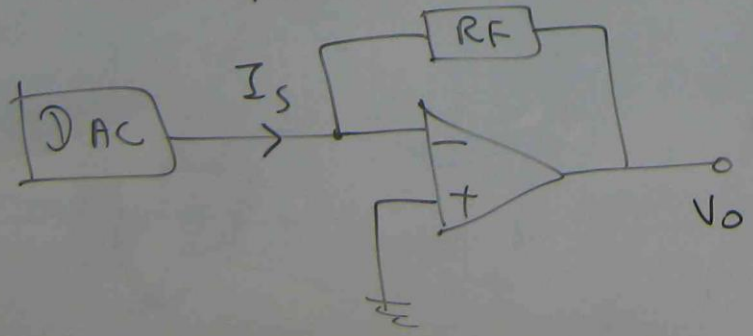




CURRENT TO VOLTAGE CONVERTER (TRANSRESISTANCE AMPLIFIER)



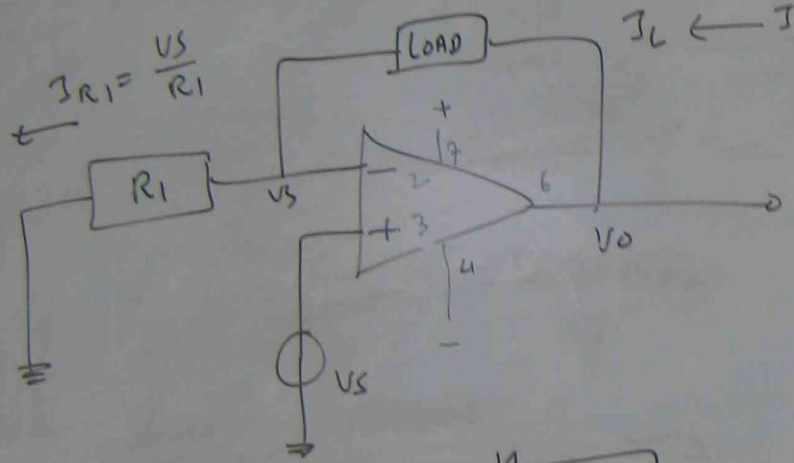
pb IN THE FOLLOWING CIRCUIT, THE D TO A CONVERTER GIVES AN OUT PUT CURRENT IN THE RANGE 0 TO 1.992 mA. SELECT R_f TO GIVE OUT PUT VOLTAGE RANGE 0 TO 5V



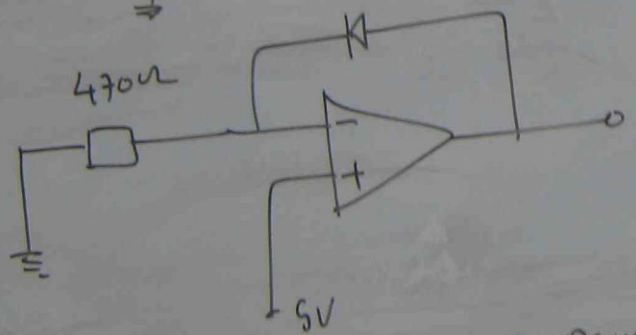
$$R_F = \frac{V_o}{I_S} = \frac{5}{1.992 \times 10^{-3}}$$

$$= 2.51 k\Omega$$

VOLTAGE TO CURRENT CONVERTER (TRANSCONDUCTANCE AMPLIFIER)



pb



(a) IS THE DIODE FORWARD BIAS OR REVERSE BIASED

(b) CALCULATE DIODE CURRENT

(c) CALCULATE OUT PUT VOLTAGE IF DIODE DROP IS 650mV

(a) DIODE IS FORWARD BIASED

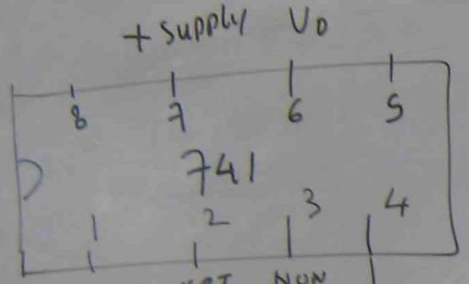
(b) DIODE CURRENT $= \frac{5V}{470\Omega} = 10.63\ mA$

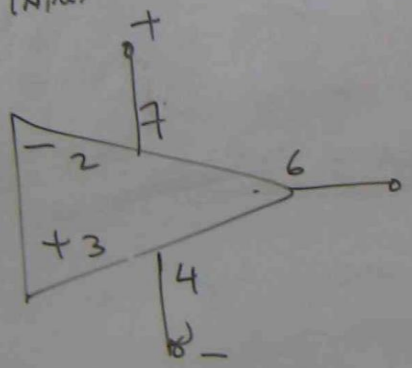
(c) OUTPUT VOLTAGE = 5V + DIODE DROP

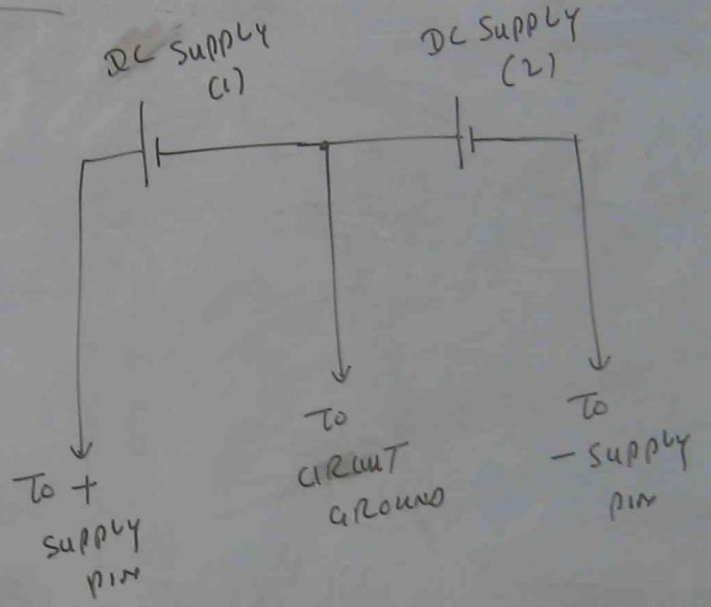
$= 5 + 650 \times 10^{-3}$

$= 5.65\ V$

POWER SUPPLY CONNECTION FOR OP AMPS







Summary

THE IDEAL OP-AMP HAS INFINITE GAIN, INFINITE INPUT RESISTANCE AND ZERO OUT PUT RESISTANCE.

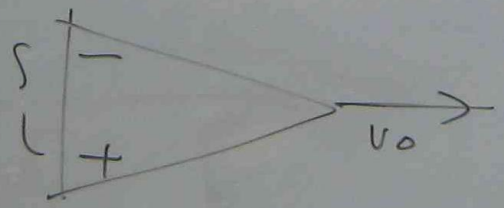
IN INVERTING AMPLIFIER, THE INPUT SIGNAL IS CONNECTED TO – INPUT.

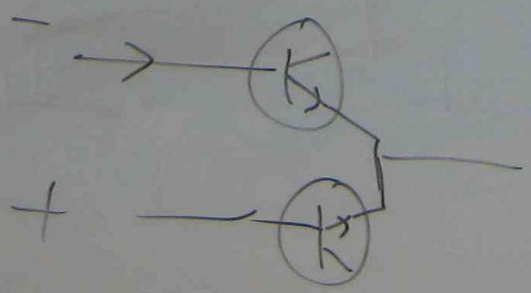
IN VOLTAGE FOLLOWER, THE SIGNAL IS CONNECTED TO + INPUT.

INPUT OFFSET VOLTAGE

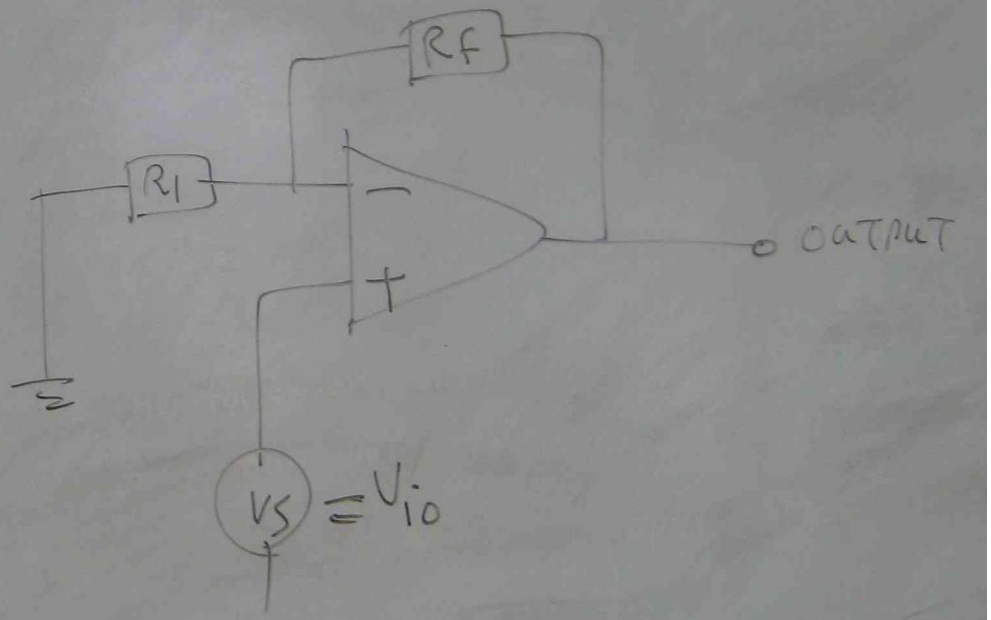
INPUT OFFSET VOLTAGE (V_{IO})

IF WE CONNECT AN OP-AMP AS A VOLTAGE FOLLOWER AND GROUND THE INPUT, WE WOULD EXPECT ZERO OUTPUT VOLTAGE. BUT PRACTICALLY THERE WOULD BE A SMALL DC OUTPUT VOLTAGE. THIS IS CALLED INPUT OFFSET VOLTAGE.





THE DC OUTPUT VOLTAGE DUE TO INPUT OFFSET VOLTAGE $= V_{io}\left(1 + \frac{R_F}{R_1}\right)$



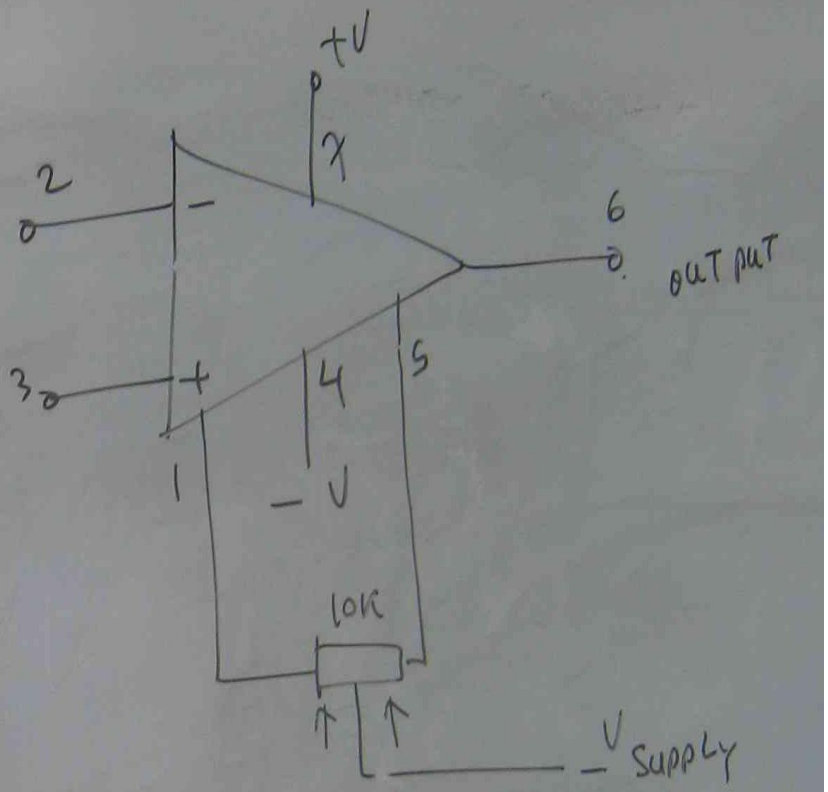
V_{io} = INPUT OFFSET VOLTAGE

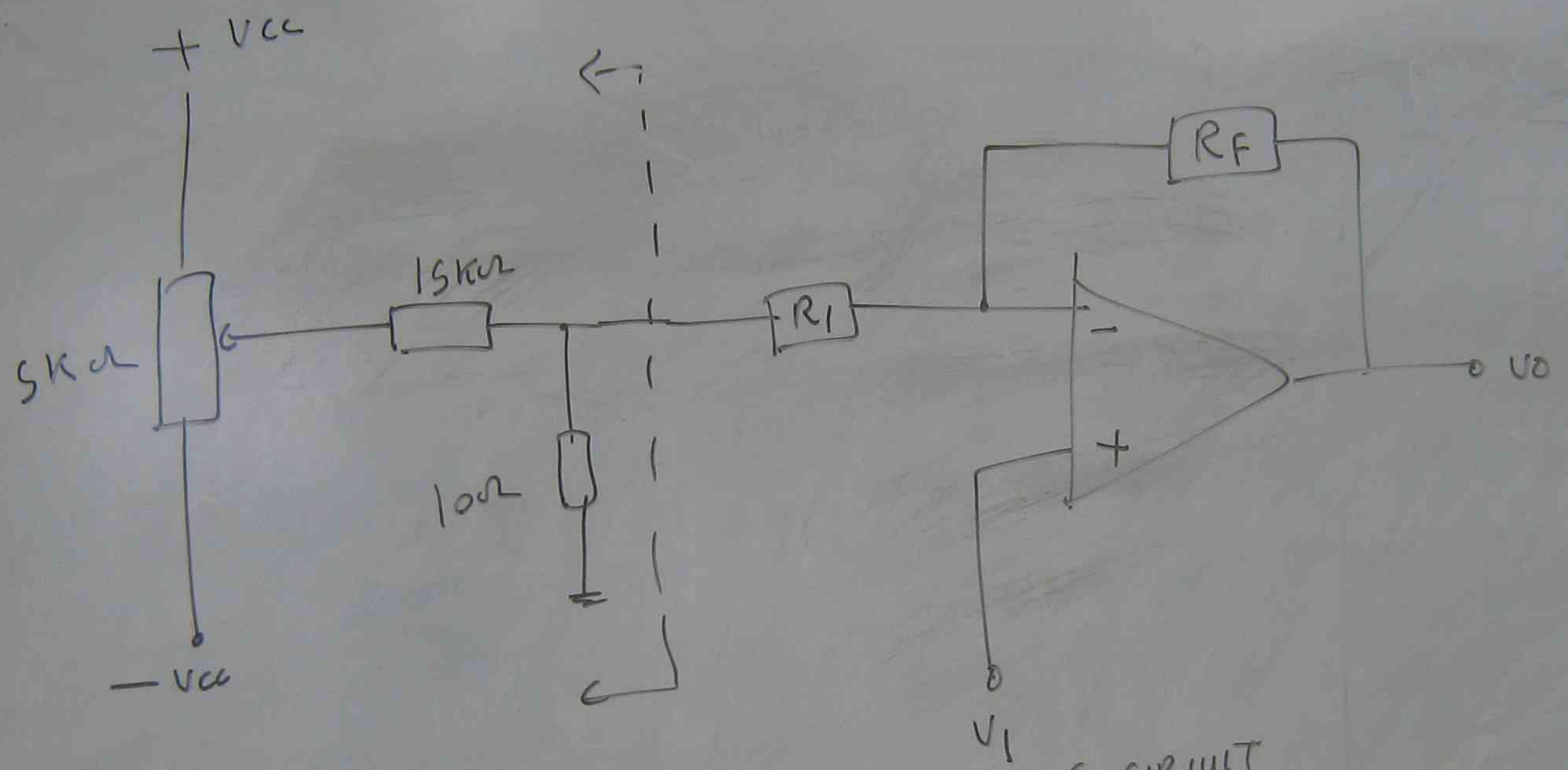
R_F = NEGATIVE FEED BACK RESISTOR

R_1 = TOTAL RESISTANCE FROM INVERTING INPUT TO GROUND.

REDUCING THE EFFECT of INPUT OFF SET VOLTAGE

- CHOOSE HIGH QUALITY Op-Amp WITH Low V_{io}
- WORK WITH AC SIGNAL RATHER THAN DC
- USE OFF SET NULLING CIRCUIT.





UNIVERSAL OFFSET NULLING CIRCUIT

BIAS CURRENT COMPENSATION