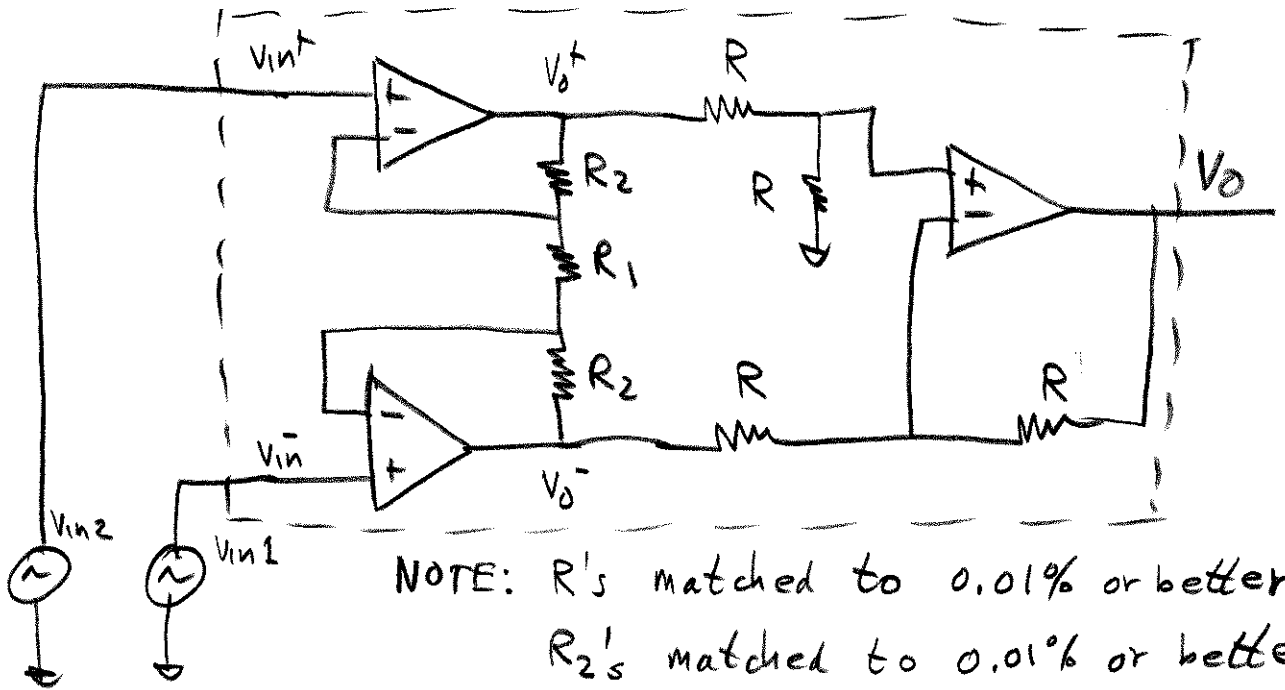


# INSTRUMENTATION AMPLIFIER



NOTE: R's matched to 0.01% or better  
R<sub>2</sub>'s matched to 0.01% or better

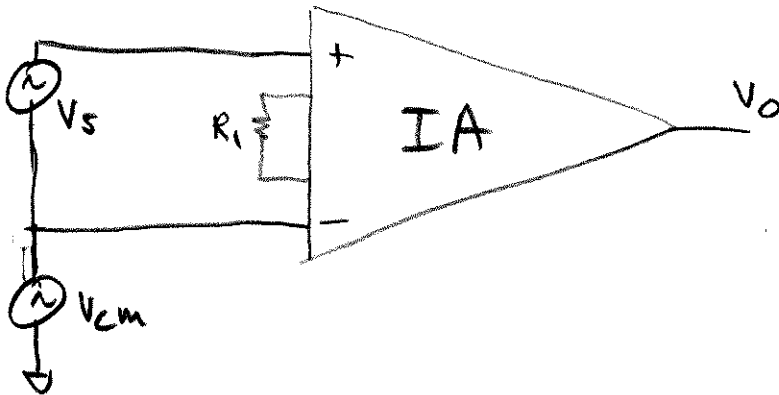
USING SUPERPOSITION:

$$V_0^+ = V_{in2} \left(1 + \frac{R_2}{R_1}\right) - V_{in1} \frac{R_2}{R_1}$$

$$V_0^- = V_{in1} \left(1 + \frac{R_2}{R_1}\right) - V_{in2} \frac{R_2}{R_1}$$

$$V_0 = V_0^+ - V_0^- = (V_{in2} - V_{in1}) \left(1 + \frac{2R_2}{R_1}\right)$$

TYPICAL APPLICATION



$$V_{in}^+ = V_s + V_{cm}$$

$$V_{in}^- = V_{cm}$$

$$V_o^+ = (V_s + V_{cm}) \left(1 + \frac{R_2}{R_1}\right) - V_{cm} \frac{R_2}{R_1}$$

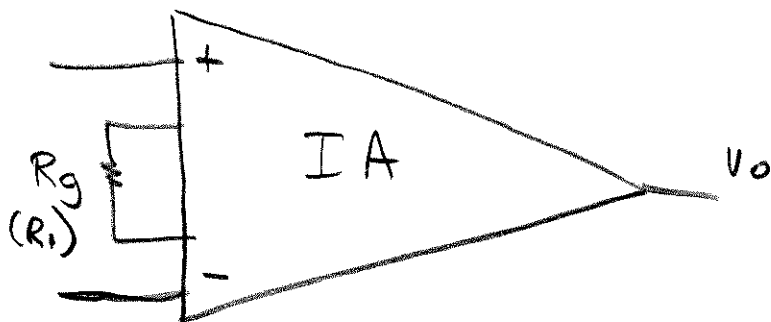
$$= V_s \left(1 + \frac{R_2}{R_1}\right) + V_{cm}$$

$$V_o^- = V_{cm} \left(1 + \frac{R_2}{R_1}\right) - (V_s + V_{cm}) \frac{R_2}{R_1}$$

$$= -V_s \frac{R_2}{R_1} + V_{cm}$$

$$V_o = V_{in}^+ - V_{in}^- = V_s \left(1 + \frac{2R_2}{R_1}\right) + 0$$

NOTE:  $V_{cm}$  IS NOT AMPLIFIED!!



ALL INTERNAL RESISTORS ARE LASER TRIMMED TO WITHIN 0.01% AT FACTORY. USER ONLY PROVIDES ONE RESISTOR,  $R_g$  ( $R_i$ ). INTERNAL VALUE OF  $R_2$  IS GIVEN ON DATA SHEET.

$R_2$  TYPICALLY IS 50K OR 100K.

$$\text{GAIN} = 1 + \frac{2R_2}{R_G}$$

$$R_G = \frac{2R_2}{\text{GAIN} - 1}$$