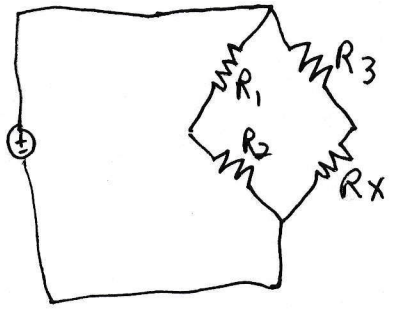
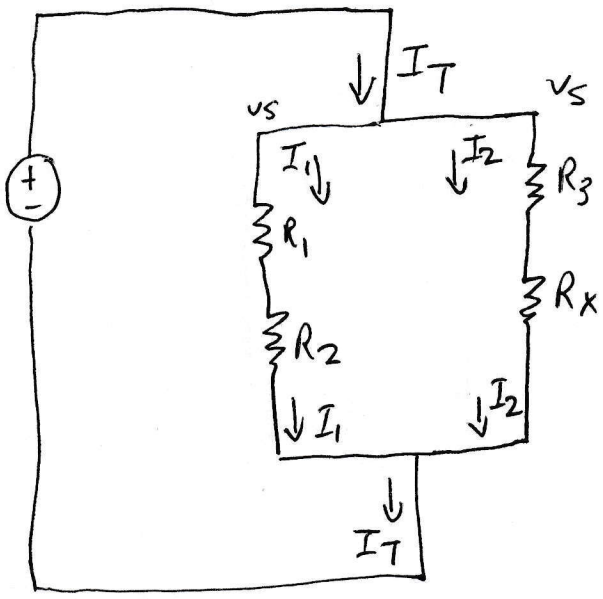
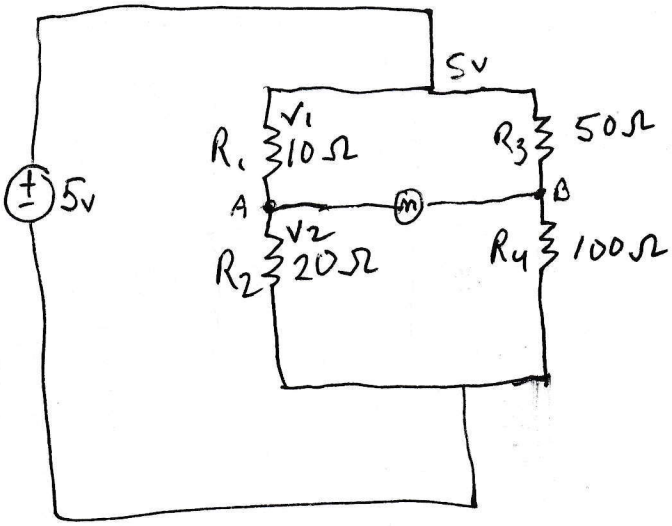
Wheatstone Bridge







Ohms LAW

$V = IR$

1:2 ratio

$R_1 = \frac{10\Omega}{20\Omega} = \frac{1}{2}$

$R_2 =$

$R_3 = \frac{50}{100} = \frac{1}{2}$

$R_4 =$

$$V_1 = \frac{R_1}{R_1 + R_2} \cdot V_S = \frac{10\Omega}{10\Omega + 20\Omega} = \frac{10\Omega}{30\Omega} = \frac{1}{3} \cdot V_S = \frac{1}{3} \cdot 5V = 1.67V$$

1.67 × 2 = 3.34

$$V_2 = \frac{R_2}{R_1 + R_2} \cdot V_S = \frac{20\Omega}{10\Omega + 20\Omega} = \frac{20\Omega}{30\Omega} \cdot V_S = \frac{2}{3}(5V) = 3.33V$$

$$V_3 = \frac{R_3}{R_3 + R_4} \cdot V_S = \frac{50}{50 + 100} = \frac{50}{150} \cdot V_S = \frac{5}{15} \cdot V_S = \frac{1}{3} \cdot V_S = 1.67V$$

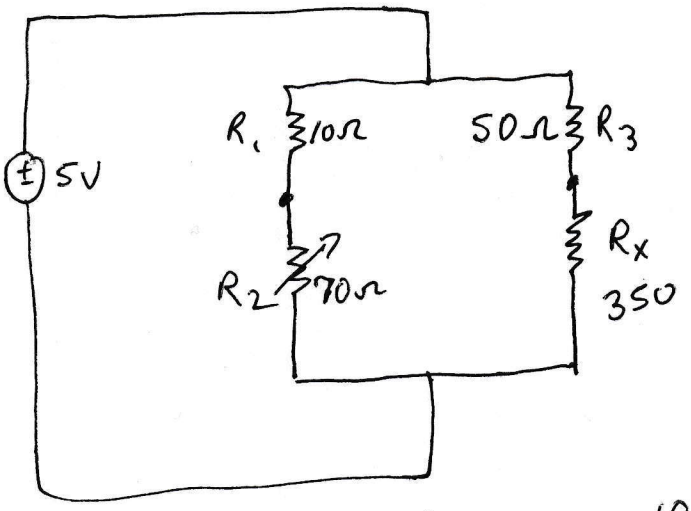
$$V_4 = \frac{R_4}{R_3 + R_4} \cdot V_S = \frac{100}{50 + 100} = \frac{100}{150} = \frac{10}{15} \cdot V_S = \frac{2}{3} \cdot V_S = 3.33V$$

$V_A = 3.33V$

$V_B = 3.33V$

$V_A - V_B = 0V$

Wheatstone Bridge



$$\frac{R_1}{R_2} = \frac{10}{70} = \frac{50}{R_x} \cdot \frac{R_3}{R_x}$$

$$\frac{10}{70} = \frac{50}{350} = \frac{1}{7} = \frac{5}{35} = \frac{1}{7}$$

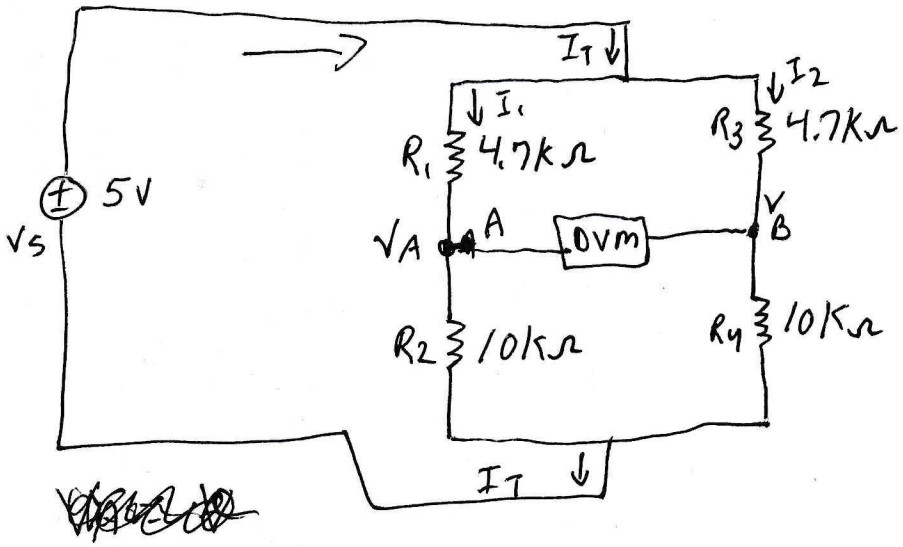
$$\frac{1}{7} = \frac{1}{7}$$

When a Bridge is Balanced. Ration is the same.

$$\boxed{\frac{R_1}{R_2} = \frac{R_3}{R_x}}$$

$$R_x = \frac{R_2}{R_1} \cdot R_3 = \frac{R_2 \cdot R_3}{R_1} = \frac{70}{10} \cdot 50 = \frac{3500}{10} = 350\Omega$$

In the Lab



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$$V_A = 5v \cdot \frac{10{,}000\Omega}{14{,}700\Omega} = 3.40V, \quad V_A = V_S \cdot \left(\frac{R_2}{R_1+R_2}\right)$$

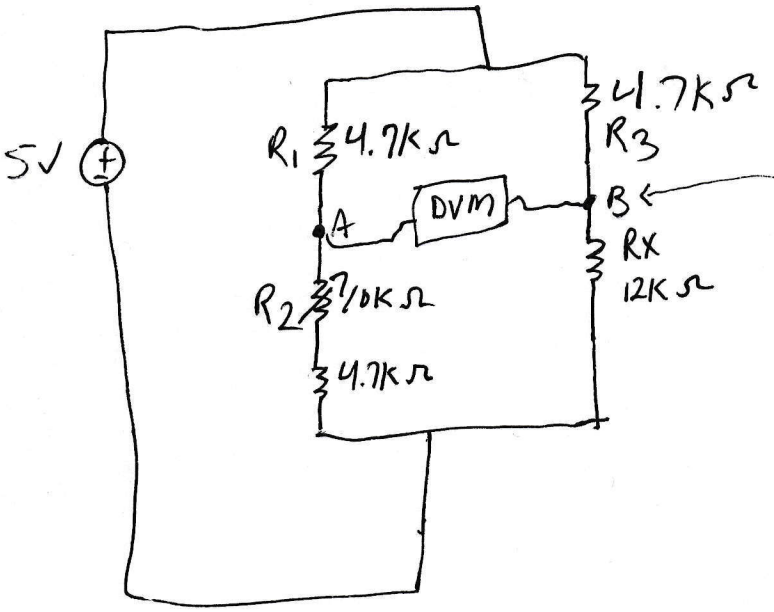
$$V_B = 5 \cdot \frac{10{,}000\Omega}{14{,}700\Omega} = 3.40V, \quad V_B = V_S \cdot \left(\frac{R_4}{R_3+R_4}\right)$$

$$V_{R_1} = V_S \cdot \frac{R_1}{R_1+R_2} = 1.6V$$

$$V_{R_2} = V_S \cdot \frac{R_2}{R_1+R_2} = 3.40V$$

$$V_{R_3} = V_S \cdot \frac{R_3}{R_3+R_4} = 1.6V$$

$$V_{R_4} = V_S \cdot \frac{R_4}{R_3+R_1} = 3.40V$$



0V means balanced

Encouraging Bible Verse:

John 3:16

"For God so loved the world, that he gave his only begotten Son, that whosoever believeth in him should not perish, but have everlasting life."