Basic Elec. Engr. Lab

ECS 204

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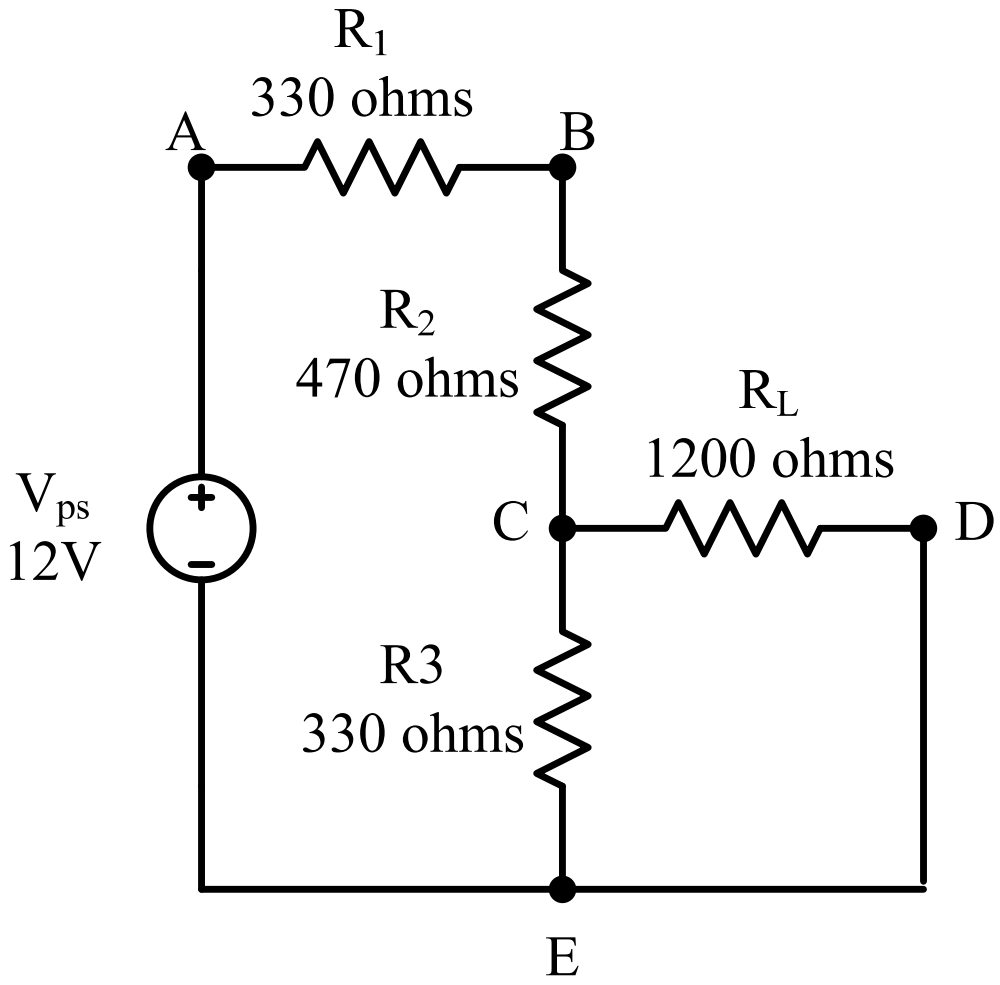
Lab 2

- Thevenin's and Norton's Theorems
- New toy: Potentiometer
- Building a "fake" current source

Lab 2: Circuit under consideration

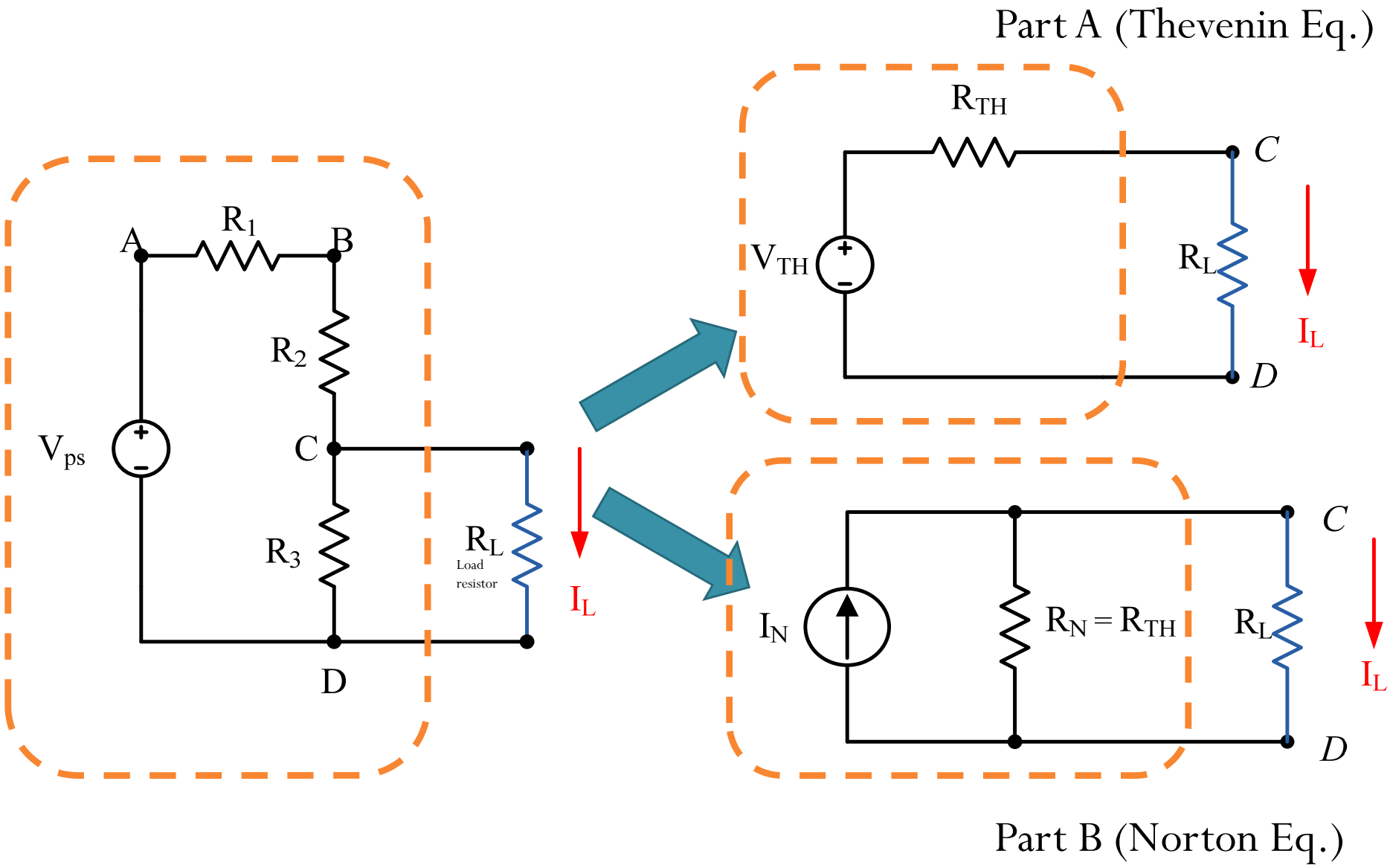


Direct measurement of I_L

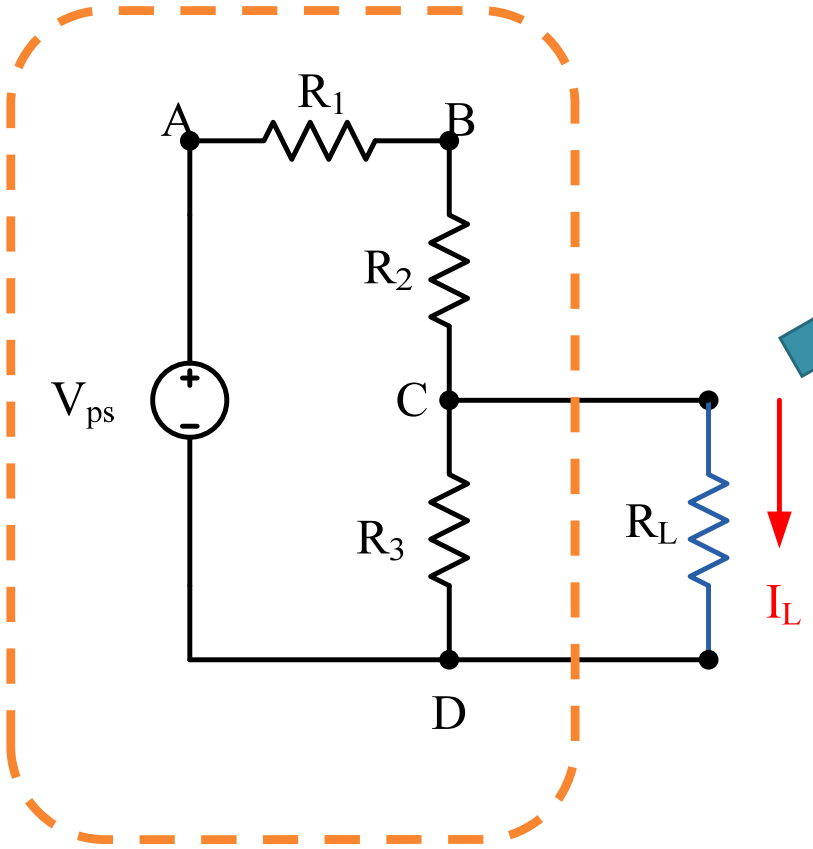
(A.4)

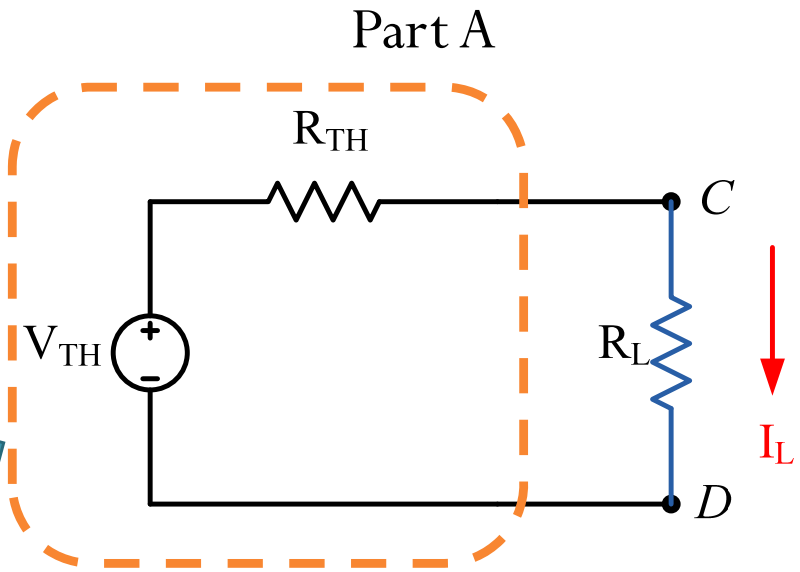
I_L

Outline of the lab



Part A: Thevenin Equivalent (1)





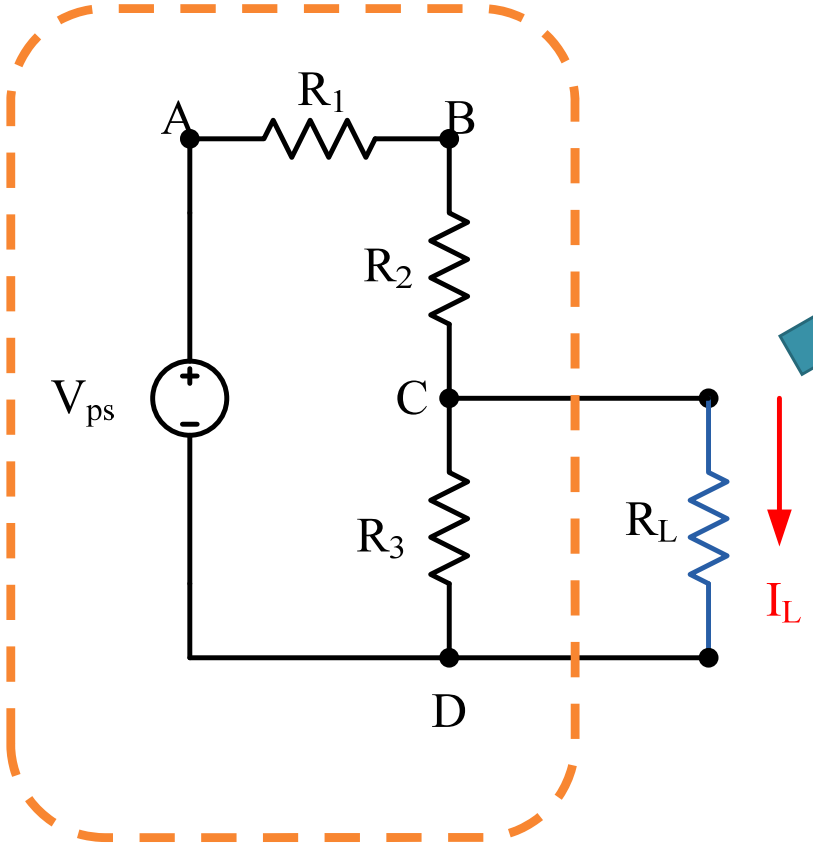
voltage divider

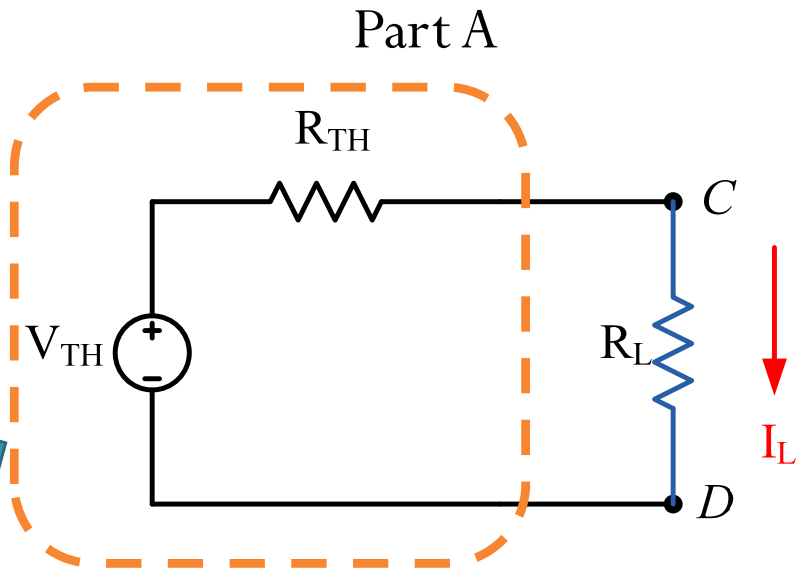
$$V_{TH} = \frac{R_3}{R_1 + R_2 + R_3} V_{ps} \qquad (A.12)$$

$$R_{TH} = R_3 // \left(R_1 + R_2 \right) \qquad (A.13)$$

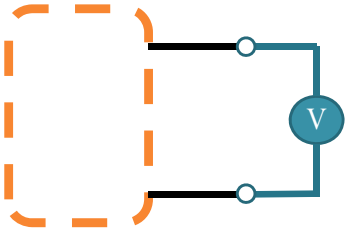
$$I_L = \frac{V_{TH}}{R_{TH} + R_L} \qquad (A.14)$$

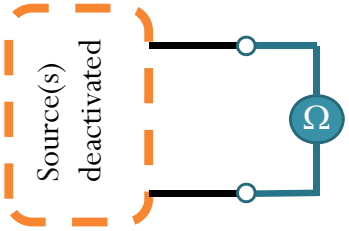
Part A: Thevenin Equivalent (2)





Directly measure V_{TH} (A.5) and R_{TH} (A.8)





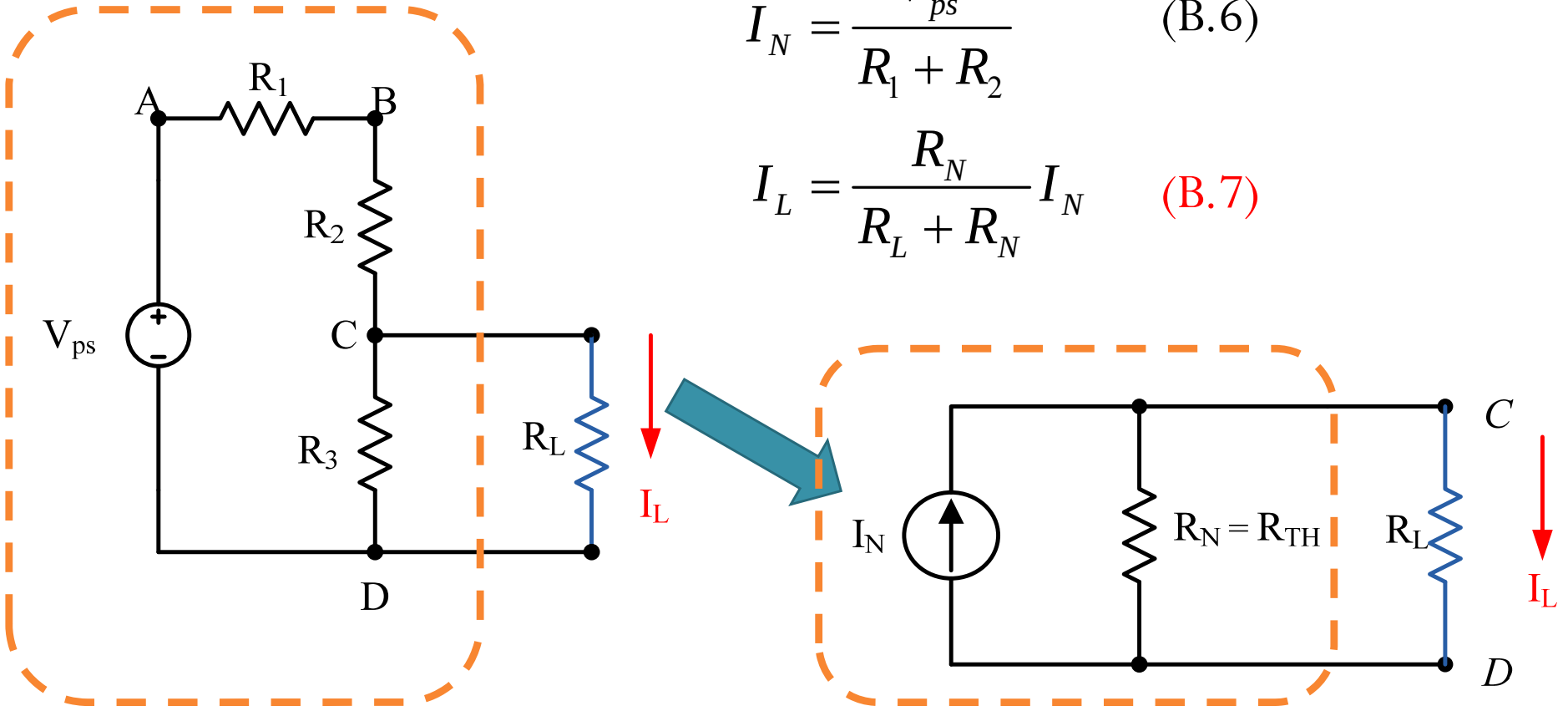
Build (Thevenin) equivalent circuit to measure I_L (A.11)

Part B: Norton Equivalent (1)

$$R_N = R_{TH}$$

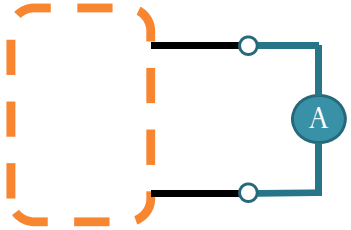
$$I_N = \frac{V_{ps}}{R_1 + R_2} \qquad \text{(B.6)}$$

$$I_L = \frac{R_N}{R_L + R_N} I_N \qquad \text{(B.7)}$$



Part B

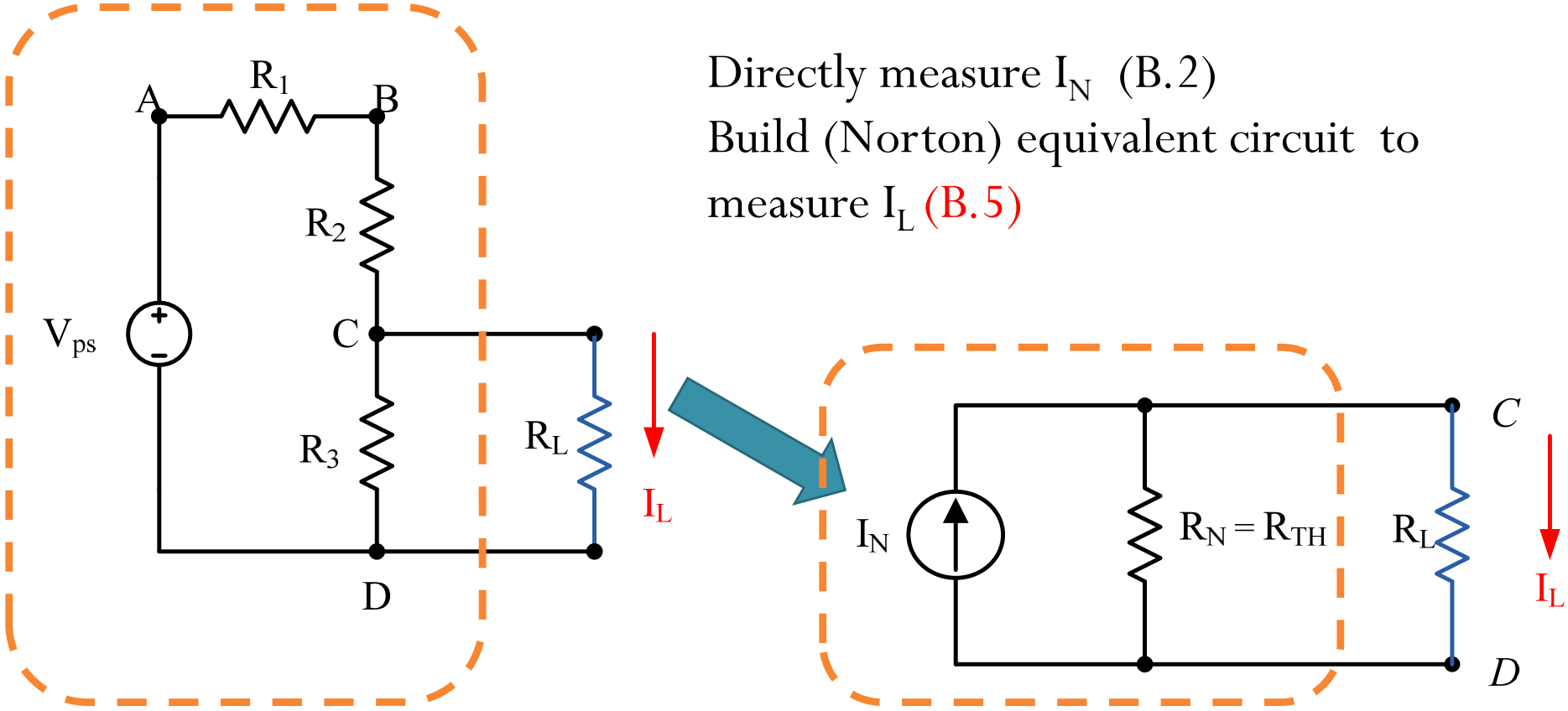
Part B: Norton Equivalent (2)



Note that the ammeter itself acts as a short circuit.

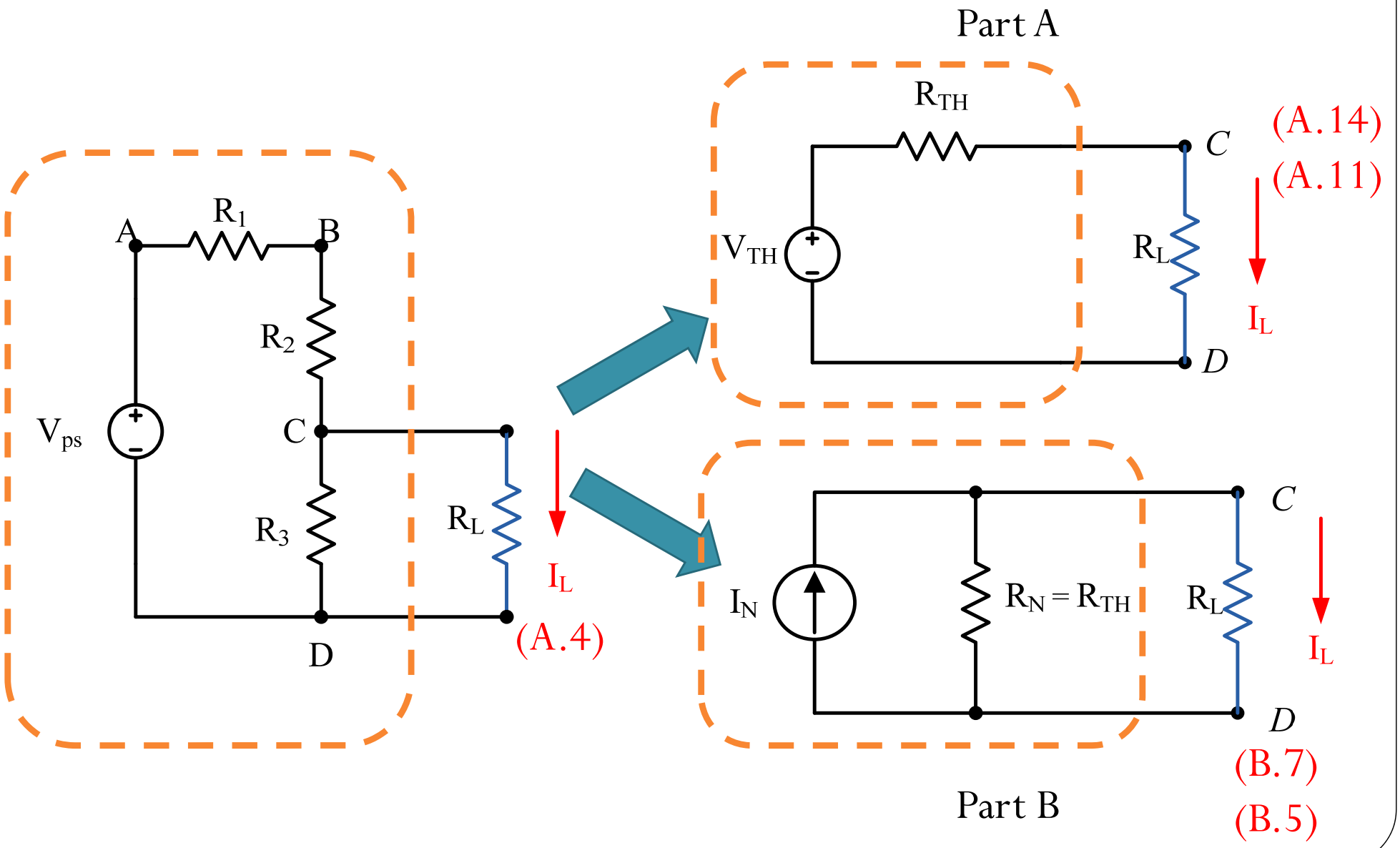
Directly measure I_N (B.2)

Build (Norton) equivalent circuit to measure I_L (B.5)

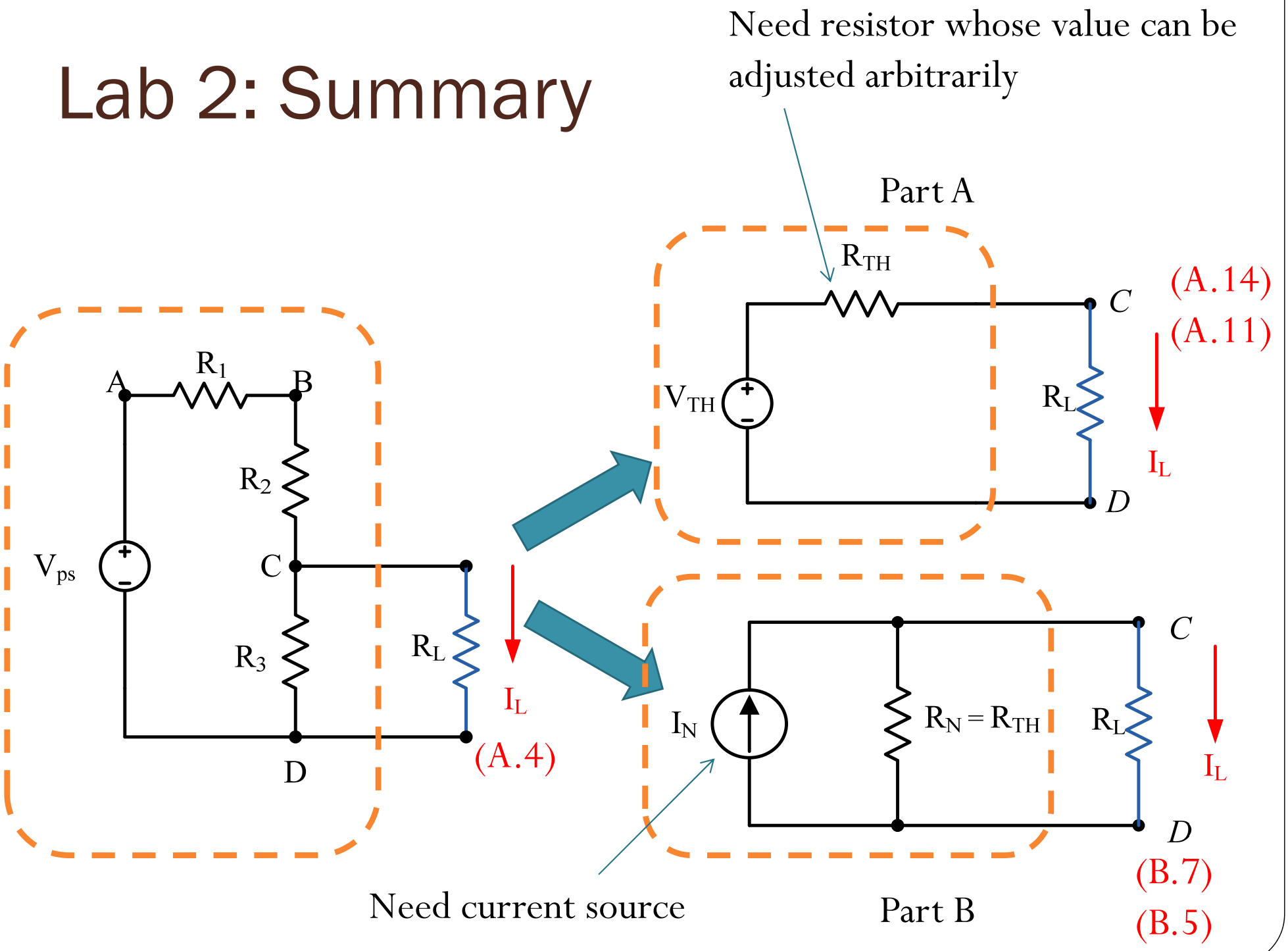


Part B

Lab 2: Summary

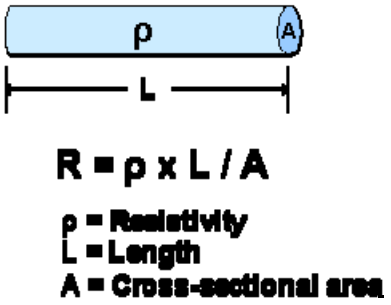


Lab 2: Summary

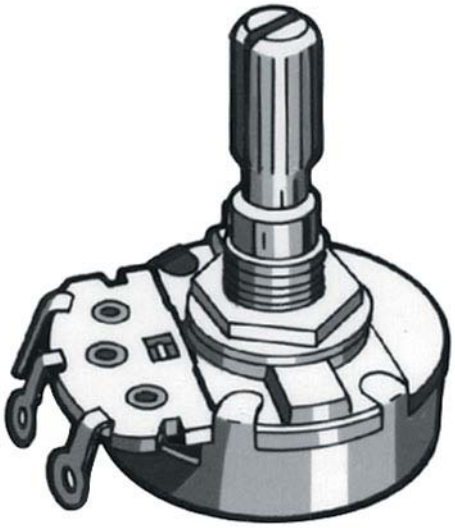


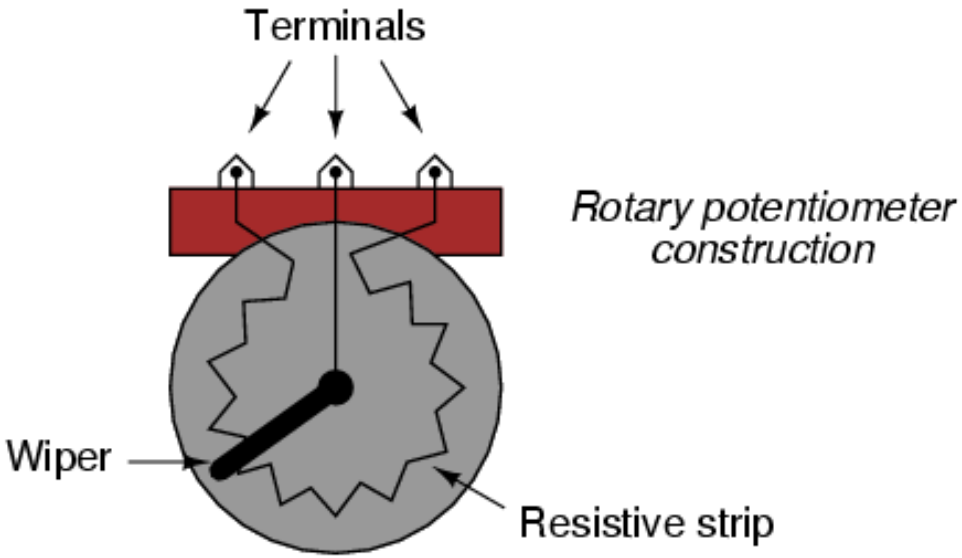
Potentiometer (Pot)

Pot as a variable resistor



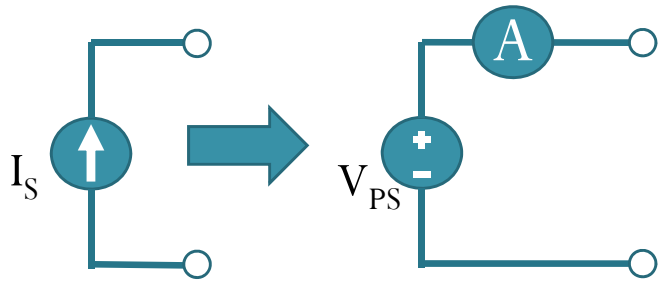
- Manually adjustable resistor
- Three terminals
- The resistance between the middle terminal and either of the two sides depends on the position of the wiper.





Rotary potentiometer construction

Current source



- We do not have current source.
  - Again, it is meaningless to connect an ammeter directly across the power supply. This will NOT give you the amount of current produced by the power supply.
- We use a voltage source (power supply) to give the specified amount of current.