EXPERIMENT NO: 10

Aim : To determine the internal resistance of a given primary cell using a potentiometer.

Apparatus : Potentiometer, (dry) cell, ammeter, rheostat, galvanometer, resistance box, key, jockey, battery or a battery eliminator and connecting wires.

Theory : The internal resistance 'r' of a cell is given by,

$r = (\frac{l_1}{l_2} - 1)R$; where l_1 and l_2 are the balancing lengths without and with the shunt respectively.

Procedure :

1. Arrange and connect the apparatus accordingly, with reference with the circuit diagram.
2. Switch ON the circuit and move the rheostat so that it shows some current (say 100 mA)
3. Take some resistance from the resistance box R (say 2000 Ω) and keep the key K_2 at open position.
4. Touch the jockey at the end A of the potentiometer wire and observe the deflection in the galvanometer. Touch the jockey at the end B. If the galvanometer shows opposite deflection, the connections are correct. If not try the same by increasing the current.
5. Slide the jockey over the potentiometer wire till you reach a point where the galvanometer shows no deflection. Measure the length (l_1) between this point and the end A.
6. Take some resistance (say 10 Ω) from the resistance box and close the key K_2. Again find the null point length (l_2) by sliding the jockey through the potentiometer wire.
7. Repeat the same steps for three different currents.

Result :

The internal resistance of the given cell is = _____ Ω

Precautions :.

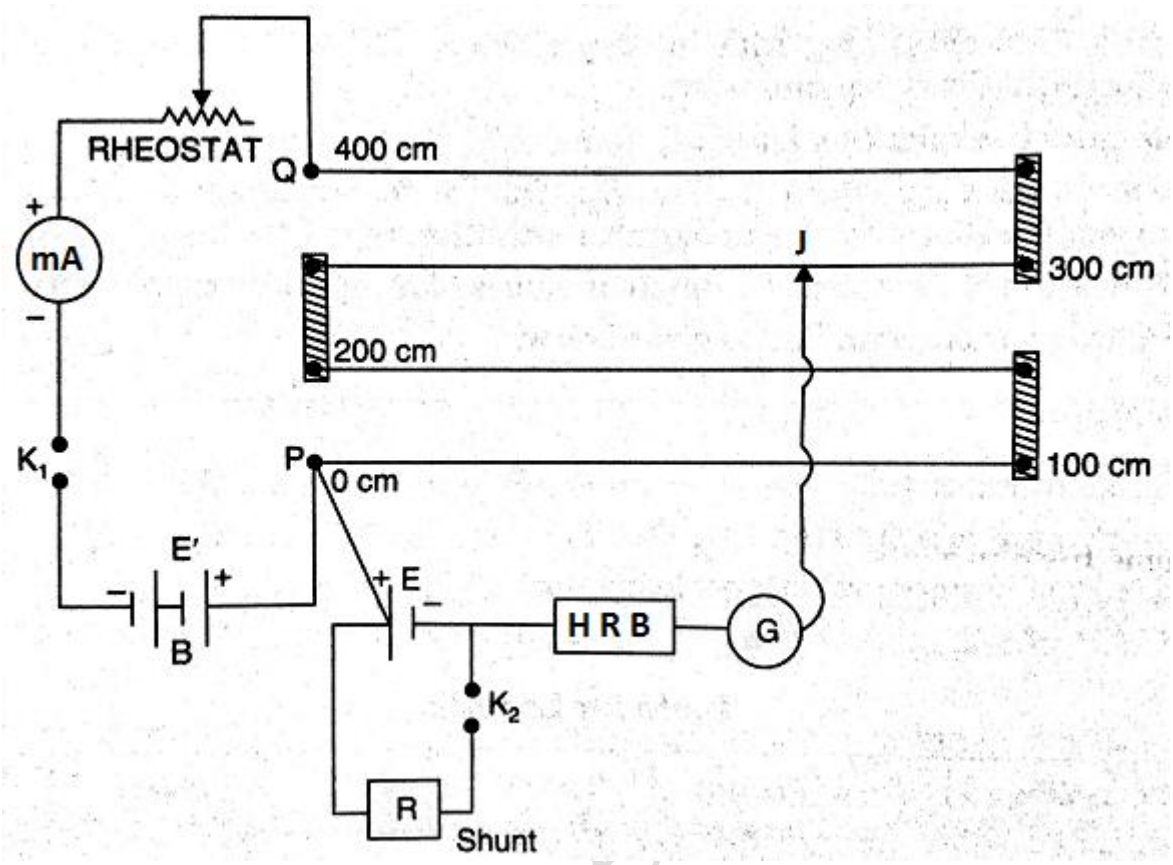
1. All the connections should be neat, clean and tight.
2. The e.m.f of the battery should be greater than the emf of primary cell.
3. Some high resistance should be taken from the resistance box before the jockey is moved through the wire.

Sources of error :

1. The potentiometer wire may not be of uniform cross-section and material density throughout its length.
2. The e.m.f of the battery is less than that of the cells.
3. End resistances may not be zero

Eby P Kurien
ebypkurien@gmail.com

Circuit Diagram :



Observations :

EMF of the battery/ battery eliminator = _____ V
L.C. of the ammeter = _____ mA
Zero error of the ammeter = _____ mA

Observation Table :

Sr. No.	Ammeter Reading (mA)	Position of the null point		$r = (\frac{l_1}{l_2} - 1)R$
		Without the shunt R (Ω)	With the shunt R (Ω)	
1				
2				
3				

Calculation:

$r = (\frac{l_1}{l_2} - 1)R$ = _____ (Ω)

Mean r = _____ (Ω)

Eby P Kurien
ebypkurien@gmail.com