EXPERIMENT NO: 9

Aim : To compare the E.M.Fs of two primary cells using a potentiometer.

Apparatus : Potentiometer, Leclanche cell, Daniel cell, ammeter, rheostat, galvanometer, two way key, jockey, battery or a battery eliminator and connecting wires.

Theory : The ratio of the emf of two cells is given by,

$\frac{E_1}{E_2} = \frac{l_1}{l_2}$; where l_1 and l_2 are the balancing lengths for the cells of e.m.f E_1 and E_1 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 insert the key in the two way key, between the points 'a' and 'c'.
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. Remove the key to disconnect E1 and insert the same between 'b' and 'c' so that E2 is connected to the circuit.
7. Find the null point length (l_1) by sliding the jockey through the potentiometer wire.
8. Repeat the same steps for three different currents.

Result :

The ratio of the e.m.f s of the two given cells = _____

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 either of the two cells.
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

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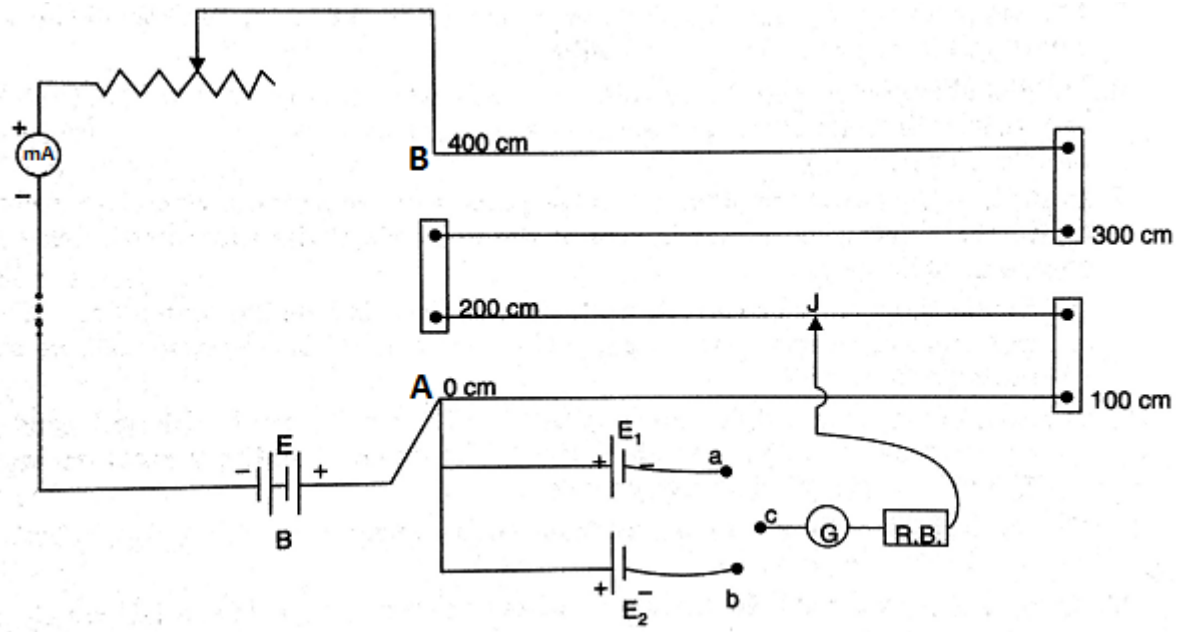
Circuit Diagram :



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)	Balance point when E_1 (Leclanche cell) in circuit l_1 (cm)	Balance point when E_2 (Daniel cell) in circuit l_1 (cm)	$\frac{E_1}{E_2} = \frac{l_1}{l_2}$
1				
2				
3				

Calculation:

$$\frac{E_1}{E_2} = \frac{l_1}{l_2} = \_\_\_\_\_$$

$$\text{Mean } \frac{l_1}{l_2} = \_\_\_\_\_$$

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