To verify the laws of combination (series) of resistance using a meter bridge (R=R1 + R2):

Aim: To verify the laws of combination (series) of resistance using a meter bridge (R=R$_1$ + R$_2$)

Apparatus : a meter bridge , a leclanche cell (battery eliminator) , a galvanometer , a resistance box , a jockey , two resistance wire or two resistance coils , set square , connecting wires .

Theory:

1. The resistance (r) of a wire or coil is given by

$$r = \frac{(100-l) \cdot R}{l}$$

Where R is the resistance from resistance box in the left gap and l is the length of the meter bridge wire from zero end up to balance point.

2. When two resistance r$_1$ & r$_2$ are connected in series, then their combined resistance

R$_3$=R$_1$+R$_2$

Procedure:

1. Mark the two resistance coil as r$_1$ and r$_2$.

2. To find the r$_1$ and r$_2$ proceed same way as in experiment 1.

   (If r$_1$ and r$_2$ are not known)

1. Connect the two coils r$_1$ and r$_2$ in series as shown circuit diagram in the right gap of Meter Bridge and find the resistance of this combination. Take at least three sets of observation.

2. Record your observation.

   Circuit diagram:
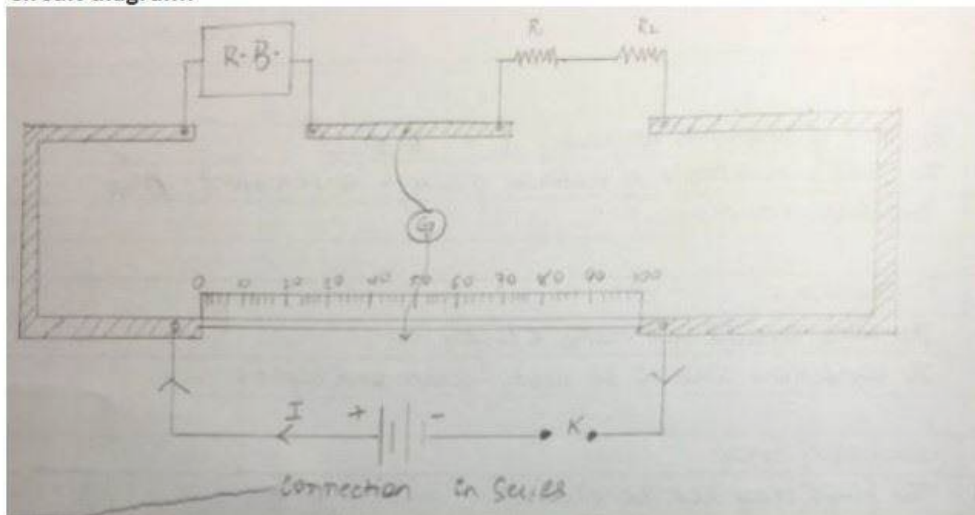
Observation table:

Resistance in R.B. (ohm)	Balance l (cm)	(100-l) (cm)	[(100-l)*R]/l	Mean r_1(cm)
0.5	24	76	1.583	
1	38	62	1.631	1.616
2	55	45	1.636	

Resistance in R.B. (ohm)	Balance l (cm)	(100-l) (cm)	[(100-l)*R]/l	Mean r_2(cm)
0.5	33	67	1.015	
1	50	50	1	1.015
2	66	34	1.030	

Resistance in R.B. (ohm)	Balance l (cm)	(100-l) (cm)	[(100-l)*R]/l	Mean r_s(cm)
0.5	16	84	2.625	
1	28	72	2.571	2.615
2	43	57	2.651	

Calculation:

$R_1 + R_2$ = 1.616+1.015 = 2.631 ohm
R_s = 2.615 ohm

Therefore, experimental error = [(2.615-2.631)/2.615]*100 = 0.6%

Result:

Within limits of experimental error, experimental and theoretical values of R are same. Hence law of resistance in series is verified.

Precaution:

1. The key should be inserted only while taking observation.
2. Connections should be neat and tight.