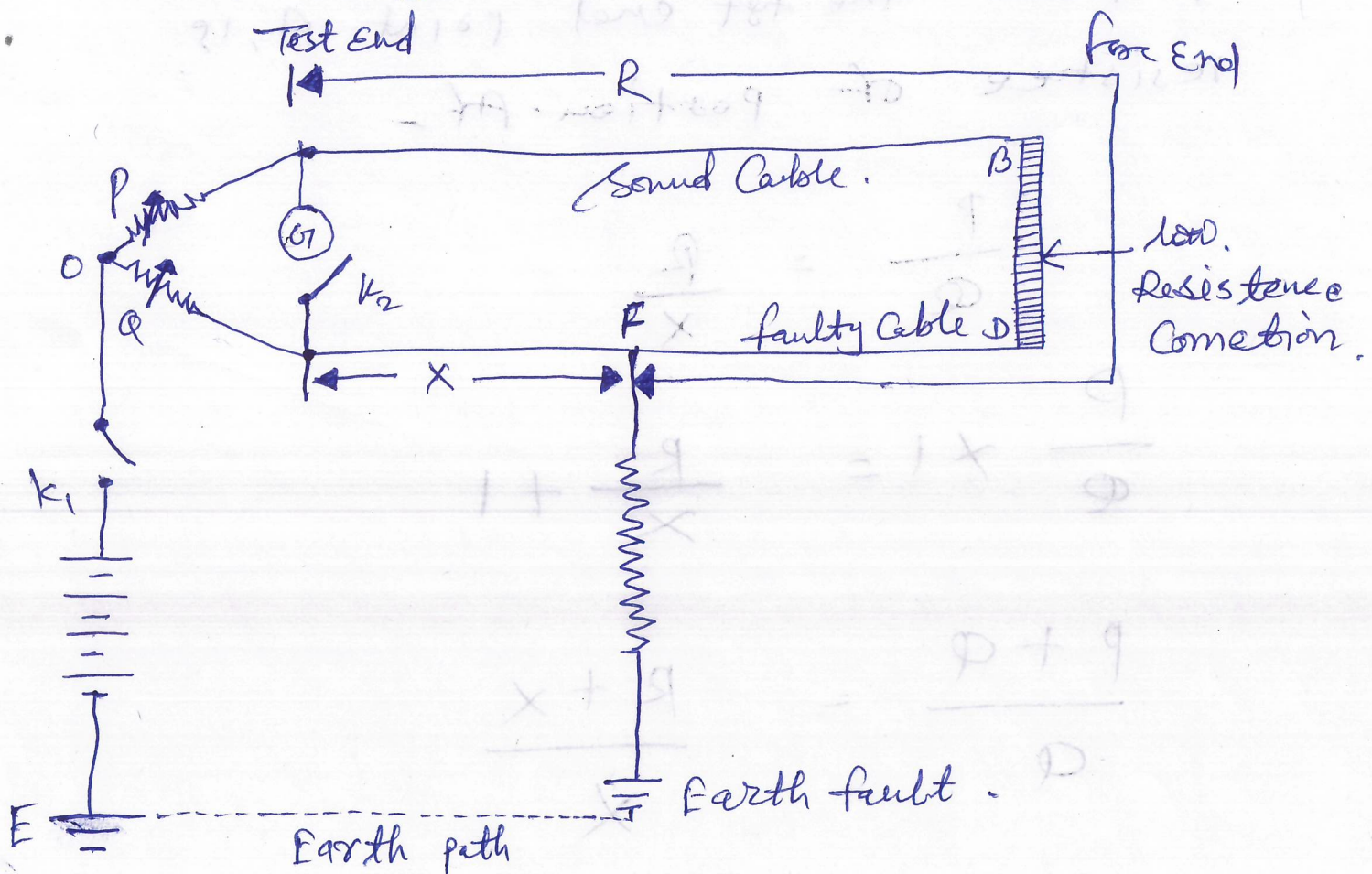fault

With the help of murry loop test, we can easily locate fault and short circuit fault in the under ground cable.

At first, we describe how does locate earth in underground cable!

The procedure of Earth fault test:-

In this test, the Sound Cable is used to connect in between test end for end of the faulty Conductor:-

Test End   R   free End

Sound Cable.

B

P

O

Q

V₂

X

F × faulty Cable D

low.
Resistence
Connection.

K₁

E

Earth path

Earth fault.

to the end A point of sound coble and e point of faulty coble respectively.

A be there is connected to point o and earth point e through a switch k1. And a galvanometer G is connected in between point A and e through a switch k2.

Let,

R = Resistance of the lap way to fault point f F from the tst end point A, is resistance of portion. Af.

$$\frac{P}{Q} = \frac{R}{X}$$

$$\frac{P}{Q} \times 1 = \frac{R}{X} + 1$$

$$\frac{P+Q}{Q} = \frac{R+X}{X}$$

$$\frac{P+Q}{Q} = \frac{22}{X}$$

$$or, \quad X = \frac{Q}{P+Q} \times 22$$

Let, total length of the cable is 1 meter, so the resistance per meter will be $= \frac{r}{v}$,

Therefore, we can easily measure th fault point from the faulty points is

$$d = \frac{x}{rL} = \frac{Q}{P+Q} \times 2\sigma \times \frac{1}{r} = \frac{Q}{P+Q} \times 2l$$

$$d = \frac{Q}{P+Q} \times 2 \quad (\text{cable length})$$

Note that the fault resistance Rf is not in the bridge circuit, so, the fault ba leaving at the bridge.

$$\frac{P}{Q} = \frac{R}{X + \sigma_1}$$

$$\frac{P+Q}{Q} = \frac{R + X + \delta_1}{X + \sigma_1}$$

Let, R = Resistance of the conductor loop up to fault Point f from test end point A, is resistance of Portion Af.

X - Resistance in between two points A and f.

note that, P, Q, R and X are the four arms of the wheat stone bridge. Now, the switch k_1 and k_2 are closed respectively then,

$$\frac{P}{Q} = \frac{R}{X}$$

$$\frac{P}{Q} + 1 = \frac{R}{X} + 1$$

$$\frac{P+Q}{Q} = \frac{R+X}{X}$$

if r is the resistance of each cable, then $R + X = 2r$

$$x = \frac{Q(R+x)}{P+Q} - PS_1,$$

$$\therefore \quad \frac{P+Q}{Q} = \frac{2\gamma}{x}$$

$$\text{or,} \quad x = \frac{Q}{P+Q} \times 2\gamma$$

$$\text{or,} \quad x = \frac{Q}{P+Q} \times (\text{loop length})_2$$

Murry loop test for locating underground cable fault

Murry loop test is test by which we can locate the earth fault or short circuit fault in the underground cable.

$$\frac{P}{Q} = \frac{R}{x + S_2}$$

$$(P + Q) Q = PS_2 \quad ----- \quad (ii)$$

we get,

$$x = P(S_2 - S_1)$$

The value of P, Q, S_1 and S_2 are known, we can easily get the value of loop resistance.

So, the loop resistance $= R + x = \dfrac{P}{Q}$

If the resistance of the Cable per meter length is r,

So, the loop resistance $= R + x = \dfrac{P}{Q} S_2$

where P_1 and P_2 are constants and a is the area of x-section of the conductor.

(ii) Annual Cost of energy wasted, this is on account of energy lost mainly in the conductor due to $I^2 R$.

Annual Cost of energy wasted

$$= P_3 / a \dfrac{q}{s^2 + x} = \dfrac{q}{p}$$