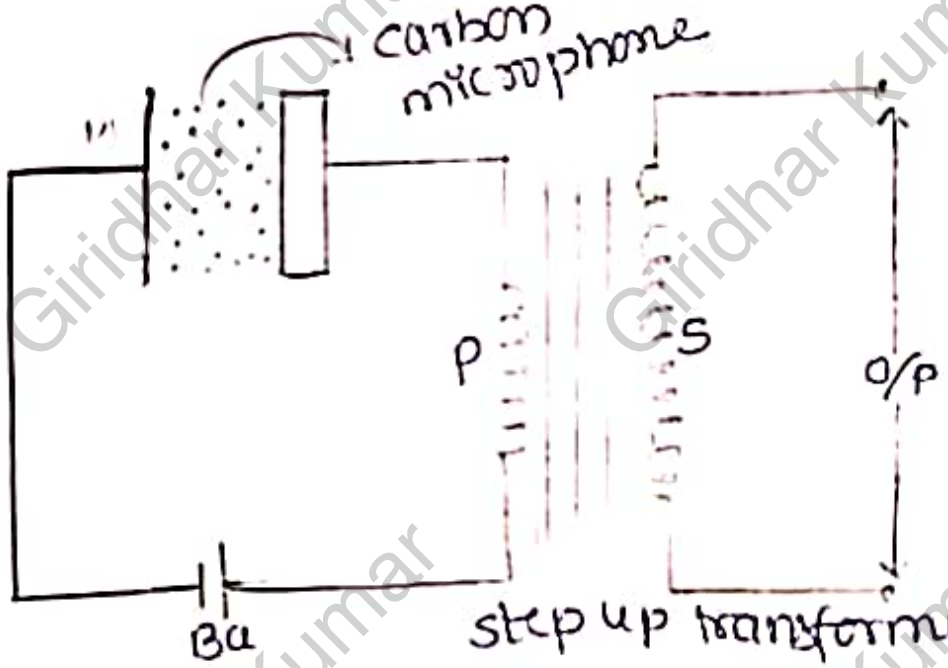
## Carbon microphone:

Carbon micro phone is a device which converts sound energy into electric signals.




The basic diagram of carbon microphone is shown in above fig

**Principle:** The basic principle is based on the variation of resistance of carbon granules which are enclosed in between two plates. One of which is movable called as diaphragm & another one is fixed. These two plates are connected in series with battery. & primary coil of step up transformer.

(2) When vibration of sound is strikes the diaphragm it moves too & fro motion. i.e it starts vibrating. When two plates moves closer to each other then the resistance of the granuals decreases and when they are away from each other, the resistance of the granuals increases so there will be oscillation of current in the circuit, which is amplified either by step up transformer or amplifier or both.

If R is the resistance of the circuit when there is no displacement of diaphragm & let dR be the varying resistance due to displacement of diaphragm, which is given by

$$dR = Ka \sin \omega t$$

So the total resistance at the moment is

$$R_1 = R + dR$$

$$R_1 = R + Ka \sin \omega t$$

So we can write the current as,

$$I = \frac{V}{R + Ka \sin \omega t}$$

$$I = \frac{V}{R\left(1 + \frac{Ka}{R} \sin \omega t\right)}$$

$$I = \frac{V}{R}\left(1 + \frac{Ka}{R} \sin \omega t\right)^{-1}$$

By using Binomial expansion

$$I = \frac{V}{R}\left[1 - \frac{Ka}{R} \sin \omega t + \frac{K^2 a^2}{R^2} \sin^2 \omega t - \cdots\right]$$

$$I = \frac{V}{R} - \frac{V Ka \sin \omega t}{R^2} + \frac{V K^2 a^2 \sin^2 \omega t}{R^3} \cdots$$

The first term in above eqn indicates steady current when diaphragm is at rest & second term indicates the alternating current when diaphragm is vibrating.