Unit - III.

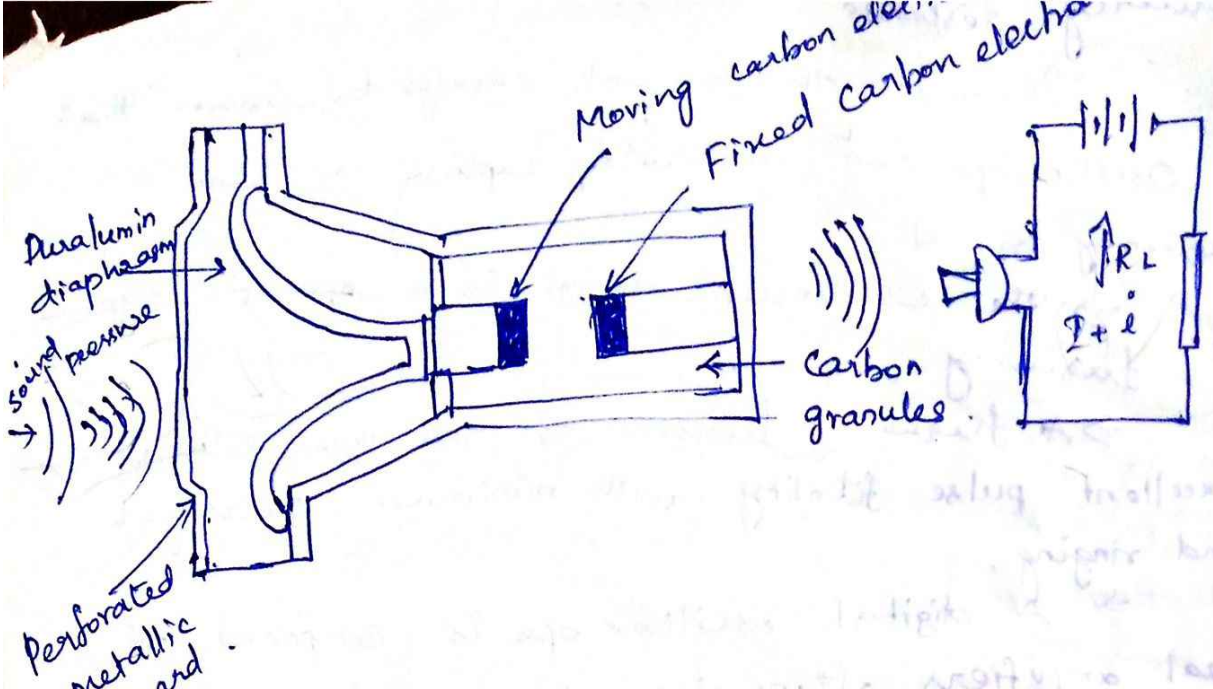
Transducers :-

⇒ Electrical and electronic circuit and devices can be utilised for measurement, analysis or application of non-electrical quantities or physical changes with better accuray and sensitivity.

⇒ Such devices known as transducers can sense the variation in the non-electrical quantities and convert them into measurable electrical quantities or signals. (eg) a telephone transmitter.

⇒ As the sound waves strike its diaphragm its vibration compresses or decompresses the carbon granules. This results in the variation of the resistance between the two carbon electrodes.

⇒ Thus a telephone transmitter or a microphone is a tranducer converting sound waves into electrical signals.



=> The milli-voltmeter connected across the circuit will measure a voltage proportionate to the temperature.

=> The thermocouple is another type of transducer which can sense and convert temperature into measurable electrical quantity.

=> The sound effect resulted in change of resistance. needed an additional source for activating the circuit the circuit to produce the desired current signal.

=> This is the case of a passive transducer.

=> The change of temperature directly caused measurable electrical quantity in term of thermo emf. This is the case of an active transducer not requiring any addition power source.

Types of Transducers:-

The transducers can be classified

(i) Passive transducers.

(ii) Active transducers or self-generating transducers.

Another method of classification of transducers is from the point of view of the electrical Parameters.

(i) Capacitive transducers
(ii) Inductive transducers
(iii) Resistive tranducers
} Passive

(iv) Magneto-electric transducers
(v) photo-electric transducers
(vi) Piezo-electric transducers
(vii) Thermo-electric transducers
(viii) Radio active transducer.
} Active

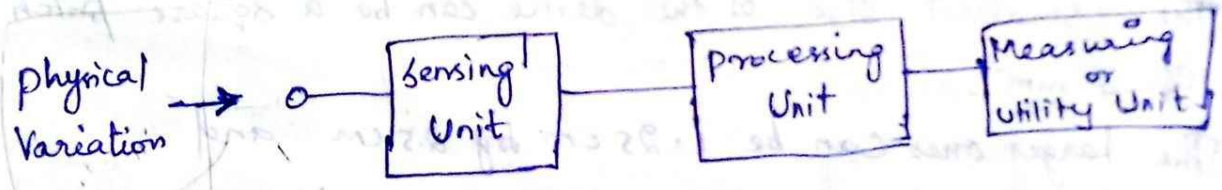
The first three belong to the passive and the rest to the active type of Transducers.

The third method of grouping the transducers is from the output point

(i) Self generating and analog
(ii) Changing parameters and analog
(iii) pulse generating
(iv) Digital.

The type of a transducer the application

(i) Sensing
(ii) Processing
(iii) Measuring or application.

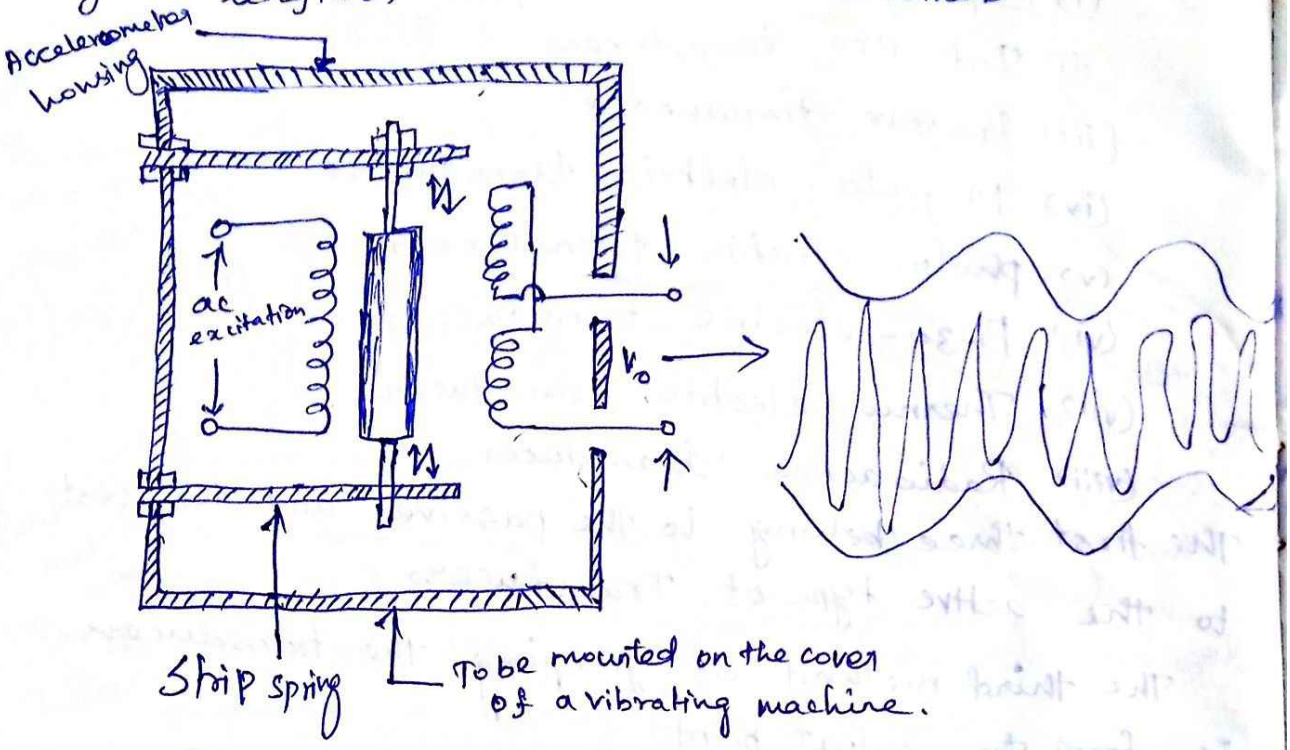


Block diagram of transducer

Strain Gauge transducer:-

Stress and strain measures involves the use of a device called strain gauge. Strain is the ratio of change in length to the

Original length of a member under stress



Construction of a Strain Gauge :-

Metallic strain gauges are made from fine high resistance conductors like constantan or nichrome.

⇒ The conductors have a diameter as small as 0.025 mm or even less with resistance varying between 1.20 to 300 ohms.

⇒ The coil of this fine wire is bonded between two paper folds which are plastic coated on the reverse side.

⇒ It is to insulate the coil from the metallic surface which is to be tested for strain measurement.

The smallest size of the device can be a square patch of 3 mm^2.

The larger ones can be 1.25 cm by 2.5 cm and rectangular in shape