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Speed measuring instruments

- Speed measuring instruments are vary with the job whether measuring traveling speed , wind speed, acceleration or engine speed, there is a proper instruments for calculating that from of speed.
- Police use Radar & lidar To measure traffic speed .
- Cars have speedometer For travel speed and Tachometer for engine speed. Accelerometer also used With cars speed measurements. Meteorologist Used anemometer and radar to create their whether forecasts.

Tachometer

- Tachometer is used for measuring the rotational speed.
- It can be used to measure speed of rotational shaft.
- It can also be measure the flow of liquid by attaching a wheel with incline vane.

Classification of Tachometer

- Mechanical Tachometer:
 1. Revolution counter



Hand speed Tachometer



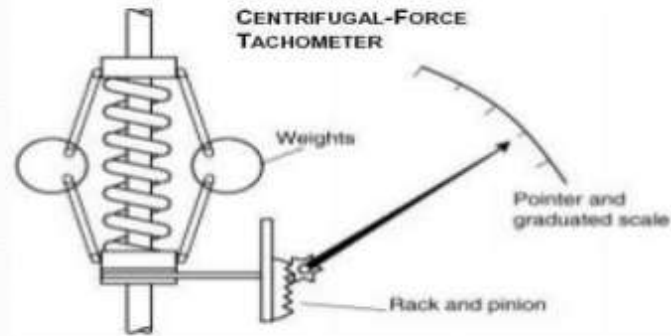
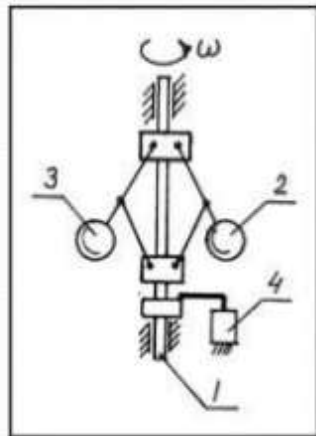
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Tachoscope



Centrifugal Tachometer



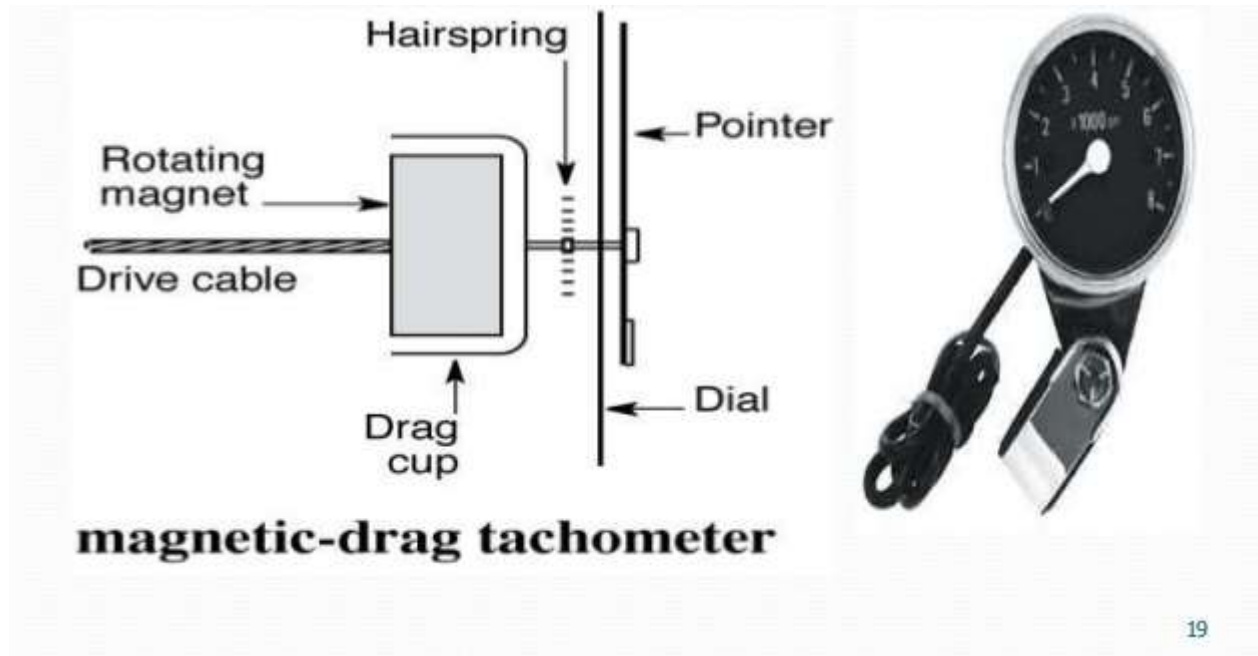
w = angular speed, 1 = shaft,
2 and 3 = masses, 4 = displacement-sensitive element.

Resonance Tachometer



Electrical Tachometer

- Eddy current or Drag cup Tachometer



Tachogenerator (DC&AC)

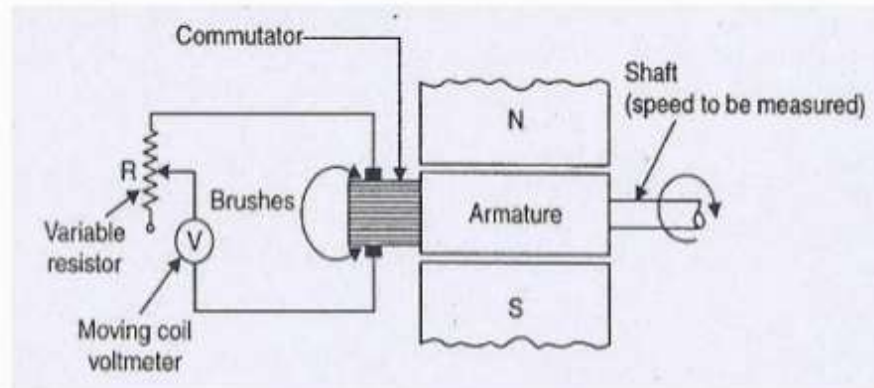


Fig. 32. D.C. tachometer generator.

Contactless Electrical Tachometer

- Magnetic Pick-up Tachometer
- Photoelectric Tachometer
- Stroboscope

Tachoscope

- Tachoscope consist of revolution counter for timing device.
- Rhe two components are Integrally mounted & Start simultaneously when contact point is pressed Against rotating shaft.
- The rotational speed is computed from reading of counter and timing.
- Tachometer can be used to measure hoto 5000 r. P .m.

Hand speed indicator

- It has an integral Stopwatch and counter with automatic disconnect.
- The spindle operate when Brought in contact with shaft.
- Counter does not function Until Start and wind button is pressed to start watch and engage the clutch.
- The instrument indicate the average speed over the short interval in rpm.

Revolution counter

- It is used to measure an Average of rotational speed instead of instantaneous rotational speed.
- It consists of a worm gear that is usually attached to a spindle.
- It has two dials, an inner one & an outer one.
- These are limited to low speed engine and measure satisfactory up to 2000- 3000rpm.

A.C. Tachogenerator

- The inherent demerits associate with DC Tachometer generator, due to the Provision of commuter and brushes are eliminated in AC Tachometer generator.
- The alternating r.m.f. Induced in a stationary coil is rectified , O/p Dc voltage is measured with the help of moving coil voltmeter(V).
- The ripple Connect to the rectified voltage is smoothened By the capacitor filter.

Centrifugal Tachometer

- It operates on principle that centrifugal force is proportional to speed of rotation.
- It consist two balls compressed spring as function of speed position factor.
- They are suitable for 4000r.p.m.

Eddy current & Drag cup Tachometer

- An Eddy current Tachometer uses the interaction of magnetic field generated by the permanent magnet and a rotor whose speed of rotation is proportional to the Eddy current generated.
- The deflection of disks, which is rigidly connected to a pointer to a scale indicated on a dial.

Working Principle

- The ignition system triggers a voltage pulse at the output of the tachometer electrochemical part whenever the spark plug fires.
- The electrochemical part responds to the average voltage of the series of pulses.
- It shows that the average voltage of the pulse train is proportional to the engine speed.
- The signal from the perception head is transmitted by standard twin screened cable to the indicator.
- The tachometers are temperature compensated to be able to handle operations over a range of -20 to +70 degrees.

Advantages :

- (1) It has a linear relationship between output and rotational speed.
- (2) It is rugged and inexpensive.
- (3) It requires less maintenance.
- (4) It gives ripple free output.

Disadvantages :

- (1) These tachometer are hard to calibrate.
- (2) At high speed, it has a non-linear relationship between speed and output.

Applications :

- (1) Automobile speedometer works base on this principle.
- (2) Locomotive speed is measured by this tachometer after some modifications.