



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



COIMBATORE-35

**Accredited by NBA-AICTE and Accredited by NAAC – UGC with A++ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai**

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME: 23EEB210 / Electrical Machines and Drives

II YEAR MECHANICAL / IV SEMESTER

Unit III – SPEED CONTROL TECHNIQUES

Topic : Starting Methods of DC Motor



STARTING METHOD OF DC MOTOR

- A starter is a device that initiates and accelerates the motor. Also used to start, control speed, reverse, stop and protect the motor.
- The motor's armature current is given by

$$I_a = \frac{V - E}{R_a}$$

- Thus, the armature current I_a depends upon E and R_a if V is kept constant.
- When we switch on the motor, the armature is stationary so back e.m.f will be zero.
- The starting armature current I_{as} is given by

$$I_{as} = \frac{V - 0}{R_a}$$



THREE-POINT STARTER

- When the dc connected motor is to be started, the lever turns gradually to the right.
- When the lever touches the point 1, the field winding gets directly connected across the supply.
- Simple high resistance in steps which comes in series with the armature of machine and control the current.
- The handle H is moved manually, and when it moves to contact with the resistance, stud 1 is in the start position. In this position, the field winding receives the full supply voltage, and the armature current is reduced by graduated resistance R1, R2, R3, and R4.
- Starter handle is gradually moved from start to start until it leaves the RUN position. In Run position, motor attains full speed, resistance is completely cut off, and supply is directly connected across both the windings.

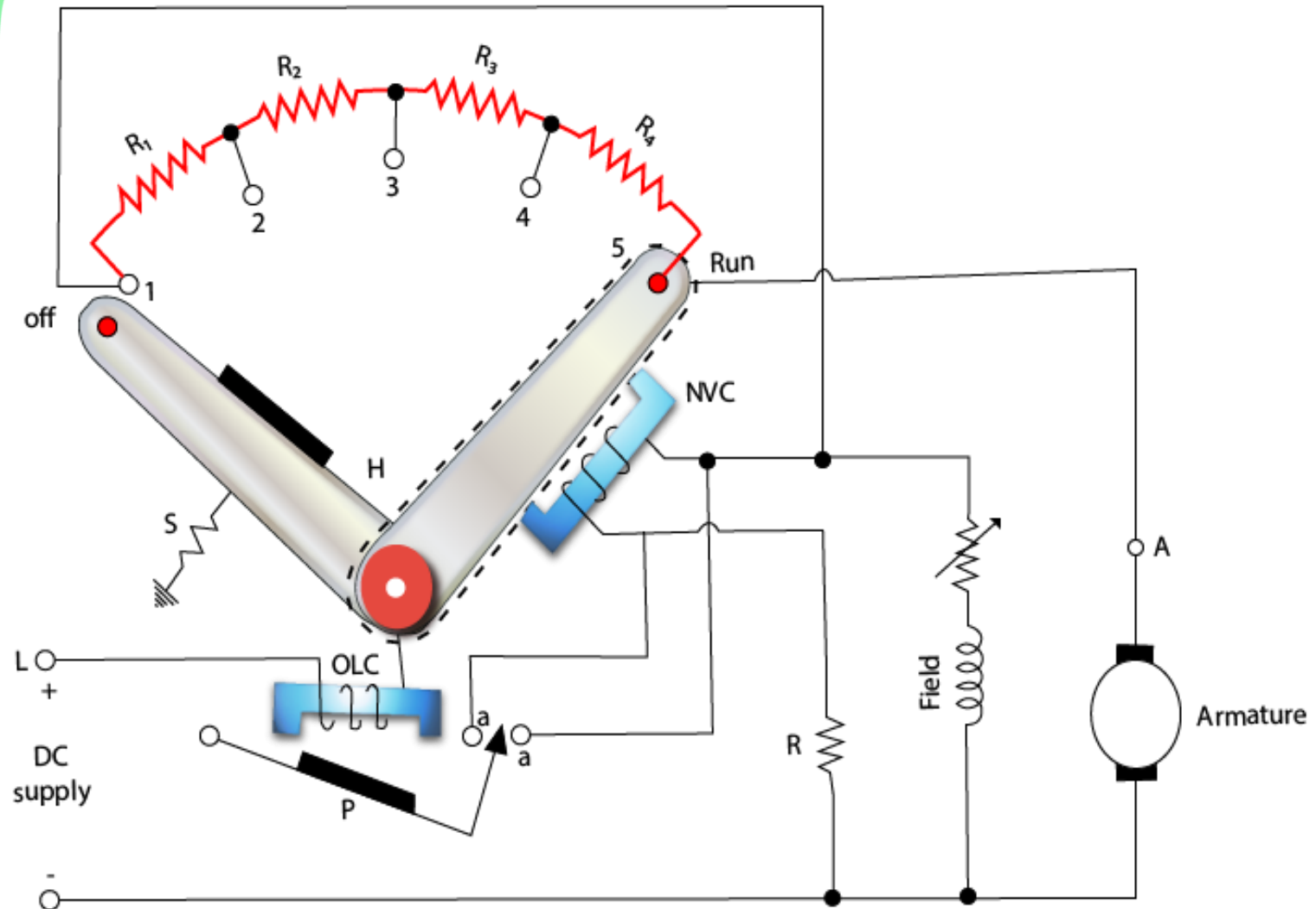


THREE-POINT STARTER

- NVC (No voltage trip coil) is connected in series with field winding of the motor. When the supply voltage falls below a particular value, the handle is pulled back to off position. It also protects against the open circuit of the field winding. The NVC is called no-volt or under voltage protection of the motor.
- When armature current exceeds the normal rated value, P is attracted by the electromagnet of OLC (overload coil) and close the contact aa, which short-circuits the NVC. This results in the release of handle H, which return to off position and motor supply is cut off.
- To increase the speed of the motor, field resistance should be increased which reduce the current in the shunt field. A very low field current could not hold the switch and handle will achieve the off position. To overcome this difficulty, 4 point starter is used.



FOUR-POINT STARTER





FOUR-POINT STARTER

- The main difference between a 3 point starter and a 4 point starter is that the no voltage coil (electromagnet E) is not connected in series with the field coil.
- The field winding gets directly connected to the supply, as the lever moves touching the brass arc (the arc below the resistance studs).
- The no voltage coil (or Hold-on coil) is connected with a current limiting resistance R_h . This arrangement ensures that any change of current in the shunt field does not affect the current through hold-on coil at all. This means, electromagnetic pull of the hold-on coil will always be sufficient so that the spring does not unnecessarily restore the lever to the off position.
- A 4 point starter is used where field current is to be adjusted by means of a field rheostat for the purpose of operating the motor above rated speed by reducing the field current



KEEP
LEARNING.

Thank u

SEE YOU IN NEXT CLASS