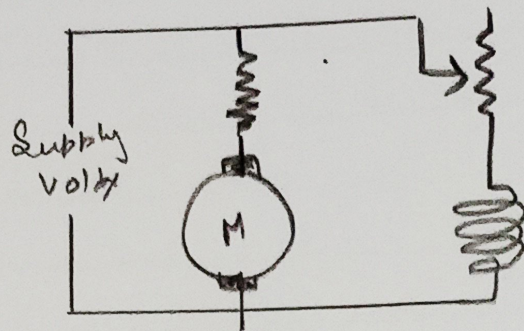
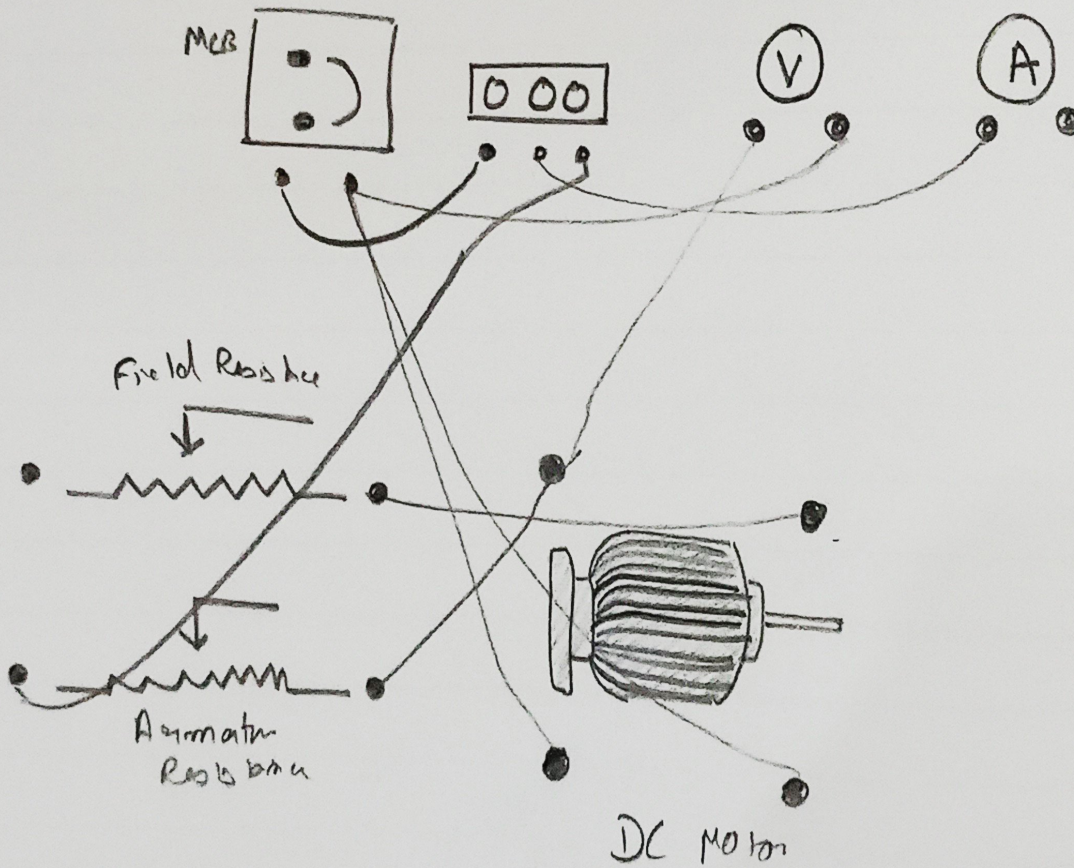




Equivalent Circuit for field controlled DC Motor



Aim: Speed control of DC motor by field resistance control. Draw the graph between the armature current and motor speed by varying the field resistance.

Apparatus:

DC Shunt Motor

• Connecting wires

• Variable resistance x 2

Voltmeter

Ammeter

Theory:

Speed of DC shunt motor is given by:

$$N = \frac{V_a - I_a R_a}{K \phi}$$

Where V_a is the armature voltage ϕ is the flux proportional to field current ~~determined~~ by the ~~me~~ I_f . And I_a is the armature current determined by the mechanical load. Speed control is achieved by varying V_a and I_f using the external resistance either in series with the armature or the field circuit.

Methods of speed control

Current (A)	Speed (RPM)
0.1	2500
0.3	2100
0.4	1930
0.5	1700
0.6	1575
0.7	1480
0.8	1400

- Armature Resistance Control
- Field Resistance Control

In Field resistance control Method, speed is controlled by varying the field current I_f . Which ~~directly~~ directly the flux Φ . A shunt field regulator an external resistance in series with field windings. It is used for the adjustment. Increasing resistance reduces I_f lowering the flux Φ and increasing motor speed. This allows speed control above the base speed but does not permit operation below the rated speed.

Conclusion

We have seen that speed control of a DC Shunt motor can be effectively achieved by varying field resistance. Increasing the resistance decreases the field ~~resistance~~ current I_f , reducing flux Φ and inc the speed above the base level. However This method does not allow speed reduction below the rated value.

Precautions :

- Avoid excessive speed
- Check for coil temperature
- Ensure stable operation
- Use proper regulations