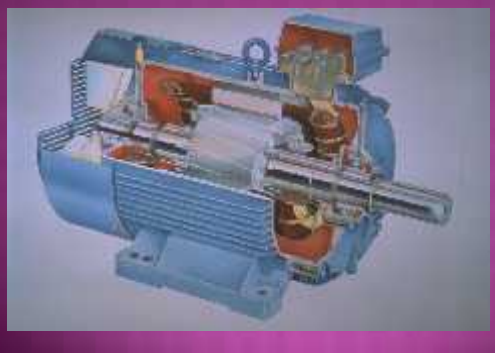
Module 4

AC MOTOR CONTROL

LECTURE 3

BRAKING AND REVERSING OF AC MOTORS



Shameer A Koya

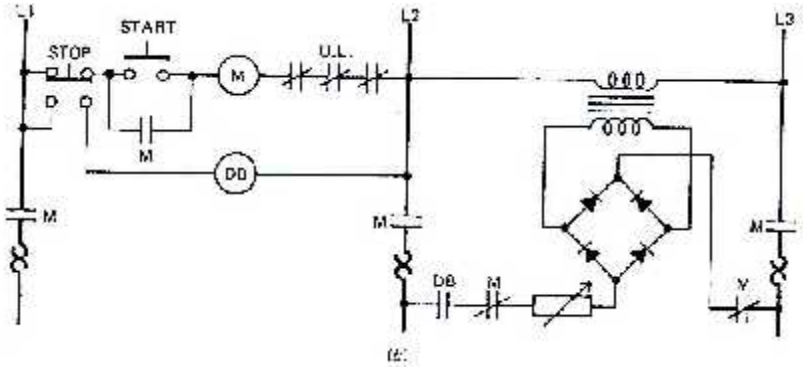
BRAKING OF AN INDUCTION MOTOR

- There are five general methods
  - Dynamic Braking
    - Energy recovered is wasted in resistor
  - Regenerative Braking
    - Energy recovered is fed back into the mains
    - saves energy and money
  - Plugging
    - Two phases are swapped over until motor stops.
  - Mechanical Braking
    - Springs hold brake shoes against drum stopping the load from turning
  - DC Injection Braking
    - When required to stop, DC is connected to two of the phases

DC INJECTION BRAKING

- Direct Current is applied to two supply lines of the motor after opening main line contactors.
- The DC produces fixed magnetic poles in the stator.
- induces a voltage in the rotor bars, which is short circuited.
- a heavy current flows in them
- This produces a magnetic field that opposes movement through the original field (a negative torque is produced)
- This action produces a braking effect on the rotor.
  - It produces less heat than the plugging
  - The braking torque is proportional to the square of the dc braking current
  - When fast braking is required, resistance should be gradually cut-out from the rotor circuit to maintain the constant braking torque when the speed falls. (for wound rotor)

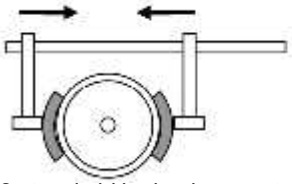
- Press start button, closes the M contacts and the motor start.
- Pressing Stop button, De-energize M and Energize DB.
- All M contacts will be opened and DB contact will close, thus connecting the DC from rectifier across the stator terminals.



MECHANICAL BRAKING

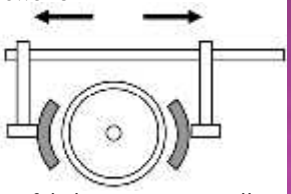
- shoe brake, band type and disc type
- Shoe type is preferred because they are ruggedly constructed, reliable quick acting and trouble free
- Consist of brake wheel (mounted on the motor shaft), two brake shoes (whose inner surfaces are provided with friction material), and an electromagnet.
- The brake coil is de-energized - to apply the brake
- And energize the coil to remove brake

Power Off

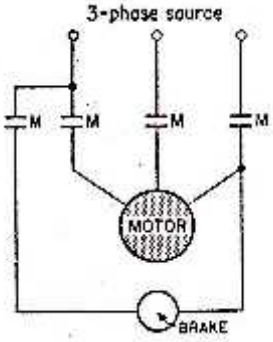


Springs hold brake shoes against drum stopping the load from turning

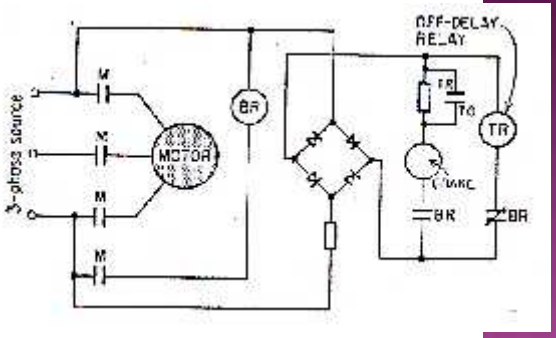
Power On



Powerful electromagnets pull the shoes off the drum allowing the load to turn



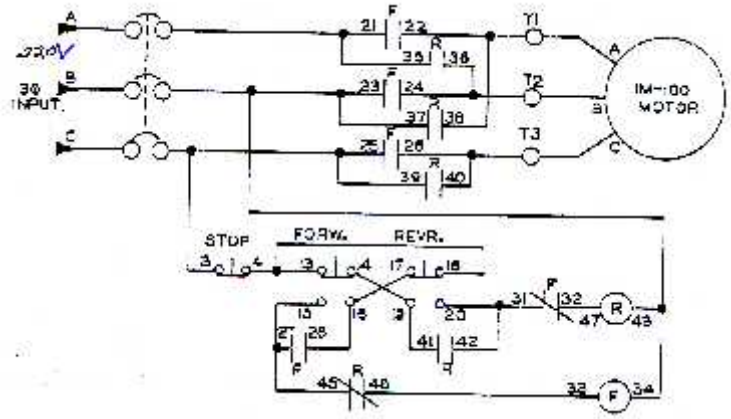
AC mechanical brake



DC Mechanical brake used for big motors

REVERSING OF AC MOTORS

- If the current in any two of the three-phases is interchanged, the direction of the magnetic field's rotation will be reversed.
- Any two phases are inter changed to reverse the motor.
- Can be done manually using Drum switch
- or electromagnetically using a Reversing starter



Next Lecture – Special Motors

THANK YOU