

Module – 5

SPECIAL MOTOR CONTROL

Lecture – 2

Single phase Induction Motor

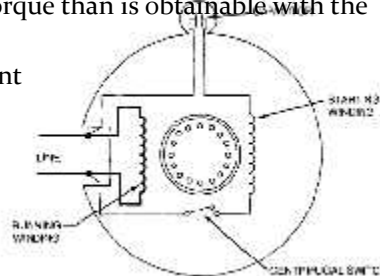
Shameer A Koya

Introduction

- most used residential and light commercial motors
- use the concept of taking one phase and shifting the effects of the currents through the coils to create a moving magnetic field
- Types:
 - split- phase
 - capacitor-start
 - disconnect the starting windings from the line after the motor is up to running speed
 - Two-capacitor motors
 - use multiple capacitors or variations of two-value capacitors to create a starting and a running circuit

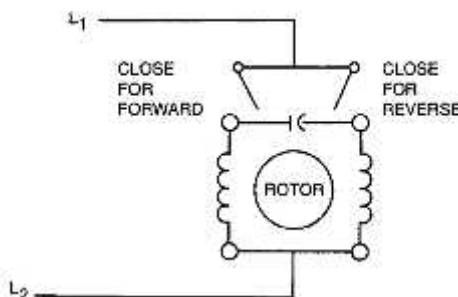
Starting of CAPACITOR-START, INDUCTION-RUN MOTOR

- a capacitor is connected in series with the starting windings
- By placing a capacitor in series with one winding, the current in that winding will lead the current in the other winding, causing a split in the magnetic fields and causing the motor to rotate
- When the motor reaches a value of 75 percent of its rated speed, the centrifugal switch opens and disconnects the starting winding and the capacitor from the line.
- motor run using only the running winding.
- The capacitor provides a higher starting torque than is obtainable with the standard split- phase motor
- capacitor limits the starting surge of current



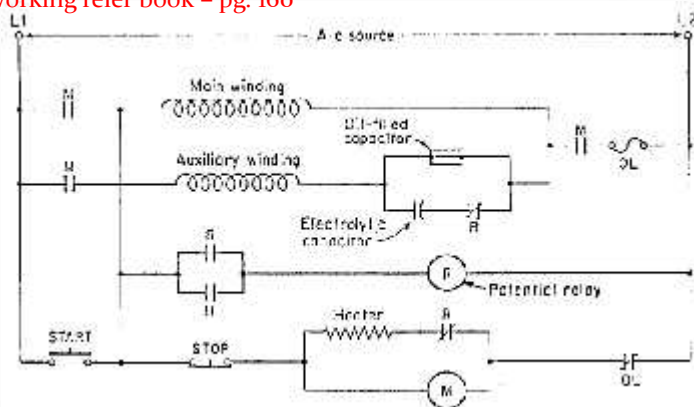
Reversing Capacitor start Induction run motor

- The leads of the starting winding circuit are interchanged to reverse the direction of rotation of a capacitor-start motor.
- the direction of rotation of the magnetic field developed by stator windings reverses
- So the rotation of the rotor is reversed
- By simply closing one switch or the other, the capacitor will be in series with different windings, thus reversing the direction of motor rotation.

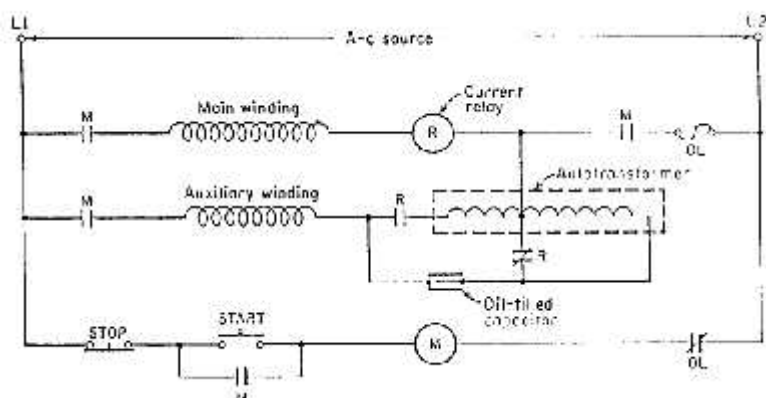


Starting TWO-VALUE CAPACITOR MOTOR

- Electrolytic capacitor for starting and oil-filled capacitor for running
- Electrolytic capacitor is disconnected using a centrifugal switch or thermostat or any other method.
- Using thermal bimetallic heater timer
 - Working refer book – pg. 160

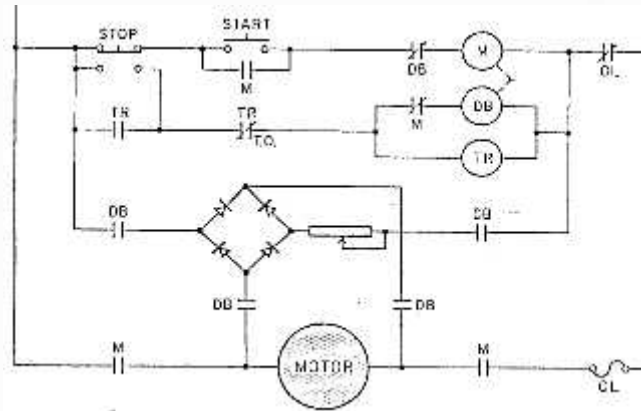


- using a current relay and an autotransformer
- Only one capacitor is used.
- An autotransformer is used to increase the effective value of the capacitor
- The current relay is designed to pick up at about three times the full-load current rating of the winding and to drop out at twice that value.
- Working refer book Pg. 161.



Dynamic Braking of Capacitor Motor

- disconnect the stator winding from the a-c lines
- substitute a suitable d-c power source, usually using a full-wave rectifier.
- rheostatic control is usually provided in the d-c circuit to adjust the timing of the stop.
- Working refer book Pg. 162

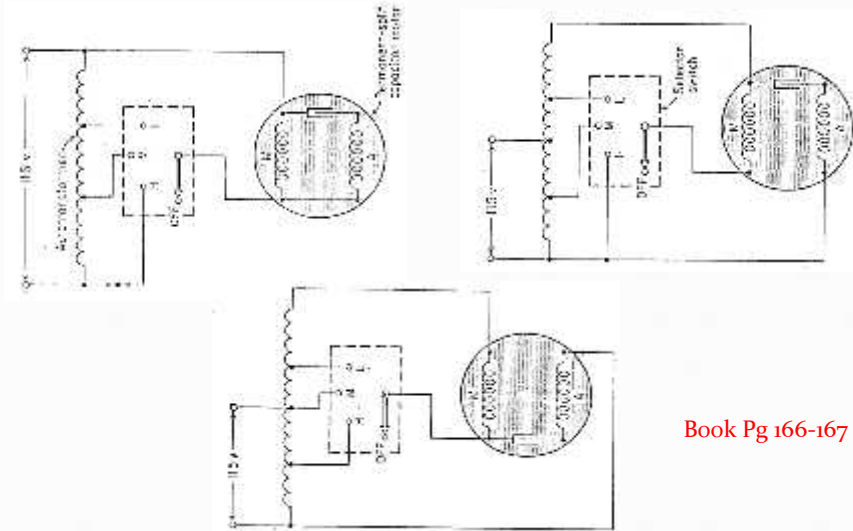


Speed control of split-phase motors

- Pole changing methods
- use special winding arrangements
- In a two-speed motor, for example, there will be two main and two auxiliary windings - each set wound to get different number of poles.
- Also, the centrifugally operated switch must be set to open at the lower of the two possible speeds, (In a 4-pole-6 pole 60-Hz motor, the centrifugal switch will be adjusted to open at about 1,100 rpm).

Speed Control Of Permanent-Split Capacitor Motors

- connect to a variable-voltage source – use autotransformer
- Used frequently for shaft-mounted fans and blowers



That's All in EEET 221



Thank you