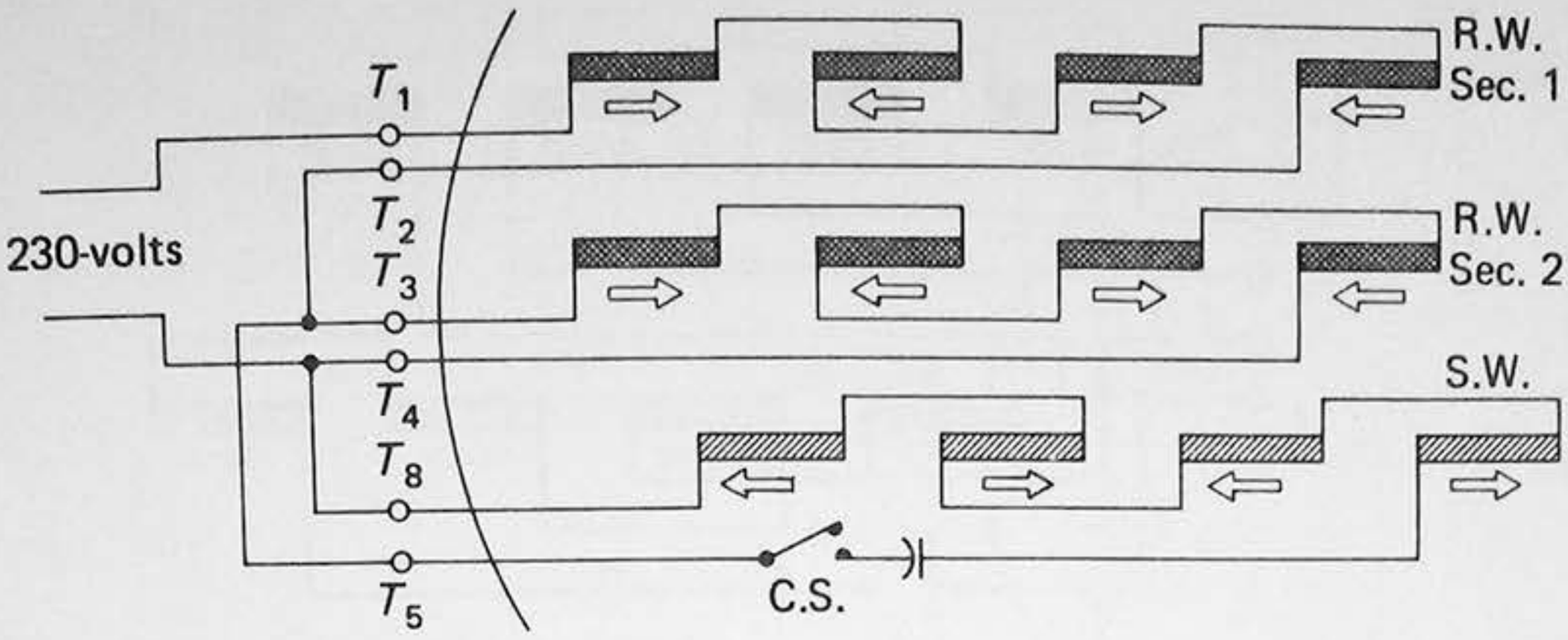


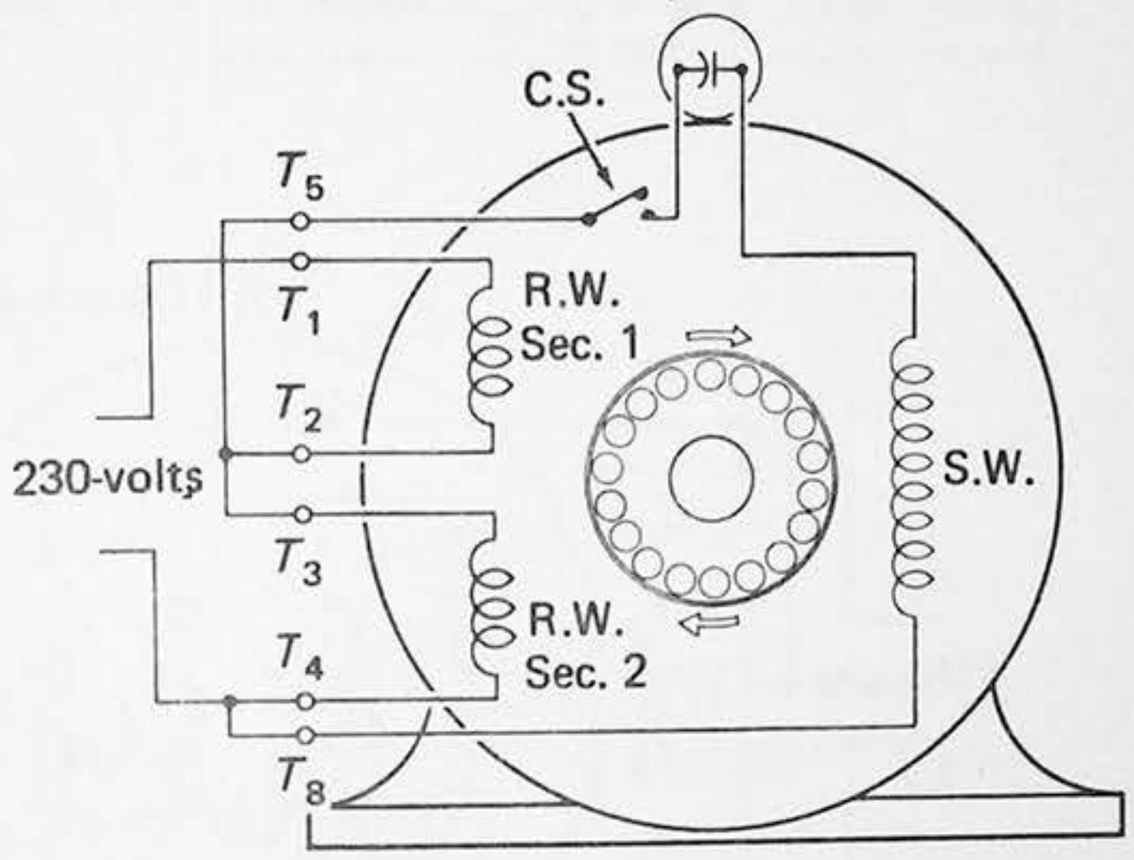
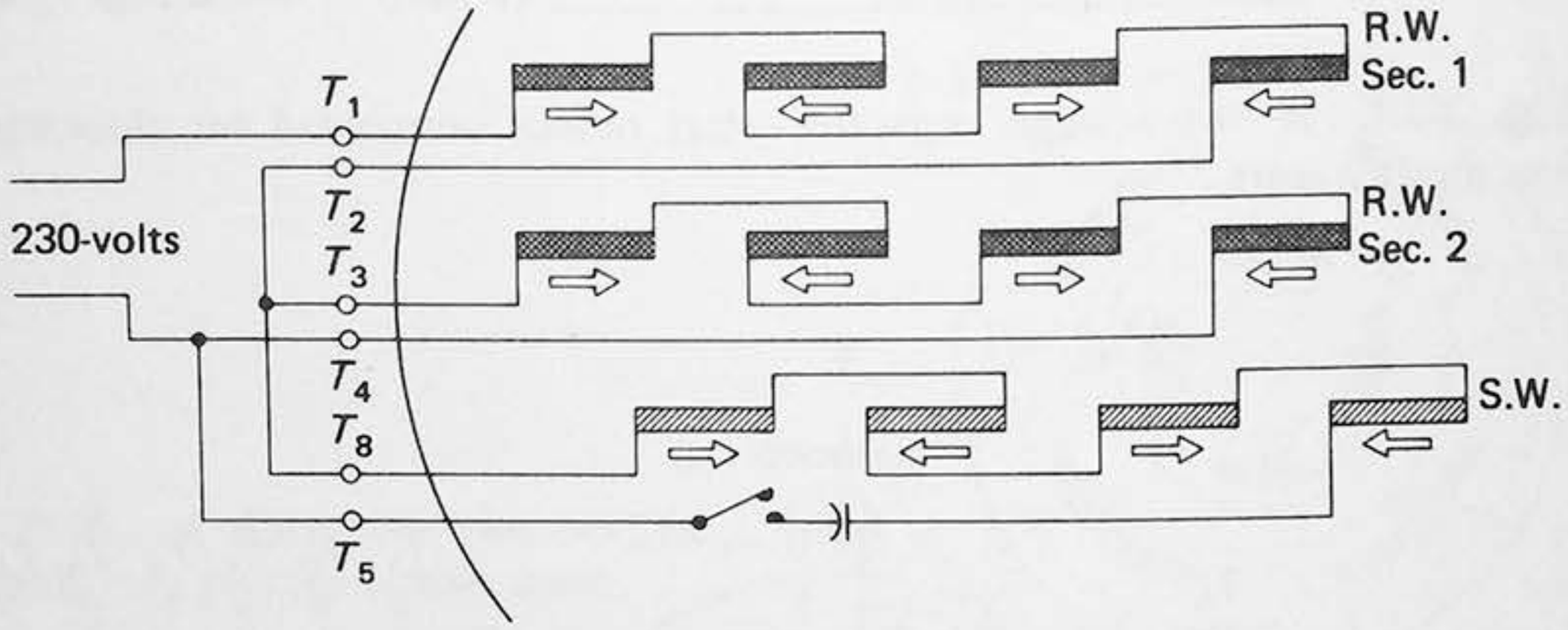


Fig. 2-41. A two-voltage capacitor-start motor connected for clockwise rotation on 230 volts.



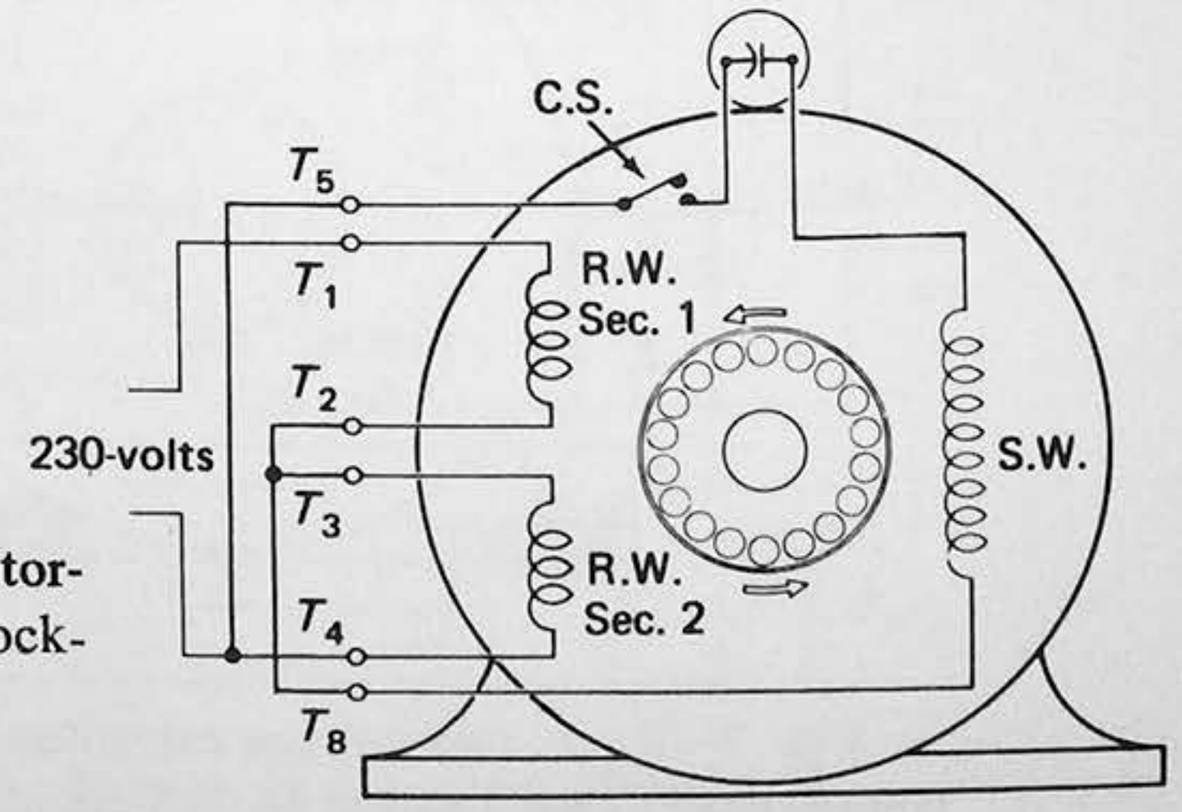


Fig. 2-42. A two-voltage capacitor-start motor connected for counterclockwise rotation on 230 volts.

Figures 2-41; 2-42

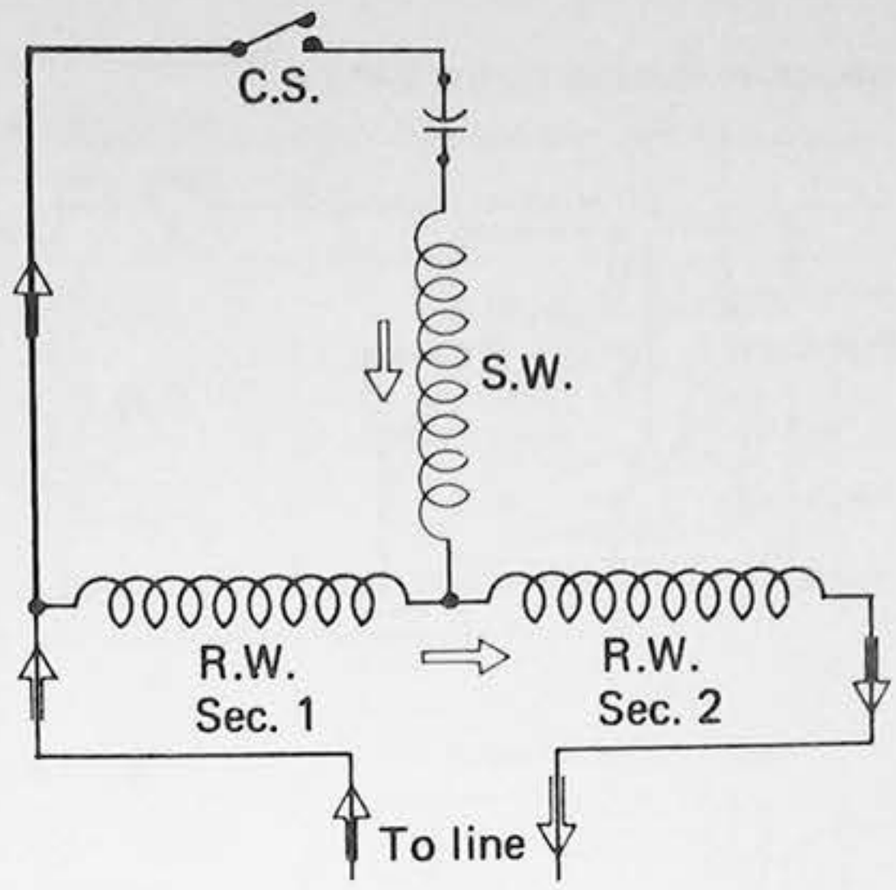


Fig. 2-43. A schematic diagram of a three-lead, reversible capacitor-start motor showing how current in starting winding flows when it is connected across running winding.

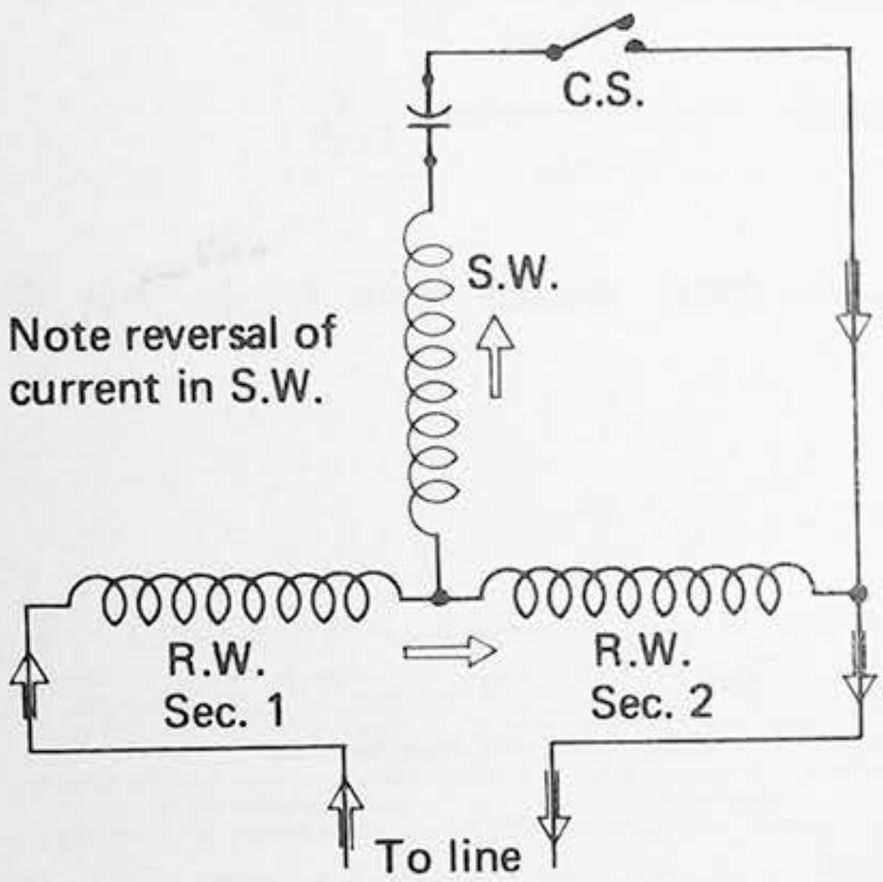


Fig. 2-44. Same as **Fig. 2-43,** except that starting winding is connected across running winding 2.

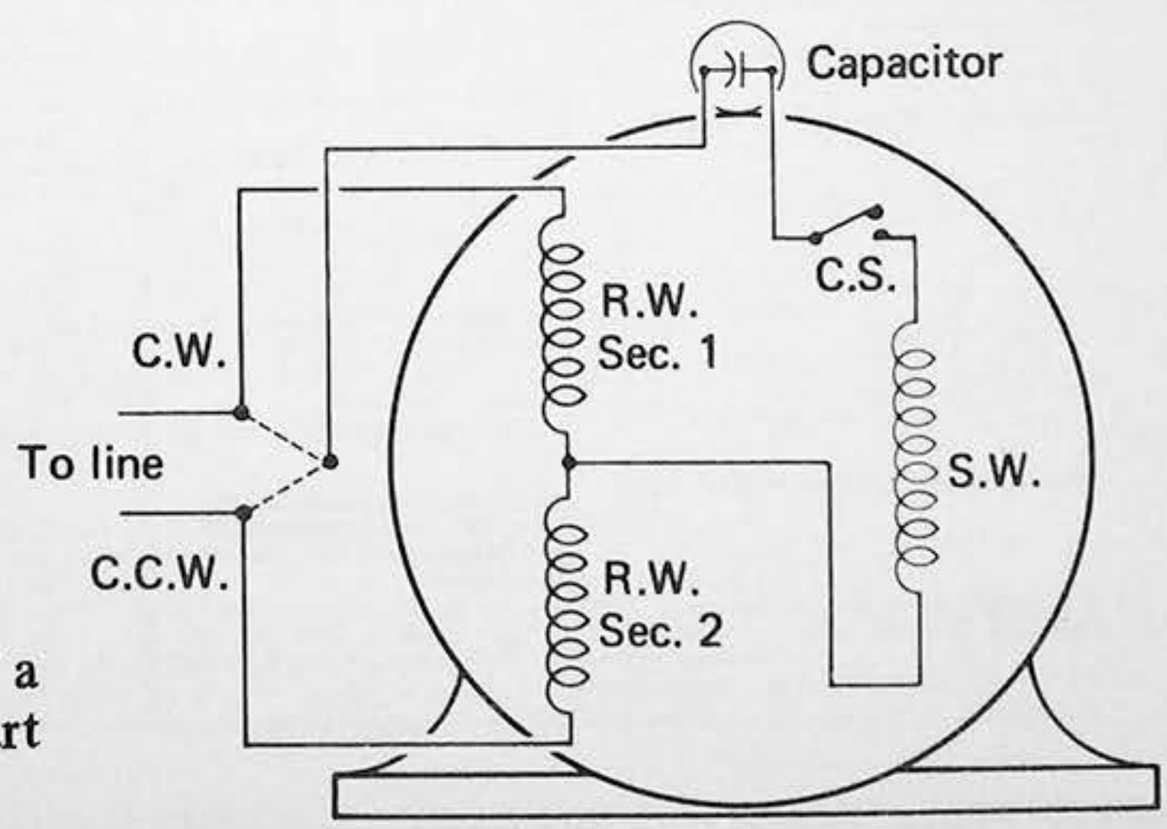


Fig. 2-45. A wiring diagram of a three-lead, reversible capacitor-start motor.

rotation, the starting-winding leads are reversed on the centrifugal-switch terminal plate.

Figure 2-30 shows the connections of the windings for 115-volt operation. The internal connections of the poles of this motor are given in Figure 2-31. Figure 2-32 shows all leads of a reversible two-voltage motor with thermal protection. Other methods of connecting this type of motor are shown in Figure 2-48.

The pitch of the coils, the number of turns, and the wire size were recorded upon stripping. These data are shown in Figure 2-33.

Another method of winding consists of placing both sections of the running winding into the slots at the same time by using two separate wires. This method saves valuable winding time. It should be remembered that since there cannot be an insulation barrier between sections, a high quality covering on the magnet wires is a necessity. A third method consists of winding the poles as in a single-voltage motor and connecting half the poles for one section and the other half for another section. Regardless of the method, the starting winding is connected across one section of the running winding. This is shown in Figure 2-34.

For the third method of winding dual-voltage motors, a long jumper or end-to-beginning connection is preferable to that of the short jumper connection. Diagrams for a four-pole, dual-voltage motor short jumper connection are shown in Figures 2-35 and 2-37. Long jumper connections are shown in Figures 2-36 and 2-38.

6. *Two-voltage, Reversible Capacitor-start Motor* This motor provides for external reversing by means of two additional leads that are brought out from the starting-winding circuit. Figures 2-39 and 2-40 show the connections for clockwise and counterclockwise rotation, respectively, on 115 volts. Figures 2-41 and 2-42 show the connections for 230-volt operation.

7. *Two-voltage Capacitor-start Motor with Overload Protection* The two-voltage, capacitor-start motor described in Section 5 (page 59) contained a thermostatic device for overload protection. This consisted of a three-terminal, bimetallic disc type of relay with auxiliary heater and is connected as shown in Figure 2-30.

8. *Single-voltage, Three-lead, Reversible Capacitor-start Motor* External reversing is impossible in the ordinary capacitor-start motor if only three leads are provided. However, reversing is

easily accomplished if a two-section running winding is used, as on the two-voltage motor. To make this possible, the two sections are internally connected in series, as in the 230-volt connection of the two-voltage motor. The two remaining leads are brought out for connection to the power line (Figure 2-43). One lead of the starting winding is internally connected to the midpoint of the two-section running winding. The other lead of the starting-winding circuit is brought out of the motor. This arrangement permits the starting-winding circuit to be connected across running section *1* in Figure 2-43 for one direction of rotation.

For reversed rotation, the external lead of the starting-winding circuit is changed to the position shown in Figure 2-44, where it is connected across running section *2*. This changes the direction of current through the starting winding.

A schematic diagram showing the windings with three leads brought out for reversing purposes is shown in Figure 2-45.

9. *Single-voltage, Instantly Reversible Capacitor-start Motor.* Under normal operating conditions, a capacitor-start motor must be brought to a complete stop before it can be started in the reverse direction, because the centrifugal switch cannot close until the motor has almost stopped. Since the starting winding is out of the circuit when the switch is in the OPEN position, the reversal of the starting-winding leads while the motor is running has no effect on the operation of the motor.

Some capacitor-start motors have a reversing switch, which is connected as shown in Figure 2-46. This switch has three blades, or poles, that move as one unit to either of the two positions. In one position, clockwise rotation of the motor is provided as shown in the illustration; in the other position, the leads of the starting winding are reversed for counterclockwise rotation. Push button manual, magnetic reversing starters or drum starters are utilized for reversing purposes.

To reverse this type of motor, it is necessary to wait until the motor slows down to a point where the centrifugal switch closes and connects the starting winding to the line.

INSTANT REVERSAL. For certain types of work, considerable time would be lost waiting for the rotor to slow down before it could be reversed. To permit instant reversal while the motor is operating at full speed, a relay is placed in the circuit to short-