INVERTERS

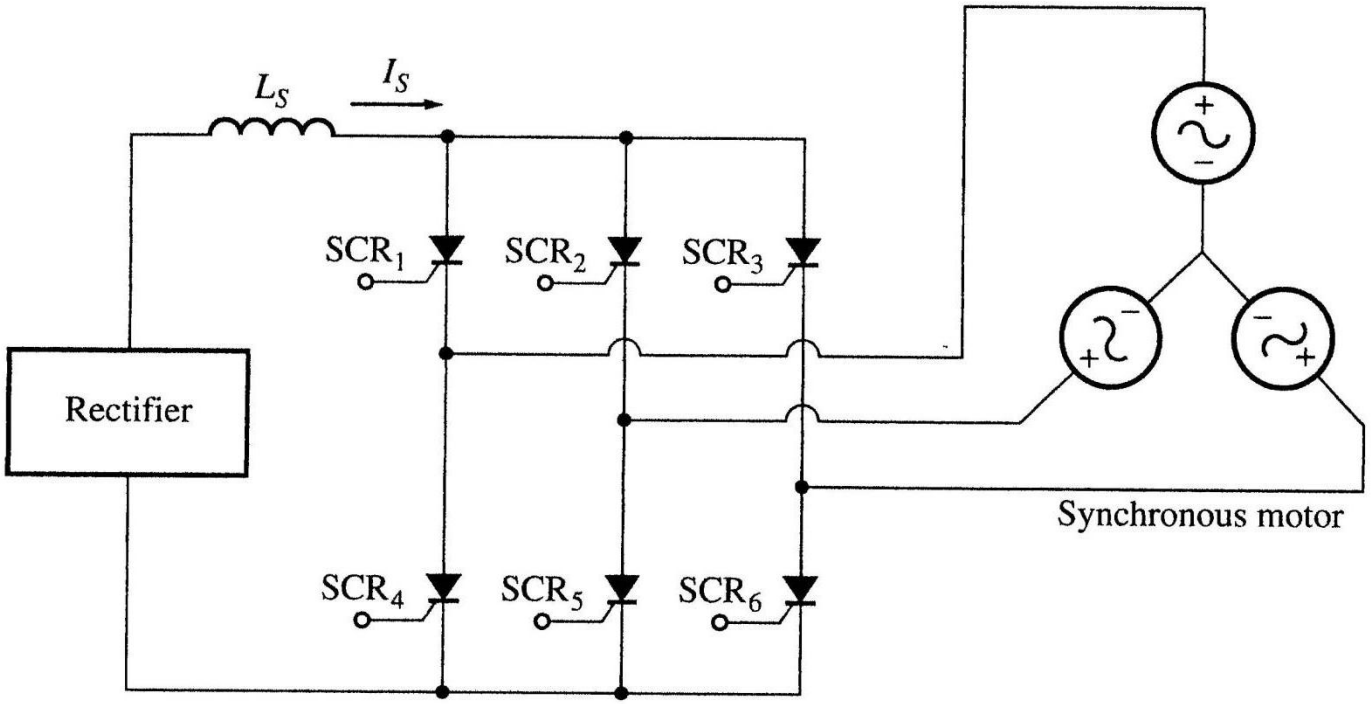
- Inverters are classified into two basic types by the utilized commutation technique:
  - External Commutation
  - Self Commutation

EXTERNAL COMMUTATION INVERTERS

- External commutation inverters are inverters in which the energy required to turn off the SCRs is provided by an external motor or power supply

EXTERNAL COMMUTATION INVERTERS

- An example of an external commutation is shown below



EXTERNAL COMMUTATION INVERTERS

- The inverter is connected to a three-phase synchronous motor, which provides the countervoltage necessary to turn off one SCR when its companion is fired

- The SCRs in this circuit are triggered in the following order:

  - SCR_1, SCR_6, SCR_2, SCR_4, SCR_3, SCR_5

EXTERNAL COMMUTATION INVERTERS

- When SCR_1 fires, the internal generated voltage in the synchronous motor provides the voltage necessary to turn off SCR_3
- Note that if the load is not connected to the inverter, the SCRs would never be tuned off and after ½ cycle a short circuit would develop through SCR_1 and SCR_4
- This inverter is also called a load-commutated inverter

SELF-COMMUTATION INVERTERS

- If it is not possible to guarantee that a load will always provide the proper countervoltage for commutation, then a self-commutation inverter must be used

- Self-commutation inverters can be designed using GTOs, IGBTs, or power transistors

SELF-COMMUTATION INVERTERS

- There are three major types of self-commutation inverters:

1. Current source inverters (SCI)
2. Voltage source inverters (VSI)
3. Pulse-width modulation inverters (PWM)

SELF-COMMUTATION INVERTERS

- Pulse-width modulation is the process of modifying the width of the pulses in a pulse train in direct proportion to a small control signal

SELF-COMMUTATION INVERTERS

- The principle of single-phase inverter operation can be explained with the following figure