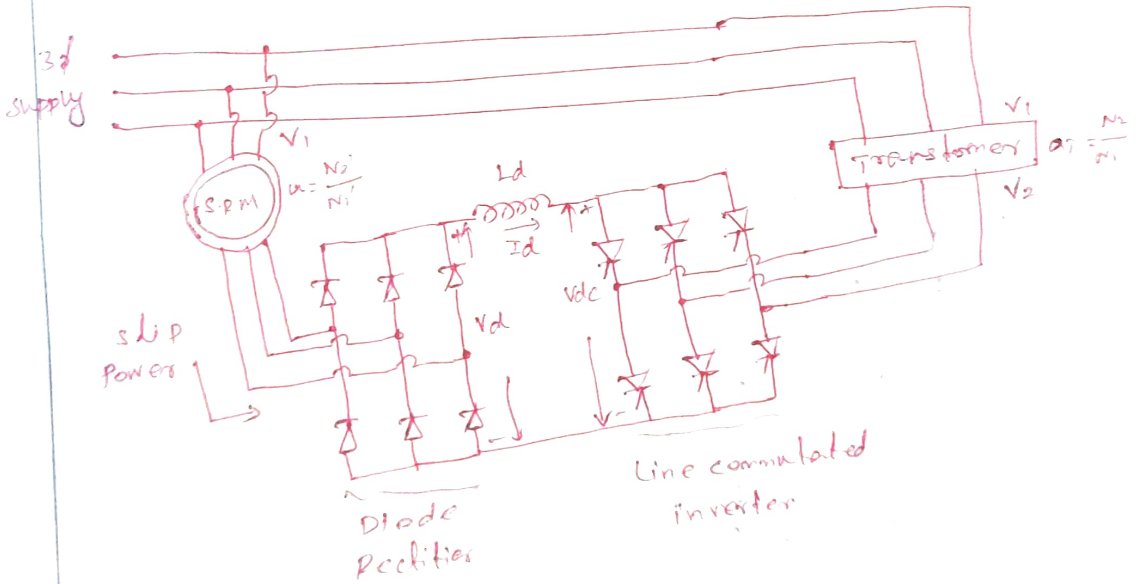
(vi) Static slip Power Recovery scheme:-

In the normal method of speed control of induction motor, the slip power is dissipated in the control resistance connected externally and hence the efficiency of the machine is very less. Now in this method, instead of wasting the slip power in the rotor circuit resistance, we are going to tap it out and use it conveniently to control the speed of the induction motor.

The methods are
(a) Static kramers scheme
(b) static scherbius scheme

(a) static kramer scheme:-



~~The circuit set-up for this scheme:~~

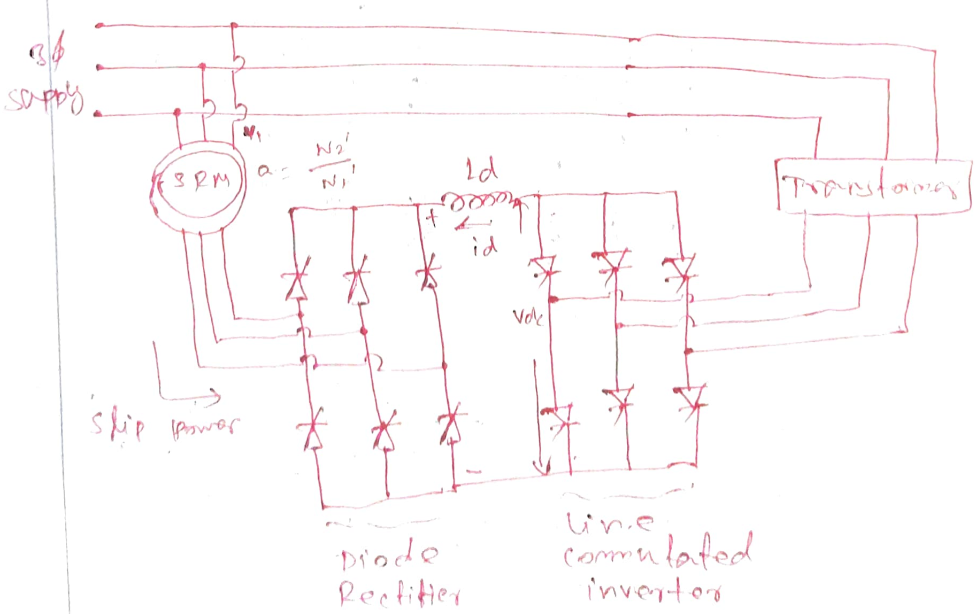
The slip voltage at slip frequency is tapped from the rotor of the main motor, then rectified into a DC voltage, which is again invertered back to AC voltage at normal supply frequency. Then it is fed back to the AC source. The slip power can only flow in one direction

Static

below the synchronous speed.

The slip voltage is rectified into DC voltage by a diode rectifier bridge. An inductor Ld is used for smoothening the ripples in the rectified voltage. This DC voltage is again invertered to AC voltage at normal supply frequency using line commutated inverter. We said that the power flow is from rotor circuit to supply. Static kramer drive offers constant-Torque drive. We can control the speed of the main motor below its synchronous speed by this method.

(b) Static scherbius scheme:-



The main limitation from which static kramers scheme suffers is, in this speed can be controlled below synchronous speed only.

For both below and above synchronous speed, static Scherbius scheme is used.

In sub-synchronous speed control, slip voltage is tapped from the rotor and is fed-back to the supply. But in super synchronous speed control, the additional power is fed into the rotor circuit at slip frequency. The circuit consists of a slip ring induction motor (whose speed is to be controlled), two phase controlled bridges, smoothening inductor and a transformer.

For sub-synchronous speed control, bridge 1 will have firing angle less than 90° (rectifier bridge) and bridge 2 will have firing angle more than 90° (line commutated inverter bridge). The slip power flows from rotor to bridge 2, transformer and to the supply.

For super synchronous speed control, bridge 1 will have firing angle more than 90° (line commutated inverter bridge) and bridge 2 will have firing angle less than 90° (rectifier bridge). The power flow is now from the supply to transformer, bridge 2, smoothening inductor, bridge and to the rotor circuit.

Near the synchronous speed, slip frequency EMF's are not sufficient for natural or line commutation. This can be overcome by using forced commutation.

Advantages:- * simple in construction * used for sub and super synchronous speed control.

D.Adv:- * Expensive than static kramer system