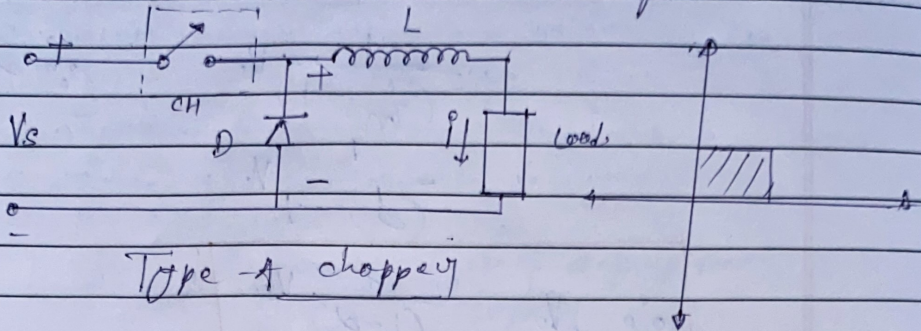


## Type-1 chopper.

In power electronics chopper circuits, unidirectional power semiconductor devices are used. If these semiconductor devices are arranged appropriately a chopper can work in any of the four quadrants as type-1, type-2, type-3, type-4, type-5.

Type-1 chopper is also known as first quadrant chopper. When it is on  $V_o = V_s$  as a result current flows in the direction of the load. But when the chopper is off  $V_o = 0$  but  $I_o$  continues to flow in the same direction through the load  $FD$ .

The average value of current and voltage  $V_o$  and  $I_o$  will be ~~the~~ ~~same~~ positive.



Type-A chopper

The power flow in type A chopper is always from source to load. So this chopper is also known as step down chopper.

### Step-2 Type-B chopper.

Class-B or Type-B chopper: It is defined as the chopper in which the direction of power flow is always from load to source.

The operation of this chopper is confined in the second quadrant. In this quadrant, the output voltage is +ve but current is -ve.

Circuit diagram and operation:

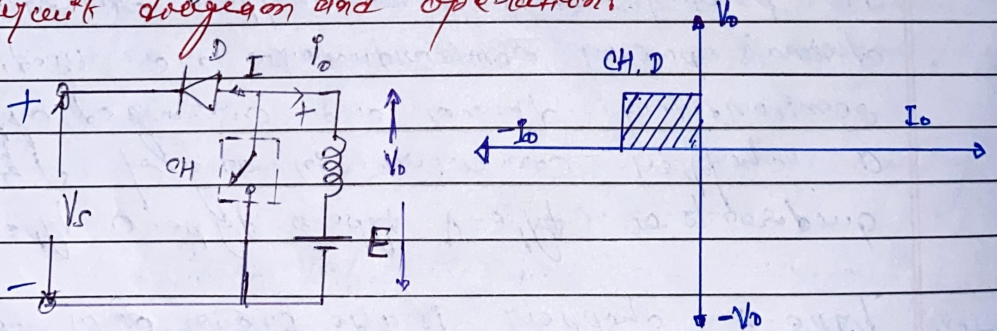


Fig: Type-B chopper.

Fig's Nature of type-B chopper.

When chopper is ON, the load voltage or output voltage  $V_o$  becomes 0. But load voltage  $E$  drive currents through inductor  $L$  and  $CH$ .

During this ON period of chopper, the inductor stores energy in it, and diode is in reversed biased during  $T_{on}$  time of chopper. Hence load is disconnected from source.

When chopper CH is OFF, the load gets connected from the supply source  $V_s$ . However, due to the presence of inductor  $L$ , the current can't be reversed suddenly. Rather, the current through inductor must die down before the current gets reversed. During this time current is decaying through the inductor, the current  $i_o$  flows from load to source and voltage across load is  $V_o = E + L \frac{di_o}{dt}$  makes the diode forward biased and hence current starts to flow from load to source. Here it may be noted that chopping frequency is kept high so that load always supplies power to source. Thus from above discussion, it is clear that current  $i_o$  always flows out of the load irrespective of the fact that whether chopper is ON or OFF. Therefore current  $i_o$  is always  $-ve$  (A general convention is that current is  $+ve$  if it flows from source to load). Since output voltage is always  $+ve$  and current  $i_o$  is  $-ve$ , the load power is  $-ve$ . Negative load power means the load feeds to source.

Type 2 chopper is also called step-up chopper.