DC TO AC CONVERTER INVERTER

SATYAJIT SAHOO

LECTURER IN ELECTRICAL ENGINEERING

GOVERNMENT POLYTECHNIC, BOUDH

Government of Odisha

ସରକାରୀ ବହୁବୃତ୍ତି ଅନୁଷ୍ଠାନ, ବୌଦ୍ଧ

KEY TOPICS TO BE COVERED

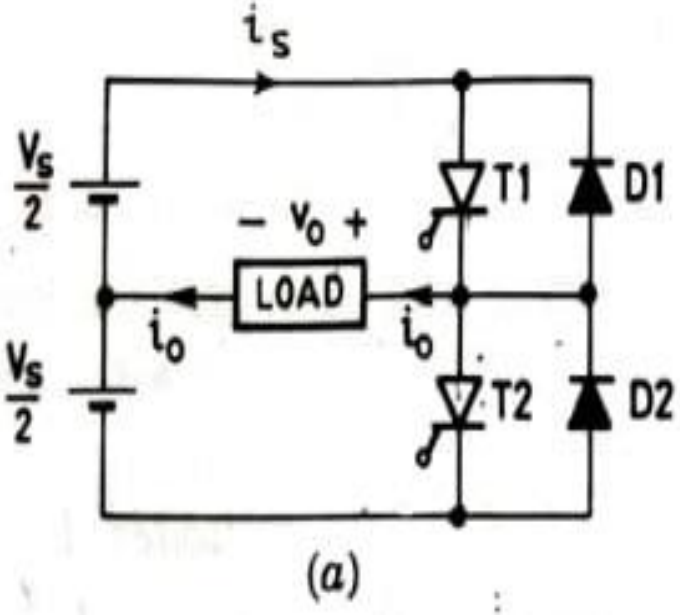
- Classify inverters
- Single-phase bridge inverter
- Series inverter
- Parallel inverter

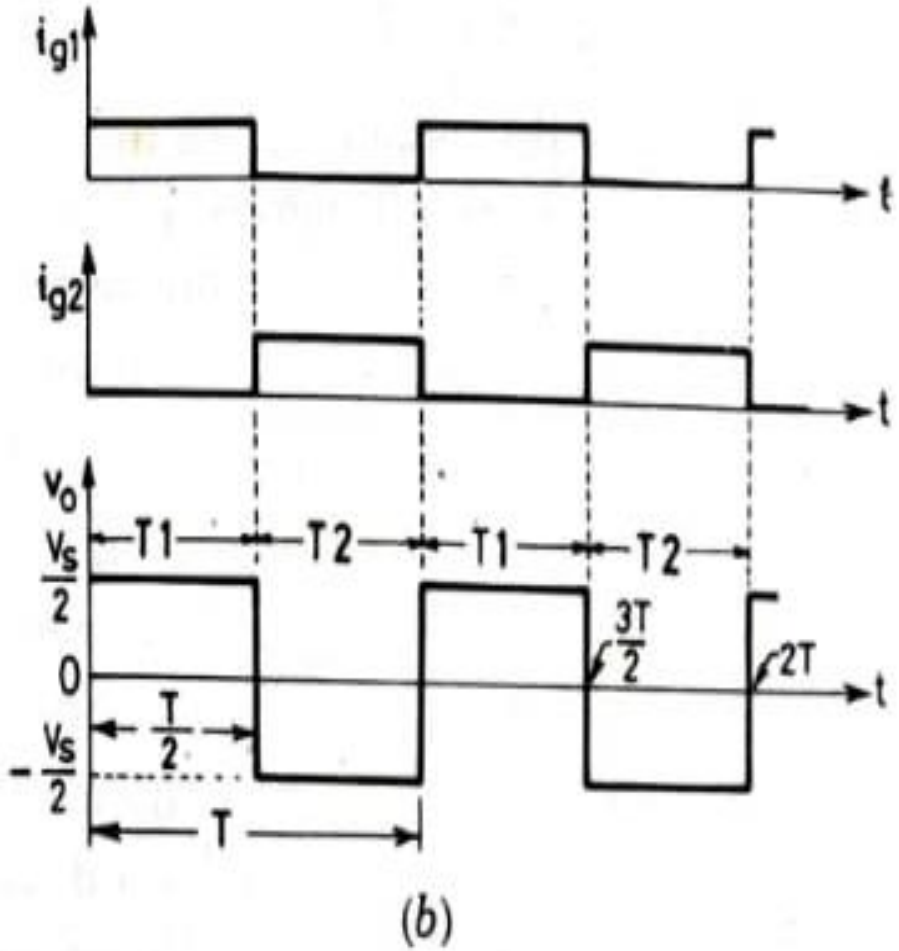
CLASSIFICATION OF INVERTERS

- Classification on basis of Connection of Semiconductor Devices.
  - Series inverter
  - Parallel inverter
  - Single-phase bridge inverter
    - Single-phase half bridge inverter
    - Single-phase full bridge inverter
- Classification on basis of Source
  - Current Source Inverter
  - Voltage Source Inverter

SINGLE-PHASE BRIDGE INVERTER

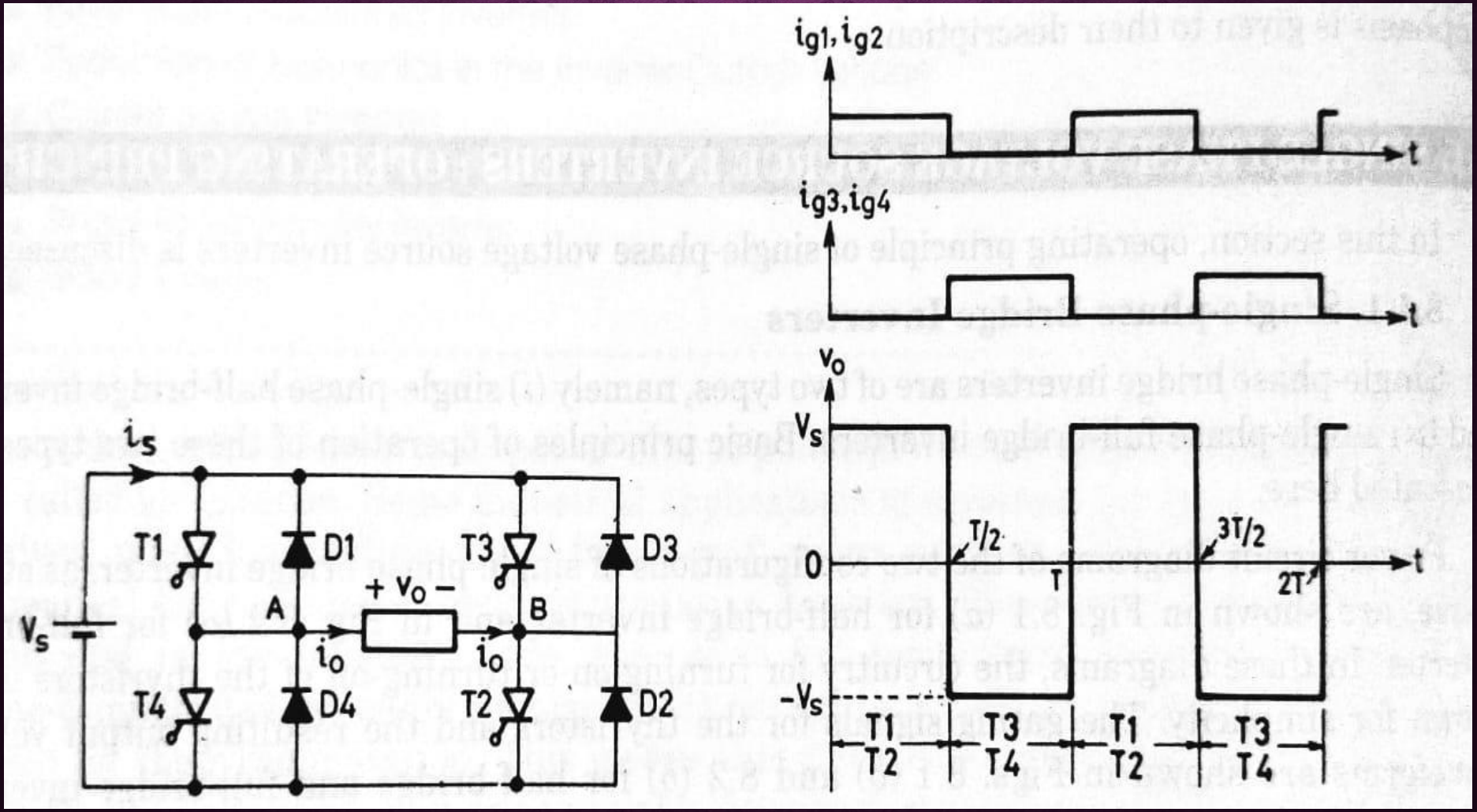
- Single-phase half bridge inverter





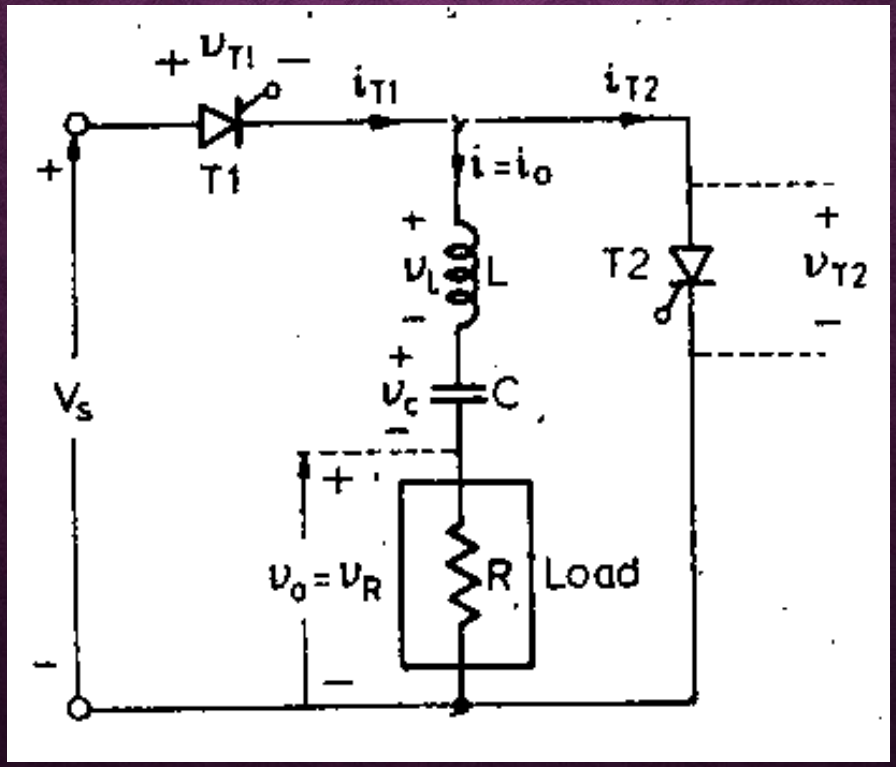
SINGLE-PHASE BRIDGE INVERTER

- Single-phase full bridge inverter



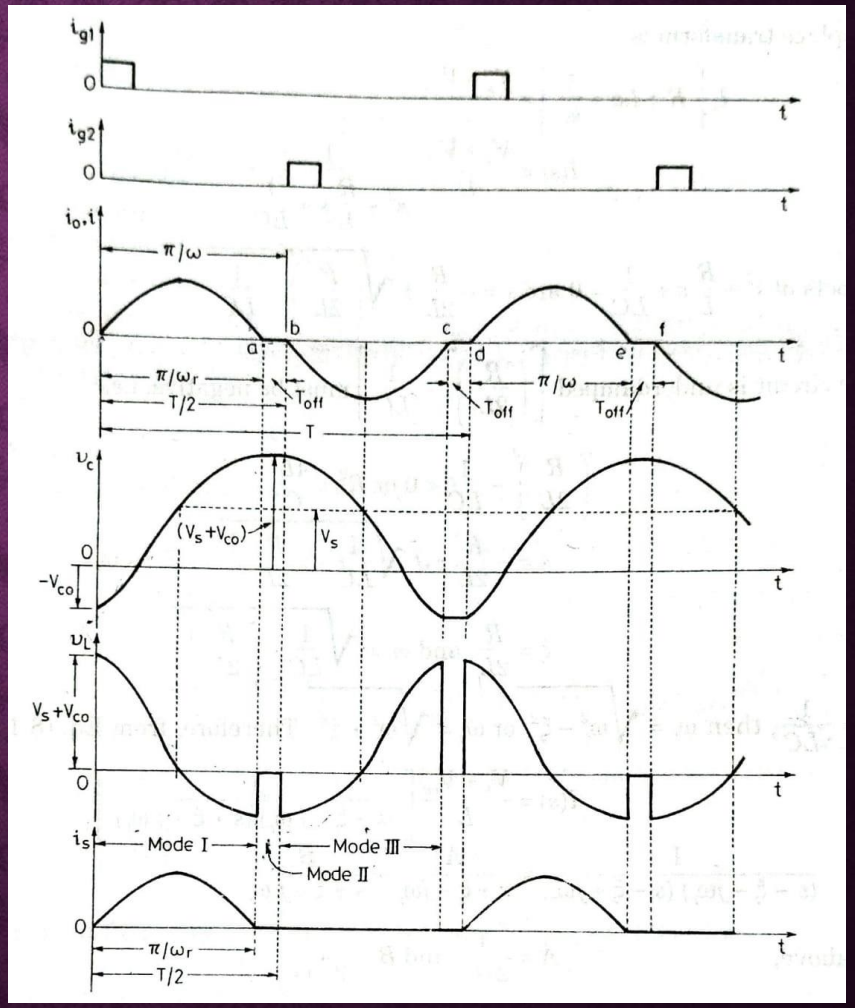
SERIES INVERTER

- Inverters in which commutating components are permanently connected in series with load.
- The figure shows a basic series inverter in which the load resistance "R" is in series with commutating components L and C.



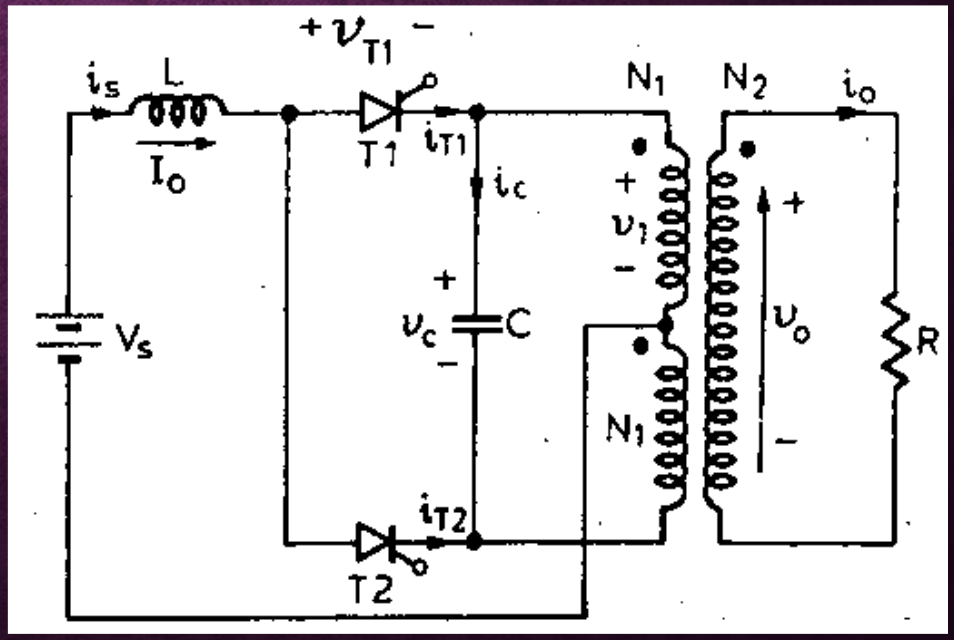
SERIES INVERTER

- When T1 is turned on, with T2 off, Current i starts building up in the RLC circuit.
- At point ‘a’ , T1 is turned off and some time must be provided to thyristor to regain its blocking capability.
- At point ‘b’ , T2 is turned on. After T1 is off the upper part of the capacitor attains positive polarity and begins to discharge now and continues till point ‘c’.
- After time cd must elapse for T2 to recover.
- At point ‘d’ , T1 is again turned on and the process repeats.
- The time ab and cd is called circuit turn-off time or dead zone time.



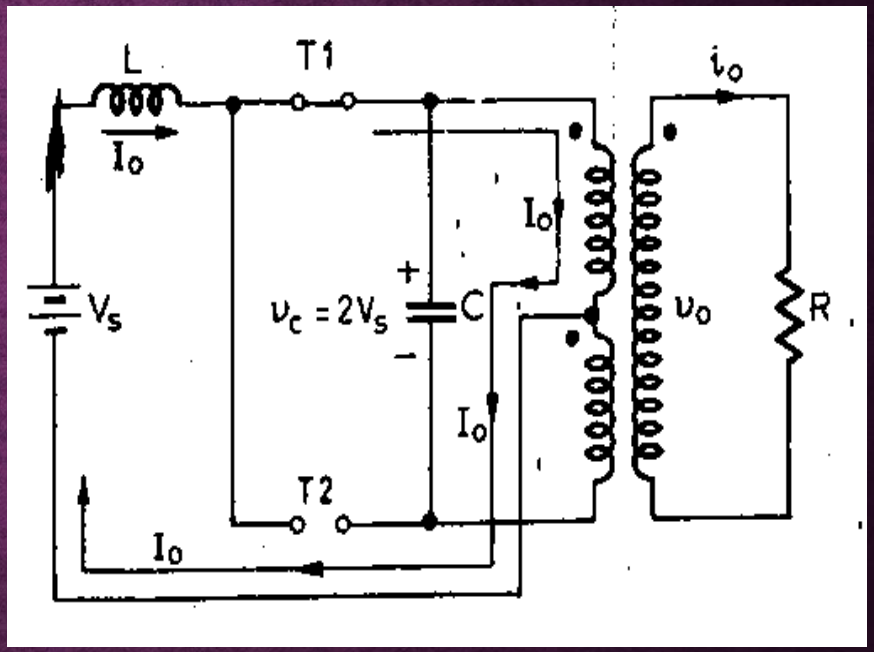
PARALLEL INVERTER

- Inverters in which commutating components are permanently connected in parallel with load.
- It consists of two thyristors T1, T2 ,one inductor L, an output transformer and a commutating capacitor C.
- The turn ratio of transformer is 2 : 1 that can also written as 1:1 ::1.
- During working the capacitor C comes in parallel with the load via transformer so it is parallel inverter.
- It has three modes of operation.
  - Mode I
  - Mode II
  - Mode III



PARALLEL INVERTER MODE-I

- T1 is conducting and a current flows in the upper half of primary. T2 is off.
- An emf V_s is induced in the upper half and so total emf in primary is equal to $2V_s$.
- This voltage charge the commutating capacitor C to a voltage $2V_s$ with upper plate positive.
- Now the T2 is in forward blocking mode through T1 by the capacitor voltage '$2V_s$'.
- Here a current ' I_o ' flows through V_s , L,T1 and upper half of primary.



During this mode

$V_o = V_s$

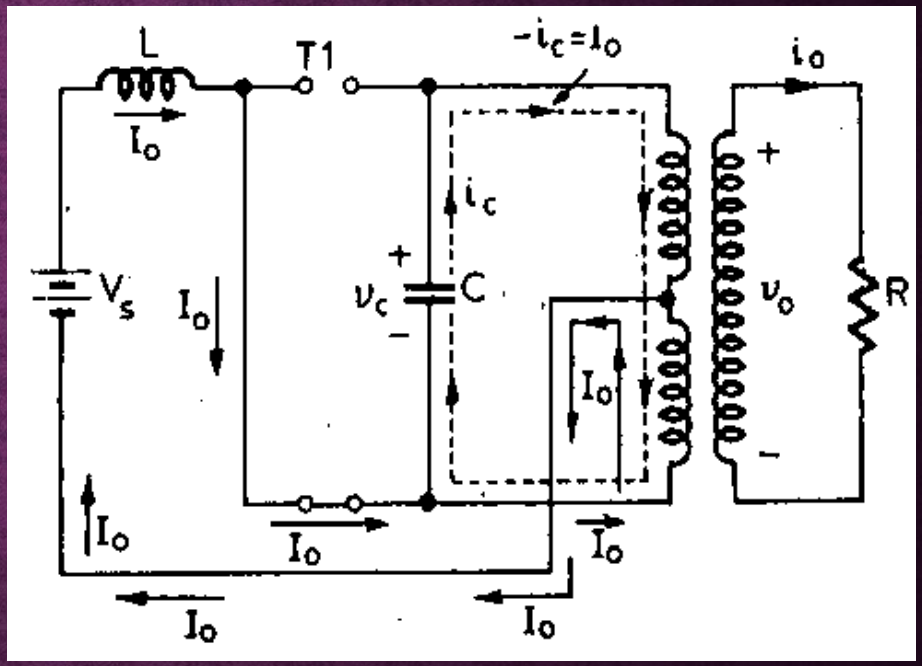
$V_c = 2V_s$

$i_o = I_o$

$V_{T1} = 0$

PARALLEL INVERTER MODE-II

- T2 is turned on by applying gate pulse at t=0.
- The capacitor voltage $2V_s$ appears as a reverse bias across T1 and gets turned off.
- A current I_o begins to flow through T2, lower half of primary winding. An emf $-V_s$ is induced in the lower half and so total emf in primary is equal to $-2V_s$.
- This voltage charge the commutating capacitor C to a voltage $-2V_s$ with lower plate positive at $t=t_1$



During this mode

$V_o = -V_s$

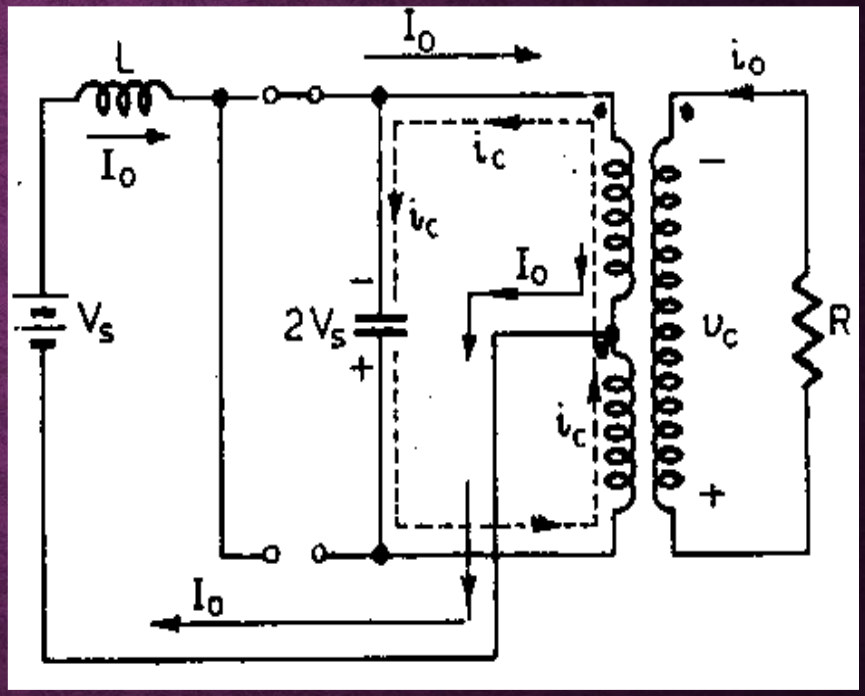
$V_c = -2V_s$

$i_o = -I_o$

$V_{T2} = 0$

PARALLEL INVERTER MODE-III

- When capacitor has charged to -2V_s with upper plate negative.
- The capacitor voltage 2V_s appears as a reverse bias across T2 and gets turned off.
- A current I_o begins to flow through T1, upper half of primary winding. An emf V_s is induced in the lower half and so total emf in primary is equal to 2V_s .
- This voltage charge the commutating capacitor C to a voltage 2V_s with upper plate positive at t= T/2



During this mode

$V_o = V_s$

$V_c = 2V_s$

$i_o = I_o$

$V_{T1} = 0$

THANK YOU