1Ph_HW_Inverter -- Overview

Dr. Ashish Shrivastava (Professor & HoD)
Vikas Singh Bhadoria (Asst. Professor)
Electrical Engineering Department
JRE Group of Institution, Gr.Noida (UP)

1-PHASE HALF WAVE INVERTER WITH R-LOAD

Objective:

After performing this lab exercise, learner will be able to:

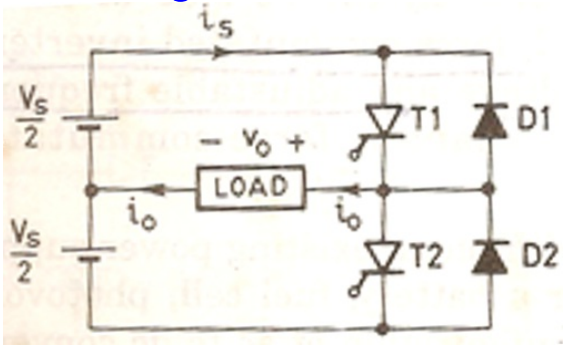
- Understand the working of DC-AC inverter
- Learn the role of Power Electronics in utility related applications.
- Understand and design single-phase Half Wave Inverter.
- Analyze and interpret results
- Work with digital oscilloscope to debug circuit and analyze signals

Equipment:

To carry out this experiment, you will need:

- Single phase inverter kit
- SCR firing circuit kit, 1-phase, 230V, 5A
- Patch chords
- Load (100 ohm / 2A)
- Digital Oscilloscope

Circuit Diagram:

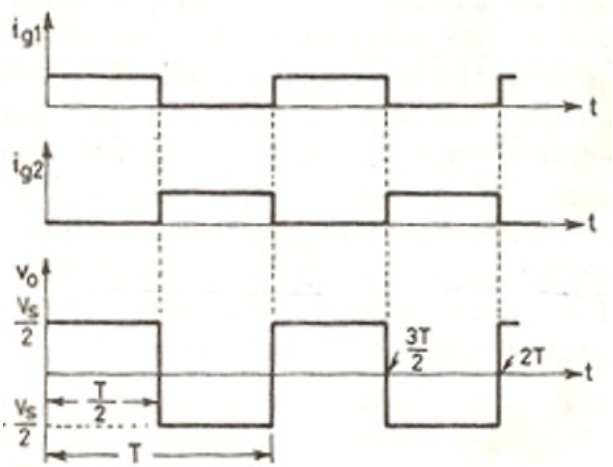


Theory:

- A device that converts DC power into AC power at desired output voltage and frequency is called an inverter.
- The single phase half bridge consists of two SCRs and two diodes and three wire supply. For $0 < t \leq T/2$, thyristor T1 conducts and load is subjected to a voltage Vs/2 due to upper voltage source Vs/2.
- At $t = T/2$, thyristor T1 commuted and T2 is gated on. During the period $T/2 < t \leq T$, thyristor T2 conducts and load is subjected to

a voltage (-Vs/2) due to lower voltage source Vs/2.

- Load voltage is an alternating voltage of amplitude of Vs/2 and of frequency 1/T Hz.
- The frequency of the inverter output voltage can be changed by controlling T.
- The main drawback of half-bridge inverter is that it requires 3-wire DC supply
- The ideal waveform of the experimental setup is shown in Figure below:



1Ph_HW_Inverter -- Procedures

Step 1

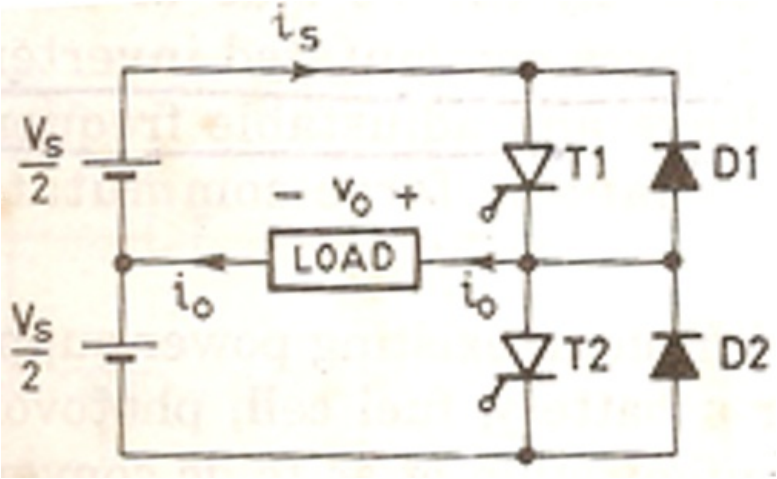
Precautions:

- A main switch should be included in whole circuit, so that in case of any emergency main supply can be disconnected from the circuit.
- Check all the connection before switching ON the power supply.
- Apply low voltages or low power to check the proper functionality of circuits.
- Load should be remained connected to the experimental setup for discharging the energy stored in the inductor or capacitor present in the circuit, if any.
- Don’t touch live wires.

Step 2

Circuit Setup:

Build the circuit as shown below:



Step 3

Probe across load resistance (V_0)

Step 4

Keep the multiplication factor of the CRO’s probe at the maximum position (10X or 100X - whichever is available)

Step 5

Switch on the experimental kit and firing circuit kit.

Step 6

- Set the duty cycle to 50%
- Capture output waveforms on oscilloscope

Step 7

- Measure the RMS value of the output
- Take screenshot of output waveform.

Step 8

Switch off the power supply and disconnect from the power source.