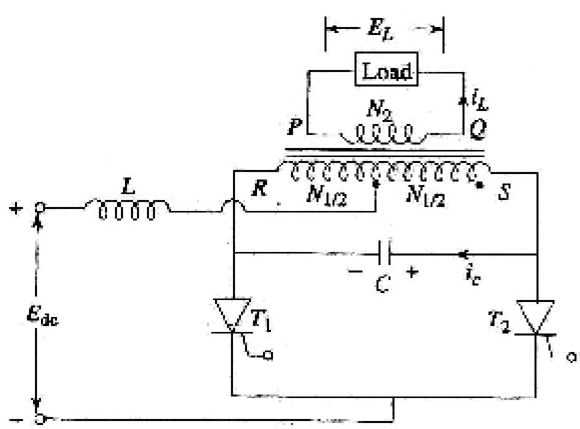
INVERTER

The DC to AC power converters are known as Inverters. An inverter is a circuit, which converts a dc power into an ac power at desired output voltage and frequency. The ac output voltage could be fixed or variable frequency. This conversion can be achieved either by controlled turn on and turn off devices (e.g. BJT's, MOSFETs, IGBTs, MCTs, SITs, GTOs, and SITHs) or by forced commutated thyristors, depending on applications. The output voltage waveforms of ideal inverter should be sinusoidal. The voltage waveforms of practical inverters are, however, nonsinusoidal and contain certain harmonics. Square wave or quasi-square wave voltages are acceptable for low and medium power applications, and for high power applications low, distorted, sinusoidal waveforms are required. The output frequency of the inverter is determined by the rate at which the semiconductor devices are switched on and off by the inverter control circuitry and consequently, an adjustable frequency ac output is readily provided.

Parallel Inverter: A parallel inverter is used to produce a square-wave from a DC supply. Basically, by alternately switching the two Thyristors, the DC source is connected in alternative sense to the two halves of the transformer primary, thereby inducing a square-wave voltage across the load in the transformer secondary. Figure 1 shows the circuit in its most regularly used form. In this inverter, the commutating capacitor comes in parallel with the load during the operation of the inverter and hence this inverter is called as a parallel inverter. The capacitor shown in Fig.1 is required for commutation, but as the capacitor is effectively in parallel with the load via the transformer, an inductor *L* is required in series with the DC source to prevent the instant discharge of capacitor C via the source when Thyristor switching occurs.



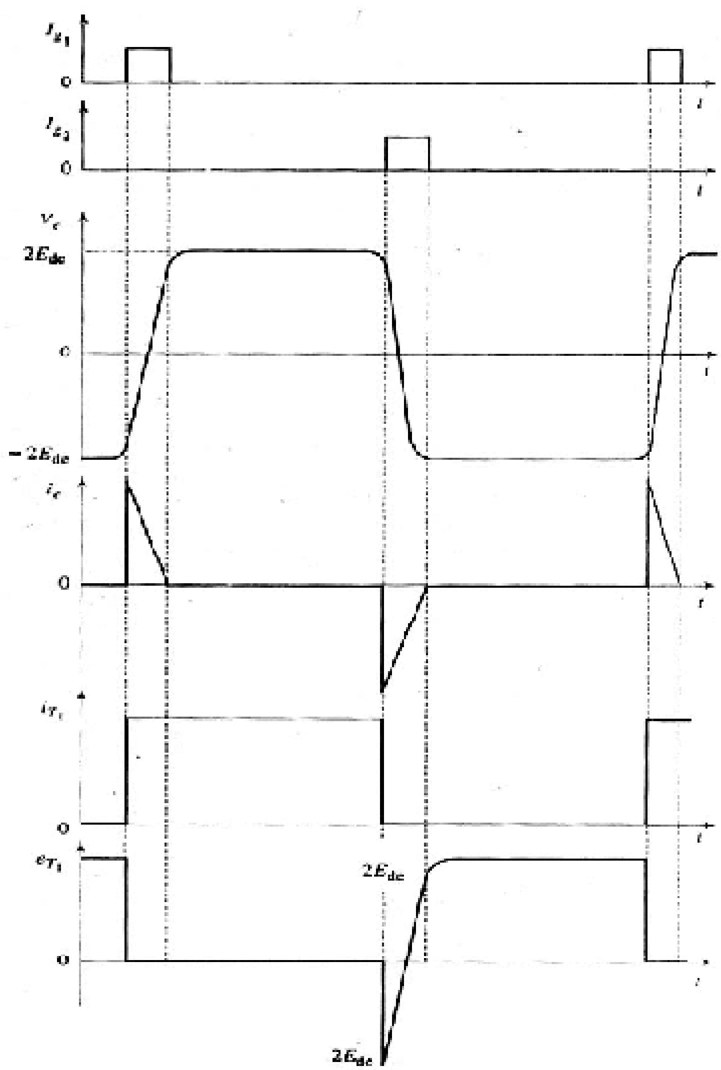
Parallel Inverter

The operation of the circuit can be explained with the help of several operating modes as follows:

Mode 1: This mode begins when T_1 is fired and a current flow through the inductance L and the Thyristor T_1. When SCR T_1, is turned on, the D.C. source voltage Edc appears across half the transformer primary, which means the total primary voltage is 2Edc, hence the capacitor is charged to 2Edc with the polarity shown in Fig.1.

Mode 2: This mode begins when thyristor T_2 is fired. When T_2 is turned-on, the commutating capacitor applies a voltage -2Edc to appear across T_1, when this reverse voltage is applied for a sufficient time across T_1, it will be turned off. SCR T_2 will now be conducting and a voltage of 2Edc will appear across the transformer primary and the commutating capacitor, but with a reverse-polarity to that shown in Fig.1.

Mode 3: During this mode, this SCR T_1 is again turned-on. When T_1 is turned on, the commutating capacitor applies a voltage - 2Edc to appear across T_2 when this reverse voltage is applied for a sufficient time across T_2 it will be turned-off. Thus, if trigger pulses are periodically applied to the alternate Thyristors, An approximately rectangular voltage waveform will be obtained at the transformer output-terminals. The related circuit voltage and current waveforms are shown in Fig.2.



Voltage and Current Waveform