

## TAPA-8. PUSH PULL AMPLIFIER

A pushpull amplifier uses two transistors as shown in Fig. TAPA-16. This circuit can work in class-B, class-AB or class-A operation.

The audio power amplifier used in transistor receivers, tape recorders, record players etc. make use of this circuit. These systems are usually operated by batteries (cells).

This amplifier consists of two transistors (*npn*) and two transformers, one at the input and other at the output end. Both transistors work in class-B mode.

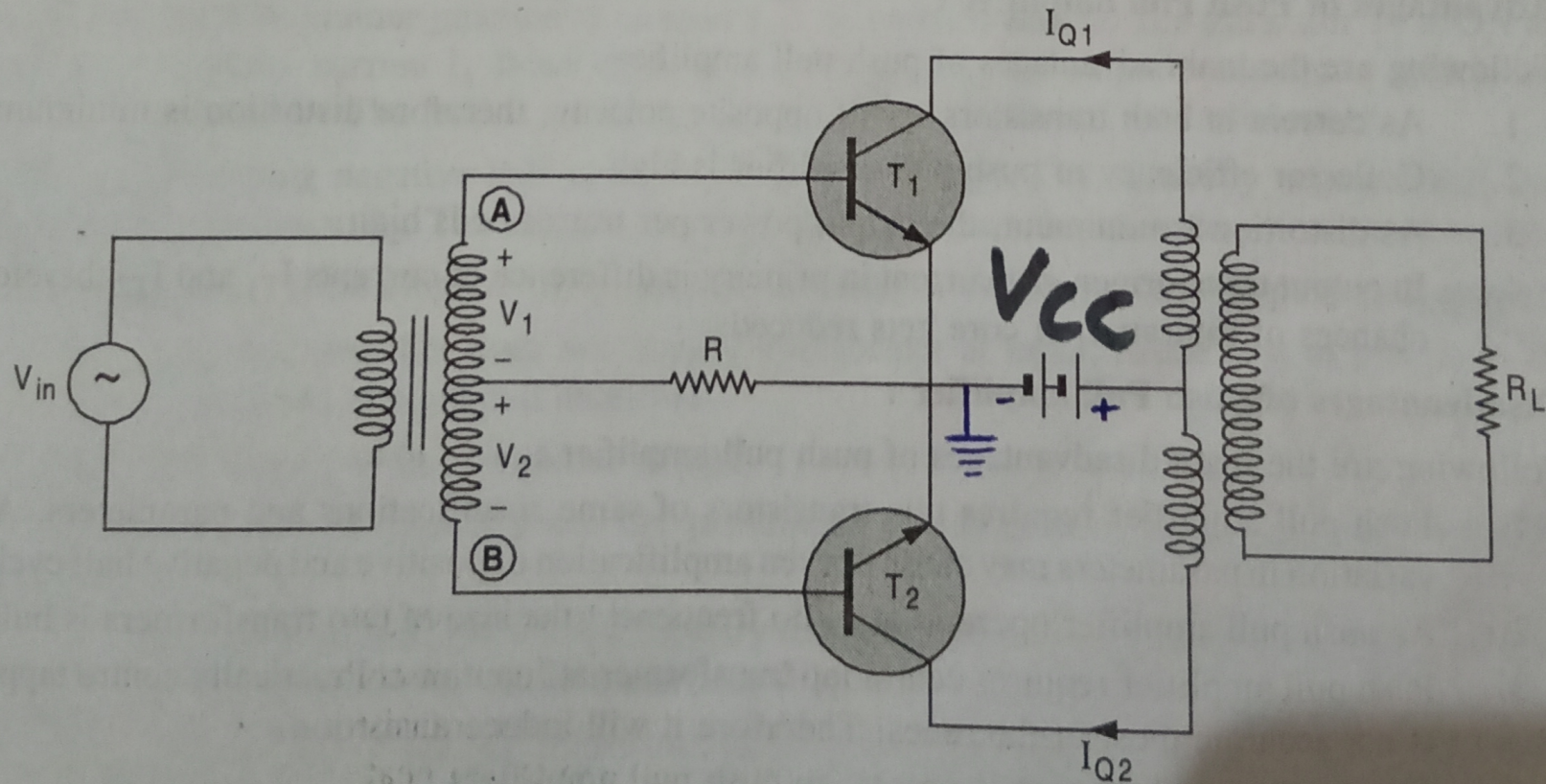


Fig. TAPA-16 : Push pull amplifier

The amplifier is called push pull because at a time, one transistor is ON and other is OFF and over next input cycle, the condition is reversed.

**Operation :** When input voltage is applied at primary end of input transformer, then voltage is induced in secondary coil. As secondary coil is centre taped, the voltage at terminal A will be of opposite polarity then voltage at B. During positive half cycle of input signal, if terminal A is positive then terminal B will be negative. Therefore, voltage  $V_1$  will forward bias base-emitter junction of transistor  $T_1$ . The  $T_1$  will turn ON. As a result, current  $I_{Q1}$  will flow in primary winding of output transformer. This will cause induction of voltage in secondary coil or output terminal.

When input is positive, terminal B is negative. Therefore voltage  $V_2$  will reverse bias  $T_2$  transistor. The  $T_2$  will be OFF, no current will flow through  $T_2$ , so during positive half cycle of input signal, following will be status of transistors.

Input	Transistor $T_1$	Transistor $T_2$
Positive half cycle	ON	OFF

Similarly, when input is in negative half cycle, then situation will be reversed. Terminal A is negative and B is positive. Thereby now voltage  $V_1$  will reverse bias  $T_1$  and voltage  $V_2$  will forward bias  $T_2$ . It will turn  $T_2$  ON and  $T_1$  OFF. Thereby status of transistors will be :

Input	Transistor $T_1$	Transistor $T_2$
Negative half cycle	OFF	ON

In push pull amplifier, one half of input is amplified by one transistor and other half is amplified by other transistor. The amplified output will appear across secondary of output transformer which deliver maximum power to load. It is essential that both the transistors should have same specifications otherwise it will cause uneven amplification of positive and negative half cycles of input signal.

#### Advantages of Push Pull amplifier :

Following are the main advantages of push pull amplifier :

1. As current in both transistors are of opposite polarity, therefore distortion is minimum.
2. Collector efficiency of push pull amplifier is high.
3. As distortion is minimum, the output power per transistor is high.
4. In output transformer, net current in primary is difference of currents  $I_{T1}$  and  $I_{T2}$  therefore chances of saturation of core gets reduced.

#### Disadvantages of Push Pull amplifier :

Following are the main disadvantages of push pull amplifier :

1. Push pull amplifier requires two transistors of same specifications and parameters. Any variation in parameters may cause uneven amplification of positive and negative half cycles.
2. As push pull amplifier operates at audio frequency, the size of two transformers is bulky.
3. Push pull amplifier requires centre tap transformer at Input end. Practically centre tapping is not accurate most of the times. Therefore it will induce distortion.
4. The cross over distortion is present in push pull amplifiers.