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POWER AMPLIFIER

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Abstract- **An amplifier receives a signal from some pickup transducer or other input source and provides a larger version of the signal to some output device or to another amplifier stage. An input transducer signal is generally (a few millivolts from a cassette or CD input, or a few microvolts from an antenna) and needs to be amplified sufficiently to operate an output device (speaker or other power-handling device). In small-signal amplifiers, the main factors are usually amplification linearity and magnitude of gain. Since signal voltage and current are small in a small-signal amplifier, the amount of power-handling capacity and power efficiency are of little concern. A voltage amplifier provides voltage small amplification primarily to increase the voltage of input signal. Large-signal or power amplifiers, on the other hand, primarily provide sufficient power to an output load to drive a speaker or other hand, primarily provide sufficient power to an output load to drive a speaker or other power device**

I. INTRODUCTION

An amplifier system consists of signal pick-up transducer, followed by a small signal amplifier(s), a large signal amplifier and an output transducer. A transducer is used to convert one form of energy into another type. For example a microphone is used to convert acoustical energy into electrical energy. Conversely, a loudspeaker is used to convert electrical energy into acoustical energy. A motor is a transducer that is used to convert electrical energy into mechanical energy. Power amplifier is meant to raise the power level of the input signal. In order to get large power at the output, it is necessary that the input-signal voltage is large. That is why, in an electronic system, a voltage amplifier always precedes the power amplifier, also, that is why power amplifiers are called large-signal amplifiers. In fact, power amplifier does not amplify power. What a power amplifier actually does is that it draws power from dc supply connected to the output circuit and converts it into useful ac signal power. The type of ac power available at the output terminals of the power amplifier is controlled by the input signal. Thus a power amplifier may be defined as a device that converts dc power and whose action is controlled by the input signal. The transistors employed in power amplifiers are called power transistors. They differ from other transistors in the following respects.(i) The base is made thicker to handle large currents i.e.in power amplifiers; transistors with comparatively smaller gain are used.(ii) The area of collector region of a power transistor is made considerably larger in order to dissipate the heat developed in the transistor during operation. Moreover, heat sinks are used for improving the heat dissipation.(iii)The emitter and base layers are heavily doped. The contact area between the base layers and base base leads is in ring like form so that the area is Increased.

II. CLASSIFICATION ACCORDING TO MODE OF OPERATION

Transistor power amplifiers handle large signal that collector current. The transistor dissipates more power Many of them are driven so hard saturation voltage; Because of total absence of negative half cycle from the output the signal distortion is high. by the input large Zero signal input represents the best condition for class B amplifiers because of zero collectors current is either cut- off or is in region during a large portion of the input cycle. So such amplifiers are generally with

increase in signal strength. In comparison to class A amplifiers average current is less, power dissipation is less So overall efficiency is Increased. The theotrical efficiency in class B operation is about 78.5% while it is only 50% in class A operation.

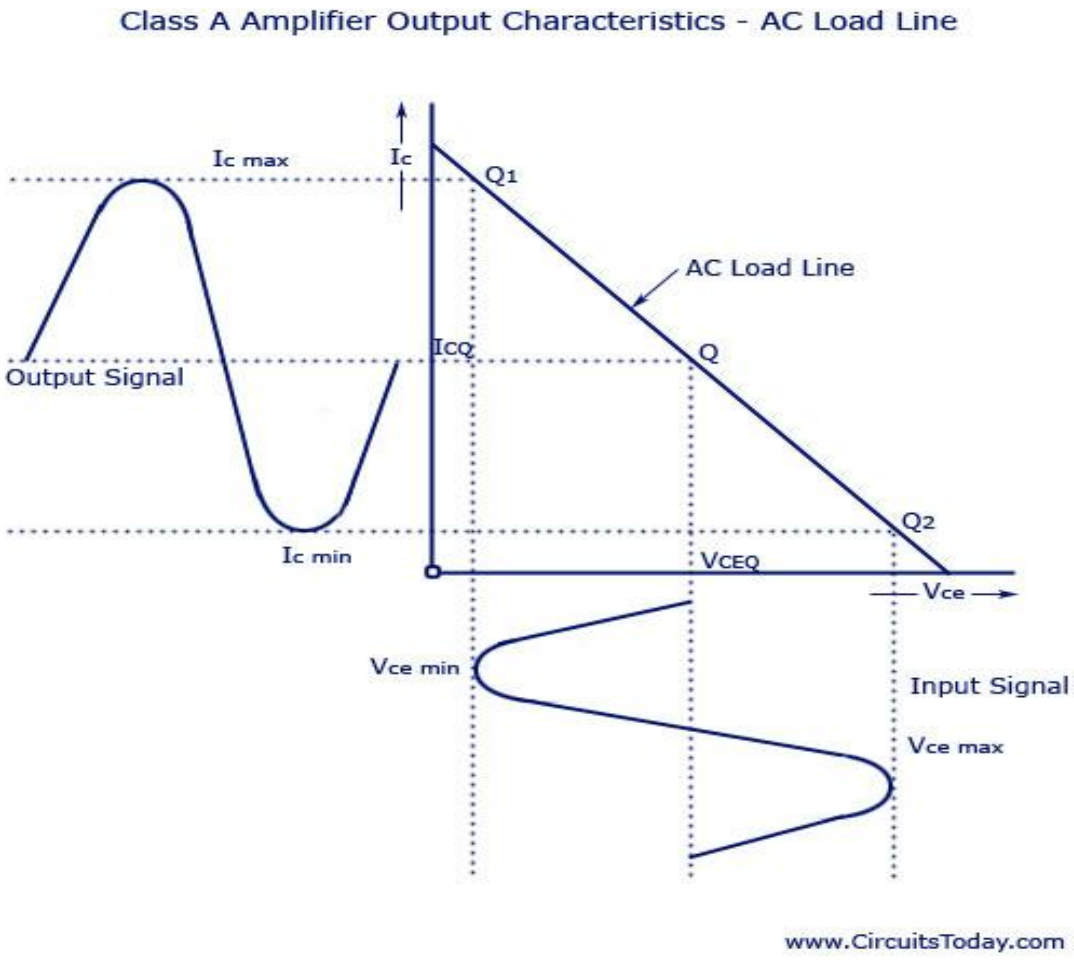
Class C Power Amplifiers - - A class C power amplifier is biased for operation for less than 180 of the input signal cycle and will operate only with a tuned or resonant circuit which provides a full cycle of operation for the tuned. or resonant frequency. Such power amplifiers are, therefore, employed in special areas tuned circuits, such as radio or communication

Class D Power Amplifiers - Class D power amplifiers are designed to operate with digital or pulse type signals. Using digital technique makes it possible to have a signal that varies over the entire cycle (using sample-and-hold-circuitry) to recreate the output from many pieces of input signal. The main advantage signal. The main advantage of class D power amplifiers is that it is on (using power) only For short intervals and the overall efficiency can practically be very high.

classified according to their mode of operation. This classification is based on the amount of transistor bias and amplitude of the input signal. It takes into account the portion of the cycle for which the transistor conducts. They are classified as below:

Class A Power Amplifiers – In this case, transistor is so biased that the output current flows for the entire cycle of the Thus the operating point Is so selected that the transistor operates only over the linear region of its load line So such an amplifier can amplify input signal of small amplitude. As the transistor operates over the linear portion of load line, the output waveform is exactly similar to input waveform. So class A amplifiers are characterised by a high fidelity of the output. Such amplifiers are used where freedom from distortion is prime aim. Operation is restricted only over a small central region of the load line so such amplifiers can be used for amplifying signals of small amplitude. Also ac power output per transistor is small. The maximum possible overall efficiency with resistive load is 25%. The maximum possible collector efficiency with resistive load is 50%. . In case an output transformer is used, both of these efficiencies are 50%.

Class B Power Amplifiers - In this case, the transistor bias and signal amplitude are such that output current flows only during positive half cycle of the input signal. At zero signals , the collector current is zero and no biasing system is required in class B amplifiers. The operating point is selected at collector cut-off



III. RESULT

The term power amplifier is a relative term with respect to the amount of power delivered to the load and/or provided by the power supply circuit. In general the power amplifier is the last 'amplifier' or actual circuit in a signal chain (the output stage) and is the amplifier stage that requires attention to power efficiency.

IV. CONCLUSION

Power Amplifiers (PA) deliver power to a given load withmaximum efficiency while faithfully transferring the modulation from the input to the output.Like small-signal amplifiers, PAs are typically matchedat the input. However, the output of the PA is usuallyunmatched in order to maximize efficiency (which results in lower power gain).

REFERENCE

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