ELECTRONICS LAB.

PART 6

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OPERATION CLASSES OF TRANSISTOR

8.1 INTRODUCTION

There are classes of transistors according to the ratio of output signal to the input signal.

These are *A-AB-B-C* classes. Operation classes of transistor are determined by base bias or in other words work point on the load line. Operation bias of a transistor can be made by various methods. The most common methods are seen in Figure 8. 1

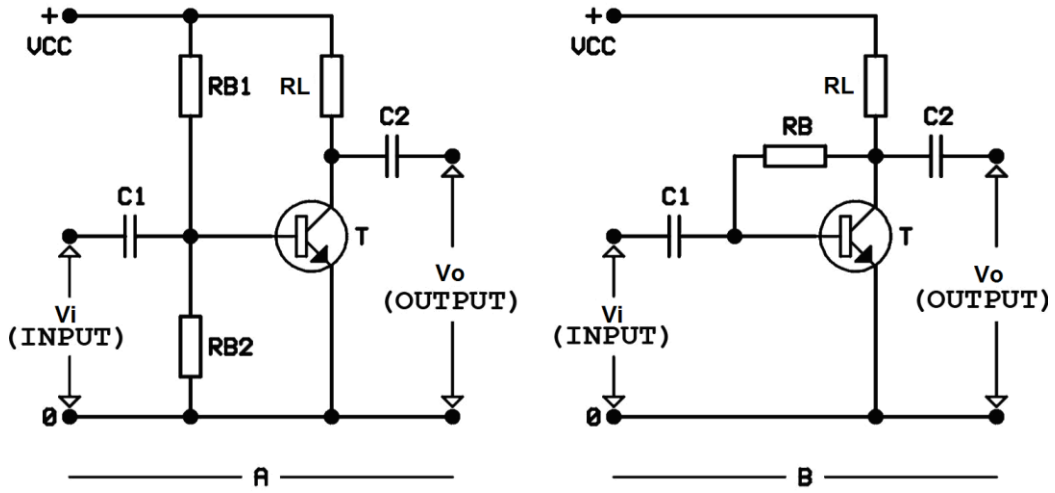

Figure 8. 1

The transistor in Figure 8. 1is an emitter ground amplifier. As we know it is the most common connection type. Operation classes of transistor are examined on this connection type in our experiment set. In figure 15.1A, base bias is maintained by the RB1 and RB2 resistors from the supply voltage. This type of bias is called fixed bias. In Figure 8. 1B, base bias is sustained by collector voltage. During the work time of transistor, there are forward voltage from the supply and alternating voltage formed by the input signal. This voltage has a variable collector and this voltage controls the base in negative direction because there is 180^0 of phase difference in emitter ground amplifiers. As you see, base is negative charged from collector and the gain is restricted. This type of bias is called "**degenerative bias**".

While examining operation classes of amplifiers, productivity of amplifiers will also be dealt. Productivity of an amplifier is the supply energy it uses during the active work time.

8.2 CLASS A AMPLIFIER

The most important aspect of class An operation is that the output signal is not distorted. However, the productivity is very low.

Schema of a class A amplifier is shown in Figure 8. 2

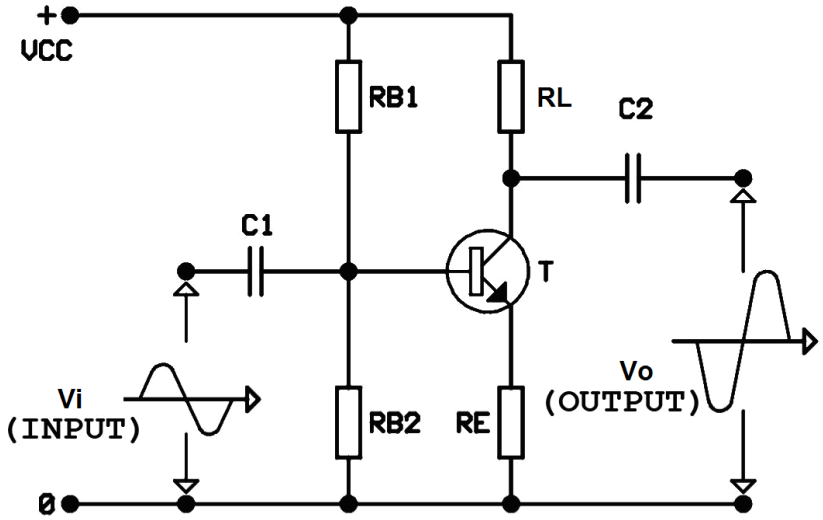

Figure 8. 2

In this type of amplifiers, load line and work point is determined by the graphics drawn by the help of Ic (**collector current**) and Vc (**collector voltage**). Current passes through collector even if there is no input signal. There is no distortion but the productivity is very low.

Output and input signals are shown in Figure 8. 3

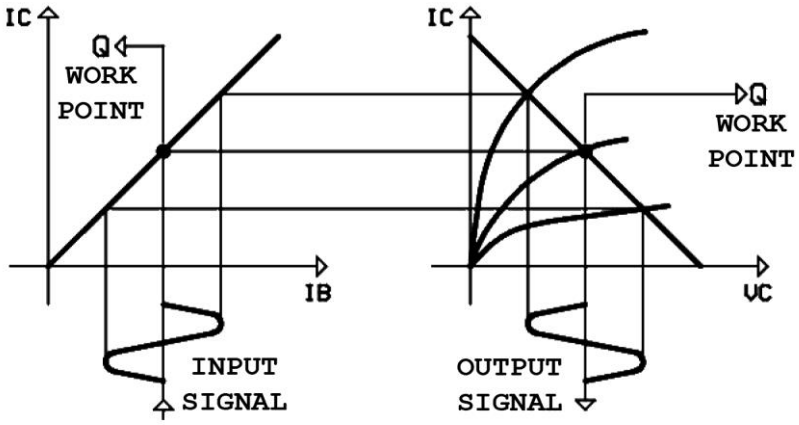

Figure 8. 3

8.3 CLASS B AMPLIFIER

In Figure 8. 4, class B amplifier is shown.

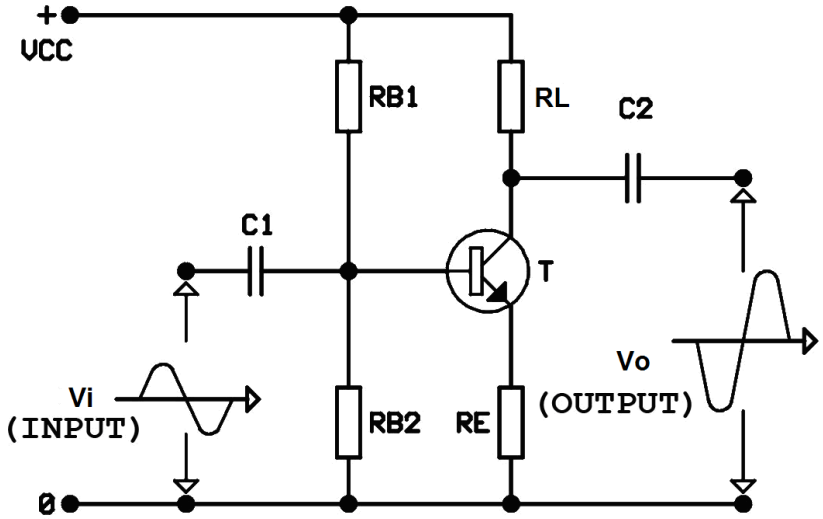

Figure 8. 4

It is the same as common-emitter circuit. Only the bias resistor (**RB1-RB2-RE**) values are changed.

In Figure 8. 5, characteristics, work point, input and output curves of a class B amplifier are shown.

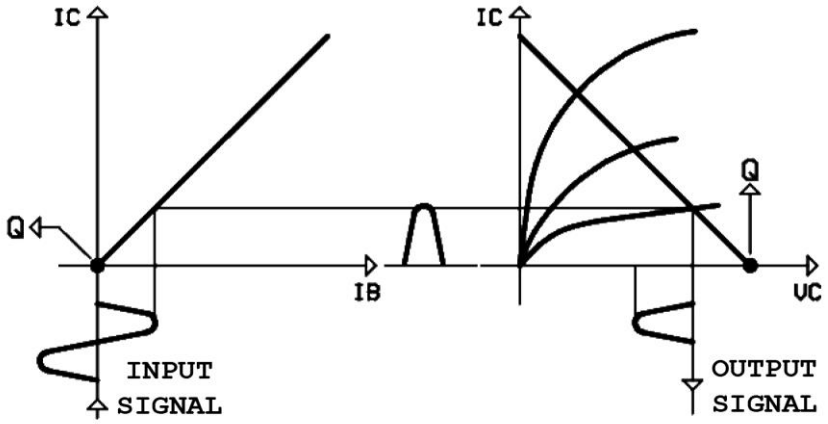

Figure 8. 5

Lower point of load line is selected as the work point of class B amplifier. Shortly, it is chosen as the collector current will be zero when there is no input signal. Current passes at the half period of input signal (at positive alternation). So the productivity is higher than class A amplifier. Yet, there is distortion. In order to decrease the distortion, point Q is shifted a little by applying a low pre-bias voltage.

8.4 CLASS C AMPLIFIER

Class C amplifier is shown in Figure 8. 6

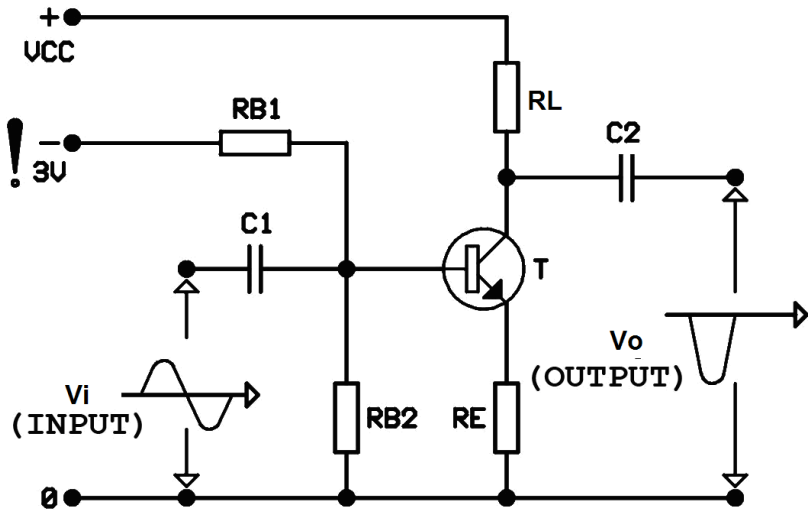

Figure 8. 6

A voltage with opposite direction (-3V) from a second DC supply is applied to the base of transistor. Output signal is only taken from the positive peak points of input signal.

In Figure 8. 7, characteristics, work point, input and output curves of a class C amplifier are shown.

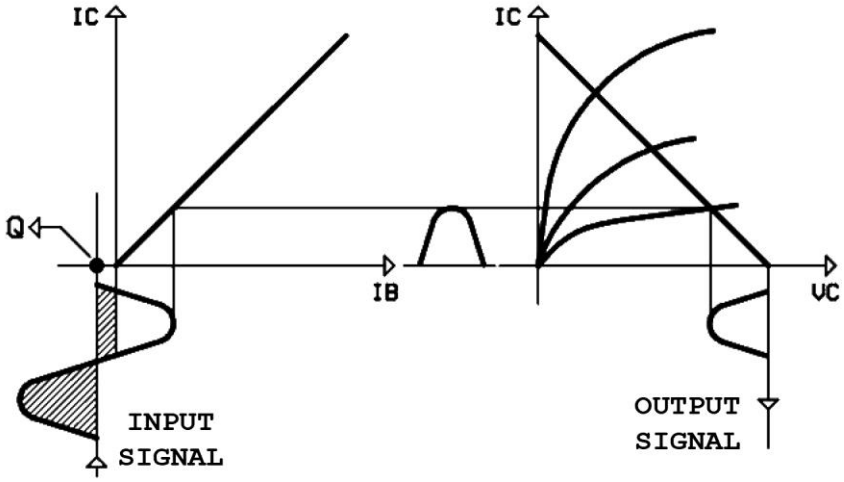

Figure 8. 7

As you see from the graphic, work point is selected outside of load line. Base is biased in opposite direction. So, collector current passes at positive alternation of input signal through a restricted part. There is a huge amount of distortion. Because of that it is used as RF amplifier in transmitters. Class C amplifier has the most productivity.