Instituto Superior Técnico
Department of Electrical and Computer Engineering
Field of study Electronics

Electronics Lab Guide II

feedback

(1 work)

Group No. _____

Number	Name

Date ____ / ____ / ____

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Motivation

In the RF section of the site *Circuit Exchange International* (http://www.zen22142.zen.co.uk/) Is proposed radio signal receiver with amplitude modulation (AM) consisting of the first two floors of the circuit shown in Figure 1.

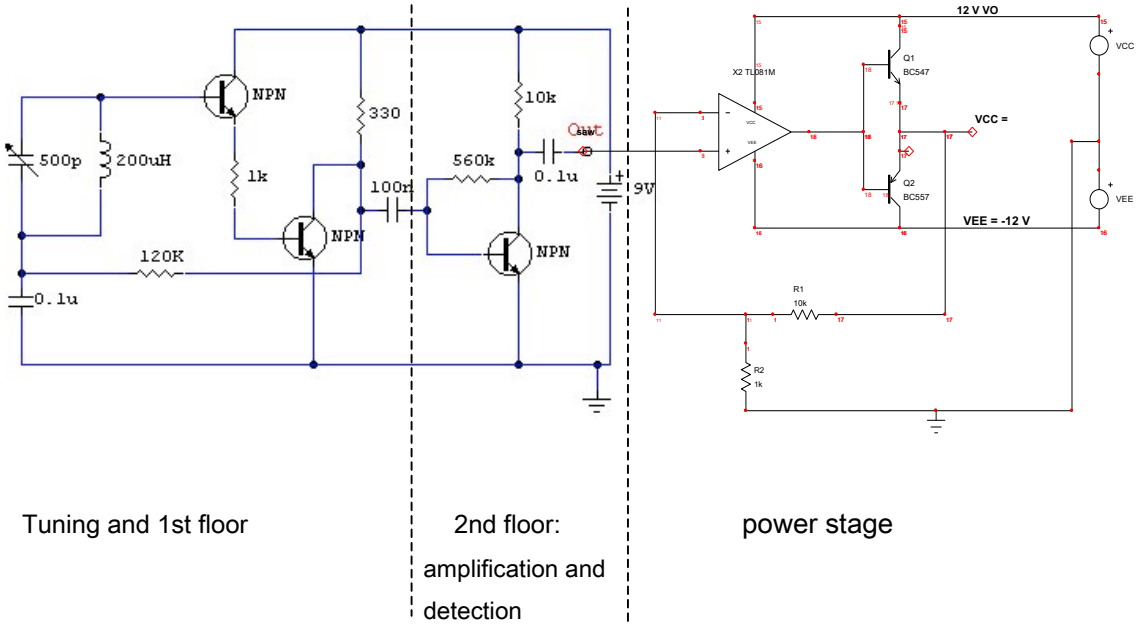

Figure 1 - a radio signal receiver with amplitude modulation (AM) followed by the output stage.

The proposed circuit shown followed by the power stage, which is a simple receiver will be partially discussed in the 1st laboratory work. The 2nd floor fulfills a double function: amplification and detection. In this laboratory work we analyze this floor solely as an amplifier, which is the function performed when the input signal has a very low amplitude.

Part 1 - Theoretical Preparation

For the theoretical preparation, use the typical values of catalogs and consider | V_{BE} | = 0.7 V. For operating point at rest, take β as the DC gain (DC current gain, $H_{FAITH)}$ and weak signals analysis take as $h_{faith.}$

1) Determine the circuit of Figure 3 PFR (perform the calculations for the transistor BC547B and BC547C transistor). Calculate the percentage change in V_W when the transistor is replaced.

2) Determine the value of R_4 Figure 2 so that the PFR obtained in 1) to BC547B transistor is maintained. keeping R_4 and replacing the transistor BC547C, determine the new CFP and complete feedback on the effect of the sensitivity of the transistor current gain.

3) Identify the type of feedback and calculate the parameters of the matrices over The appropriate for describing and β of the Figure 3 circuit.

4) Determine the gain, $k_v = v_O / v_i$ of the Figure 3 circuit.

5) Determine the input impedance, Z_i and output Z_O, of the Figure 3 circuit.

R_2 = 10 K ohms R_3 = 560 K ohms R_4 = R 1 k_5 = C 2.2 K ohms $_1$ = 10 uF C_2 = 10 uF C_3 = 100 uF Q_1: BC547B

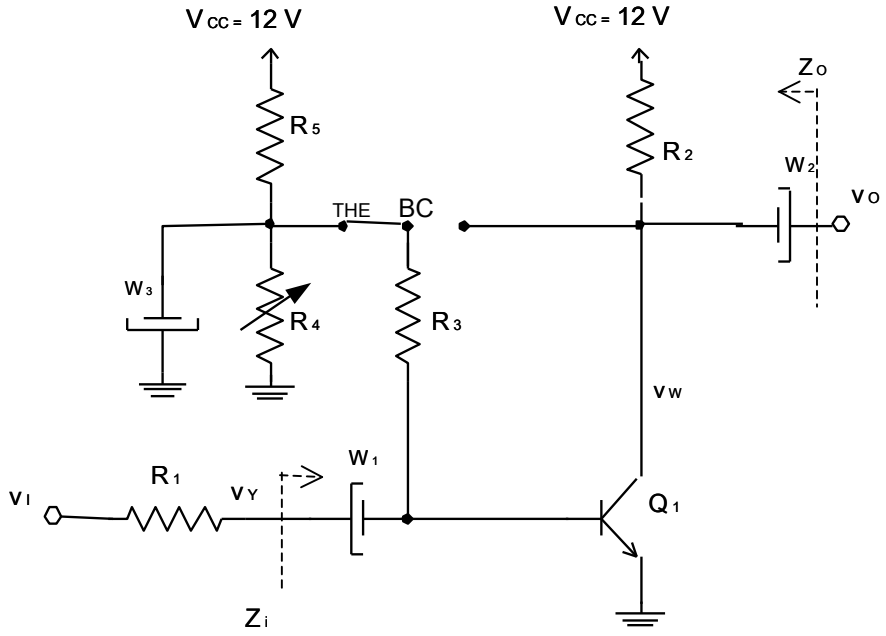

Figure 2: BJT amplifier with no feedback.

R1 = 10 K ohms R2 = 10 K ohms R3 = 560 K ohms R4 = R 1 k5 = C 2.2 K ohms 1 = 10 uF C2 = 10 uF C3 = 100 uF Q1: BC547C

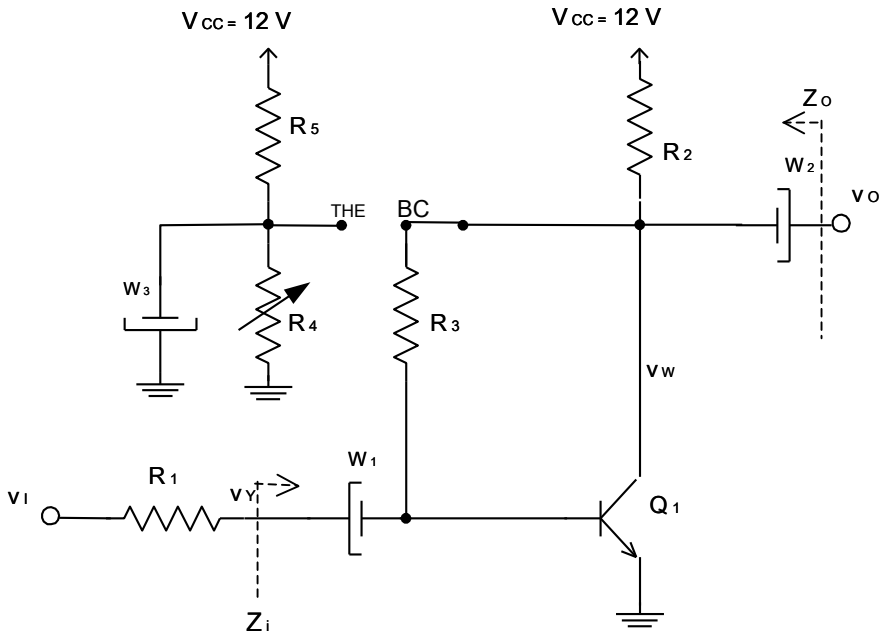

Figure 3: amplifier with refed with BJT.

Part 2 - Preparation laboratory

1) Mount the circuit of Figure 3 (with the transistor BC547B), and then v_i = 0. Measure the voltage at point C, V_{C_547B}.

2) Switch BC547C transistor and to measure the voltage at point C.

3) Replace the BC547B transistor. With V_I = 10 sin (2π1000 t) [mV] measure the voltage gain $k_v = v_O / v_i$ and the input impedance.

4) Compare the values obtained in 1) to 4) with those obtained in theoretical preparation. Hint: estimate the value of M FAITH Eh faith the transistors you are using.

Stop the connection between point B and point C, and make the connection between point B and point A, obtaining the circuit shown in Figure 2 (with the transistor BC547B) [1]. Setting the value of the resistor R4 to V_W is approximately equal to the measured under point 1). In this way the BJT is the same PFR but the floor is without feedback amplifier.

[1] the same transistors that were used in 1 to 5 in order to be possible to make a comparison of results should be used.

5) Repeat steps 1) to 5) to the amplifier without feedback, and
based on the measured values, complete on the importance of feedback in stabilizing the PFR and the effect on the gain and the input impedance