Kathmandu University
Department of Electrical and Electronics Engineering
ELECTRONICS AND ANALOG FILTER DESIGN LAB

EXPERIMENT 3: G Amplifier

Objective: To Understand the Effect of H Feedback.

The ideal VCVS is uniquely defined by one of the two-port network parameter and the parameter is **g** parameter.

In order to realize an ideal VCVS from non ideal VCVS we apply the **h** feedback. With the application of **h** feedback the input impedance is boosted up (*Voltage Controlled*) and the output impedance goes down (*Voltage Source*); all by the factor (*1+Loop gain*). The forward transmission parameter in the **g** matrix is stabilized and depends only upon the reverse transmission factor of **h** feedback structure, which is passive ☺.

Notice that in general, amplifier network and feedback network are frequency dependent. So, always care of oscillation while you are designing negative feedback amplifier (Nyquist criteria helps you for the stability of your system).

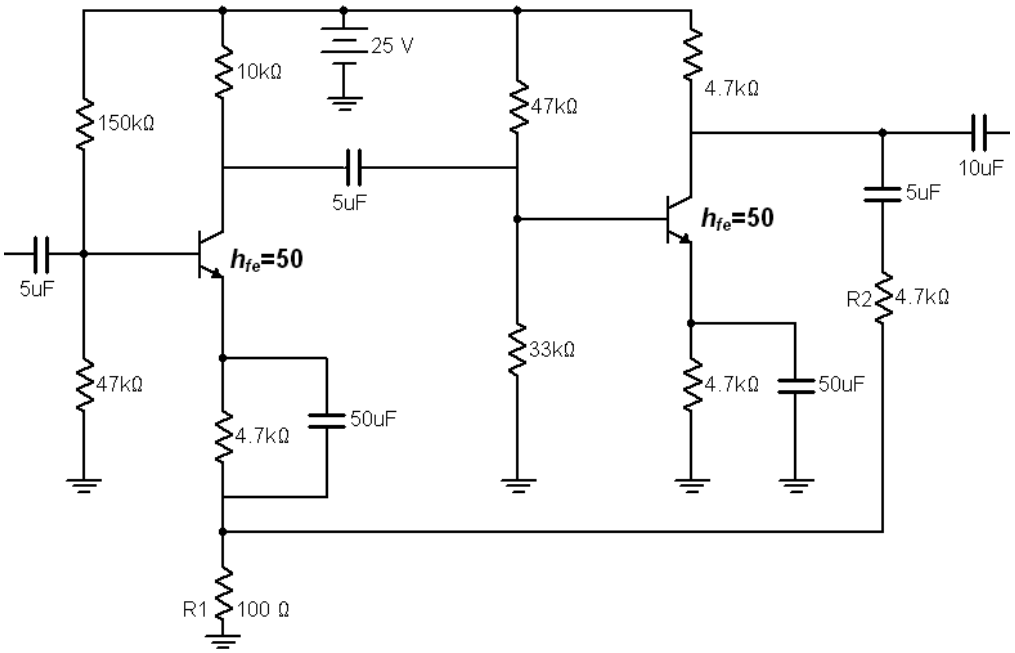

Fig 1: H Feedback

This is the feedback amplifier that we are going to analyze in this lab experiment. First we analyze the amplifier without feedback but taking the loading of feedback network into consideration.

First connect the basic amplifier network without feedback but taking the loading of feedback network into consideration as shown in figure 2.

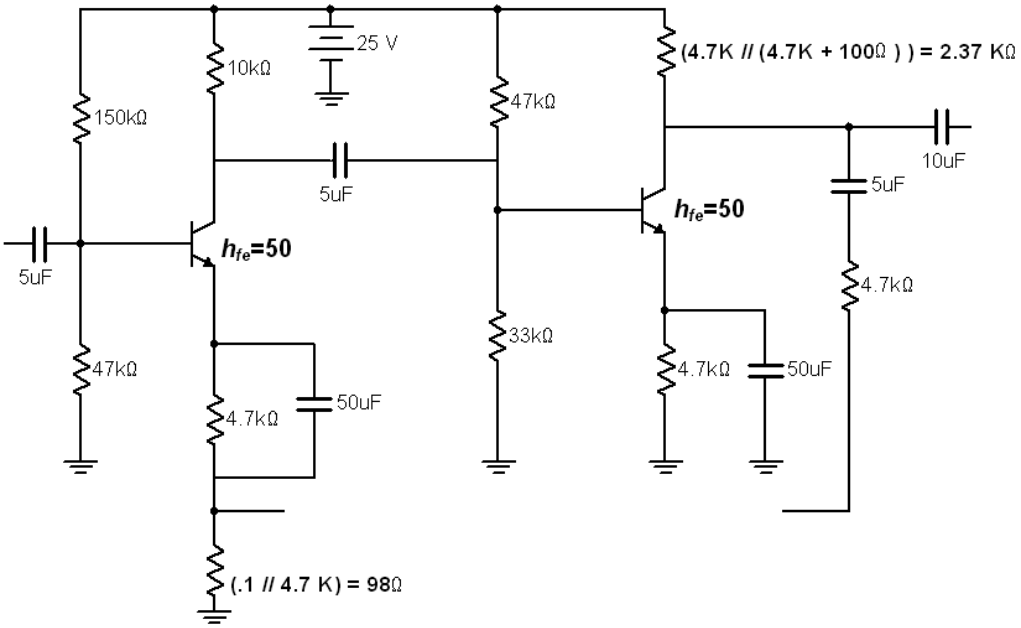

Fig 2: Basic amplifier network without feedback but taking the loading of feedback network into consideration

A. BASIC AMPLIFIER NETWORK WITHOUT FEEDBACK BUT TAKING THE LOADING OF FEEDBACK NETWORK INTO CONSIDERATION

[5 Marks]

1. Connect the circuit as shown in figure 2.
2. Set the input to 1mV sine @ 1kHz
3. Using the cursor of oscilloscope find the gain of amplifier without feedback but with loading. The output is shown in figure 3.
4. Find the input impedance of the network in figure 2.

Procedure for 4

a) Note the output voltage amplitude.
b) Use the series resistor with function generator and vary the value of the resistor until you get half the voltage amplitude at output.
c) The value of resistor at which the output voltage amplitude reduces to half is the input impedance of the network.
d) The input impedance of the network is around 5K.

5. Find the output impedance of the network in figure 2.

Procedure for 5

a) All the things are similar to procedure for 4 but use the resistor at the output side shunting the collector load resistor.
b) The output impedance of the network is around 2.4K.

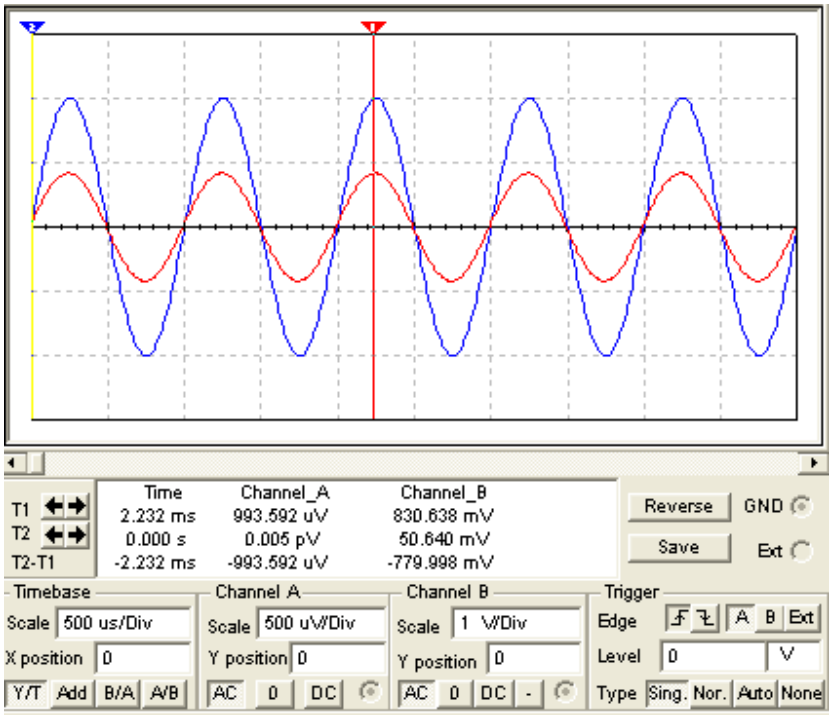

Fig 3: Channel _B (Output) Channel_A (Input)

B. AMPLIFIER WITH FEEDBACK [5 Marks]

1. Connect the circuit as shown in figure 1.
2. Set the input to 1mV sine @ 1kHz
3. Find the voltage gain with feedback and compare the result with A.3
4. Find the input impedance of the amplifier following the procedure of A.4
5. The input impedance is around 28K
6. Find the output impedance of the amplifier following the procedure of A.5
7. The output impedance is around 129Ω.

Conclusion

With the application of **h** feedback the input impedance is boosted up and the output impedance is reduced. The forward gain (i.e. voltage gain) of the amplifier is desensitized. All the things happen with the expense of reduced gain.