EXPERIMENT NO. 10

Objective: To observe the characteristics of a current series feedback amplifier using the CE transistor amplifier with an unbypassed emitter resistor.

Apparatus Used:

(i) CRO	:	1
(ii) Funcation Gen. 1 MHz	:	1
(iii) PSU- 0 to 30V	:	1
(iv) Series Feed Back Amp Kit	:	1
(v) Connecting Lead	:	2
(vi) Coaxial Cable	:	3

Theory:

Feedback amplifiers are different from amplifiers without feedback in that they sample the output voltage of current by means of a suitable sampling network and feed it to the input through a two port feedback network. There are essentially two kinds of feedback networks negative and positive. The amplifier is said to have negative feedback, if any increase in the output signal results in a feedback signal to the input in such a way as to cause a decrease in the output signal. An amplifier is said to have positive feedback if an increase in the output signal results in a feedback signal to input in such a way as to cause an increase in the output signal.

Positive feedback is mainly used for realizing oscillators. The usefulness of negative feedback lies in the fact that any of the four amplifier types may be improved by the proper use of negative feedback. For example, the normally low output resistance can be lowered:

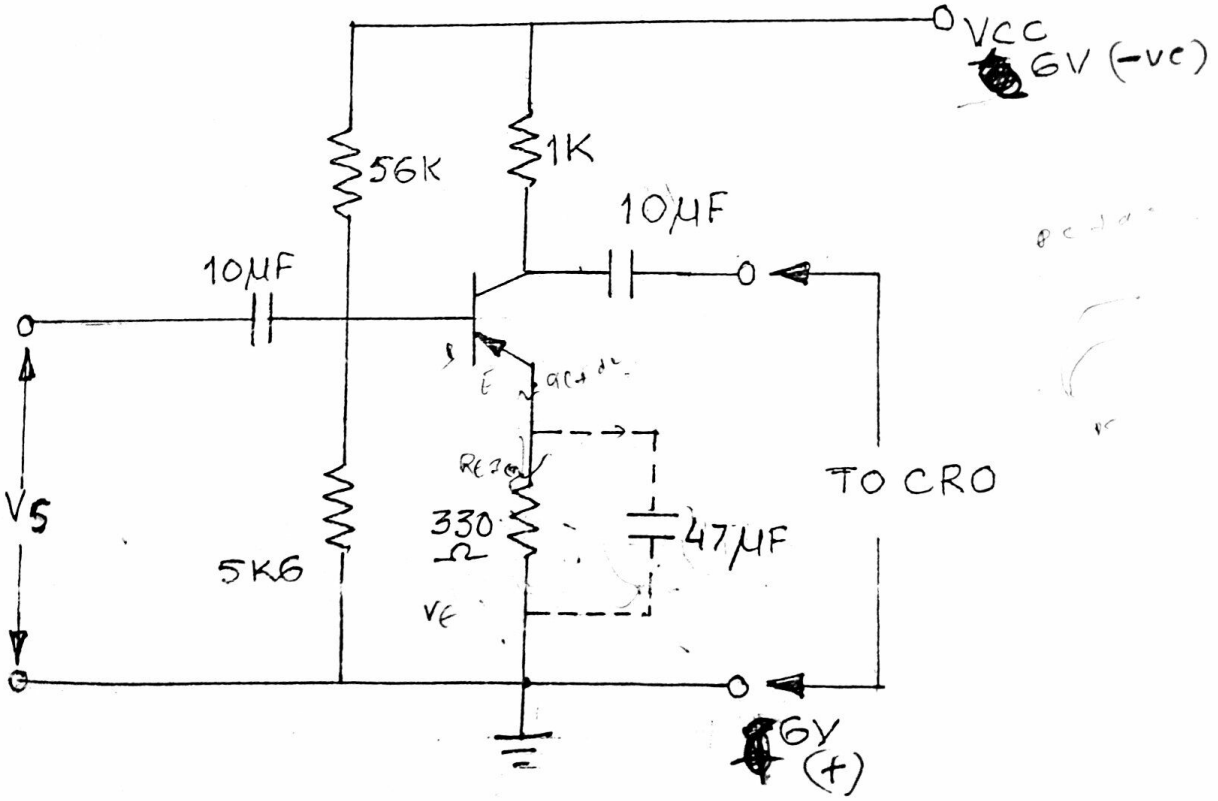
Also the transfer gain of the amplifier with negative feedback can be stabilized against variations of h- parameters of a transistors or the parameters of the other active devices used in the amplifier. Another important advantage of the negative feedback is the significant improvement in the frequency response and in the linearity of operation of the feedback amplifier compared to that of the ~~amplifier compared to that of the~~ amplifier without feedback.

It should be pointed that all advantages mentioned above are obtained at the expense of the gain A_{fb} with feedback which is lowered in comparison with the transfer gain A of an amplifier without feedback.

There are eight feedback amplifiers viz. voltage series, voltage shunt, current series, current shunt with positive and negative feedback.

Current Series Feedback:

Current series feedback is the simplest of all the four types of feedbacks. Here the output current is sampled and feedback in series with the input voltage with reverse polarity. A common emitter amplifier stage in which the emitter resistance is not bypassed is an example of this type of feedback. This configuration has a lesser voltage gain and both higher input and output impedances as compared to the amplifier without feedback having emitter resistance bypassed by a capacitor placed across it.



(Figure.1)

Procedure:

1. Connect supply voltage of 6V DC to the circuit. (Fig. 1.)
2. Connect function generator output to the input terminal of the marked Vs.
3. Connect CRO to monitor V_O and $V_S = V_i$ i.e. output and input voltages.
4. Connect 47uFD capacitor in parallel with R_e which is 330Ω
5. Vary the frequency 'f' and tabulate (V_0 vs f)
6. Observe and calculate the voltage gain Vo/Vs.
7. Find the bandwidth (BW) and note the frequencies where gain fails maximum output voltage.
8. Disconnect the 47uFD capacitor across R_e and repeat steps 5, 6 & 7. Note that has increased.
9. Apply a sinusoidal input signal of amplitude 100mv peak to peak at 1KHz from generator.
10. Measure the output voltage Vo through an oscilloscope (i.e. HIL 5020) and the gain Vo/Vs.

- Vary the frequency of the input from 50Hz to 200KHz in steps of 20 each the signal amplitude constant and measure Vo for each frequency setting.
- Plot a graph of Vo/Vi vs log f on a semi logarithm graph paper. The gave have a shape similar to that shown in Fig. 2.

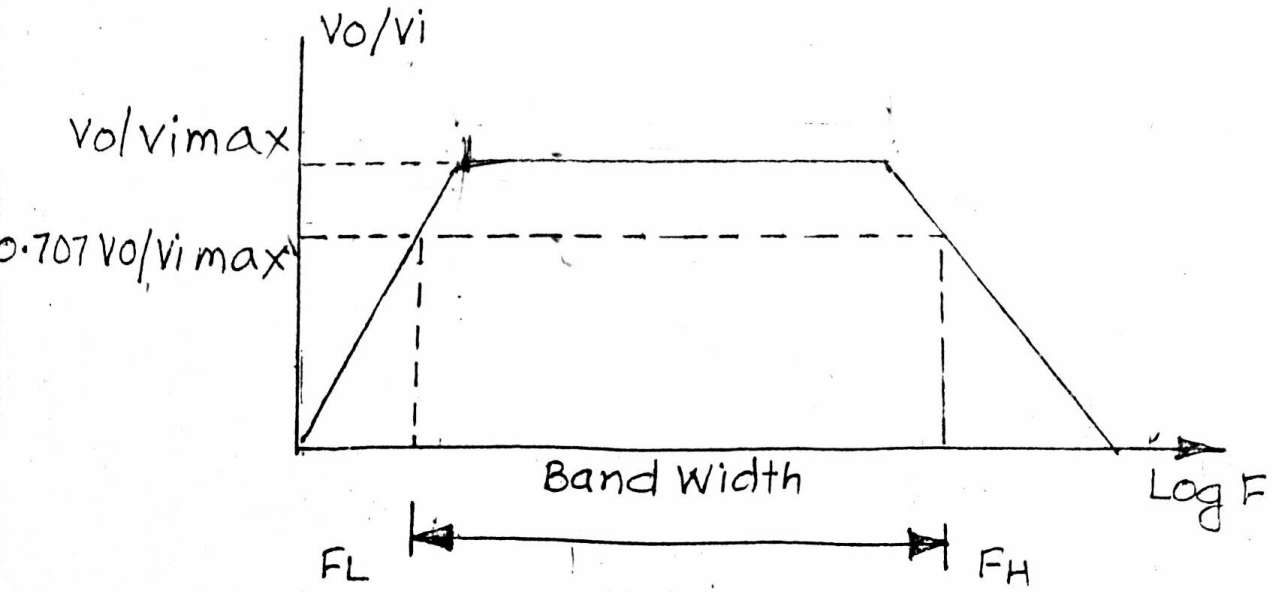


Figure.2.

Observations:

Readings for Output Voltage vs Frequency of the Feedback Amplifier.

Sl.No.	Frequency (Hz)	Output Voltage (V) (with feedback)	Output Voltage (V) (without feedback)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

Calculations:

Voltage

1. Voltage Gain with feedback =
2. Bandwidth with feedback =
3. Voltage gain without feedback =
4. Bandwidth without feedback =

Result:

Precautions: