****

**Lyceum of the Philippines**

**University**

**Grade**

**Buenaventura, Allen Lester C. ID # 2008-12178**

**Engr. Erwin Daculan**

**Experiment # 4: Using the Transistor in a Common-Emitter Amplifier**

**Objective:**

Upon the completion of this activity, the student must be able to:

1. Measure the DC bias voltages of a Common-Emitter amplifier.
2. Calculate the voltage gain and examine the input-output waveform relationships in a Common-Emitter Amplifier Circuit.

**Data Analysis:**

Experimentation

**Measuring the DC bias voltages of the Common-Emitter Amplifier**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CE AMPLIFIER DC BIAS VOLTAGES** | | | | |
| **VB** | **VC** | **VE** | **VBE** | **VCE** |
| 1.7 V | 6.4 V | 1 V | 0.69 V | 5.3 V |

Table 1

* Are the readings in Table 1 approximately equal to the ff: VB = 1.7V, VC = 6V, VE = 1V, VBE = 0.7V, VCE = 5V?
  + Yes. The readings in Table 1 are approximately equal to VB = 1.7V, VC = 6V, VE = 1V, VBE = 0.7V, VCE = 5V.

**Dynamic Operation of a Common-Emitter Amplifier**

* Observe and compare the input and output waveforms. Is the output waveform larger than the output waveform? Is this the characteristic of a Common-Emitter Amplifier?
  + The output waveform larger than the output waveform which shows the characteristic of a Common-Emitter Amplifier.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

Legend:

• Input

1 V/div; 0.5 t/div

• Output

1 mV/div; 0.5 t/div

|  |  |  |
| --- | --- | --- |
| **CE AMPLIFIER SIGNAL CHARACTERISTICS** | | |
| **VIN (P-P)** | **VOUT (P-P)** | **Voltage Gain** |
| 16 mV p-p | 1.4 V p-p | 87.5 |

* Does the transistor provide voltage amplification to the small input signal?
  + The transistor provides voltage amplification to the input signal.
* Is the input signal approximately in-phase or out-of-phase with the output signal?
  + The output signal is out-of-phase and is lagging.
* How many times larger than the input signal is the output signal?
  + The output signal is 160 times larger than the input signal.

Evaluation

1. On what terminal(s) do we apply the input signal in a Common-Emitter amplifier? On what terminal(s) do we take the output signal in a Common-Emitter amplifier?

* We apply the input signal to the base and emitter and we take the output signal from the collector and emitter of a Common-Emitter amplifier

2. What is the input current in a Common-Emitter amplifier? What is the output current in a Common-Emitter amplifier?

* The input current in a Common-Emitter amplifier is the base current and the output current in a Common-Emitter amplifier is the collector current.

3. Is there a voltage gain in a Common-Emitter amplifier? Is there a current-gain in a Common-Emitter amplifier?

* There is both a voltage and current gain in a Common-Emitter amplifier.

4. To bias the transistor as an amplifier, what must be the typical values of VBE and VCE?

* VBE must be equal to 0.5-0.7V and VCE must be approximately ½ of the VCC.

**Discussion:**

**Conclusion:**