ELECTRONICS FOR ME
Laboratory 4

Purpose

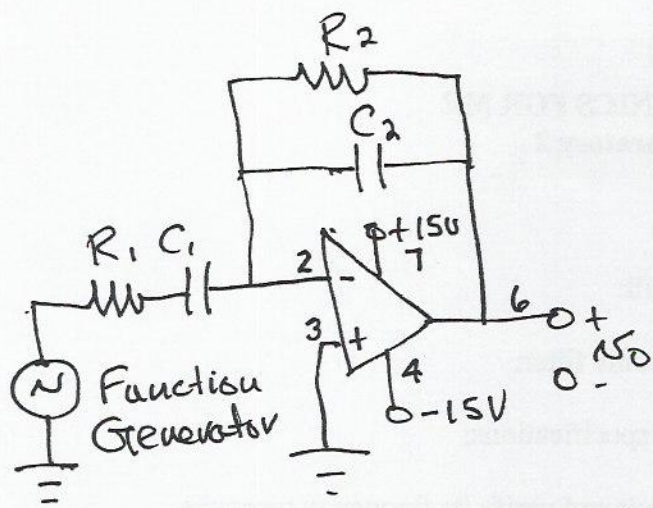At the conclusion of this lab, the student will:

1. Be able to build and test a single-stage common emitter BJT amplifier;

2. Understand how an emitter bypass capacitor affects amplifier gain;

3. Be able to measure corner frequencies and determine the amplifier bandwidth.

Procedure

1. Build the circuit shown in Figure 1 (back of this sheet) on the protoboard .Do not connect the 22 uF capacitor across R_E for this part of the lab. See Figure 2 (back of this sheet) to determine which leads on the transistor are the emitter, base, and collector. Watch polarity when connecting the function generator and power supply. Use the +25 volt terminal (red) and the Common terminal (black) on the power supply to provide the DC voltage.

2. Measure and record the output voltage on the oscilloscope. Record the input voltage from the function generator (on the display (~50 millivolts).

3. Now install the 22 uF capacitor across R_E and repeat the measurements from step 2.

4. With the same circuit as in step 3, decrease the frequency of the input voltage (on the function generator) until the output voltage falls to 0.707 of its value at 1 KHz. Record this frequency as f_L. Now increase the frequency of the input voltage until the output voltage falls to 0.707 of its value at 1 KHz. Record this frequency as f_H.

Data Analysis

1. Calculate and report the gain of the amplifier using the input/output voltages that you measured in step 2. The gain of the amplifier is output voltage divided by input voltage.

2. Calculate and report the gain of the amplifier using the input/output values that you measured in step 3. What happened to the magnitude of the gain? Is it greater or less than that of the previous circuit? What was different about the second circuit that caused this gain change? Explain.

3. Calculate and report the bandwidth of the amplifier. Bandwidth (BW) = f_H-f_L.

R_2

C_2

R_1 C_1

2

$\circ +15v$
7

3

6 $\circ +$

$\circ -$ V_0

Function
Generator

4

$\circ -15V$

Op amp is a 741