# BJT amplifier

You'll measure the frequency response of a common-emitter BJT amplifier and examine the input and output signal waveforms.

Build the following circuit in Multisim. The multimeters are located at Simulate -> Instruments -> Multimeter.

Set the value of the potentiometer according to the figure. Simulate with Simulate -> Run and check the VCE voltage and the voltage over RC. They may be somewhat different from the values in the figure below.
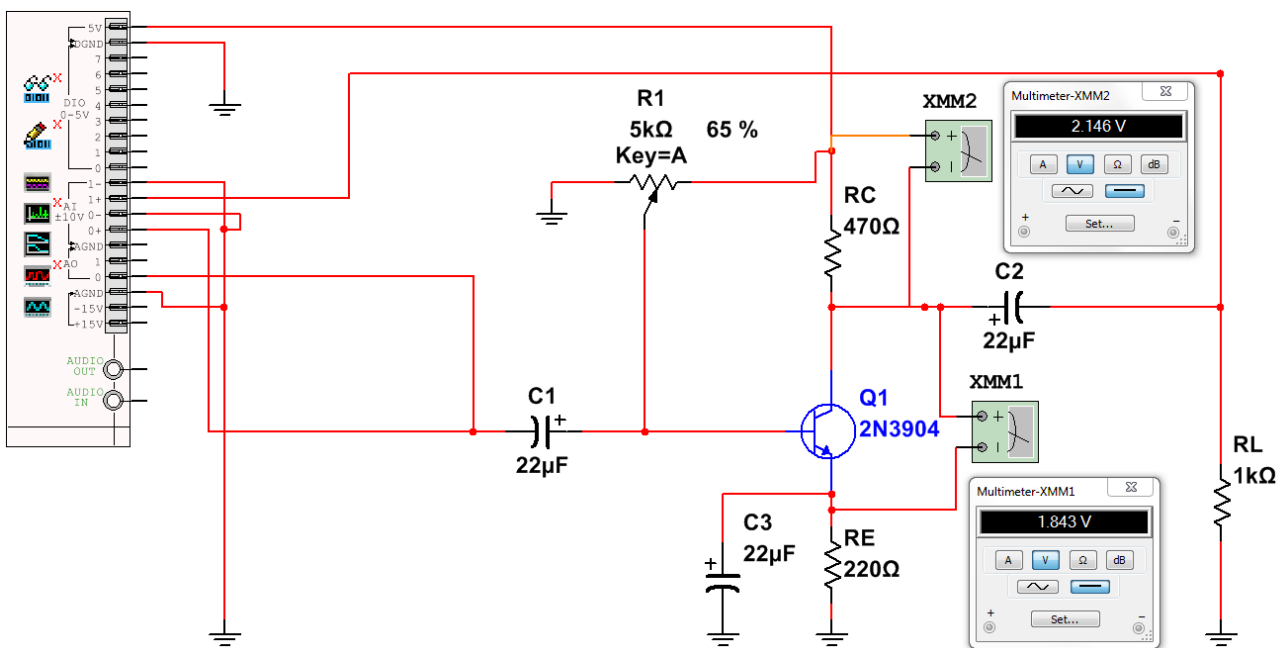
Build the circuit on the breadboard. Notice the transistor pinout:
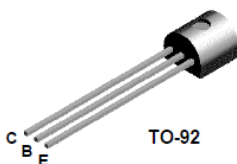
Adjust the potentiometer such that the measured the collector-emitter voltage is approximately 2 V. Measure the voltage over RC. It should be approximately 2 V.

If you can't get the circuit working correctly, check your transistor. Remove the +5 V connector, take the transistor out, set the multimeter to diode measurement and measure the base-emitter and base-collector junctions. They should be approximately 0.7 V.

Frequency response

Simulate and measure the frequency response with Multisim Bode Analyzer. Remember to enable the function generator. Set the frequency range from 100 Hz to 20 kHz. When measuring, set the peak amplitude to 0.01 V. (If you switch the Device in Instrument Control between "Simulate NI myDAQ" and "myDAQ 1 (NI myDAQ)", you may need to set the amplitude again to 0.01 V in the measurement as it may keep setting itself to 1 V.) Set Linear Mapping and read what the measured gain and phase approximately are at 10 kHz.

Waveforms

Next, measure the input and output waveforms with the oscilloscope and signal generator. Open the function generator and the oscilloscope in Multisim. Set the amplitude 0.01 Vpp and frequency 10 kHz. In both windows, set Device "myDAQ1 (NI myDAQ)". Enable oscilloscope channel 1. Adjust the oscilloscope settings until you can see both signals. Read the input and output V-pp values from the bottom of the screen and calculate the voltage gain. Does this correspond to the value obtained with the Bode analyzer? What can you conclude about the phase difference when looking at the waveforms?