

Department of Computer and Electronics Engineering Technology
CEET 1140
Lab 10

Title: Crossover Network.

Objective: The student will be able to construct and analyze the performance of a simple crossover network.

Equipment: Function Generator
Oscilloscope
Proto Board
Large 3.2Ω Speaker
Small 8Ω Speaker

Parts: 1 470Ω Resistor, $\frac{1}{4}$ watt
1 10Ω Resistor, $\frac{1}{4}$ watt
1 2mH Inductor (or two 1mH Inductors)
1 $3.3\mu\text{F}$ Capacitor

Preparation: Write the title and a short description of this lab in your lab book. Make sure the page is numbered and make an entry in the table of contents for this lab.

Measure the DC resistance of your 2mH inductor. You can think of this resistance as being in series with your inductor. Record this measurement in your lab book as R_{L1} .

Consider the crossover network shown below.

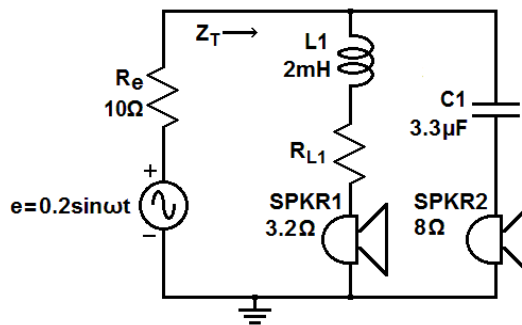


Figure 1. Crossover Network

Calculate the total impedance, Z_T and the peak voltage across each speaker for the frequencies of 1kHz, 2kHz and 4kHz. (You may want to use a spreadsheet such as Microsoft Excel.) Record these values in your lab book and bring that book to your lab period.

Set up: Construct the circuit in Figure 1 on your proto-board. Your $3.3\mu\text{F}$ capacitor will be either electrolytic or tantalum type, both of which have a “+” lead and a “-” lead. However, since the voltages we are dealing with in this lab are so small, you may insert the capacitor either way.

Use a voltage divider of 470Ω and 10Ω in conjunction with the function generator (Figure 2) to create a voltage source with only 10 ohms impedance. Do not connect it to your circuit yet.

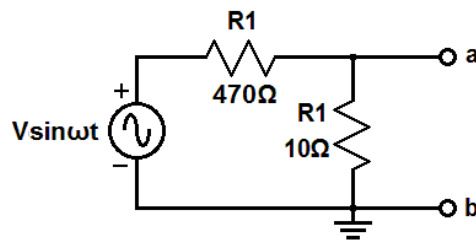


Figure 2. Voltage source with $R_{\text{TH}} = 10\Omega$.

Turn on the function generator and configure it to produce a 1000Hz sine wave at point (a) with a peak amplitude of 200mV.

Connect your voltage source circuit to your speaker circuit.

Procedure: Measure the voltage across both speakers and record them in your lab book. Repeat the procedure for frequencies of 2kHz and 4kHz. Do your measurements conform to your previous calculations?

Set the frequency to 700Hz and briefly disconnect the 3.2Ω speaker. Then set the frequency to 5kHz and briefly disconnect the 8Ω speaker. Record your observations in your lab book.

Sweep the frequency from 500Hz to 10kHz. Can you hear the sound move from one speaker to another? Again, record your observations.

Cleanup: Turn off the power to the function generator.

Conclusions: In the conclusion section, write a short summary of what you did and what you learned. Make sure your conclusion answers the following questions:

How close were your calculations to your measurements?

What source(s) of error might account for the difference?