

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
22.071/6.071 Introduction to Electronics, Signals and Measurement
Spring 2006

Laboratory 14. Filters, Bandwidth, Q factor

Exercise 1.

Here you will design and test a **Band Pass** filter (using the series RLC arrangement discussed in class) with a resonant frequency of 2000Hz and a bandwidth of 200Hz.

Determine the required capacitance, inductance and resistance. (You have choices here, so make certain that you have the values you assume)

Draw the circuit indicating the input and output ports and the element values.

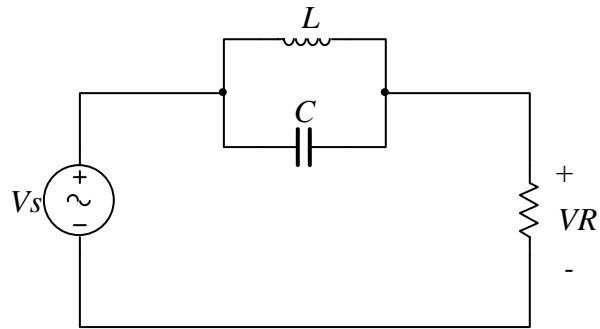
Draw the general form of the transfer function

Build your circuit and connect the input to DAC0 and the output to ACH0+ and ACH0-. Download the instrument **Bandwidth.vi** from the Labs section. Run the program and observe the results.

Does it work as you expect it to?

Exercise 2.

For this final exercise you will design and test the band reject filter shown below.



Calculate the magnitude of the transfer function $\left| \frac{V_R}{V_s} \right| = |H(\omega)|$

Design the circuit with a resonant frequency of 60 Hz and a bandwidth of 4 Hz.

This circuit is going to be useful later on when you built your heart rate monitor. It will give you the ability to filter the 60Hz noise that will find its way in your signals.

Build your circuit and connect the input to DAC0 and the output to ACH0+ and ACH0-. Download and run the instrument called **Notch.vi** from the Labs section to drive your circuit and to observe the response.