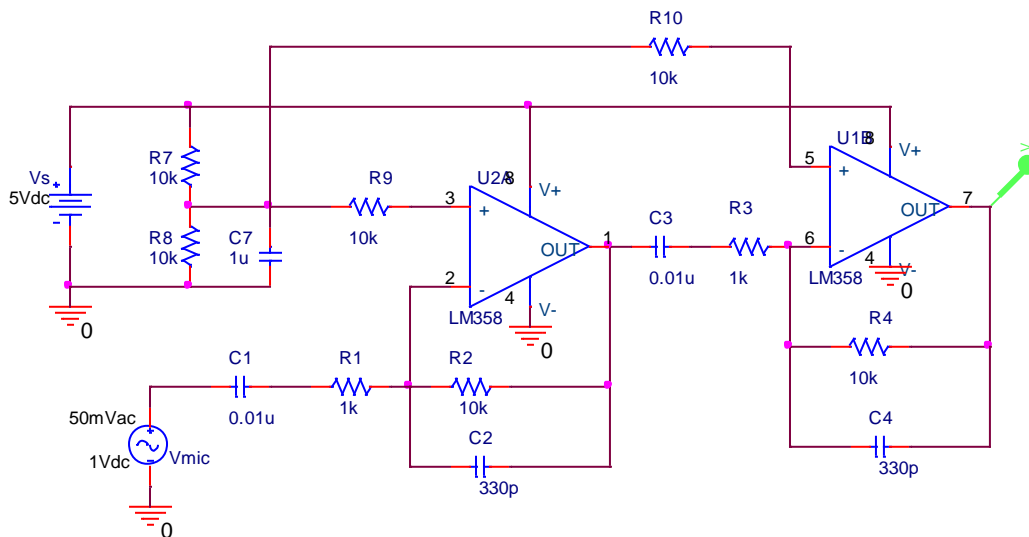


**Mini-Project 5 (10 points)**  
**Due 11:00am on May 4, 2010**

**Design of a Sound/Ultrasound Activated Toggle Switch:**

Consider the band-pass filter (BPF) and voltage amplifier shown below which is designed by cascading low-pass and high-pass filters (LPF & HPF).

1. Perform an AC Analysis from 100Hz to 1MHz using OrCAD and a decade sweep. Plot the magnitude of the overall transfer function  $(U1B:OUT)/(Vmic:+)$  and label the center frequency point on this plot with its coordinates.
2. Replace the ac source labeled Vmic with an electret microphone and build this design in the lab. Pull up the electret mic with a 2.2K resistor. Connect the output of this BPF/voltage amplifier to the input of a properly designed FVC toggle circuit (Refer to Mini-project 3). Whistle into the mic and make sure the load toggles on and off (use a visible LED as the load). Modify this design in the lab as needed for tuning it to the input signal you plan to use in your final product.



**Team leaders, please submit your team's report that includes the following in the order shown:**

- a) The plot obtained in Part 1. Write down the values of the center frequency and the overall gain at the center frequency. (2 pts.)
- b) Design calculations for R1 and C1 of the FVC circuit. (2 pt.)
- c) The schematic of your design, including the FVC and load circuit, that includes all the details and shows the actual part numbers & passive component values (including tolerances) used in the lab. (3 pts.)

- d) A sheet signed by Dr. Miri, Dr. Yanik or designees as the verification that your design has worked in the lab for the designed sequence and defined motion. (3 pts.)

**Submission:**

Your report must be typed using a word processing software. The first page should include

ECGR2252 "Electrical Engineering Design I" – Spring 2010  
Mini-project 5 - Design of a Sound/Ultrasound Activated Toggle Switch

Team #

Names (BSEE, BSCpE, or both) % effort

Turn in hardcopies of your report in class on May 4. Also, upload an electronic copy of your report into the assignment dropbox in Blackboard before 11:00am on May 4. Submit this as a single PDF file named "Team number-MP5".

**Submission Policy:**

Late submissions will be accepted up to 5 business days but 10% will be deducted for each day that a submission is late. Lateness policy applies to electronic submissions as well. All electronic submissions with a time-stamp that is later than 11:00am of the due date will be considered late. 50% will be deducted for any submission that is not organized according to the numbering (a) through (d) above.

Hardcopy of each team's report is to be submitted by the team leader. Individual grades will be assigned based on percent effort as judged by the team leader. A grade of "0" will be assigned to any team member whose name is not written on the first page by the team leader.