Lab 9 (Rev. 1) Active Filters

1. Assemble the circuit in Fig. 1. Use TL 084 Quad Op-amp which is one package containing four separate op-amps. Be sure to use the $.1\mu F$ capacitors to "by-pass" the power supplies to ground which prevents oscillations.

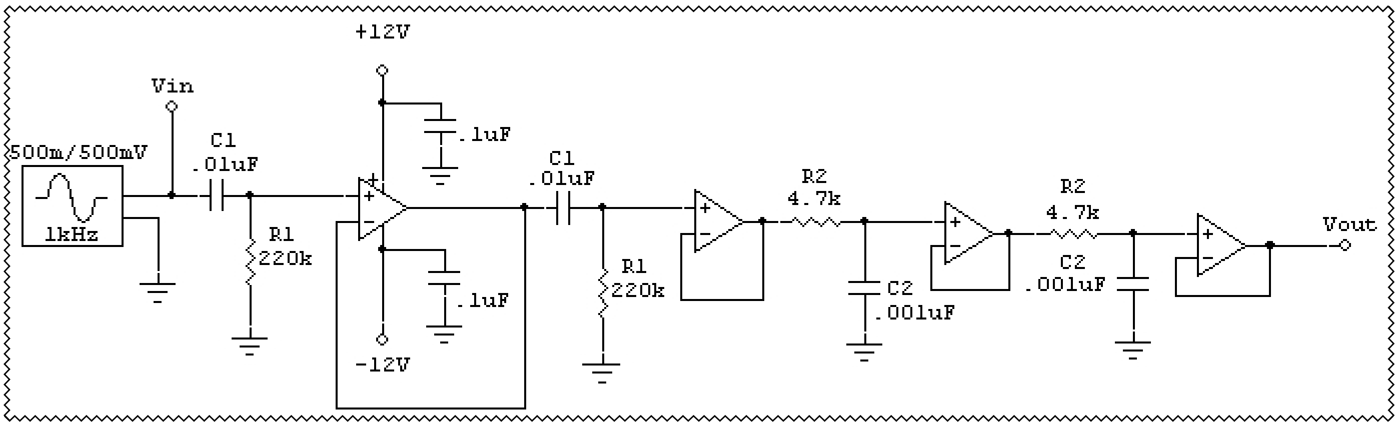

Fig. 1

2. What is the gain of each op-amp stage? What is gain of the entire circuit? Express this gain

   in decibels: A_V = ________

3. Calculate the critical frequency of the high pass filter: $f_H = \dfrac{1}{2\pi R_1 C_1} =$

4. Each filter is considered a "pole." This circuit contains two simultaneous high pass filters and therefore two poles. Because of these two poles, the critical frequency calculated in step 3 must be adjusted as follows: $F_H = 1.414 f_H =$

5. Calculate the critical frequency of the low pass filters: $f_L = \dfrac{1}{2\pi R_2 C_2} =$

6. Again because of the presence of two simultaneous low pass filters, the critical frequency from step 5 must be adjusted as follows: $F_L = .707 f_L =$

7. Use the signal generator and apply a sine wave of $1V_{PP}$ at IkHz. Begin at 1kHz and increase the frequency and observe the output voltage. Return to 1kHz and then decrease the frequency and once again observe the output. Use the table in Fig. 2 to collect the measurements. Recall that $A_V = \frac{V_{OUT}}{V_{IN}} =$ and $A_V dB = 20\log A_V =$

F(Hz)	10	50	100	1k	10k	20k	30k	50k	100k
V_{IN-PP}									
V_{OUT-PP}									
A_V									
A_VdB									

Fig. 2

8. Use the information in the table above to create a Bode plot of the frequency response of this circuit in Fig. 3. Indicate the critical frequencies and the roll-off above and below the critical frequencies. Simulate this circuit in MultiSim and compare the frequency response to the real circuit.

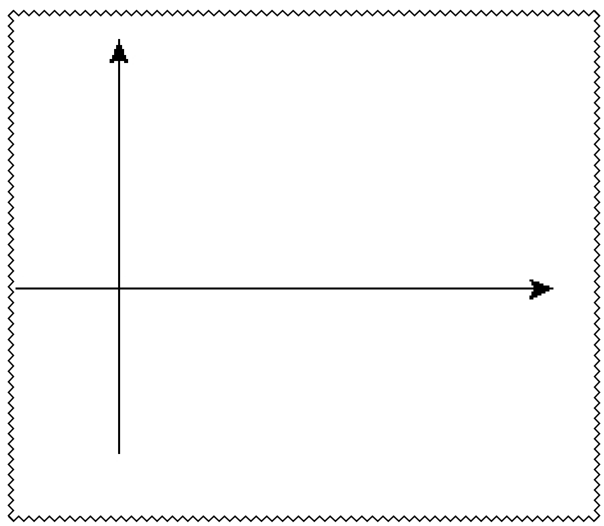

Fig. 3