Experiment No. 11

Audio Amplifier and Microphone Circuits

Objectives:

To Construct and play with an audio amplifier and a microphone amplifier.

Steps:

1. Audio amplifier

- Go through this experiment procedure and familiarize yourself with components and assembly sequence. Note that the opamps and audio amplifier IC's are single supply opamps.
- Connect the circuit as shown in Figure 1. (Refer to the datasheets for pin-diagrams of the IC's.)
- Provide a supply input (sinusoidal wave) from function generator through point 3 as shown in the circuit. Apply v_i as 1 $V_{p\text{-}p}$ at 1 KHz. Observe the output on Oscilloscope. (output waveform, amplitude, frequency.)
- Now vary the R_p pot from its minimum to maximum value and observe the output waveform.

R_p value	Input Amplitude	Output Amplitude	Distortion (Yes/ No)

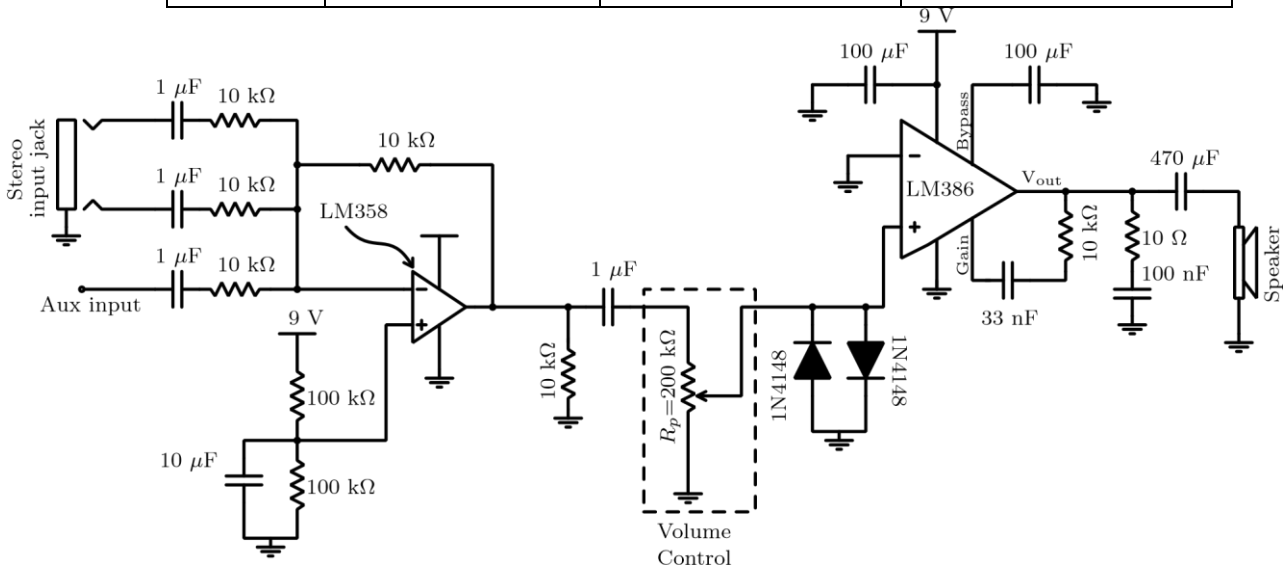

Figure 1: Circuit for audio amplifier.

- Note the value of R_p pot where the distortion in the waveform is first observed.
- Measure the average current drawn by the audio amplifier circuit at full-volume conditions (potentiometer position at maximum) with a +0.025 V 1 kHz sinewave input: _____ mA.
- Average current drawn by audio amplifier when playing music audio under normal listening conditions (keep the potentiometer position such that there is no distortion in the output): _____ mA.
- From your answer above, estimate the battery life for this circuit assuming a 500 mAh battery rating: _____ Hrs.

R_p position	Current drawn	Output Amplitude
Minimum		
beginning of distortion		
Maximum		

- Now replace the input with 3.5 mm jack and connect it to your cell phone. Connect the output port with the audio speaker.
- Observe the output audio at three different values of R_p pot
  - the value of R_p pot at which distortion was first observed.
  - minimum value of the R_p pot.
  - maximum value of R_p pot.

2. Microphone amplifier

- Read through the lab experiment to familiarize yourself with components and assembly sequence. Note that the microphone amplifier opamp is a dual supply opamp.
- With reference to the full schematic in Figure 2 calculate cut off frequencies imposed by capacitors C_1 and C_2 and resistance in the circuit.

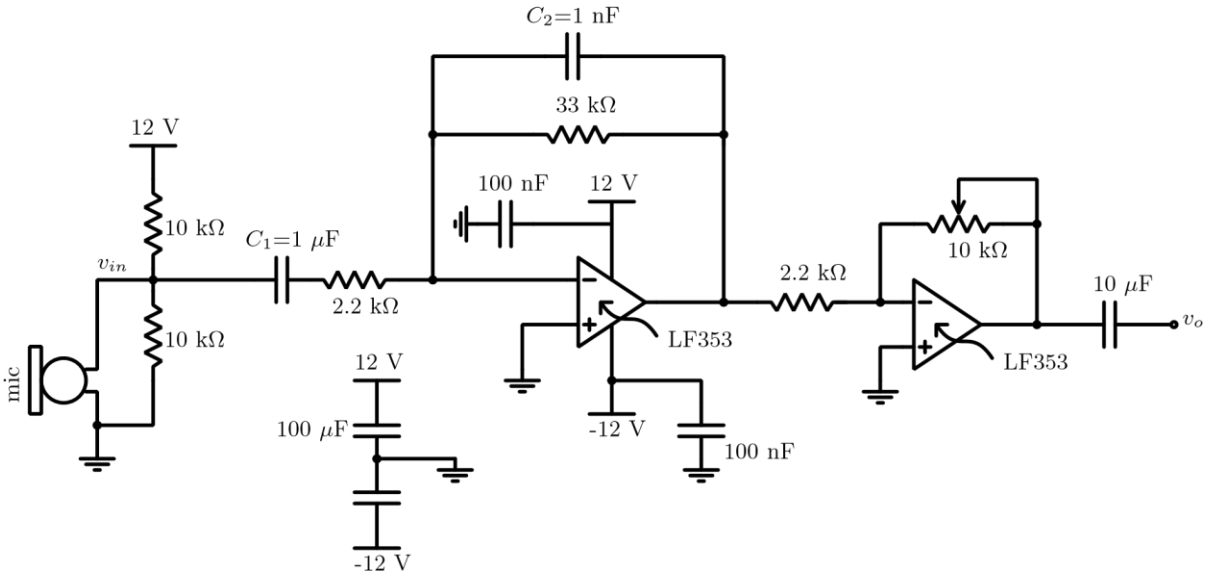

Figure 2: Circuit for microphone interface.

- Connect the circuit as shown in Figure 2 but do not connect the capacitor C_2. Apply a sinusoidal input using function generator v_{in}=0.1 V and vary the frequency of the inout signal from 10 Hz to 100 KHz. Observe the output on the oscilloscope.
- Repeat the above observation by connecting the capacitor C2
- Now connect the microphone at the input and speaker at the output. Are you getting undistorted audio signal as output?
- Connect the output of the microphone circuit to the input of the audio amplifier circuit. Try speaking through the microphone and check if you are getting amplified voice signal as output

Do it for fun (Optional): In the microphone circuit, let the input be coming from microphone but observe the output signal on the oscilloscope. Try whistling in to the microphone, you should be able to produce a nice sine wave.

	Without C_2		With C_2	
Frequency (Hz)	v_o	Gain	v_o	Gain