

## DEVICES AND CIRCUITS LAB REPORT – 10

## EXPERIMENT NAME: Audio Amplifier and Microphone Circuits

**ROLL NUMBERS:** 200020010, 200020051

### Hardware Exercise:

**Objectives:** To Construct and play with an audio amplifier and a microphone amplifier.

### Equipment/Components Required:

1. IC LM 358 & LM 386
2. Resistors – 10 k $\Omega$ , 100 k $\Omega$ , 10  $\Omega$
3. 200 k $\Omega$  potentiometer
4. 1N4148 Diode
5. Regulated Power Supply.
6. Variable Power Supply.
7. Capacitors – 1  $\mu$ F, 10  $\mu$ F, 100  $\mu$ F, 470  $\mu$ F, 100 nF, 33nF
8. Digital Storage Oscilloscope
9. Arbitrary Function Generator
10. Stereo Jack input
11. AUX input
12. Speaker

**Observations:**

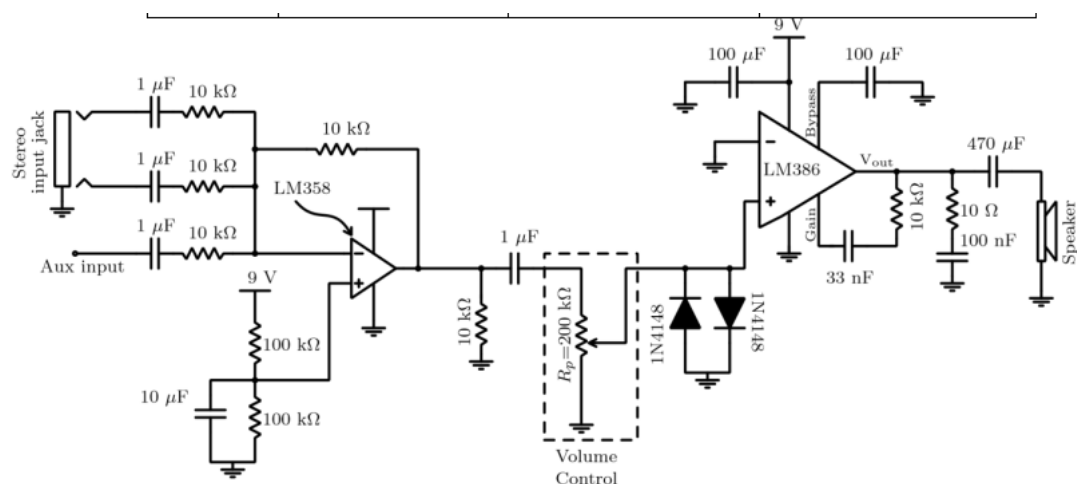


Figure 1: Circuit for audio amplifier.

- We connected the circuit as shown in Figure 1.
- We provided a supply input (sinusoidal wave) from function generator through point 3 as shown in the circuit. We applied  $V_i$  as 1 Vp-p at 1 KHz and observed the output on Oscilloscope.
- Now by varying the  $R_p$  pot from its minimum to maximum value we observed the output waveform.

$R_p$ value (in ohms)	Input Amplitude	Output Amplitude	Distortion
0k	1V	100mV	No
125k	1V	900mV	No
180k	1V	1.1V	No
240k	1V	1.4V	Yes
500k	1V	7.5V	Yes

- Distortion is observed first at 240k ohms.
- The average current drawn by the audio amplifier circuit at full-volume conditions (potentiometer position at maximum) with a +0.025 V 1 kHz sine wave = 3.1 mA
- Similarly for without distortion conditions, we get  $I_{input} = 1.8\text{mA}$
- Estimated battery life, assuming a 500 mAh battery rating =  $500\text{mA-Hr} / 2.2\text{mA} = 222.27\text{ hour}$ .

$R_p$ position	Current Drawn	Output Amplitude
Minimum	1.8	100mV
Beginning of distortion	2.5	1.4V
Maximum	3.1	7.5V

## 2. Microphone amplifier:

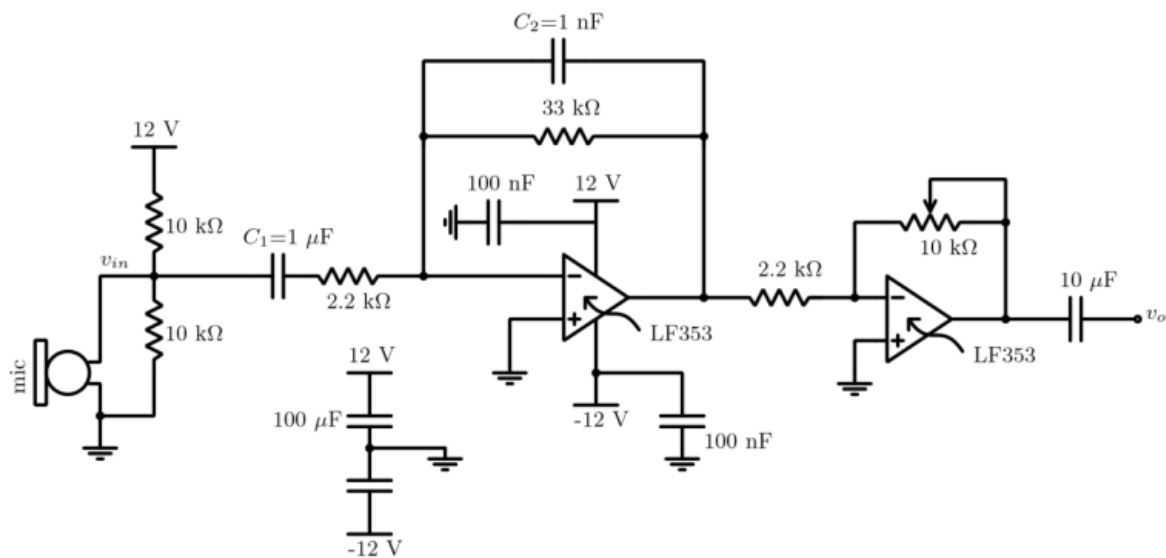


Figure 2: Circuit for microphone interface.

- We connected the circuit as shown in Figure 2 without capacitor C2 and applied a sinusoidal input using function generator  $v_{in}=0.1\text{ V}$  and varied the frequency of the input signal from 10 Hz to 100 KHz..
- We repeated the above observation by connecting the capacitor C2
- By connecting the microphone at the input and speaker at the output we got undistorted audio signal as output.

Frequency	Without C2		With C2	
	Vout	Gain	Vout	Gain
100Hz	1.5	15	1.4	14
200Hz	9.4	94	8.7	87
1kHz	9.7	97	9.5	95
2kHz	10.1	101	10.8	108
3kHz	9.6	96	10.9	109
8kHz	7.8	78	11.1	111
10kHz	5.3	53	9.5	95
20kHz	2.6	26	3.5	35
80kHz	0.5	5	1.4	14
100kHz	0.3	3	0.8	8

### Discussion:

#### 200020010:

In this lab we have learnt about implementation of audio amplifier and microphone amplifier using LM358 and LM386 opamps. First we have sinusoidal input and observed output we observed that as potentiometer resistance increases sinusoidal graph is distorted. At high resistance we hear high volume sound from speaker and

at low resistance low volume. We connected the microphone amplifier circuit to first circuit and calculated gain values .

**200020051:**

In lab 10 we constructed and played with audio and microphone amplifiers. It was a very nice lab to do, we got the exact picture of what was there inside an earphone or a mobile audio speaker. We constructed the mic part and the speaker part and we added them to make an exact amplifier. We deal with many components at a time and it is very good experience to do these kind of labs.