LAB REPORT-10

Audio Amplifier and Microphone Circuits

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

Equipment/Components Required:

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

Audio amplifier:

R_p value	Input Amplitude	Output Amplitude	Distortion (Yes/ No)
0 kΩ	$1V_{p-p}$	$100\ mV_{p-p}$	–
100 kΩ	$1V_{p-p}$	$720\ mV_{p-p}$	–
200 kΩ	$1V_{p-p}$	$1V_{p-p}$	–
230 kΩ	$1V_{p-p}$	$2.6\ V_{p-p}$	Visible distortion
500 kΩ	$1V_{p-p}$	$6.9\ V_{p-p}$	Visible distortion

The value of Rp pot where the distortion in the waveform is first observed = 230 kΩ

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 = 2.7 mA

Similarly for without distortion conditions, we get I_{input} = 1.9 mA

Estimated battery life, assuming a 500 mAh battery rating = $\frac{500\,mA-Hr}{2.7\,mA}$ = 185.2 hours

Rp position	Current drawn	Output Amplitude
Minimum	1.9 mA	100 mV_{p-p}
Beginning of distortion	2.3 mA	2.6 V_{p-p}
Maximum	2.7 mA	6.9 V_{p-p}

Microphone amplifier :

Frequency (Hz)	Without C2		With C2	
	V_o	V_{out}	V_o	V_{out}
100 Hz	0.1 V_{p-p}	2 V_{p-p}	0.1 V_{p-p}	1.8 V_{p-p}
200 Hz	0.1 V_{p-p}	10.1 V_{p-p}	0.1 V_{p-p}	9.4 V_{p-p}
1 kHz	0.1 V_{p-p}	10.6 V_{p-p}	0.1 V_{p-p}	10 V_{p-p}
2 kHz	0.1 V_{p-p}	10.4 V_{p-p}	0.1 V_{p-p}	11.3 V_{p-p}
3 kHz	0.1 V_{p-p}	9.8 V_{p-p}	0.1 V_{p-p}	11.3 V_{p-p}
8 kHz	0.1 V_{p-p}	6.9 V_{p-p}	0.1 V_{p-p}	11.4 V_{p-p}
10 kHz	0.1 V_{p-p}	5.2 V_{p-p}	0.1 V_{p-p}	9.5 V_{p-p}
25 kHz	0.1 V_{p-p}	2.3 V_{p-p}	0.1 V_{p-p}	4 V_{p-p}
75 kHz	0.1 V_{p-p}	0.5 V_{p-p}	0.1 V_{p-p}	0.6 V_{p-p}
100 kHz	0.1 V_{p-p}	0.2 V_{p-p}	0.1 V_{p-p}	0.6 V_{p-p}

Discussions and Conclusions:

1. In this experiment, we explored the audio amplifier and a microphone amplifier which are excellent examples of usage of electronic circuits in practical scenarios.
2. Audio amplifier is an LM358 based amplifier. Similarly, microphone amplifier circuit is an LM386 based amplifier. The circuits here are having applications and importance in the domains of communications engineering, mobile communications etc.
3. Initially, we built Audio amplifier and connected it to a speaker to observe sound(output), while giving a sinusoidal input to the AUX end of the amplifier. We also connected the 3.5mm headphone jack to the audio amplifier to check if the sound is produced in the speaker.
4. We then realized that connecting the AUX cable to ground, while using the 3.5 mm jack helped us achieve better sound quality.
5. Then we went on further by building the microphone amplifier circuit and tested it using AFG and recording outputs on DSO. Finally after confirming that both the circuits are now well tested and working, we merged the output of the microphone amplifier circuit to the input aux point of the audio amplifier circuit, and were able to hear the sound produced by the speaker when we are playing audio at the microphone end of the microphone amplifier.