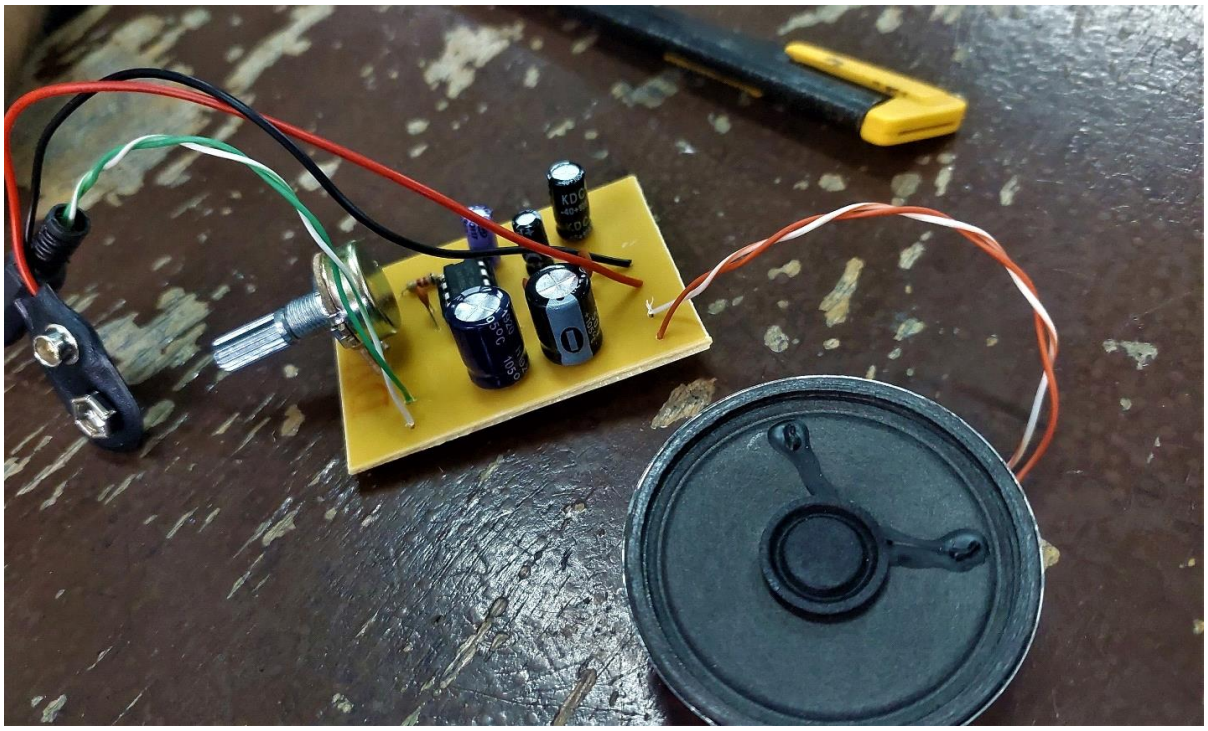
Audio Amplifier

Project Report



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وزارة التعليم العالي
جامعة بنها
كلية الهندسة بشبرا

Electronic Circuits 1

CCE204

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Abstract

The aim of this project was to design and develop an audio power amplifier. The amplifier is mainly for CD and DVD players which are the most common audio players today.

In this Project, we study the audio amplifier circuits. Moreover, study the flow of the whole system from a music player to the loudspeakers. Each function of the components in the amplifier.

Then the whole single ended audio power amplifier is built. After finishing the whole have some different test and measurement to define the performance of the amplifier.

Introduction

An amplifier is an electronic device that increases the voltage, current, or power of a signal. Amplifiers are used in wireless communications and broadcasting, and in audio equipment of all kinds. They can be categorized as either *weak-signal amplifiers or power amplifiers.*

An amplifier is one of the most used electronic devices in the world. It's a basic building block of a vast number of circuits and comes in various forms. Amplifiers can be defined simply as an electronic device that increases the power of a signal. In other words, it increases the amplitude of a signal, and makes it stronger than the given input. Although this sounds simple in theory, amplifiers have a lot of parameters and conditions in the real world. Amplification is never perfectly efficient; there are always losses, distortion, and noise to deal with.

The power amplifier receives the audio signal from the mixing board or signal processor and magnifies it, giving it the power, it needs to drive your speakers and entertain your audience. In this article, we'll discuss the things you need to know when choosing an amplifier for your pro audio system.

List of components

Ic lm386

Ic Socket

Battery 9v

3 ceramic capacitor 0,1uf

1 ceramic capacitor 47nf

2 polar capacitor 220uf

1 polar capacitor 10uf

1 polar capacitor 100uf

1 resistor 10 ohm

1 resistor 1.2k ohm

1 potentiometer 10k ohm

1 audio input jack

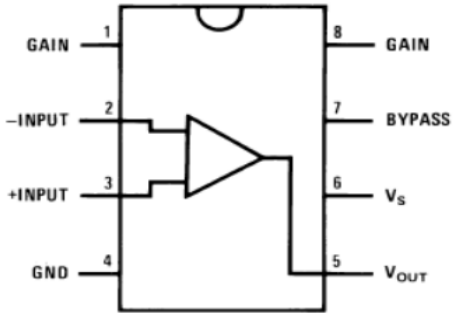
1 speaker 8-ohm 0.5 watt

Project box

Circuit Designing:

About LM386:

This is a popular IC that is used to amplify low audio signals. It uses a set of transistors to amplify the sound and this version can output 1W sounds. Other versions output at 0.325W and 0.7W.



Vs: Power input between 9V and 12V AC to make the IC turn ON.

GND: Connects to negative of the battery or ground of the power supply. In other words, it's the common ground.

-Input: Reference (comparator) for 0V or ground. Sets whatever is on that pin as 0V and then compares it to +Input.

+Input: Receives positive voltage from audio device. The audio signal to amplify.

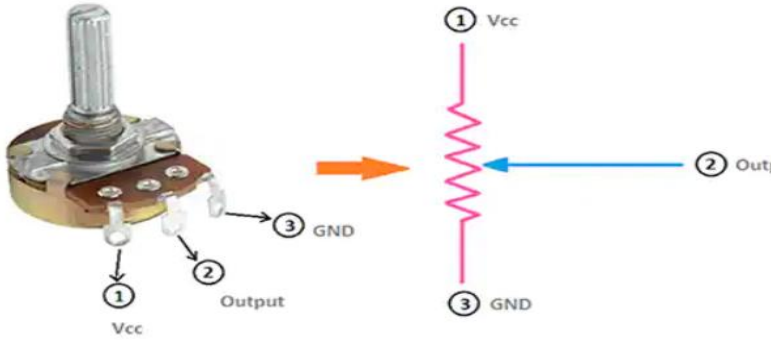
Vout: Positive voltage to the speaker. The amplified audio signals.

Gain: Connect resistors/capacitors between pin 1 and 8 to adjust the gain (pre-volume).

Bypass: Whatever the IC flushes out. The leftover current.

AUDIO PLUG: Plugs in a phone or other audio device.

POTENTIOMETER: Variable resistor that adjusts the volume.



SPEAKER: Outputs sound.

IC SOCKET: Will be soldered on a PCB and will hold the LM386. By having a socket, we don't solder on the IC and don't heat it up and makes it easy to replace the IC if it goes bad, which happens.

RESISTORS can:

A) Lower the voltage

B) Block the current until it is pushed harder:

- Will make the current go another way if there is an easier way (a lower resistance).

- The current always goes to the path with less resistance.

- The lower resistance path acts like a magnet that attracts the current to it.

- For the current, a resistor acts like a wooden roadblock. It's like "Only go through if you really need to". In case of emergency, you can go through if you really want to.

Capacitors (or caps): temporarily hold a charge and discharge continually. In our circuit, they are used to reduce audio noise to keep a **clean audio signal**. They prevent interference or "bad mood" between signals that could create audio noise. Metaphorically, they act like springs or suspensions by absorbing the shock caused by the bumps on the roads, keeping the ride smooth. **Caps smooth out the current**.

The big suspension springs for bigger trucks would be the 220 uF cap.

IMPORTANT: To avoid explosions, only replace caps by:

- SAME Capacitance (uF)

- Volts are EQUAL or Higher

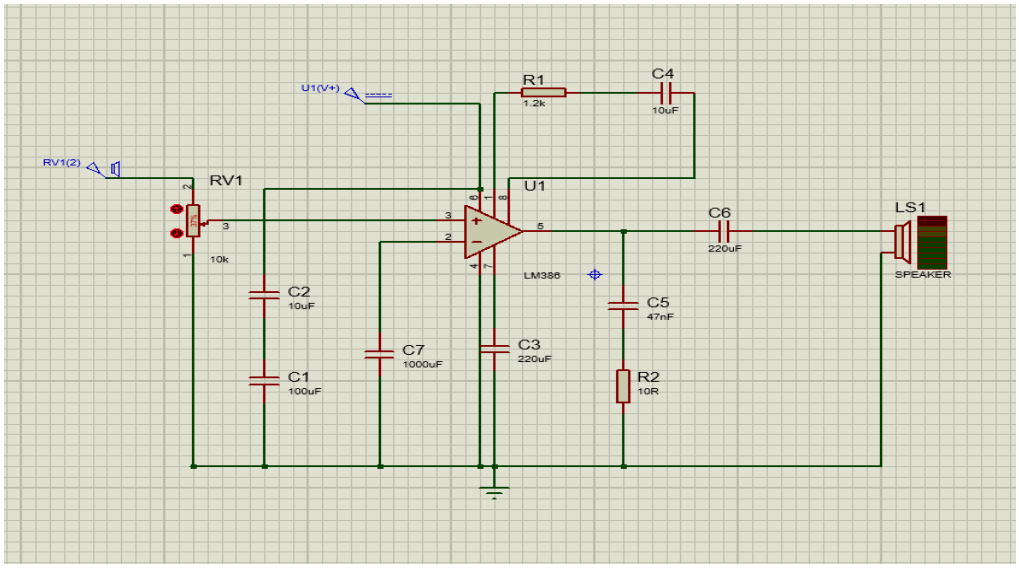
Aluminum Caps Polarity (also to avoid explosions):

POSITIVE: Long lead

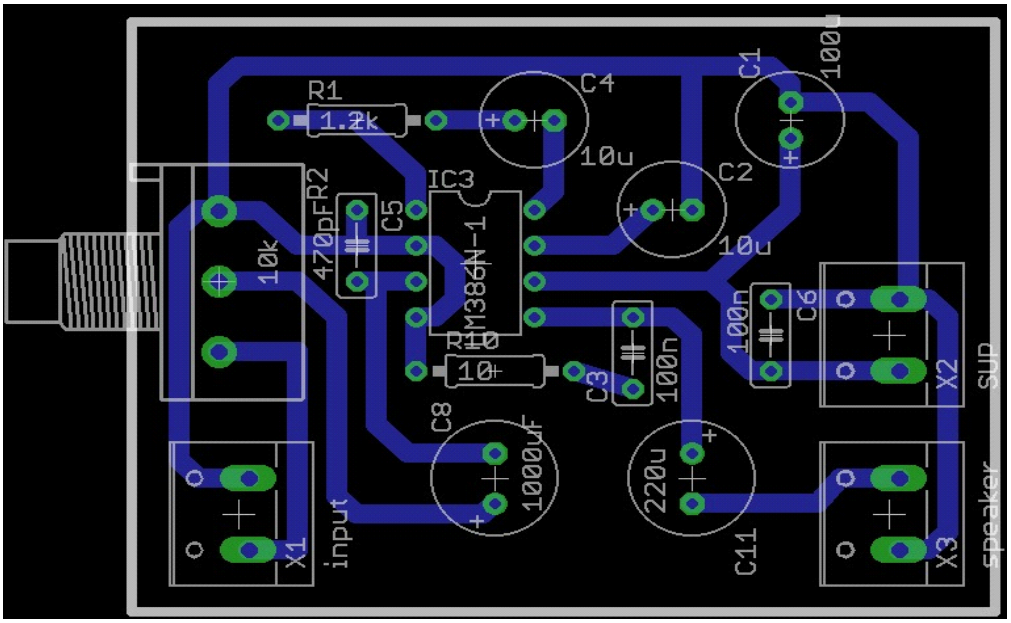
NEGATIVE: White Bar

PCB Manufacturing Process

Once you have decided on the design of the audio amplifier's circuit, you want to be made on a PCB, by using different PCB designing CAD software like **PROTEUS.**



CIRCUIT FOR AN AUDIO AMPLIFIER



PCB layout

The most important point to note is that everything must be designed in reverse because you are watching the board from above. The next step is to print out the layout using a laser printer.

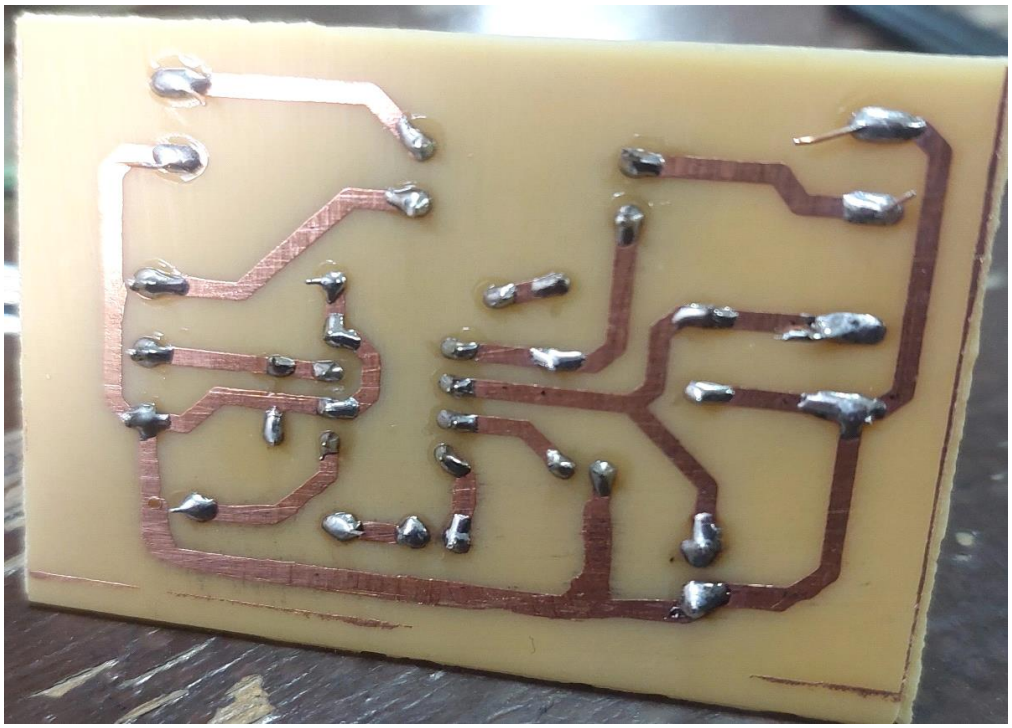


image of Printed circuit Board

PCB Etching Process

All PCBs are made by bonding a layer of copper over the entire substrate, sometimes on both sides. The etching process must be done to remove unnecessary copper after applying a temporary mask, leaving only the desired copper traces.

Dip the PCB inside the solution and keep it moving inside. Take it out at times and stop the process as soon as the copper layer

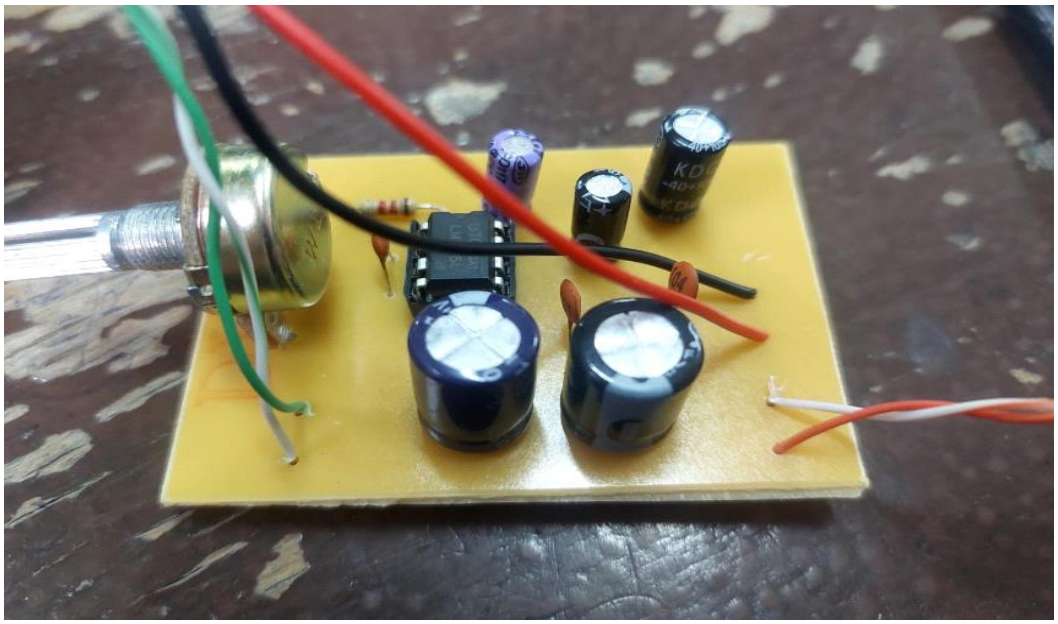
has gone. After etching, rub the PCB with a little acetone to remove the black color, thus giving the PCB a shining attractive look. The PCB layout is now complete.

PCB Assembling & Soldering

First, we drill the PCB board to get the places for the components.

Then we assemble the electronic components all together in the hole construction we made.

Then we inserted and got it fixed mechanically to the board with a molten metal solder.



Components of Audio Amplifier

RESULT

The project report is about reproducing input audio signals at sound-producing output elements, with desired volume and power levels—faithfully, efficiently, and at low distortion.

Conclusion

The design process was presented in detail and the calculations with respect to the operation and performance of amplifiers were undertaken. In conclusion, the simulations carried out supported the calculations. This had to be ensured before the actual implementation of the design.

This is a low voltage power amplifier according to its amplification factor it has some advantages as follows:

- The circuit of this amplifier is not so complex, so it is easy to make it.
- This amplifier circuit uses capacitor and resistor and an IC, due to the cost is very low.
- The reliability of this audio amplifier is also high.

Also, it has disadvantages:

- The level of output is not that high. To obtain high output multistage may be required.
- The quality of sound is also low.
- There is some amount of noise present in the final output.

Sources

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