Audio Amplifier Design

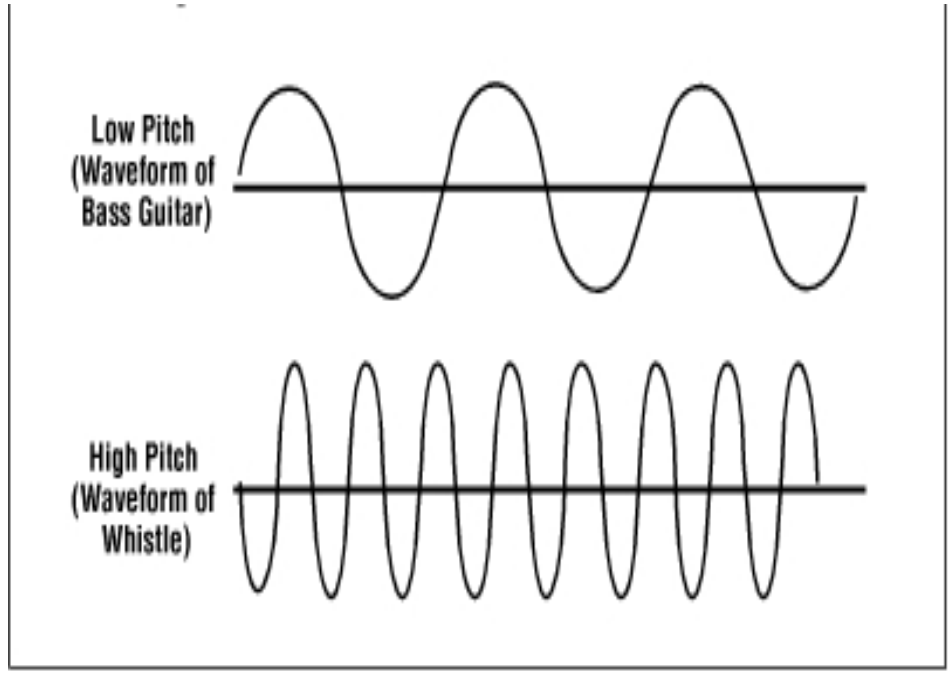
SES Projects

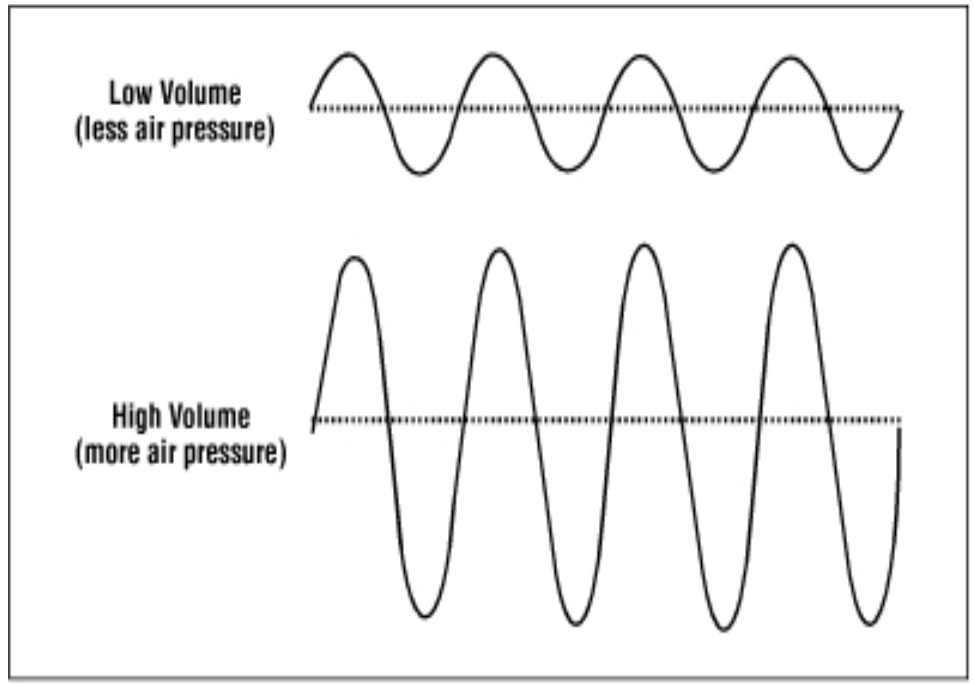
Objectives

- To Learn about the audio amplifier
- To design one on CAD.

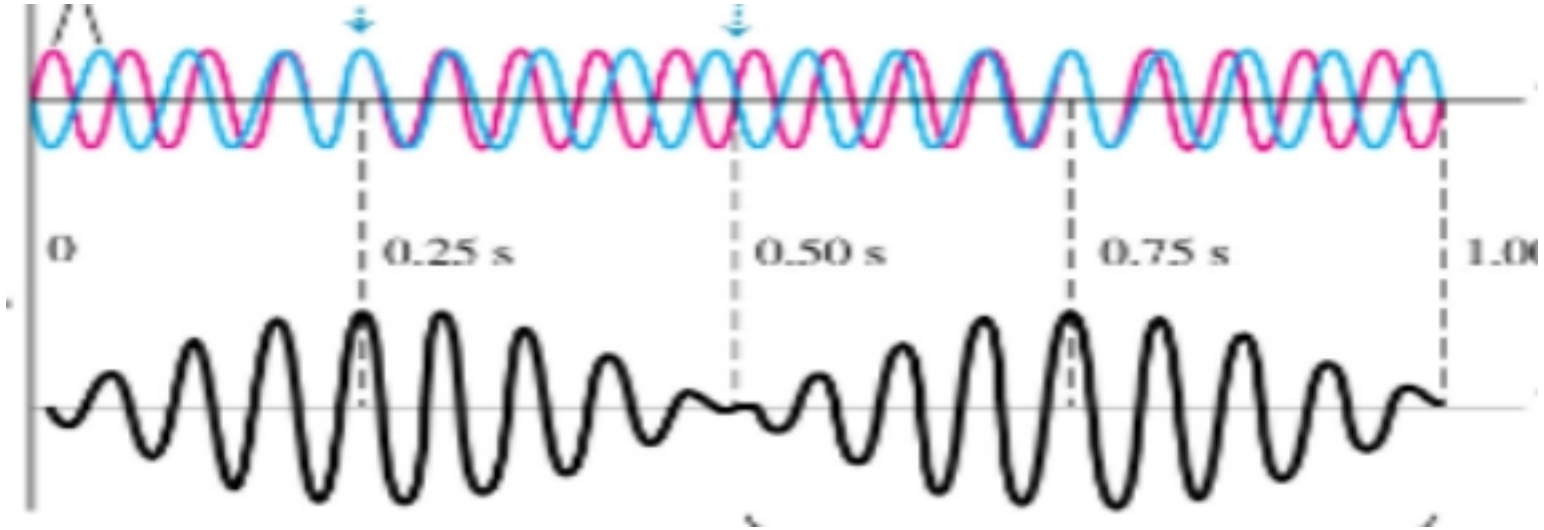
Introduction

- A wave is the transmission of a disturbance usually in form of energy
- Sound is a mechanical longitudinal wave i.e. the particles of the medium carrying sound propagate parallel to the direction of wave travel
- Audio frequency range is 20Hz to 20KHz.
- The frequency of the sound wave determines its pitch while its amplitude determines its loudness.
- Low frequency/Low pitch sounds are called bass audio while high frequency/high pitch sounds are called treble audio

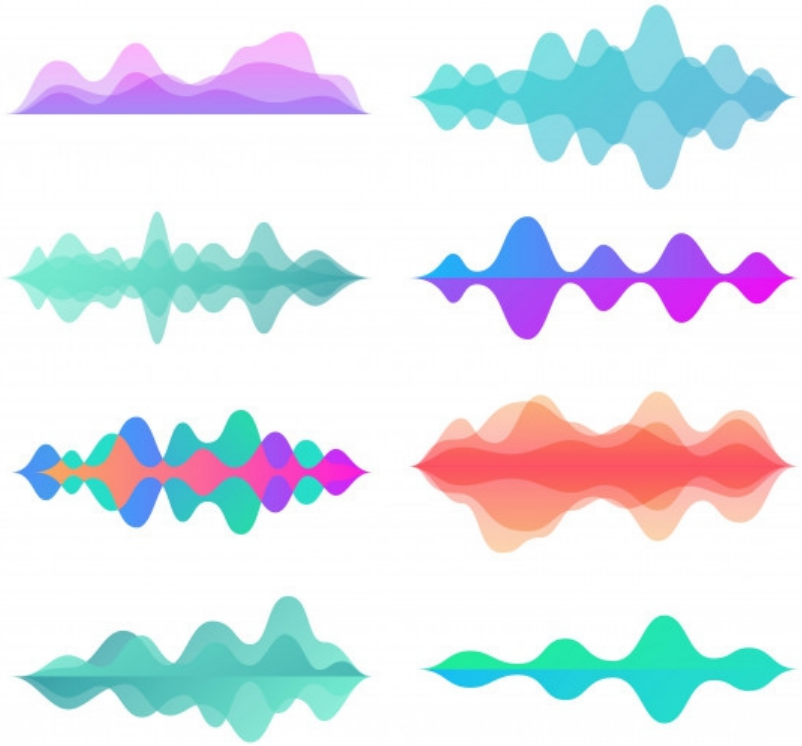

Low Pitch
(Waveform of
Bass Guitar)
High Pitch
(Waveform of
Whistle)


Low Volume
(less air pressure)
High Volume
(more air pressure)

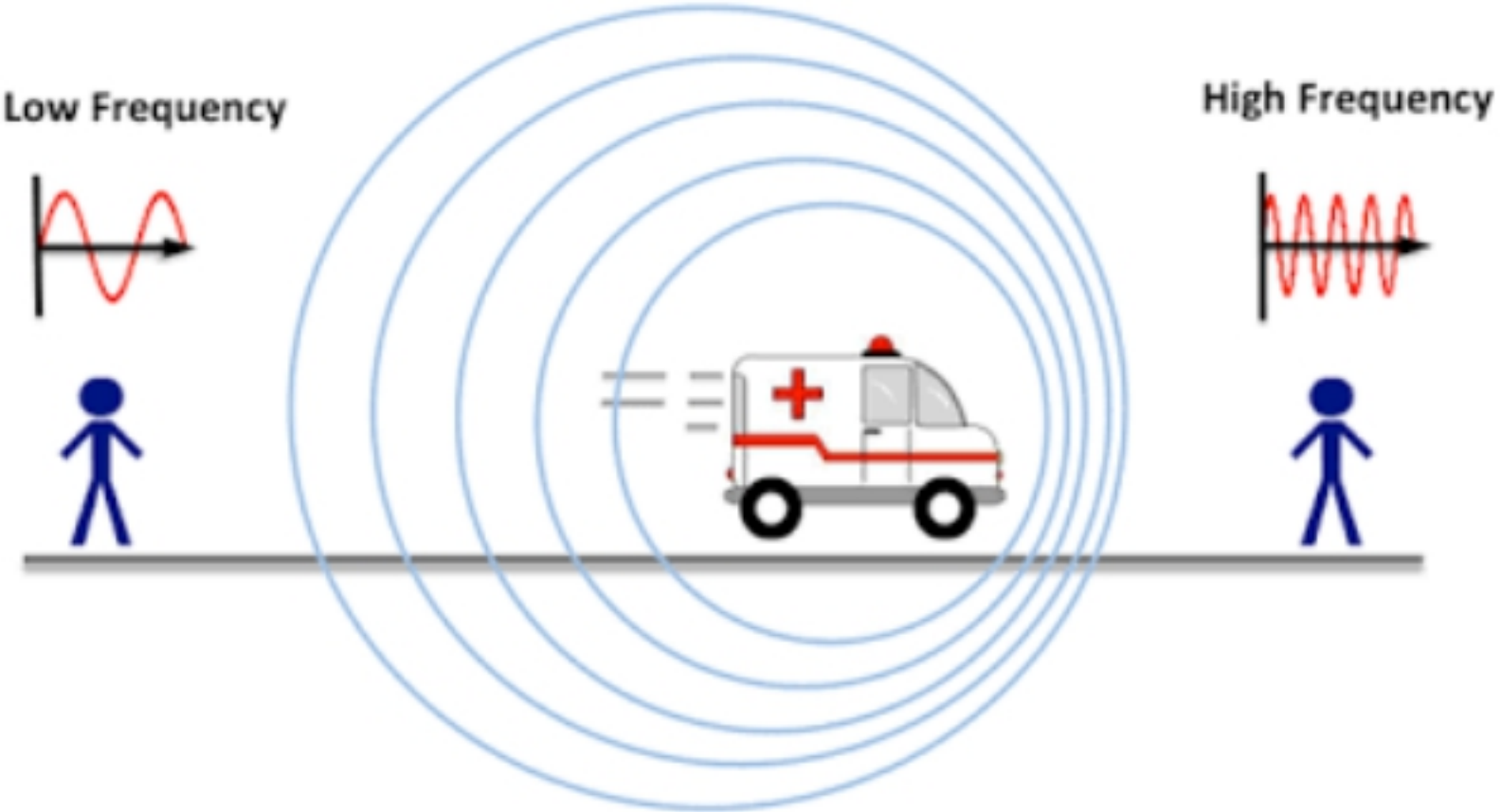
- Some sound consists of a single frequency such as an alarm or a car horn
- Others are a summation of several frequencies e.g orchestras, music.



Typical Sound Signals obtained from synthesizers



Doppler effect



Parts of a full Sound System

- Electromechanical transducer e.g. Microphone (may or may not be present)

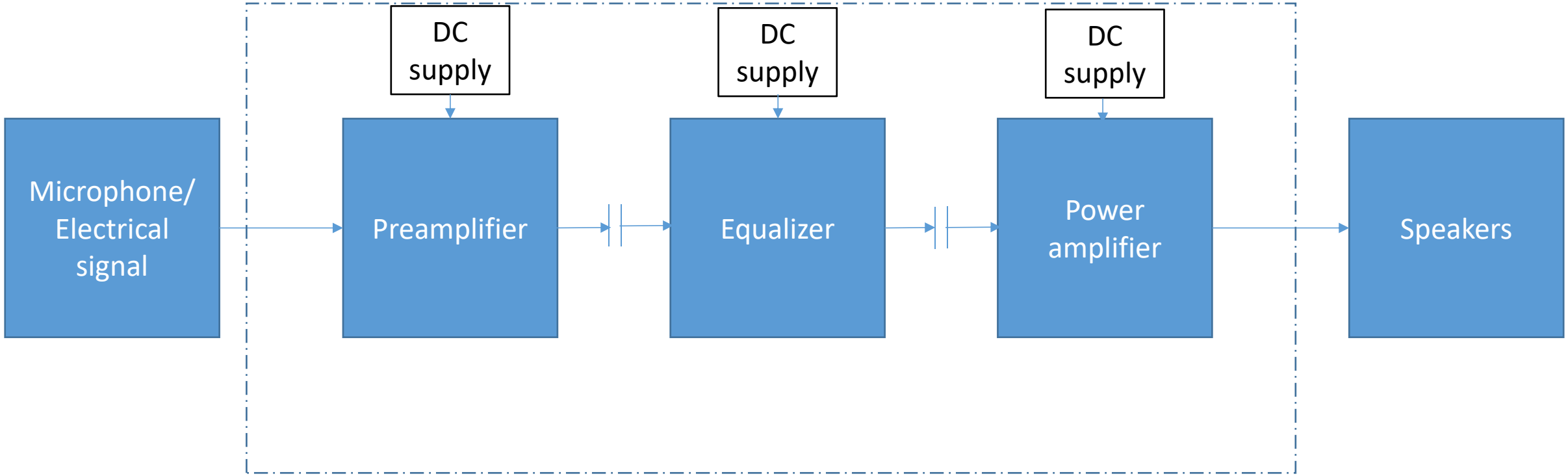
The Audio Amplifier:

- Preamplifier
- Equalizer/Tonality control circuit
- Power amplifier/Drivers

Stages within the audio amplifier are coupled by capacitors

- Electromechanical transducer: Speakers

Block Diagram



Significance of stages

- Microphone: convert sound to an electrical signal (AC)
- Preamplifier: amplify the electrical signal to a level that can be sensed by a power amplifier.
- Equalizer: manipulate the tone and quality of the sound e.g treble and bass
- Power amplifier: to deliver required power to the speakers. It converts the DC power from the supply to AC power and is therefore able to drive the speaker.

Audio amplifier chips

- TEA2025: the one used in this design
- TDA2030
- LM386

A brief discussion on speakers

Why do we split speakers into woofers, tweeters and midranges?

NB: Excursion of a speaker is the displacement of the diaphragm/cone from its mean position.

Types of distortion, Doppler distortion, crossover distortion.