

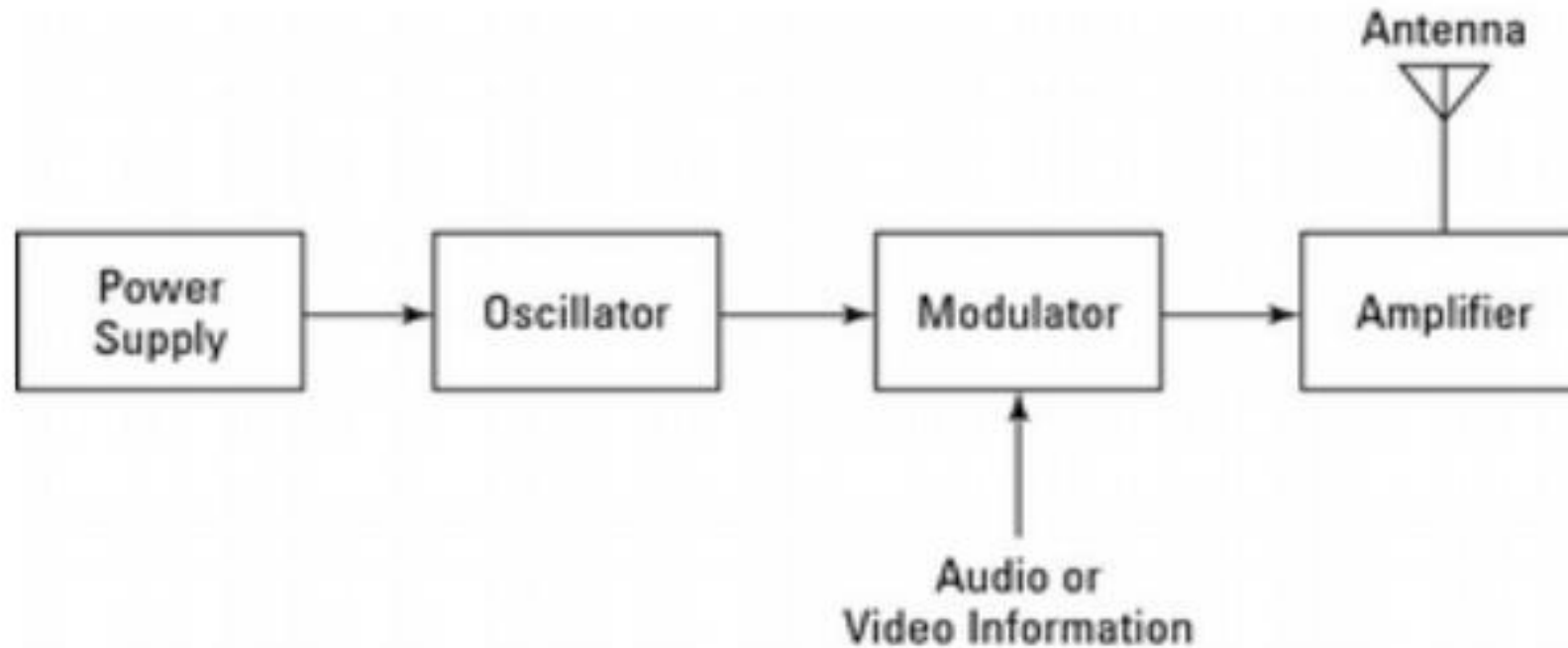
Radio Transmitters

Presented by:
Ragav, VU3VWR



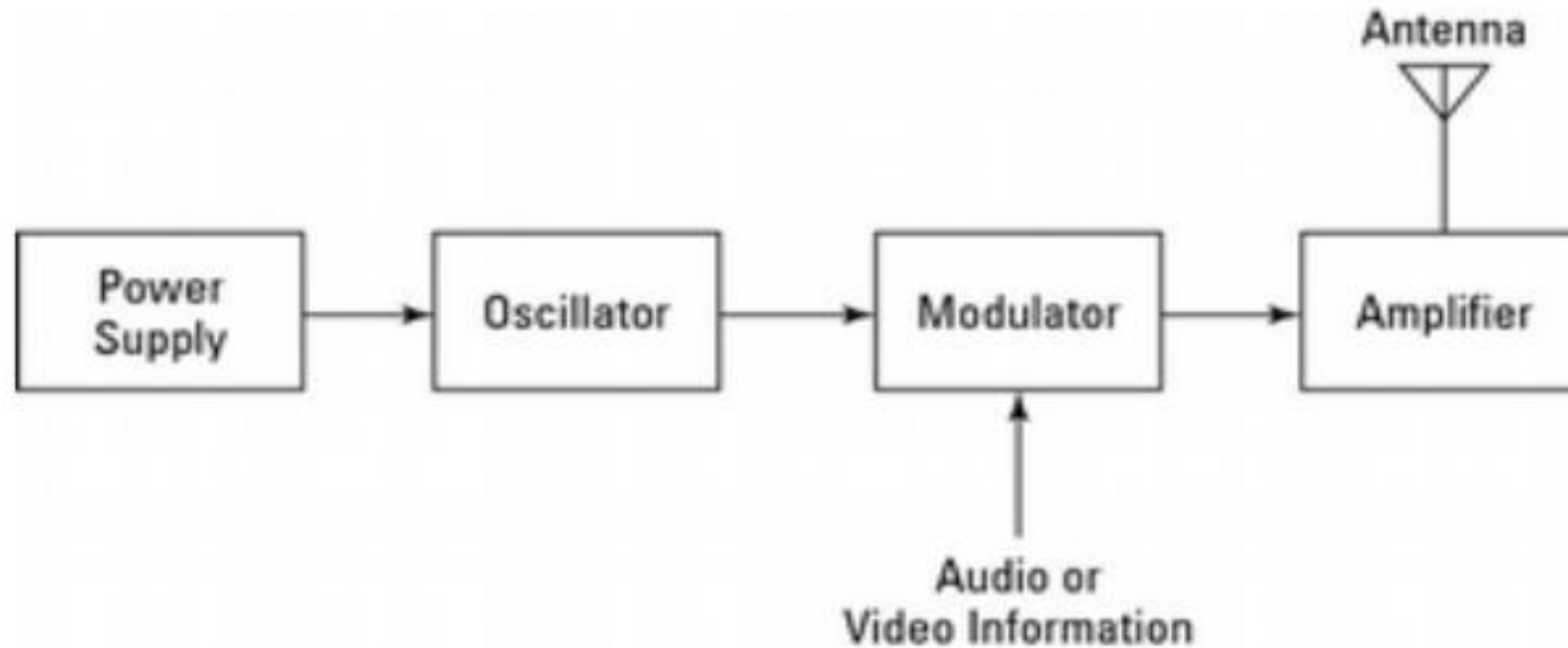
What is a radio transmitter ?

- A radio transmitter is an electronic circuit that generates radio waves that contain useful information such as audio, video or other data



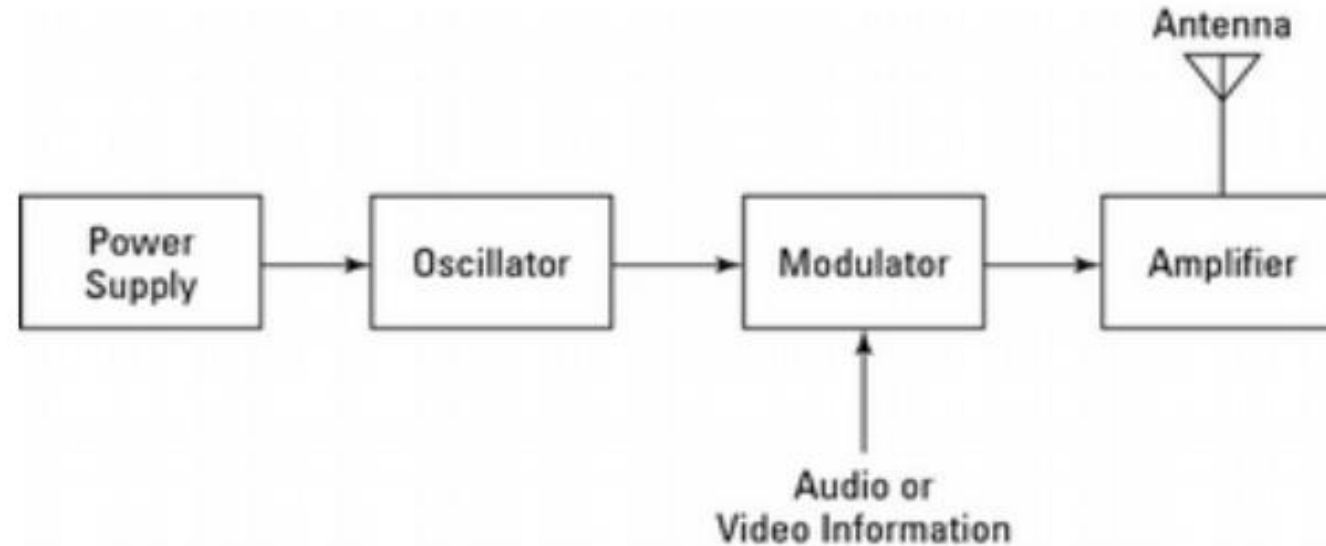
Parts of a radio transmitter

- The Power supply provides the necessary electrical power to operate the transmitter



Parts of a radio transmitter ..

- An electronic oscillator is an electronic circuit that produces a periodic, oscillating signal, often a sine wave or a square wave;



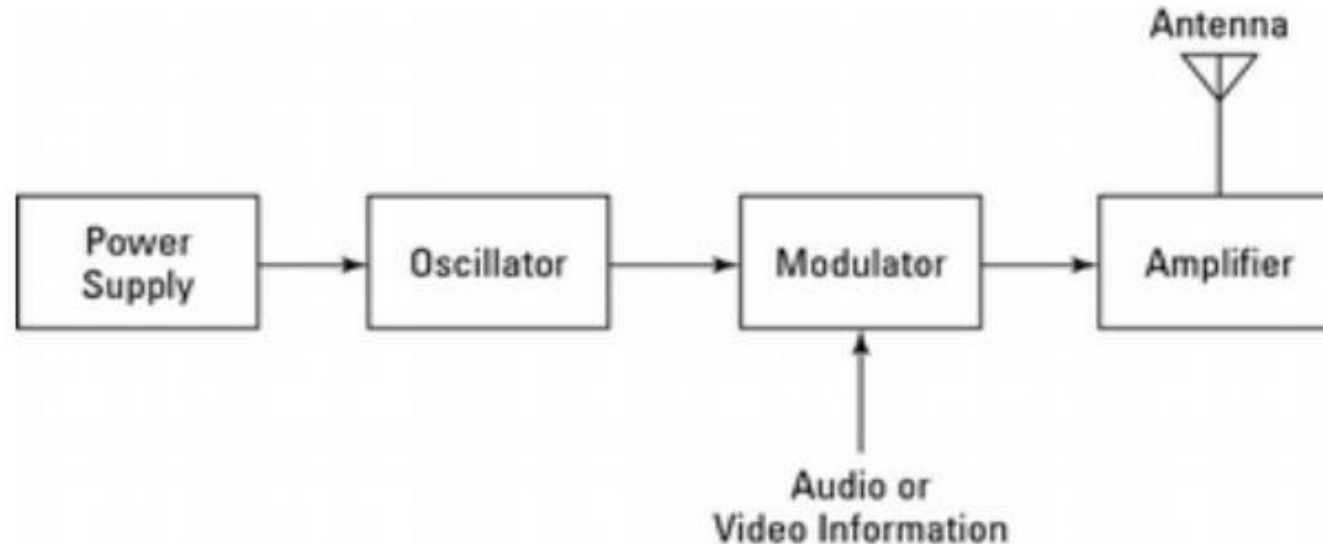
Oscillators

- Oscillators convert direct current (DC) from a power supply to an alternating current signal
- They are widely used in many electronic devices. Common examples of signals generated by oscillators include signals broadcast by radio and television transmitters, clock signals that regulate computers and quartz clocks, and the sounds produced by electronic beepers and video games
- Oscillators are often characterized by the frequency of their output signal: Audio Frequency oscillators produces frequencies in the audio range, about 20 Hz to 20 kHz; RF oscillators produces signals in the radio frequency (RF) range of about 100 kHz to 100 GHz.
- Oscillators designed to produce a high-power AC output from a DC input are usually called inverters.



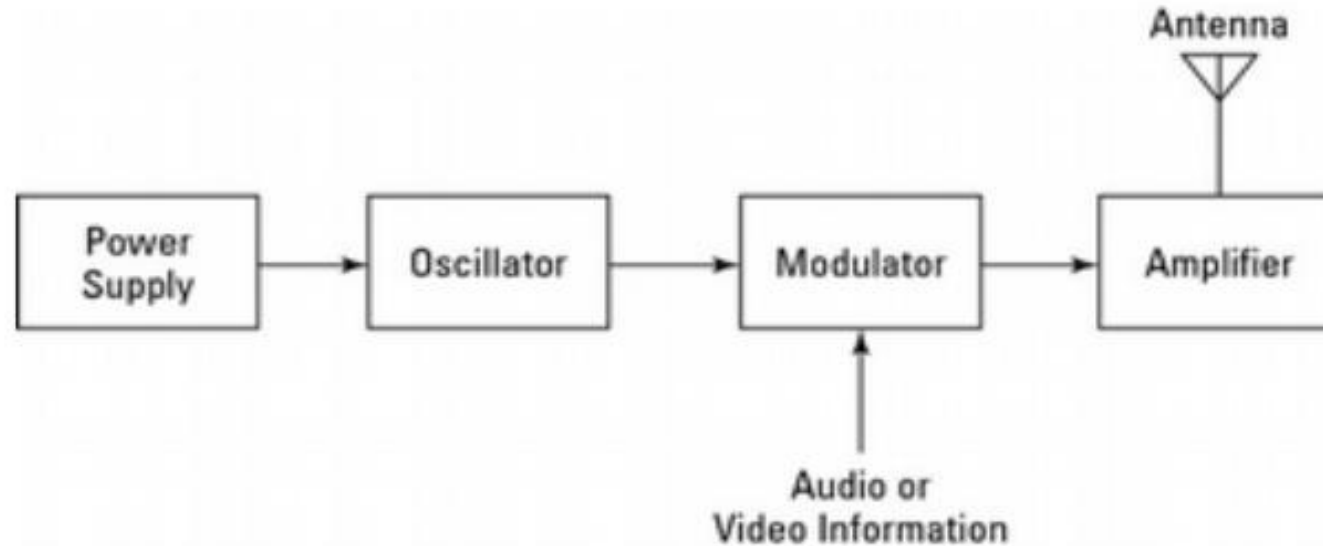
Parts of a radio transmitter ...

- The modulator superimposes the information such as audio, video, or data on to the carrier wave generated by the oscillator; It can either be an AM or FM modulator.



Parts of a radio transmitter ...

- The weak modulated signal is then boosted several times to increase its power; the power of the amplifier determines the power of the signal; this powerful signal is sent to an antenna which broadcasts it as radio waves

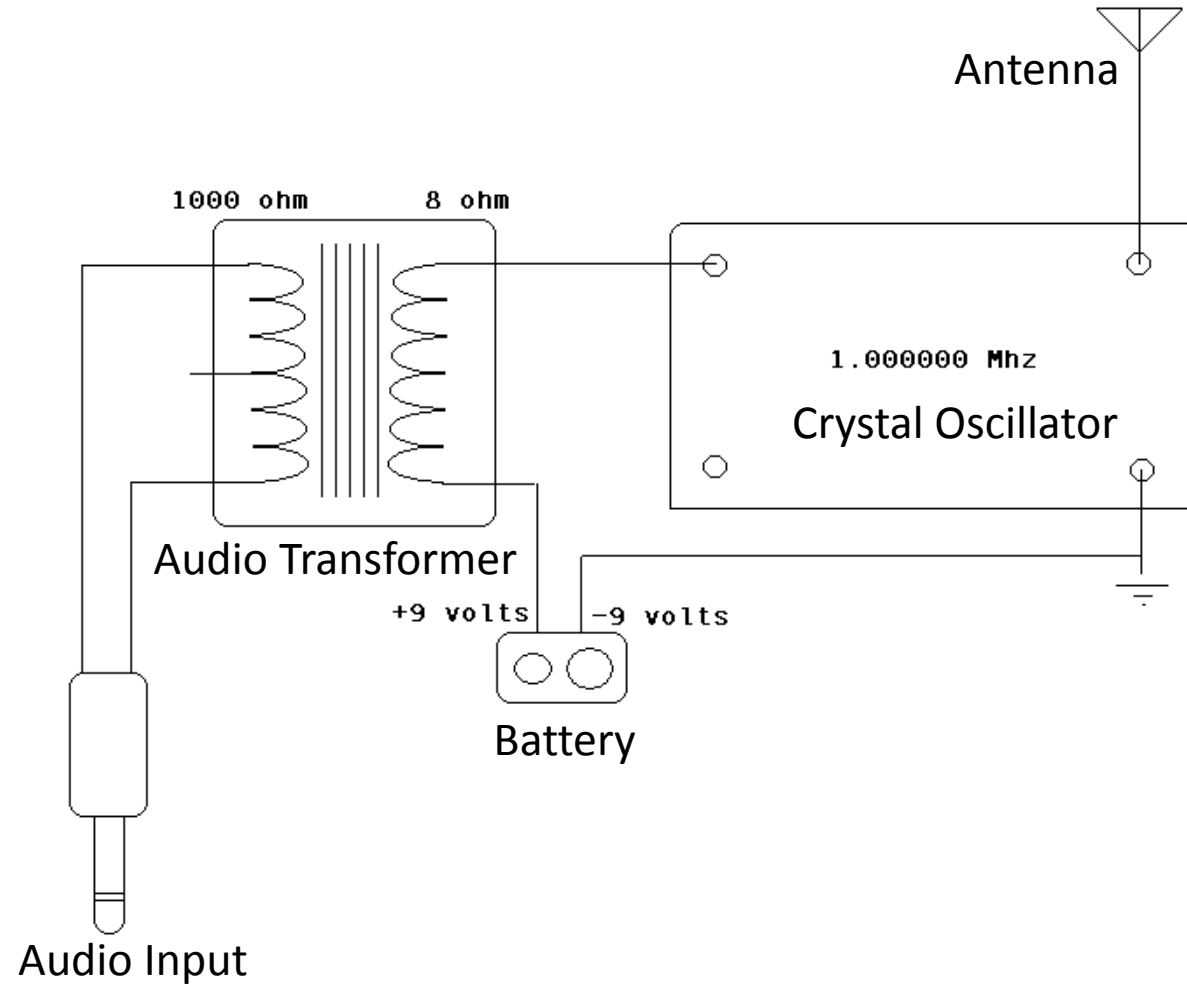


AM Transmitter

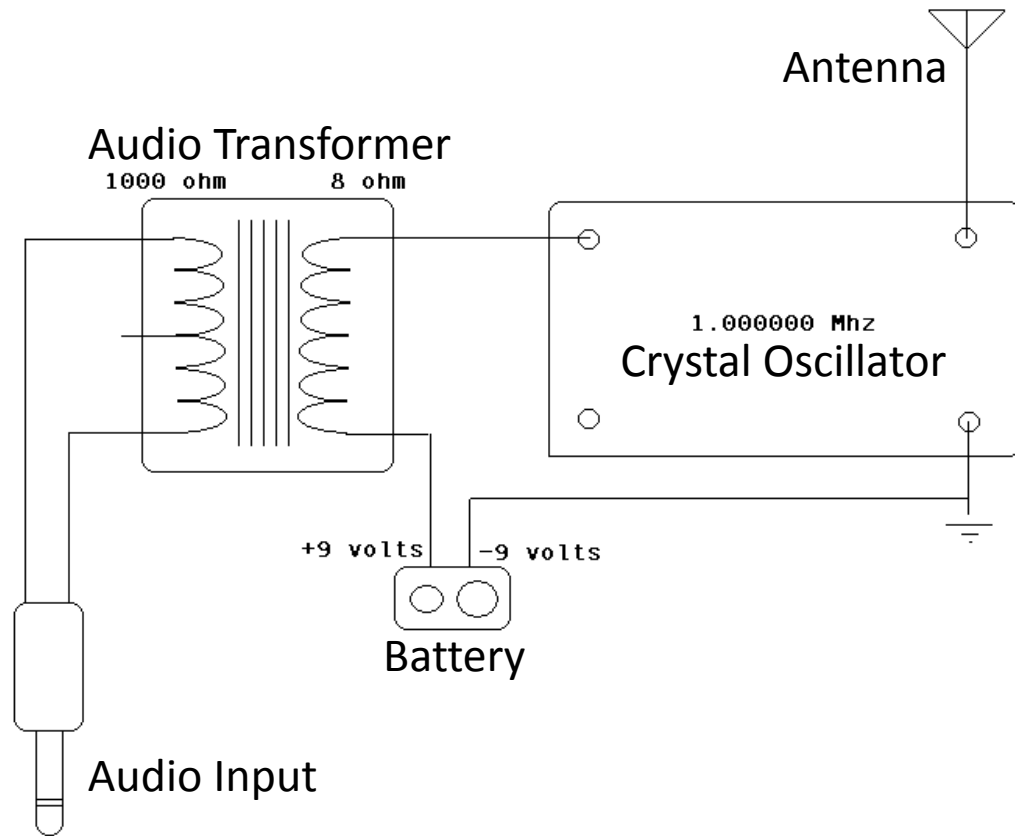
- In an AM transmitter circuit, the information to be transmitted is superimposed on the amplitude of a carrier wave
- The most basic AM transmitter circuit consists of a power supply, an oscillator for generating the carrier, a modulator to mix the carrier and the information signal and an antenna
- A power amplifier can be used between the modulator output and the antenna to increase the power of the transmitted AM signal



AM Transmitter

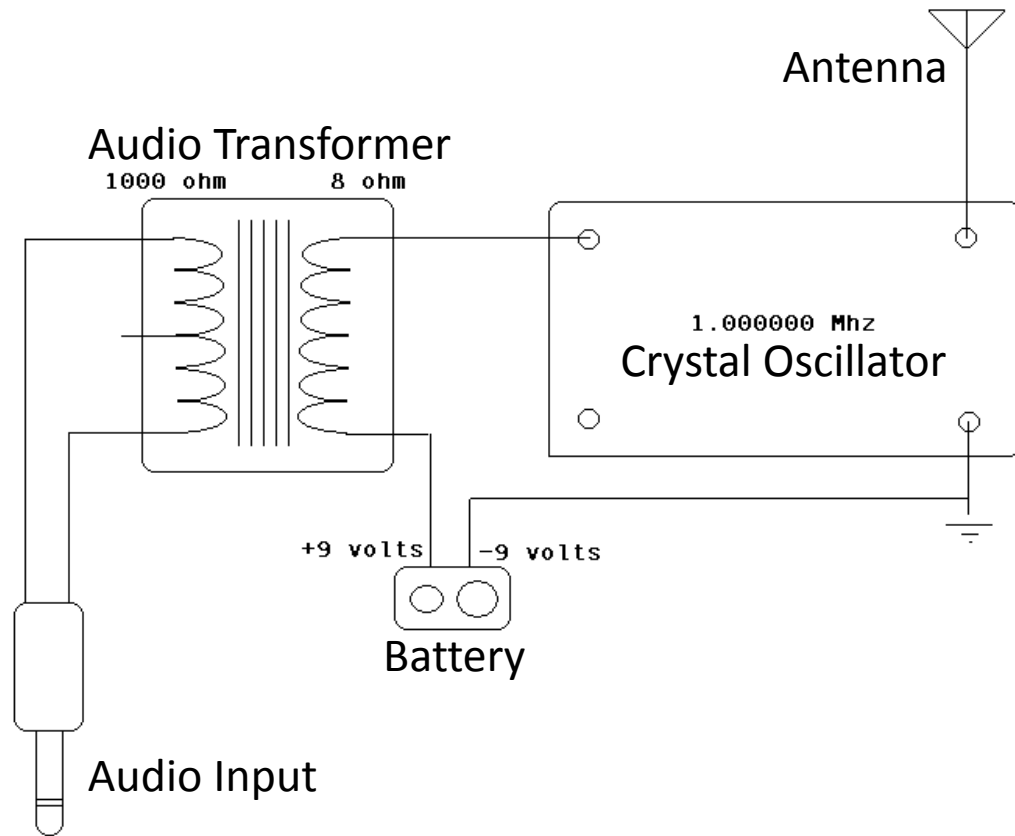


AM Transmitter



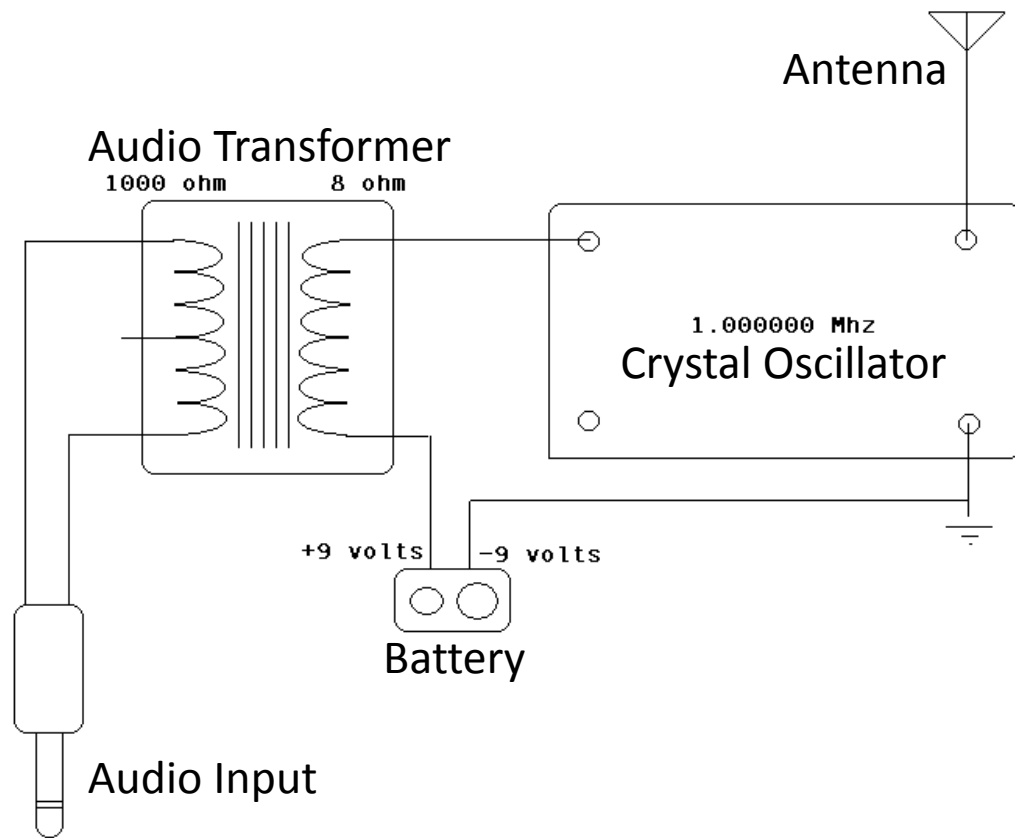
- The oscillator is connected to one end of a long wire antenna. It alternately applies 9 volts of electricity to the end of the wire, and then 0 volts, over and over again, a million times each second.
- The electric charge travels up and down the wire antenna, causing radio waves to be emitted from the wire. These radio waves are picked up by the AM radio, amplified, and used to make the speaker cone move back and forth, creating sound.

AM Transmitter



- The audio input is connected to the primary winding of the audio transformer; the secondary is connected such that the power for the oscillator (DC) runs through the secondary winding
- When an ac signal such a voice is applied to the primary winding, there is a small induced secondary voltage, which adds or reduces power from the oscillator

AM Transmitter



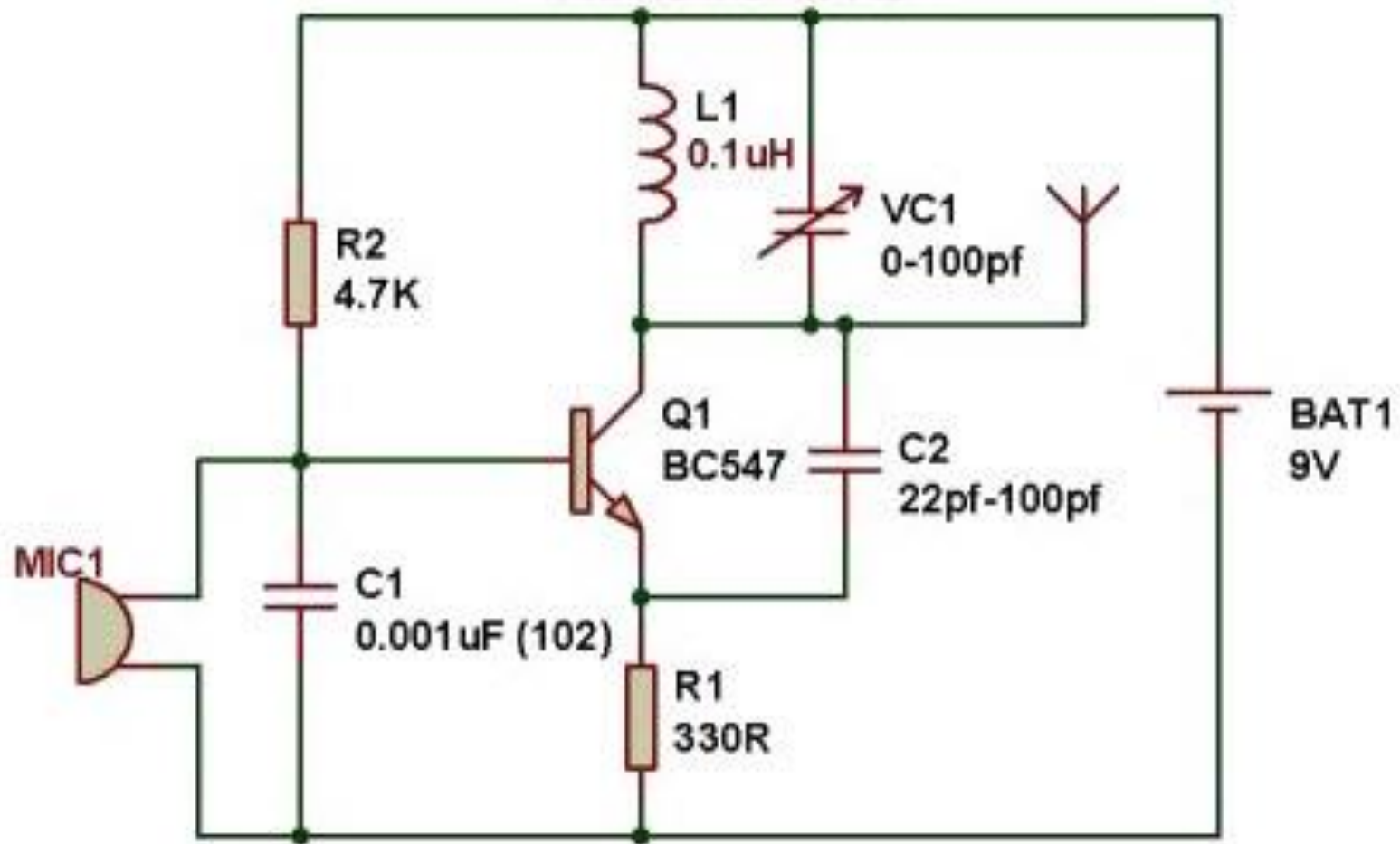
- As the power of the oscillator goes up and down, so does the power at the antenna
- It varies from 0-10 V due to the power from the transformer
- The varying power in the antenna causes radio waves to be emitted.

FM Transmitter

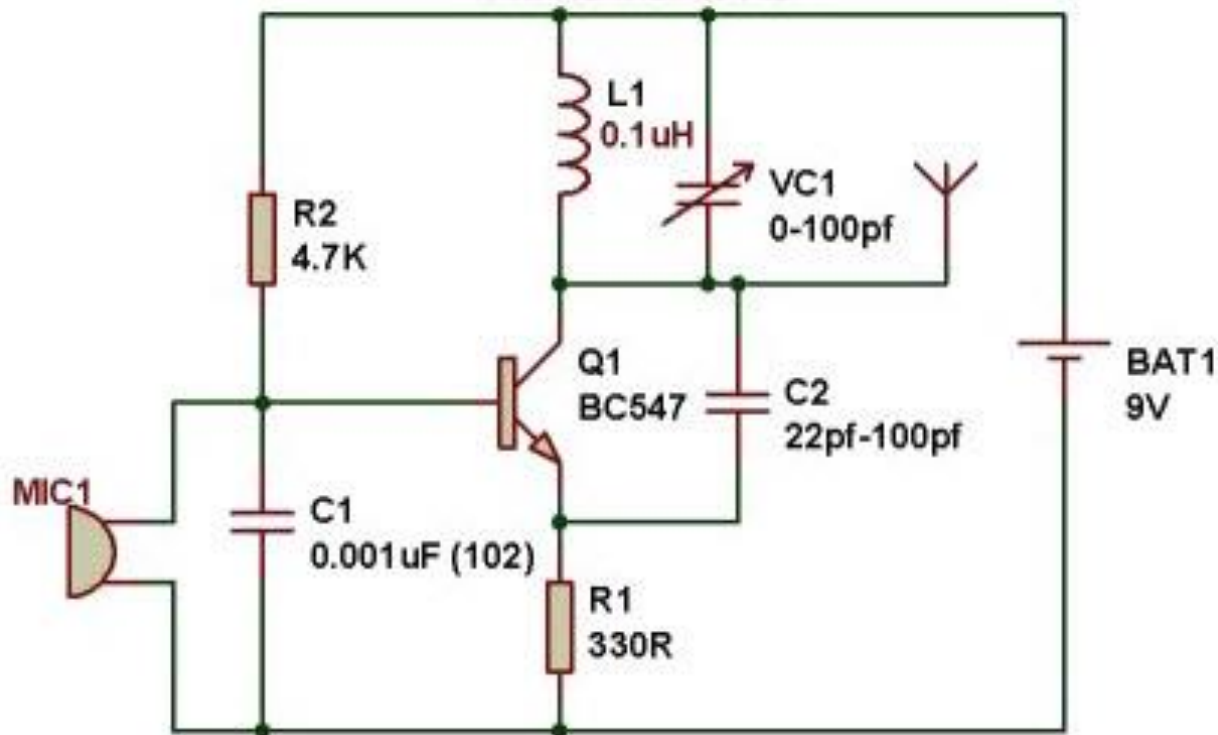
- In an FM transmitter circuit, the information to be transmitted is superimposed on the frequency of a carrier wave
- The most basic FM transmitter circuit consists of a power supply, an oscillator-cum-modulator for generating the carrier and to mix the carrier and the information signal and an antenna
- A power amplifier can be used between the modulator output and the antenna to increase the power of the transmitted FM signal



FM Transmitter

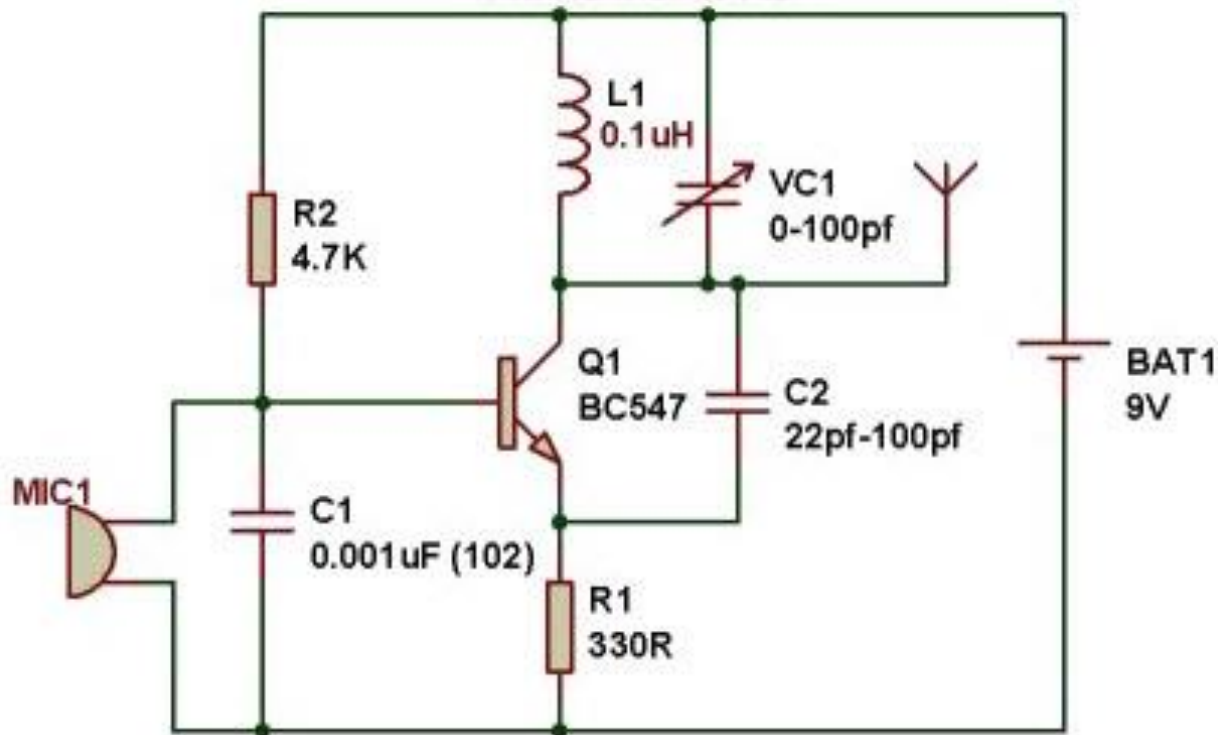


FM Transmitter



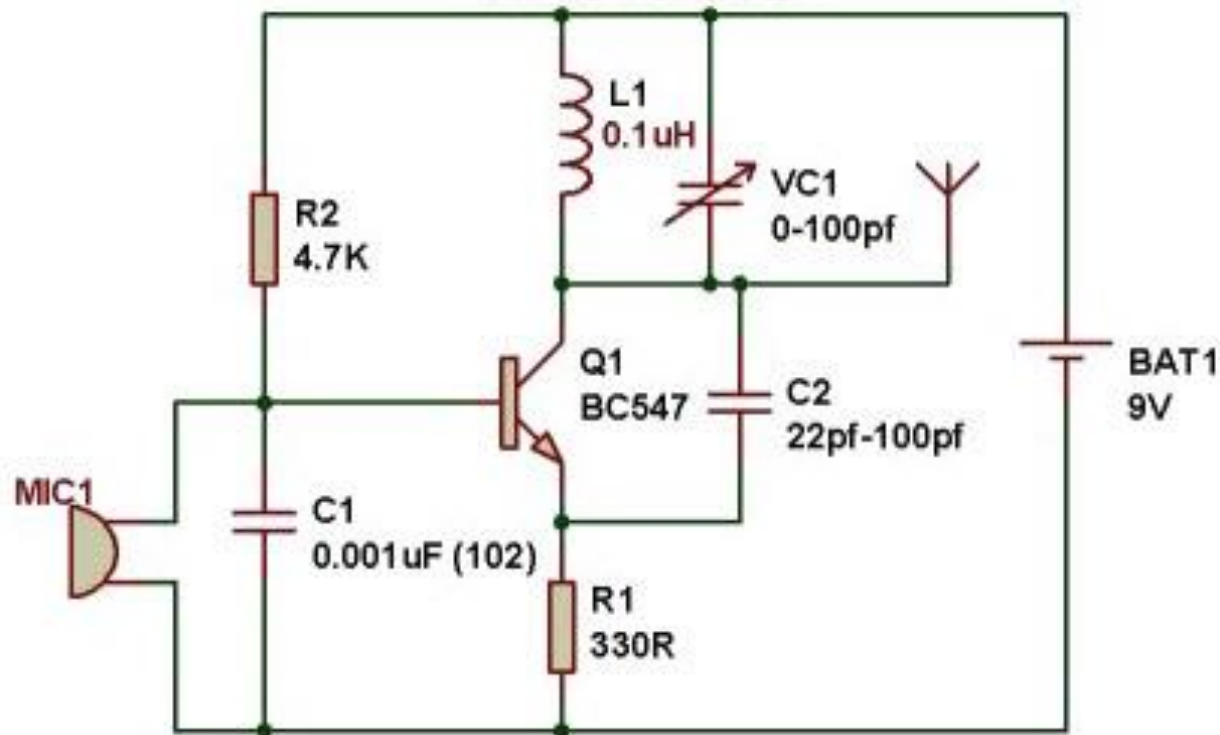
- In this basic FM transmitter, a 9V battery is used as a DC power source
- Transistor Q1, C2, L1 and VC1 form the oscillator part of the circuit, generating a carrier signal based on the values of L1 and VC1

FM Transmitter



- The microphone, transistor Q1 and R2 form the modulator section
- When an audio signal generated by the microphone flows through the base-emitter junction, it produces a minor change in the junction capacitance of the transistor

FM Transmitter



- Junction capacitance is a function of the potential difference applied to the base of the transistor ; with varying base voltage, the capacitance changes
- Any change in capacitance in a LC circuit affects its resonance frequency; by talking into the microphone, the frequency of the tank circuit is constantly modulated according to the voice signal

Thank you!

Questions and comments in the chat box!

