SIGNALS AND SYSTEMS - EE1205 LAB REPORT

FM TRANSMITTER

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Aim:

The aim of this experiment is to ~~find~~ build a simple FM transmitter circuit and investigate its functionality.

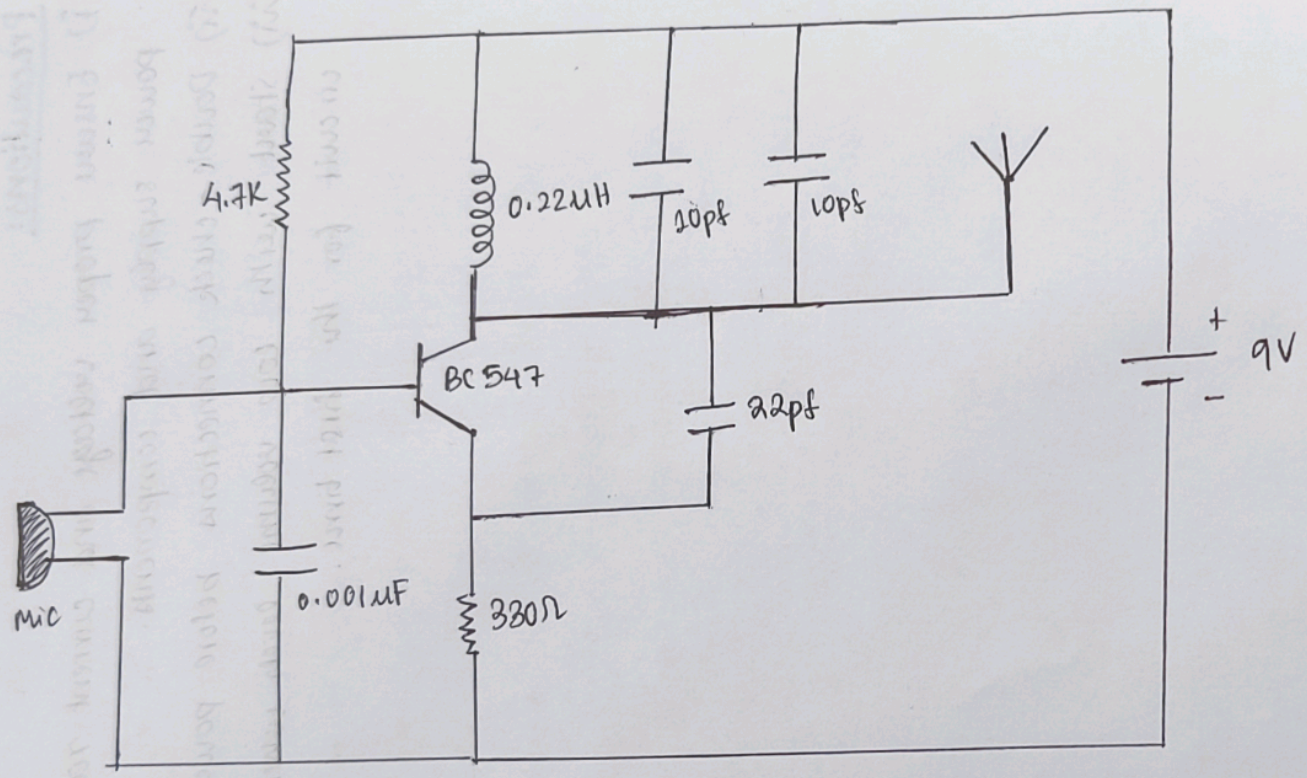
Materials required:

1) Microphone
2) Capacitors (of 0.001 uF and (2x) 10pF]
3) Resistor (4.7 KΩ, 330Ω)
4) Inductor (0.22uH)
5) Antenna
6) Capacitor (22pF)
7) Transistor (BC547)
8) Voltage supply (9V)

Working of circuit :

The FM transmitter circuit operates by generating a carrier signal at a specific frequency in the FM radio band. The audio signal captured by the microphone modulates the carrier signal, varying its frequency based on the sound wave's amplitude. This modulated signal is then transmitted through the antenna, which radiates it into the surrounding area.

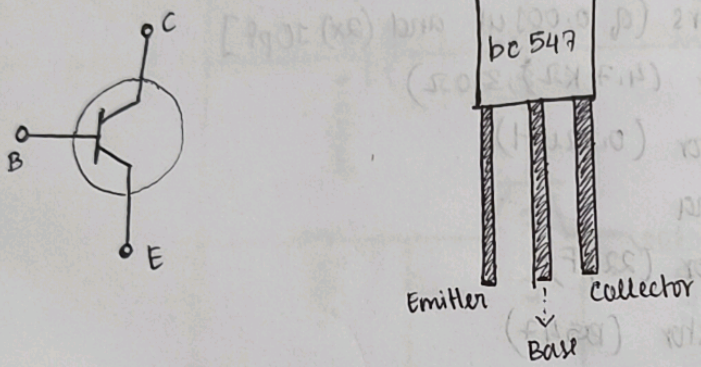
Microphone: Called condenser mike also. It converts sound waves into electrical audio signals.


4.7K
0.22uH
10pf
10pf
BC547
22pf
+
9V
-
Mic
0.001uF
330Ω

0.001 uF capacitor used / Bypass capacitor: By pass capacitor primarily deal with AC signals. They allow signals to pass through them with minimal opposition, while blocking DC signals. It also maintains a more stable bias voltage.

4.7 KΩ resistor: 4.7KΩ resistor is set the bias voltage of the transistor in oscillation section.

BC547 transistor: Used as the amplifier for the input signal coming from base.



Oscillator circuit (Transistor, Inductor, capacitors): Generates the carrier signal at the desired frequency. The transistor acts as an amplifier and oscillator, with the inductor and capacitors determining the oscillation frequency.

22 pf: Is the feedback circuit/network. that helps control the gain and stability of the oscillator. The feedback loop typically involves a portion of the amplified output signal from the trasistor being fed back to its input (the base is most common configurations).

Antenna: Radiates the modulated FM signal wirelessly.

Proadure:

1) Connect the components as per the circuit diagram provided, ensuring proper connections and polarity.
2) Connect the microphone to the input of the circuit.
3) Apply the 9V power supply to the circuit.
4) Tune an FM radio to an empty frequency in the FM band.
5) Adjust the variable capacitor or inductor to fine-tune the output frequency of the transmitter.
6) Speak into the microphone to modulate the signal.
7) Use the FM radio to recieve the transmitted signal.

Observation:

1) You first need to set up your device to scan the frequency that is emitted by fm transmitter. It was "88.3 MHz" in our case.

2) Tap Test: As you tap the mic, you can identify which freemency corresponds to your fm transmitter.

3) As we play a song through the mic, you should be able to hear it.

4) Noise can be reduced as you change the orientation of mic.

Calculation:

The frequency to be emitted can be calculated as

$f\_emitted = f\_carrier + delta(f)$.

where $f\_carrier = \frac{1}{2\pi\sqrt{LC}}$ and delta (f) is frequency caused by modulation, which is proportional to the amplitude of audio signal. So our f_carrier = 75.91 MHz

and found out f_emmitted = 97.7 MHz

Precaution:

1) Ensure proper connections and polarity to avoid short circuits.
2) Avoid interference with other electronic devices or radio signals.
3) Use appropriate safety measures when working with power sources.