AM Transmitter using Transistor with Electret Microphone

Final-Year Project Abstract · Electronics Engineering · Hardware

01 · Title

AM Transmitter using Transistor with Electret Microphone — a discrete-component medium-wave AM transmitter receivable on any MW radio.

02 · Introduction / Background

Amplitude modulation — a carrier whose amplitude follows the audio waveform — is the oldest broadcast technique and the clearest introduction to modulation. This project builds a complete AM transmitter from discrete parts: a BC547 LC-tank oscillator generates a medium-wave carrier (design target ~1 MHz from a hand-wound coil and tuning capacitor), an electret microphone with a preamp captures voice, the audio modulates the transistor's operating point so the carrier envelope follows the sound, and a whip antenna radiates it over room-scale distance. Any ordinary MW radio receives it — the student hears their own voice come back from the radio. It is deliberately a low-power lab demonstration, not a broadcast station.

03 · Problem Statement

Modulation is taught as equations and spectra, but students rarely generate a modulated carrier, radiate it, and receive it on real equipment. RF kits are often sealed modules that hide the oscillator and modulator. A discrete, tunable, demonstrably working transmitter — built coil included — is needed to make AM concrete.

04 · Objectives

- Build a BC547 LC oscillator with a hand-wound tank coil.
- Modulate the carrier amplitude with electret-microphone audio.
- Radiate via whip antenna for room-scale MW reception.
- Demonstrate modulation depth, over-modulation and frequency pulling by listening.

05 · Proposed Methodology

The tank coil is wound to specification and the oscillator verified by locating its quiet carrier on an MW radio. The mic preamp is confirmed, then coupled to the transistor bias network so voice swings modulate the carrier amplitude. With the whip antenna attached, the student receives the transmission a few meters away, adjusts the modulation preset while listening (faint → clear → distorted), and observes hand-capacitance frequency pulling with re-tuning — each effect heard directly on the radio.

06 · System Architecture / Working

Electret mic → preamp → bias modulator → BC547 LC oscillator (tank sets carrier) → whip antenna → free space → MW radio receiver (detector recovers audio). The transmitter is the student-built half; the household radio is the ready-made receiver half, closing the end-to-end link.

07 · Hardware / Software Requirements

Component	Specification
Oscillator	BC547, LC tank
Carrier	MW band, approx. 1 MHz (design target)
Tank	Hand-wound coil approx. 100 µH + tuning capacitor
Audio	Electret mic capsule + preamp
Antenna	Short whip
Range	A few meters indoors (design target)
Supply	9 V battery
Software	None

08 · Expected Outcomes

- Voice transmitted and received on an ordinary MW radio.
- Audible demonstration of modulation depth and over-modulation.
- Observed oscillator frequency pulling and re-tuning.
- Understanding of the AM link from microphone to detector.

09 · Applications

- Communication-theory laboratory demonstrations.
- RF prototyping and coil-winding practice.
- Viva and seminar demonstration of modulation.
- Foundation for FM transmitter and superheterodyne receiver projects.

10 · Future Scope

- Crystal-controlled carrier for frequency stability.
- Class-C power stage for extended range.
- FM transmitter companion build.
- Simple superheterodyne receiver as the matching project.