



EEE 141 Term Project

FM LISTENING BUGGER

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Spring, 2021

Acknowledgement

First of all, I would like to express our profound gratitude to our honorable course instructor, **Zunayeed Bin Zahir**, for his constant and meticulous supervision, valuable suggestions, his patience and encouragement to complete the project work. Finally, I would like to thank my family and everybody who supported me and provided with guidance for the completion of this project. Last but not the least, I want to thank the Almighty for giving me strength.

Abstract

In this report I present a FM listening bugger circuit with which we can listen to another people conversation from long distance using the normal FM radio set. Bugger is a device which gives the information of a person, it is used for finding out the status of the person like where he/she is going, what he/she is talking etc. In this particular report, I will provide all the information about the FM listening bugger circuit. I will provide the working procedure, equipment, circuit diagram, results and findings etc. As a result, anybody will have a clear idea about my project after going through it.

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Chapter 1

Project Overview

1.1 Introduction

We know that bugger is a device which gives the information of a person, it is used for finding out the status of the person like where he/she is going, what he/she is talking etc. This is illegal but most of police or spy agencies use such bugger device. So here is the small circuit with which we can listen to another people conversation from long distance using the normal FM radio set. This FM bugger circuit is kept in room where we want listen the conversation. We can listen to this conversation using the normal FM radio set.

1.2 Background

There are many police officers and detectives in this world who go undercover for solving their cases if required. Generally, it is needed in high profile cases. For solving those cases, it is more than necessary to learn about the plans of the criminals. In order to do that, listening to their conversation is a must. In these situations, a bugger device is a blessing in disguise. Most of the police or spy agencies use such bugger device. The idea of making a bugger circuit came into my mind after thing about all these stuffs.

1.3 My proposed project

The main idea of my project is to build a FM listening bugger circuit with which we can listen to another people conversation from long distance using the normal FM radio set.

1.3.1 Description of the idea

This will be a FM listening bugger circuit with which we can listen to another people conversation from long distance using the normal FM radio set. The function generator will send input signal and the output signal will be seen through the oscilloscope. There will be three signals in the oscilloscope; input signal, output signal and carrier signal. All of these things will be clear when the circuit diagram and work procedure of this project will be provided in the 4th chapter of this report.

1.3.2 Difficulty

The level of difficulty of this project is medium but it is an interesting project and very useful one. There are some certain things that we should keep in our mind and those are: We will have to check whether the oscillator circuit is working properly or not before transmitting. We can use a dipole antenna for transmitting the signal to increase the range of the transmitter. Circuit operating voltage is around 4V, we can use a battery of 4V or normal DC supply as the power supply.

1.4 Motivation

I have already mentioned in the background part that, there are many police officers and detectives in this world who go undercover for solving their cases if required. Generally, it is needed in high profile cases. For solving those cases, it is more than necessary to learn about the plans of the criminals. In order to do that, listening to their conversation is a must. In these situations, a bugger device is a blessing in disguise. Most of the police or spy agencies use such bugger device. So, I have taken my motivation of building a FM listening bugger circuit from those kind of incidents.

1.5 Summary

In this chapter, I have given an overview of my entire project. I have provided information about the background stories, my project objective, challenges of my project, from where I got motivated etc.

Chapter 2

Related work

2.1 Introduction

Related work is the work that shows others attempts to solve the same problem. In this chapter, I will talk about the related work which has inspired me to choose this topic for my project.

2.2 Related Work Details

Aditya Ramane who is an electrical engineer of IIT (Indian Institute of Technology) has made a FM listening bugger by which the users will be able to listen to the conversation of other people within the range of 100 meters. His work has really inspired me and I was so excited to do that. My FM listening bugger will also do the same thing but the range is around 50 meters as this is my first attempt. The main challenge of this project is to increase the range.

2.4 Summary

The existing work related to my project that I found useful have been briefly described in this section. The next chapter elaborates more on the theoretical part of my project.

Chapter 3

Theory

3.1 Introduction

The details of the theory of our system are discussed in this chapter. The theoretical explanation is divided into three sections:

1. Bugger Device
2. Tank Circuit
3. FM Frequency

3.2 Details

Bugger Device: A bugger device, all the more regularly known as a bug or a wire, is typically a blend of a small scale radio transmitter with a mouthpiece. The utilization of bugs, called messing with, or wiretapping is a typical strategy in observation, undercover work and police examinations.

Tank Circuit: A tank circuit is an equal mix of a capacitor and inductor and is the most well-known "full" circuit. A circuit that assimilates most extreme force at a specific recurrence (called the full recurrence).

FM Frequency: The frequency band for FM radio is around 88 to 108 MHz. The data signal is music and voice which falls in the sound range. The full sound range ranges structure 20 to 20,000 Hz, however FM radio restricts the upper balancing recurrence to 15 kHz.

Chapter 4

Structure of the system

4.1 Introduction

In this section, I will focus on the working procedure of my project. I will also provide the equipment I have used and the circuit diagram of this particular project.

4.2 Procedure and Functionality

- The output message signal or modulating signal is modulated with the carrier frequency which is generated by the tank circuit (LC Connection).
- The message signal and carrier signal is modulated by the transistor and transmit the modulated signal in the air through the antenna.
- The modulated signal is received by the receiver antenna and gives to the FM radio where the user can listen to the conversation. User should adjust the receiver frequency in the radio for receiving the signal from the transmitter.
- In this circuit FM modulation is used. In FM modulation, frequency of the carrier signal is varied in accordance to the amplitude of the modulating signal. Normal FM radio use this type of modulation to transmit their signals, frequency modulation gives high output and efficiency when compared to amplitude modulation.
- MIC (Function Generator in the simulation) is placed in the room in which you want to listen to the conversation of the people and MIC (Function Generator in the simulation) will decode the conversation into the signal which is given to the capacitor C1, where C1 is used for removing the noise in and turn on the transistor.
- The tank circuit (capacitor C5 and L1) which produce the carrier signal for the conversation or message signal, the transistor will amplify the both the signals and send to air through the antenna. The capacitor C6 is used to remove the noise in the transmitted signal.
- The capacitor C3 should variable because you can adjust the capacitor for producing your own carrier signal or it is okay if you used fixed capacitor value for carrier signal.

Remember carrier signal should be in range of 88 to 105 MHz so that FM radio receiver set can receive your transmitted signal.

- Capacitor C4 is the output capacitor used to remove noise from output signal, across C4 we get output. FM radio receiver set is adjusted your frequency for listening to the conversation.

4.3 Equipment and Schematic Diagrams

The following electrical equipment were used in this project.

- Resistors
- Inductor
- DC Power Supply
- Transistor
- Capacitors
- Oscilloscope
- Function Generator

The schematic diagram of the input part of this project:

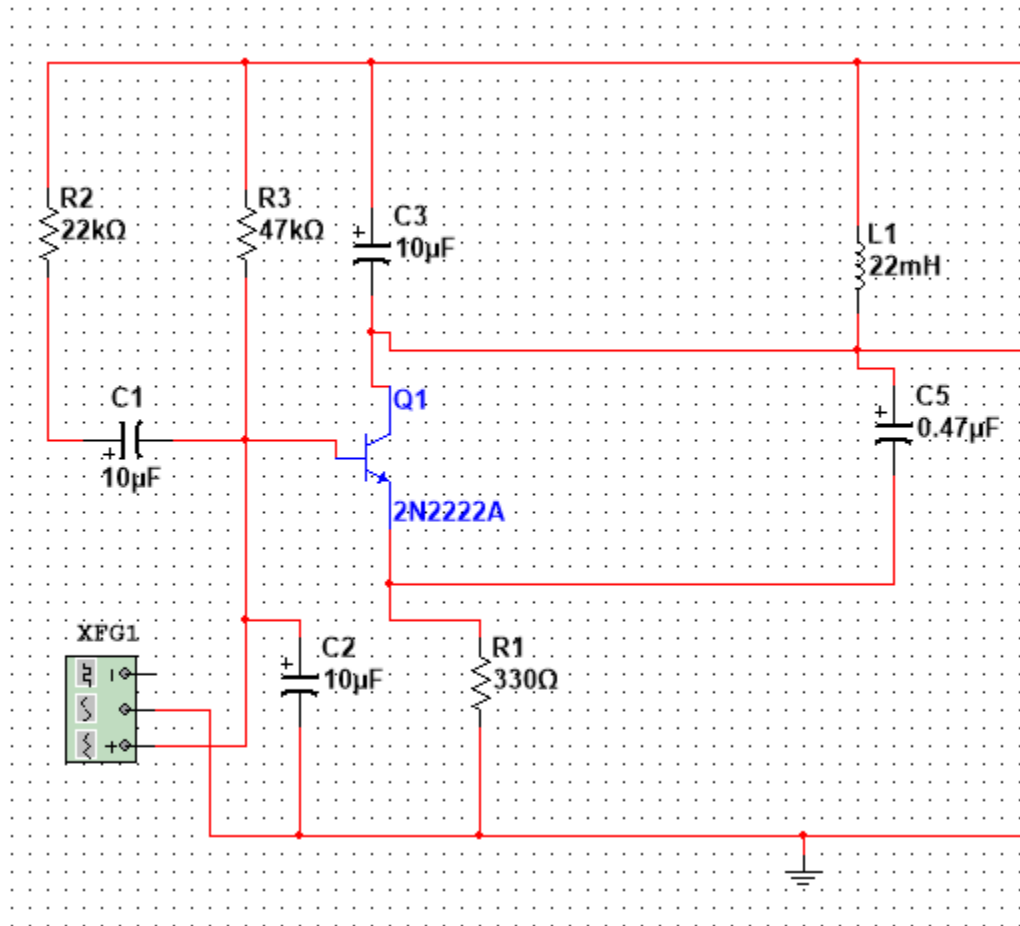


Fig. 4.1. Input part of FM listening bugger

The schematic diagram of the output part of this project:

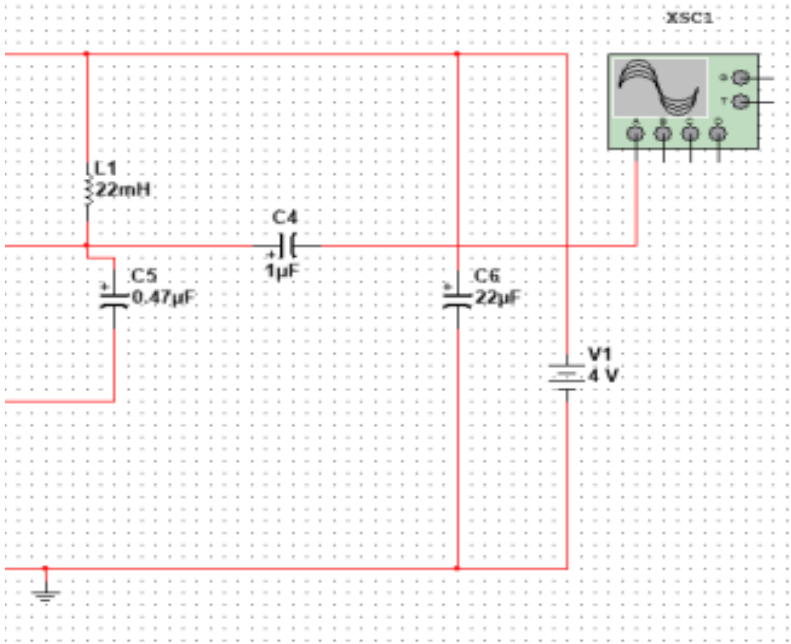


Fig. 4.2. Output part of FM listening bugger

The full circuit diagram of the FM listening bugger:

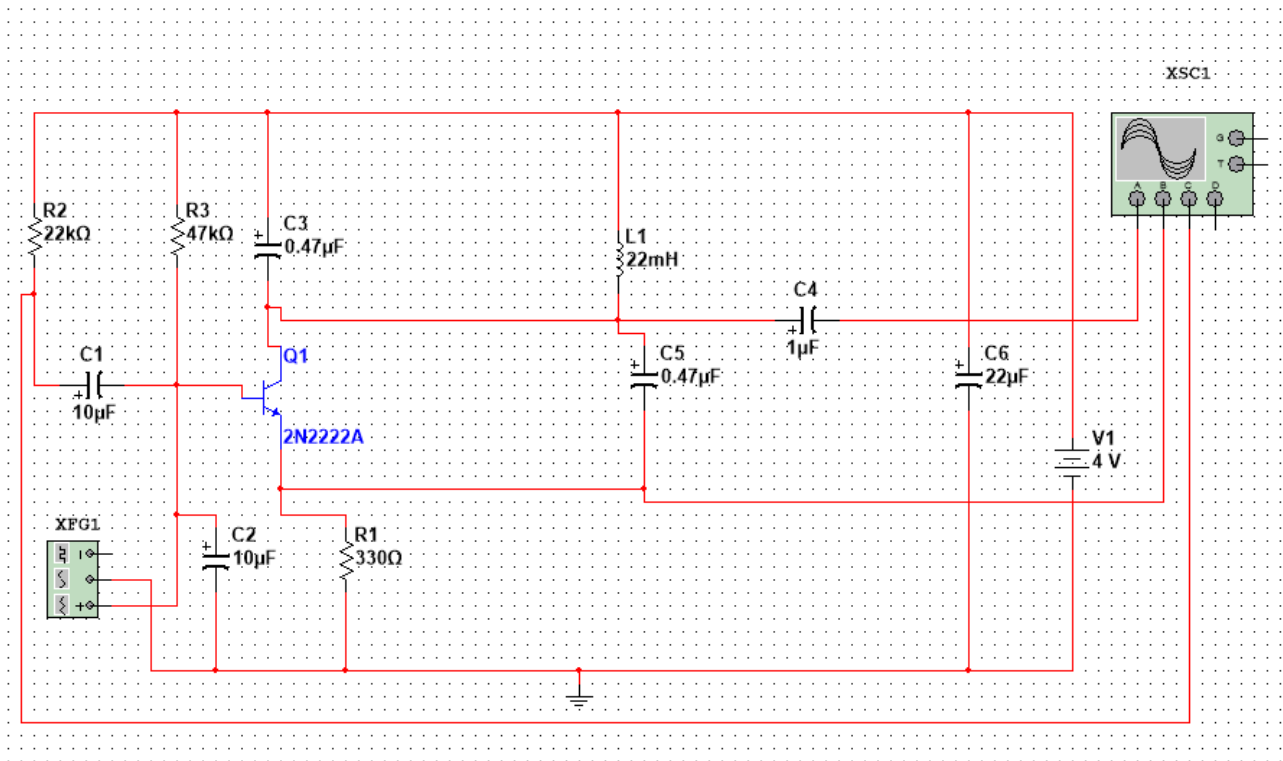


Fig. 4.3. Full circuit diagram of FM listening bugger

4.4 Summary

In this chapter, I have described how the system works. I have given information about the working procedure and the equipment I have used. I have also provided the schematic diagrams of my project.

Chapter 5

Modules used in this system

5.1 Introduction

The different modules used in our system and their functions are described in this chapter.

5.2 The Software Part

I have used NI Multisim 12.0.2 as the software to construct this circuit and also for simulation.

5.3 The Hardware Part

- **Resistor:** A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element.
- **Inductor:** An inductor, also called a coil, choke, or reactor, is a passive two-terminal electrical component that stores energy in a magnetic field when electric current flows through it.
- **DC Power Supply:** DC” is short for “direct current,” which, in basic terms, is a movement of electric charge that provides a constant voltage (or current) that only flows in one direction.
- **Transistor:** A transistor is a semiconductor device used to amplify or switch electronic signals and electrical power.
- **Capacitor:** A capacitor is a device that stores electrical energy in an electric field.
- **Oscilloscope:** An oscilloscope is a laboratory instrument commonly used to display and analyze the waveform of electronic signals.
- **Function Generator:** A function generator is usually a piece of electronic test equipment or software used to generate different types of electrical waveforms over a wide range of frequencies.

5.4 Summary

In this chapter, I have described every different hardware and only one software I have used to construct and simulate this project.

Chapter 6
Results and Discussion

6.1 Simulation

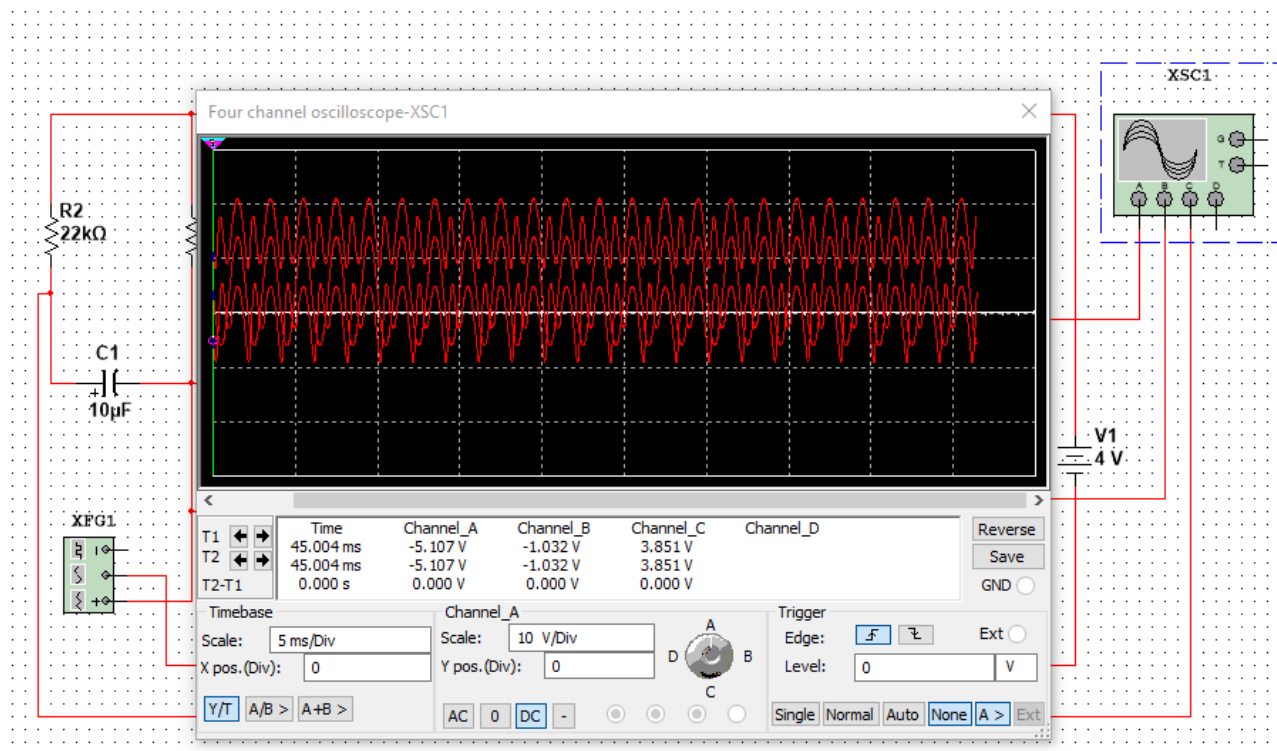


Fig. 6.1 Output waves of the FM listening bugger

6.2 Results and Findings

There are three types of waves in the oscilloscope shown above. Those which are bigger curves are the output signal, medium curves are the carrier signal and the tiny little curves are the input signal.

All wave forms have same scale of 5ms/Division and 10V/Division.

6.3 Analysis and Explanation

The output signal waveform is mixed with carrier signal so we will call our output signal as modulating signal. Modulating signal is the mixture of output signal & carrier signal. As you can see the modulating signal we get have low amplitude but after demodulation at FM Radio we will get proper output in form of voice signal.

Carrier signal Waveform is a fixed or variable waveform which carries the signal to its destination.

Due to carrier waveform the main signal will have less noise, plus our signal can travel at long distances.

Input signal is the voice signal received by MIC. Normal Human talking voice have frequency between 100Hz to 300Hz or sometimes more than that 500Hz or 600Hz.

So, in circuit the function generator acts as a frequency source of 500Hz. This signal you can see is INPUT signal of 500Hz or input signal is processed in the circuit mixed with carrier signal and then we get output signal that is modulating signal.

6.4 Summary

In this chapter, I have focused on the results and findings of my project.

Chapter 7

Conclusion

The function generator in circuit simulation acts as a MIC as it gives input signal of 500Hz (Small green box at input side.) The transmission area range is around 50 meters. You can change the range of circuit by changing L1 & C5 values. This FM Listening Bugger circuit can be used in offices, colleges or anywhere we want. But we will have to remember and keep that in mind where bugging is illegal. In the end, I want to say that it was a great experience altogether.

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