

WIRELESS MICROPHONE SYSTEM

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Dedicated to my beloved family especially my mother and father

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ABSTRACT

Nowadays, in sophisticated technology era the wireless application is important to our life. The wireless microphone system is one of wireless system that will be discussed here. The wireless microphone system is used in motorized wheelchair system. The user will be able to move the wheelchair by using this wireless microphone as an intercession to voice recognition motor. This system has two main parts which are the transmitter and the receiver. When the sensor detects a voice, the transmitter will be triggered and begin to send wireless signal. The transmitter handles the conversion of the audio signal into a radio signal and broadcasts it through an antenna. The task of the receiver is to pick up the radio signal broadcasted by the transmitter and change it back into an audio signal. The input signal from receiver will be produced through the speaker. Therefore, the voice input must be synchronized and reflected through the speaker output. This system can be implemented in various field such as voice activated system so that user can send command wirelessly.

ABSTRAK

Pada masa sekarang, pada era teknologi yang canggih jaringan tanpa wayar adalah penting dalam kehidupan harian kita. Mikrofon tanpa wayar adalah satu jaringan system yang akan diterangkan. Sistem mikrofon tanpa wayar ini digunakan pada sistem kerusi roda bermotor. Pengguna dapat mengerakan kerusi roda bermotor hanya dengan menggunakan mikrofon sebagai alat pengataraan pada motor pengecam suara. Sistem ini mengandungi dua bahagian pengesan iaitu bahagian penerima dan penghantar. Apabila pengesan mengesan signal suara, penghantar akan terpicu dan mula menghantar isyarat tanpa wayar. Penghantar mengawal signal dengan cara berkomunikasi melalui signal audio pada signal radio dan menyiarkannya melalui antena. Bagi penerima pula, ia akan menerima signal radio yang dipancarkan oleh penghantar dan merubah kembali kepada signal audio. Keluaran dari penerima akan disambung terus ke pembesar suara. Oleh sebab itu keluran yang diterima dari penghantar mestilah seiringan dan bertindak balas kepada keluaran pembesar suara. Sistem ini dapat dilaksanakan dalam pelbagai bidang seperti pengesan suara aktif dimana perintah (command) dihantar tanpa wayar.

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NO	TITLE
A	LM 2576 Datasheet
B	TDA 7000 Datasheet
C	LM 386N
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CHAPTER I

INTRODUCTION

1.1 Project Introduction

Wireless Microphone System is build by using voice in its operation. This wireless microphone system consist of a microphone, transmitter and receiver units which operate in wireless method such as FM (frequency modulation). This is one of main part of motorized wheelchair that transforms user voice by using wireless method into the wheelchair movement. A wireless microphone, as the name implies, is a microphone without a physical cable connecting it directly to the motorized wheelchair controller.

The FM Microphone is really a miniature frequency modulated transmitter operating in the standard FM broadcast band. The range of frequencies for the FM broadcast band is 90MHz (MHz = Megahertz or 90 million cycles per second). Because the FM microphone has a variable tuned circuit, it can be tuned to a quiet spot on our local FM broadcast band for the best reception. When the small microphone element is struck by sound, it converts the audio to a change in current through resistor. This electrical change is amplified and eventually frequency modulates the transmitter. The transmission range of the FM microphone is approximately 100 feet, depending on the efficiency of the antenna (properly tuned or not) and the quality of the FM receiver.

1.2 Problem Statement

A system which consists of wires interconnecting between devices would not improve any problem or difficulties if the devices are static and not involve any physical movement. However, for motorized wheelchair system that is hooked with a microphone would require physical movement and the microphone is attached to the user. Therefore wired system is not preferred. The same goes with Bluetooth headset as compared the wired Hands free for the microphone. Of course people will prefer the first.

So that, this system is build for helping people. Use for people who physical disability and need people help to move from one place to another (Voice as command). So that, its can help patient to move easier and no need people help.

1.3 Objective Project

First is about to use a wireless system as a transmission and reception for my system. Wireless communication is the transfer of *information* over a distance without the use of electrical conductors or "wires". It is low-cost and easy to use proportionate to the old microphone system. Now, we can see that it's familiar to our life.

Second, to design and develop the wireless microphone system with 10-LED VU meter. This wireless microphone system was design with combine the 10-LED VU meter to show that the output voice can be detect by this LED.

Third, to design audio amplifier circuit for amplify the signal out between output receiver and the speaker. This amplifier will amplify the signal for the clear and louder sound to the speaker.

1.4 The scope of this project are listed as follow:-

- Find the suitable circuit for transmitter and receiver that can function and can communicate each other.
- Construct the circuit and simulate in Multisim or PSpice software that can now the circuits can run or not.
- Designed the hardware for this system that will support distance mode 50 meter without any noise interruptions.
- Find the best navigator (antenna) that will give accurate signal for the both circuit.

1.5 Methodology

Phase1:-

Every weeks, meet and discuss with supervisor Mr Masran B. Esro and show the project progress. Get the more information about wireless microphone from supervisor, internet, books, journal, thesis, and so on. Firstly, I try to understand the concept & desired result for this wireless microphone. After that, I get the datasheet of component involved (antenna and speaker).

Phase2:-

For this phase, I will do a survey to the entire previous wireless microphone project for find the best method and rapprochement to my project. Do literature survey from journal and internet.

Phase3:-

For this phase, I will find the best circuit such as transmitter circuit, receiver circuit and power supply circuit. I will find the primary component involved in the wireless microphone and construct the circuit for hardware parts using Multisim 2004 software.

Phase4:-

For this phase, I will combine both circuits to get the final result. After that, I will Test the functional, ability & weakness. If have some error at the hardware part, I will troubleshoot the circuit & redesign the circuit if needed to get better result. Finally, submit the full report of this wireless microphone system.

1.6 Report Structure

The first chapter of this report is about the introduction of the report. It includes explanation about the objectives, problem statement, scope and the methodology of the project.

The second chapter is about the literature review of the project. This project was discusses about the concept of the research and how it related with the theory.

The chapter three is explanation about the methodology and process that taken to complete the project. It consist the detail development of this project.

The chapter four is about the result that we obtain based on the methodology that we used. The obtained result will be analyze and based on the objective and problem statement.

The chapter five is about the discussion the result. The result will be summarizing in this section.

The chapter six is about the conclusion. In this section, we will conclude what we have done. The finally result will discuss in this section.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction to Wireless Microphone System.

A wireless microphone, as the name implies, is a microphone without a physical cable connecting it directly to the sound recording or amplifying equipment with which it is associated. Various individuals and organizations claim to be the inventors of the Wireless Microphone.^[13]

John F. Stephens developed an FM wireless microphone for a Navy musical show in 1951 on the Memphis Naval base. Each of the principal players/singers had their own microphone/transmitter. Subsequently, the Secret Service had Stephens modify his invention to be used in government "bugging" operations. In the '60s, Stephens marketed his more famous capstan less multi track recorder/reproducers. Shure Incorporated claim that their "Vagabond" system from 1953 was the first.^[13]

In 1957 German audio equipment manufacturer Sennheiser, at that time called Lab W, working with the German broadcaster Norddeutscher Rundfunk (NDR) exhibited a wireless microphone system. From 1958 the system was marketed through Telefunken under the name of Mikroport.^[13]

Another German equipment manufacturer, Beyerdynamic, claim that first wireless microphone, was invented by Hung C. Lin. Called the "transistophone", it went

into production in 1962. It is claimed that the first time a wireless microphone was used to record sound during filming of a motion picture was on Rex Harrison in the 1964 film *My Fair Lady*.^[13]

Modern wireless microphone technology, which for the first time offered performance with audio and dynamic range equivalent to a cord, originated with the introduction of the first compander wireless microphone offered by Nady Systems, Inc in 1976 according to company claims. Nady systems, Inc were honored with an Emmy award for this breakthrough technical achievement in 1996.^[13]

More commonly known as a Radio Microphone, there are many different standards, frequencies and transmission technologies used to replace the microphone's cable connection and make it into a wireless microphone. They can transmit, for example, in radio waves using UHF or VHF frequencies, FM, AM, or various digital modulation schemes. Some low cost models use infrared light. Infrared microphones require a direct line of sight between the microphone and the receiver, while costlier radio frequency models do not.^[13]

Some models operate on a single fixed frequency, but the more advanced models operate on a user selectable frequency to avoid interference, and allow the use of several microphones at the same time.^[13]

2.2 3V FM Transmitter 88MHz to 108MHz by BF982

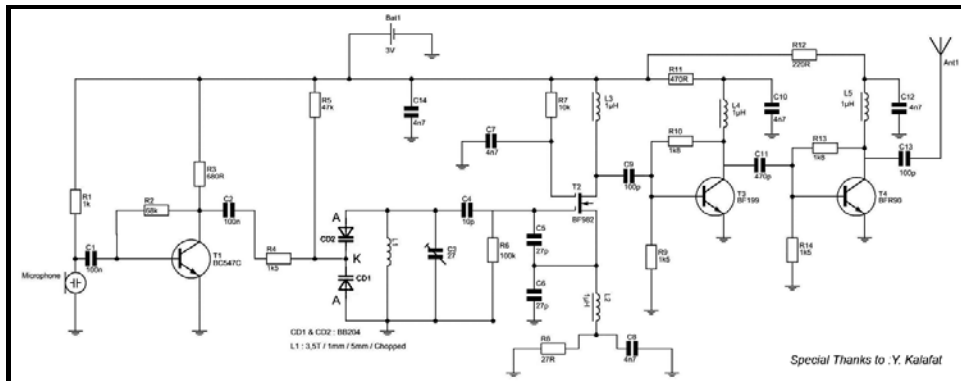


Figure 2.2: FM circuit with 3V transmitter by BF982

The important part of the circuit is formed of the Colpitts type oscillator. C3, C4, C5, C6, CD1-CD2 and L1 determine the frequency. **BF982** and dual gate MOSFET are active parts in oscillator. When the input impedance of the MOSFET gate inputs are high, LC tank is not affected. However transistors force the LC tank and cause phase shift. ^[14]

Two driver stages are added to isolate the antenna from oscillator. First stage (**BF199**) amplifies the low signal of the oscillator and works as a constant load. The second stage (**BFR90**) amplifies the signal going through the antenna some more. A short copper wire can be used as an antenna here. Attaching a large antenna to this circuit is unnecessary because the output power is low. ^[14]

2.3 FM wireless Microphone Kit

Tiny FM Wireless Microphone Kit transmits every sound in a room to any standard FM radio. Super sensitive kit uses a special high output electret microphone and a two transistor circuit to provide a stable RF transmission. Features adjustable capacitor to “fine tune” the frequency so that you can transmit on a non-used part of the FM band. Use it as a baby monitor, one way intercom, etc. Circuit operates from one 9V battery (not included). Size only 1

13/16" x 1" - the same size as a 9V battery. Complete with all parts, PC board and instructions.^[15]

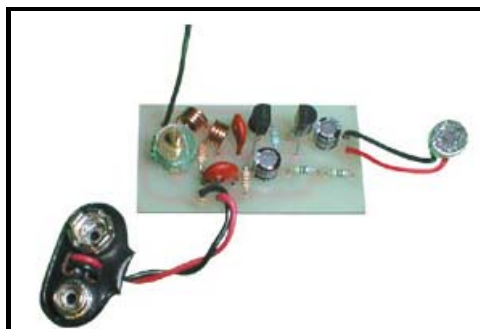


Figure 2.3: The FM wireless microphone kit.

2.4 Dynamic microphone to electret microphone input.

This is a simple microphone preamplifier circuit which you can use between your dynamic microphone and any equipment designed to work with an electret microphone (2 wire connection to electret capsule). This amplifier amplifies the low level signal to the levels used by electret microphone input and uses the power from the device.^[16]

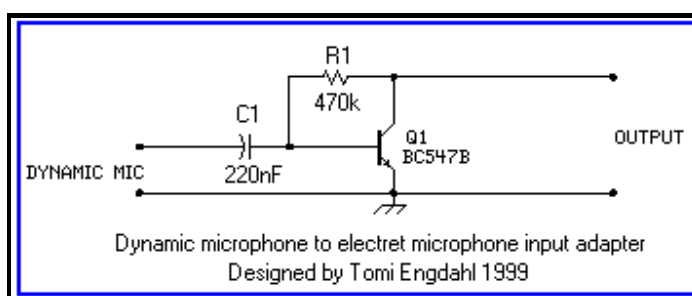


Figure 2.4: The dynamic microphone.

The circuit is a simple one transistor amplifier to convert the sub-millivolt level voltage from electret microphone to current changes as generated by electret capsule.^[16]

2.5 Microphone Circuit Test Oscillator

This unit would be mounted in a small plastic or preferably metal box, with a 9V battery, level control, a male XLR connector (same as on a mic) and a switch. Current drain is low, since the circuit only uses one dual op-amp. There is no need for a high quality device, and a 1458 is all that is needed.^[17]

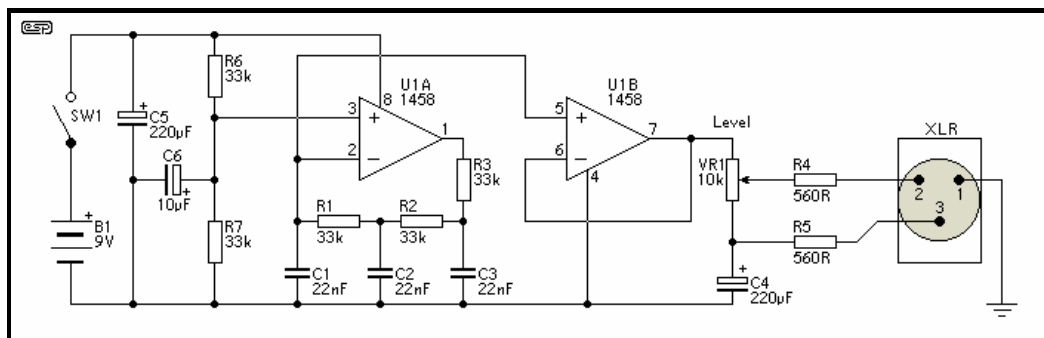


Figure 2.5 - Mic Circuit Test Oscillator

The first stage is the oscillator itself. This is a simple three stage phase shift oscillator - a circuit that is remarkably uncommon - which is to say I have never seen it used elsewhere. I designed it for another project a few years ago, and I don't understand why it is not in any opamp application notes.^[17]

If you want to tune it, you can use a 50k pot instead of R1. I suggest that if tuned, set it to A-440 Hz. Frequency stability is not wonderful, and it changes by a few Hertz as the battery discharges, but this is unlikely to cause problems - it is a test oscillator, not a tuning standard. As shown, frequency will be about 430Hz, depending on the accuracy of the capacitors.^[17]

The phase shift network (R1-C1, R2-C2 and R3-C3) serves two purposes. First (and for an oscillator, most importantly), it shifts the phase of the output signal so the feedback is positive, causing oscillation. Secondly, since it is a three stage filter, it attenuates the signal and filters the output square wave so the signal at pin 2 is a reasonable sine wave. Distortion (if you really care) is

about 3% or so - I didn't measure it this time, but I recall having done so before.
[17]

The second stage is the output buffer, and the signal is simply split to supply the two mic leads. The metal case should be connected to pin 1 (earth) on the XLR connector. The output level control must be a linear type, as the circuit loading will create a good approximation to a log pot. Maximum output into a typical microphone input will be about 100mV (unloaded oscillator output on mine was 140mV). [17]

Not much to it - the whole circuit can be built on a small piece of Vero board, and the battery, pot and XLR connector will take up far more room than the oscillator. There is no LED indicator for power, as this would draw more current than the circuit. To prevent accidentally turning it on, a slide switch is suggested. They are a pig to mount compared to a toggle switch, but are much less easily bumped. If you can get a pot with a switch, this would be even better, but these are now hard to get - especially as linear. [17]

2.6 Wireless microphone system for high quality sound.

2.61 Filed of Invention

The present invention relates to a wireless receiving/transmitting microphone system, and more particularly to a multi-channel, high quality audio wireless microphone system in a local wireless communication area ensuring reliable and specific voice reception without interferences. [7]