DESIGN AND CONSTRUCTION OF A WIRELESS PUBLIC ADDRESS SYSTEM

BY

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DEDICATION

This work is dedicated to Allah, the most exalted in greatness, Who taught man what he knows not.

CERTIFICATION

This is to certify that this project was carried out by AbubakarBilyaminu; **2006/24393EE.**

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DECLARATION

I wish to declare that this work was carried out by me.

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ABSTRACT

This project presents the design and construction of a wireless public address system with an audio frequency range of 20htz to 20khz. It is a hardware proto-type that amplifies a weak input signal producing a magnified output. It consist of the transmitting and receiving units which function on the principle of electromagnetic waves and power amplification unit, which operate on power amplification principle.

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CHAPTER ONE

GENERAL INTRODUCTION

1.1 Introduction

Human beings can not do without communication, because of the prominent role it plays in their lives. We need to communicate in order to share ideas; information; experience and of course messages [1]. A total cut-off from communication will mean denying an individual, many, if not, all of these privileges. Also, verbal communication will not be effective if the listener fails to hear what the speaker is communicating, simply because of the large distance between them. However, this problem can be easily attended to, using a Public Address System (PAS), which amplifies voices so they can be heard at great distances from the source. It amplifies a weak input signal from the microphone to give a magnified sound output that will suit the audio frequency range of the audience (20Hz-to-20KHz) [1].The output is independent on the magnitude of signal applied to its input terminals, provided it (the input signal) is applied to the terminals of the amplifier. That is to say, however small an input signal is, it is amplified to a desired sound level. Wireless Public Address System (WPAS) was designed to solve problem of audibility in large public address, conference or lecture halls comprising of a large number of audience.

1.2 Aim and objective

1.2.1 Aims

The overall aim of this project is to design and construct a wireless Public Address System. It also identifies the following specific aims:

- Provision of a wireless connection between the microphone and the amplifier via an infrared medium (i.e. electromagnetic waves).
- To provide a tone control unit for signal quality improvement.

1.2.2 Objective

To achieve the above stated aims, this project identifies the following objectives:

- A transmitter is used to transmit input signal from the microphone to the receiver.
- To design a receiver that receives input signal from the transmitter.
- A tone control unit consisting of low-pass, band-pass and high-pass filters will be used to improve signal quality.
- To provide a power amplifier which increases the voltage or power needed to drive the loudspeaker.

1.3 Scope of Work

This work entails the design and construction of a device that will help magnify a weak input signal to one within hearing or audio range (i.e.20hz to 20khz). A power amplifier is used for this process to amplify a signal from the receiver, which is fed with an input from the microphone via the transmitter. The output of the power amplifier drives the loudspeaker.

1.4 Methodology

To achieve the design of this device, a wireless communication connection is established between the transmitter and receiver. The transmitter helps to transmit input signal from the microphone to the receiver. Output of the receiver is fed to the power amplifier which then magnifies the voltage at its output to drive the loudspeaker.

CHAPTER TWO

LITERATURE REVIEW

2.1 Literature Review

The history of wireless Public Address System (PAS) is best traced back through the history of wireless communication. It all started prior to 1600S BC when scientist dedicated themselves to finding the relationship between wires and electric signals, and how to best utilise this relationship to aid transfer of information carrying signals from one point (the source) to another (the destination) [15].

Hook (1664-1685), demonstrated acoustic communication using wires stretched over wood frames, Samuel Thomas (1809), developed electro-chemical telegraph based on sending electrical signals over wires through containers of acid, Carl Friedrich Gauss and Wilhelm Ednad Weber (1883), deploy first regularly used electromechanical telegraph [14].

1867 to 1896 was the period when radio emanated. It was not possible without the contribution of the following scientist: Maxwell (1867), predicted the existence of electromagnetic (EM) waves; Hertz (1887), proves the existence of the EM waves, by transmitting a signal that generated a spark in a receiver several metres away; Branly (1890), develops Coherer for detecting radio waves; Guglielmo Marconi (1896), demonstrates wireless telegraph to English telegraph office. Therefore, the basis for wireless communication is believed to have emanated from the findings of Hertz and further developed in the findings of Marconi. It was after Marconi's finding and successful prove of wireless transmission and reception that the idea of wireless became adopted in Public address system (PAS), using the principle of frequency Modulation (F.M) [14].

David Michael, a graduate of federal university of technology, Minna had presented the design and construction of a wireless public address system in 2004. **LA4192** amplifier was used to realise the amplification section of this project. Also, **KA2297** was used to realise the receiver unit. However, incorporating **CXA16915** was an un-easy task to achieve, thus LA4192 and KA2297 were used to realise these units instead [5].

Mailafia Isaac, graduate federal university of technology, Minna had presented a project on the design and construction of a wireless public address system in 2007. A monolithic integrated circuit; **TDA7000** was adopted for use at the receiver unit. Also, **TDA8947** was used for the visualisation of the power amplification unit. The I.C has a maximum voltage of +28v and has the ability of powering 4 ohm load. However, in-cooperating a microcontroller which monitors the muting as well as the temperature level of the amplifier was the most tedious task to achieve [6].

Having observe previously designed works on Wireless Public Address Systems (WPAS), it was found that, rarely was 100watt WPAS designed. Instead 20watt, 50watt and 80watt were the top listed designs. The chief reason for restricting designs at these values were basically, poor availability of components (in the market) required to do the intended job. Also, the few ones available have either, high power demanding features (.i.e. MOSFETs), high distortion noise or poor shut circuit protection. Thus, it was found very imperative that a WPAS which has the capacity to power 100watt 8Ω speaker be designed. TDA7295 I.C was found most suitable for this design, it can operate perfectly using as low voltage as 15v and a maximum of 40v, it has an in-built muting or standby function which enables it to achieve a very low distortion or background noise, it also has a shut circuit protection feature [11].

2.2 AUDIO AMPLIFIER

By audio, we mean the range of frequency which our ear can hear. Thus, audio amplifier is a device that amplifies a weak input signal to give a magnified sound output that will suit the hearing frequency range (20Hz-to-20Khz) of the audience. However, the input signal (voice) is entered through a transducer (microphone), which convert sound energy into electrical energy. Amplifiers drive the loudspeakers used in Public Address Systems to make the input signal louder [1].

2.2.1 CLASSIFICATION OF AUDIO AMPLIFIER

Electronic amplifiers can be classified in many different ways. Some common classifications of amplifiers are presented below.

- Classification by Signal Type

Amplifiers may be classified based on the type of signal that they amplify. Thus, an amplifier that amplifies voltage signals is a voltage amplifier, while a buffer amplifier is one that amplifies current signals. An amplifier that amplifies both the voltage and current is classified as a power amplifier [8].

- Classification by Common Terminal Connection

Amplifiers consist of active devices (such as bipolar and field-effect transistors) that can be connected such that there is a common terminal between the input and the output. One common way of classifying amplifiers is in terms of their common terminal connection. For instance, a common-emitter amplifier means that the active device is a bipolar transistor whose emitter terminal is common to the input and the output side [8].

- Classification by Frequency Range

Amplifiers may also be classified according to the frequency range of the signals they can amplify. Categories under such a classification include: 1) DC amplifiers; 2) Audio Frequency (AF) amplifiers – 20 Hz to 20 kHz; 3) Video amplifiers – several MHz; and 4) Ultra High Frequency (UHF) amplifiers up to a few GHz [8].

- Classification by Function

Amplifiers may be classified according to their basic function or output characteristics. Some of these functional classifications are as follows:

- Servo amp: an amp with an integrated feedback loop to actively control the output at the desired level [8].
- Linear amp: an amp with a precise amplification factor over a wide range of frequencies often used to boost signals for relay in communications systems [8].
- Non-linear amp: an amp that amplifies only a specific narrow or tuned frequency, to the exclusion of all other frequencies [8].
- RF amp: an amp designed for use in the radio frequency range of the electromagnetic spectrum, often used to increase the sensitivity of a receiver or the output power of a transmitter [8].
- Audio amp: an amp designed for use in reproducing audio frequencies, with special considerations made for driving speakers [8].
- Operational amp: a low power amp that can perform mathematical operations [8].

- Classification by Inter-stage Coupling Method

Audio amplifiers are sometimes classified by the method used in the coupling of the signal at the input, output, or between stages. Different types of coupling methods include: the R-C coupled amplifier; the L-C coupled amplifier; the transformer-coupled amplifier; and the direct-coupled amplifier [8] [3].

- Classification by Type of Load

Another way of classifying amplifiers is by the type of load that they drive: 1) un-tuned amps - amplify audio and video with no tuning required; 2) tuned amps (RF amps) - amplify a single radio frequency or band of frequencies.

- Classification by Angle Flow or Conduction Angle

A letter system for classifying amplifiers also exists, wherein amplifiers fall under class A, class B, class C, and so on. This classification system is based on the amount of time that the amplifier's active components are conducting electricity, with the duration measured in terms of the number of degrees of the sine wave test signal [8][3].

These classes of amplifiers are a sub-division of the power amplifier.

-Class A: Class "A" amplifiers, amplify over the entire input cycle such that the output signal is an exact magnified copy of the input. They are not efficient (not more than 50 percent of efficiency is attainable), since the amplifying device is always conducting whether or not an input signal is applied [3]. Thus in summary;

1. The output device conducts for all of the input cycle.
2. Only have an efficiency rating of less than 40%.

-Class B: A Class “B” amplifier is one whose operating point is at an extreme end of its characteristics, so that either the quiescent current or the quiescent voltage is almost zero. If a sinusoidal input voltage is used, the amplification of a Class B amplifier takes place only for 50% of the cycle, e.g., the amplifying device is switched off half of the time.

A Class B amplifier can attain an efficiency of up to 78.5%. However, a Class B amp exhibits a higher distortion than an equivalent Class A amp [3]. Thus in summary,

Class B amplifiers are more efficient than Class A amplifiers at around 70% but produce high amounts of distortion [3].

Class B amplifiers consume very little power when there is no input signal present.

By using the "Push-pull" output stage configuration, distortion can be greatly reduced [3]. However, simple push-pull Class B Power amplifiers can produce high levels of Crossover Distortion due to their cut-off point biasing. Pre-biasing resistors or diodes will help eliminate this crossover distortion [3].

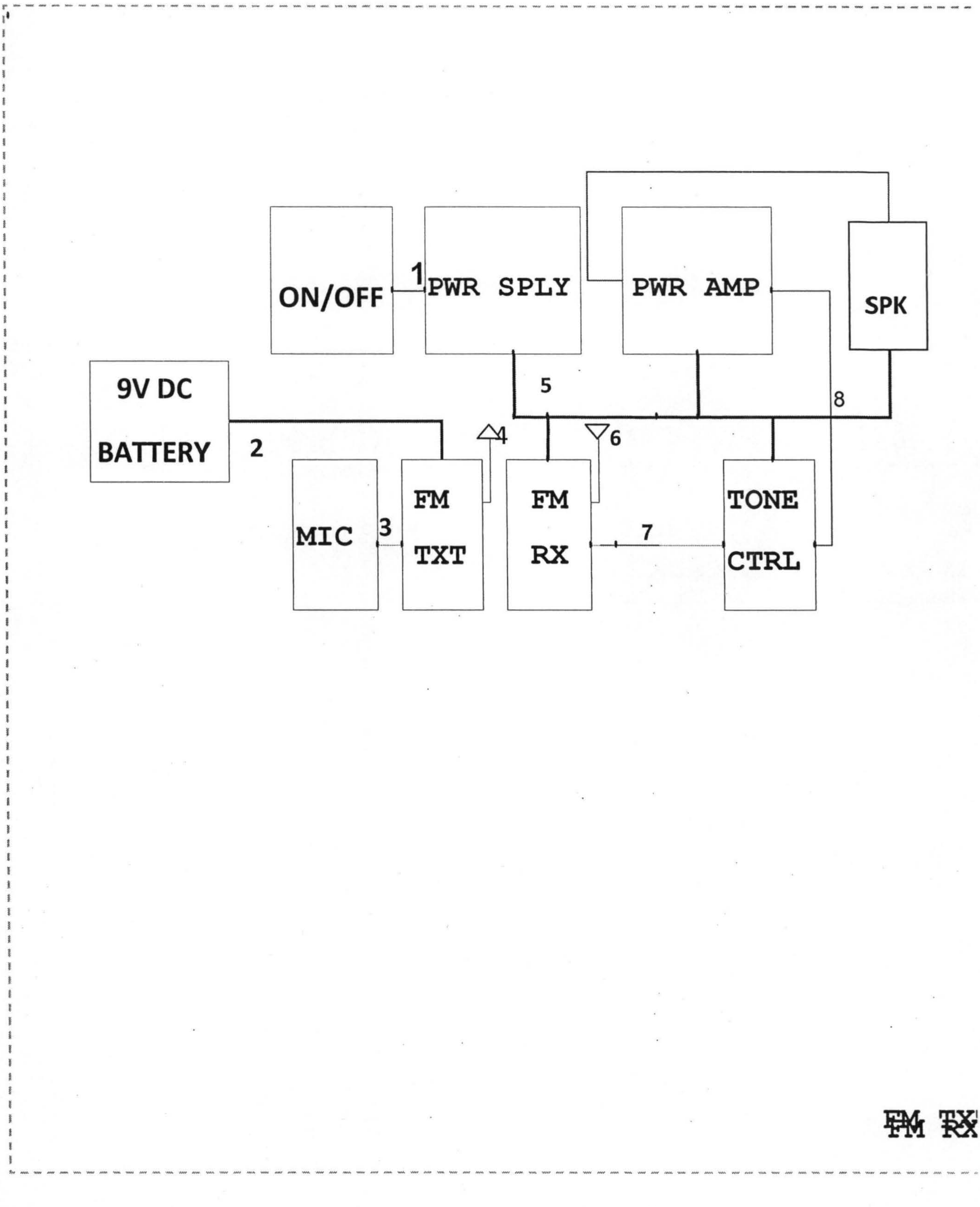

Fig 2.1 Block diagram of wireless public address system

CHAPTER THREE

DESIGN, ANALYSIS AND CONSTRUCTION

As said earlier, and as depicted by the block diagram; this project consist of the power supply unit; the transmitting and receiving unit; the pre-amplifier; tone control unit; the power amplifier and lastly, the speaker.

A detailed explanation of each individual unit as well as the criteria adopted for component selection shall be explained in this chapter. This will be followed immediately by the construction.

3.1 Design of Power Supply Unit

Having note that single phase power supply distribution in this country is a 110 or 220, 50Hz Sinusoidal ac voltage and that most electronic circuit components require as low dc voltages as 5 to 15v. A centre tapped 30v r.ms Step-down transformer was in-cooperated in this design to obtain a 30v ac supply at the secondary of the transformer and then passed through a diode bridge Rectifier for proper voltage rectification [16].

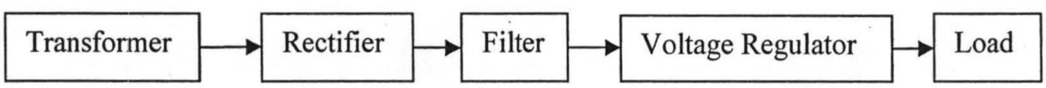

Fig. 3.1A typical dc power supply block diagram [16, 2, 3]

i. **Transformer**: A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors (the transformer's coils), by a process termed mutual induction. A centre tapped 30 vr.ms Step-down transformer was used for this design to obtain a 30v supply at the secondary [16].

ii. **Rectifier**: A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which is in only one direction, through a process known as rectification [16].

iii. **Filter**: A connection of resistors and capacitors, which serves as a barrier for dc components that can induce or introduce noise (unwanted signal, whose presence serves as a major limiting factor in communication system performance) in the circuit [2].

iv. **Voltage Regulator**: A component, whose main function is to keep the terminal voltage of the dc supply constant even when the supply voltage or the load varies [3].

v. **Load**: The circuit, for whose consumption the power supply is producing the dc supply [2].

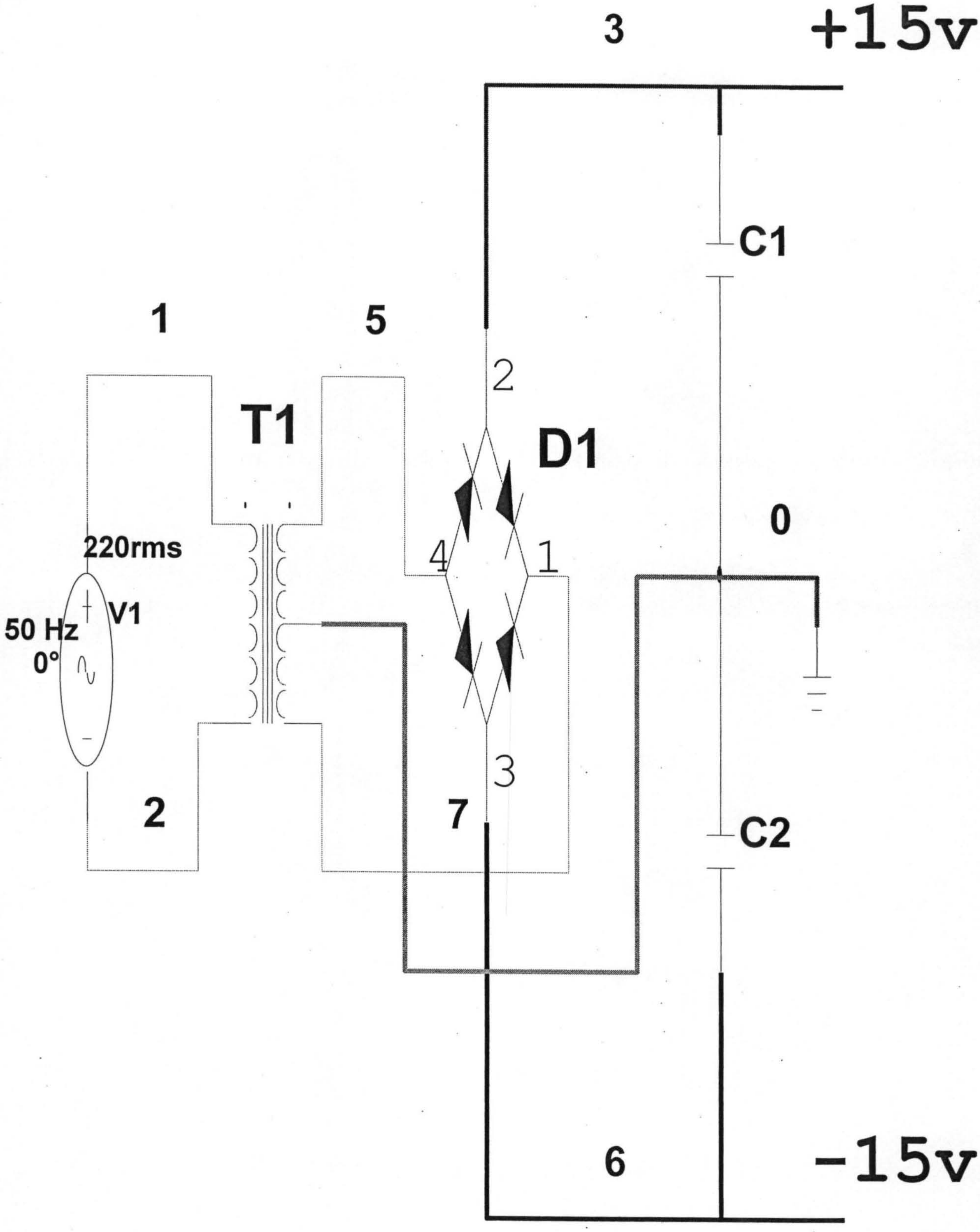

Fig 3.2 Typical circuit diagram of Power Supply Unit

3.1.1 Calculation of supply voltage

Output power (P_L) = 100watt; Resistance of speaker (R_L) = 8Ω

$P_L = (V^2_{r.ms}) / R_L$

$V_{r.ms} = (P_L R_L)^{1/2}$

$= (100 \times 8)^{1/2}$

$= 28.23$ volts

V_{out} (i.e. voltage at secondary of transformer)

$= V_{r.ms} \times 2^{1/2}$

$= 28.23 \times 2^{1/2}$

$= 39.93$ volts

≈ 40 volts

Also, from $P_L = I^2_{r.ms} \times R_L$

$I_{r.ms} = (P_L R_L)^{1/2}$

$= (100/8)^{1/2}$

$= 3.54A$

3.1.2 Calculation of filter capacitor value

The filtering capacitor is given by;

$r = (4CFR(3)^{1/3})^{-3}$

r = ripple factor = 0.1

C = capacitance of filter capacitor

$R = V_{out} / I_{r.ms}$

$= 45/3.16$

$= 14.24\ \Omega$

Thus, $C = 1 / (4 \times 1.73 \times 50 \times 14.24 \times 0.1)$

= 0.002027 F (2200uf was chosen for availability)

3.2 Design of FM Transmitter

This unit consist of the microphone, Amplifier, Oscillator and Modulator [1]. The chief function of this unit is to transmit audio signal or information through radio waves for reception at the receiver unit. A 9v D.C battery was used for powering this unit.

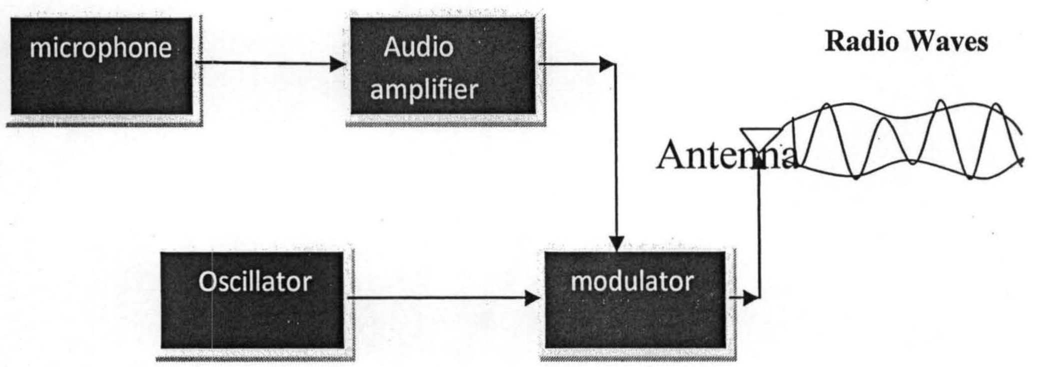

Fig 3.3 block diagram of a transmitter

- **Microphone:** This is a transducer or sensor that converts sound waves to electrical waves [7]. When the speaker speaks or a musical instrument is played, the varying air pressure on the microphone generates an audio electrical signal which corresponds in frequency to the original signal [7]. The output of a microphone is fed to an audio amplifier for amplification [1]. However, a Condenser microphone was used for this design.
- **Audio amplifier:** Audio signals from the microphone appear to be very weak and requires amplification. So they are passed through audio amplifiers which increases the strength of these weak input signal [8].
- **Oscillator:** Its function is to produce a high frequency signal called "carrier wave", which carries transmitted signals to the required destination [1].
- **Modulator:** The amplified audio signal and the carrier wave are fed to the modulator, which super imposes the audio signal on the carrier wave. Thus, permitting the transmission of audio signal at the carrier frequency. Hence, the higher the carrier frequency, the longer the distance of audio transmission [1].
- **Antenna:** This is an electrical conductor that radiates or collects electromagnetic energy [17].

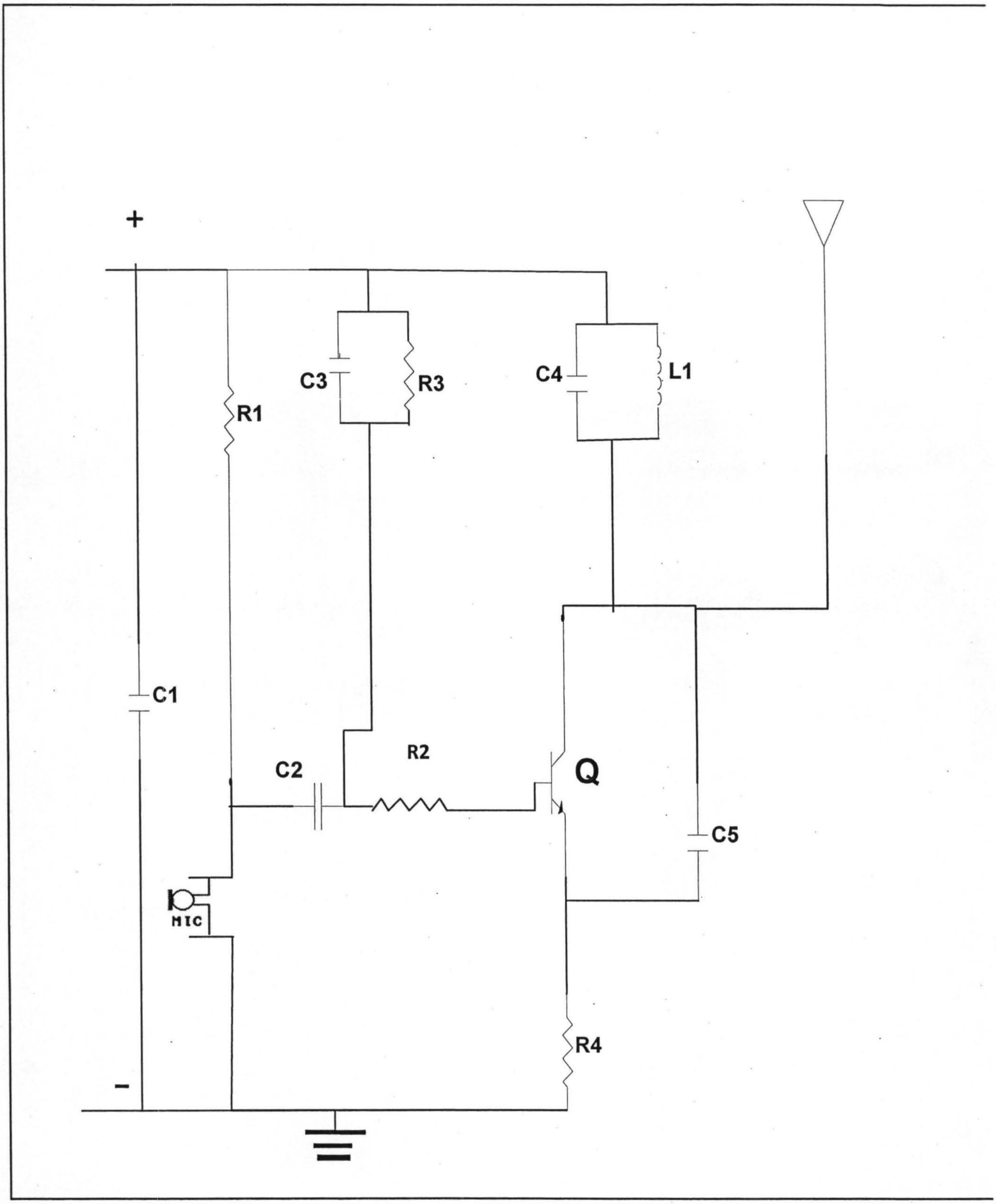

Fig 3.4 Typical circuit of an FM Transmitter

3.2.1 Calculation of voltage used-up by transmitter

From fig 3.4

$V_{OUT} = R_2/(R_1 + R_2)$

$R_1 = 10K\Omega$; $R_2 = 10K\Omega$; $V_{\cdot cc} = 9v$

$V_{OUT} = (10 \times 9) / (10 + 10)$

$= 90/20$

$= 4.5$volts

$V_{CC} - V_{BE} - V_B = 0$

$V_{CC} - V_{BE} = V_B$

$V_B = I_B R_B)$; $V_{BE} = 0.6$

Hence, $I_B = (V_{CC} - V_{BE}) / R_B$

$= (9 - 0.6) / (39 \times 10^3)$

$= 2.15 \times 10^{-4}A$

$= 21.5mA$

3.2.2 Calculation of value of Inductance (L)

$L = (n^2r^2) / 25.4(90r + dn)$

L was given as 0.79mH

$0.79 \times 10^{-3} (2286 + 38.1) = n^2r^2$

$1805.94 + 30.099n = 100n^2$

$$n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

n = -5.97 or 5.97 turns

Thus, n = 6 turns

3.2.3 Calculation of Frequency of transmission

$F = 1/2\pi (LC)^{1/2}$

$F = 1 / 6.284 (0.79 \times 2 \times 10^{-12})$

F = 98MHz

3.3 Design of FM Radio Receiver Unit

This unit consist of the R.F tuner, I.F amplifier, Limiter, Detector and A.F amplifier [1]. The function of this unit is to receive the radio waves sent by the transmitter and extract signals / information from it through a process called "demodulation" [1]. A suitable Linear Integrated Circuit selected for this purpose was TA2003. Its operating supply voltage range of **1.8 to 7v** made it selectable for this design [12].

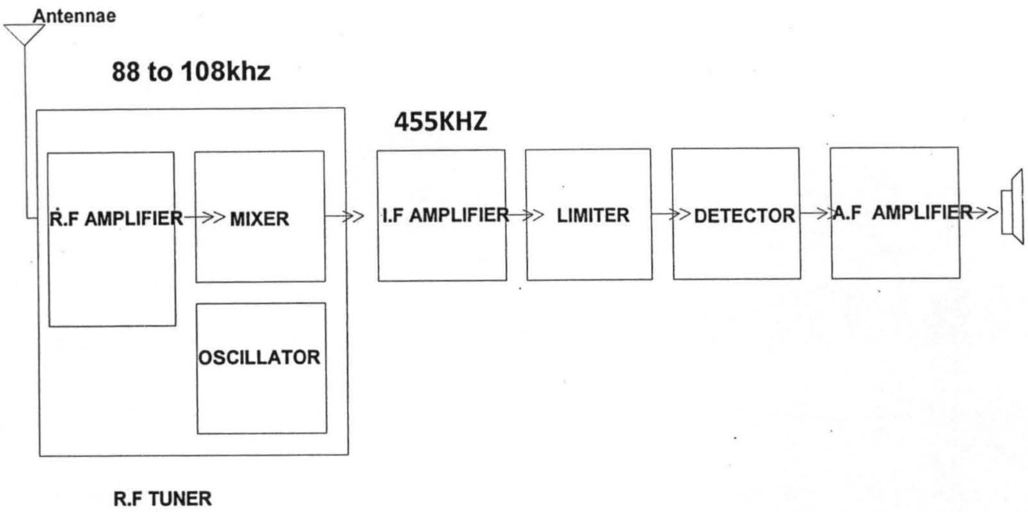

Fig 3.5 Block diagram of Receiver Unit

- **R.F tuner:** The FM signals are in the frequency range of 88 to 108Mhz.The weak FM signal is picked up by the antenna and fed to the R.F tuner, which consists of the R.F amplifier, Mixer, and local Oscillator. The output from the R.F amplifier is fed to the mixer stage, where it is combined with the output signal from a local oscillator.

  The difference between the oscillator frequency and the radio frequency produces an intermediate frequency (I.F). This I.F is always equal to 10.7MHz regardless of the frequency to which the fm receiver is tuned [1].
- **I.F amplifier:** The output signal from the mixer always has a frequency of 10.7MHz and is fed to the I.F amplifier [1].

- **Limiter:** Output from the I.F stage is fed to the limiter, whose main function is to remove AM interference from the FM signal [1].
- **Detector:** Its main function is to covert frequency variations to amplitude variations (i.e. distinguish between different frequencies) [1]. It also serves as demodulator.
- **A.F amplifier:** This helps to channel the output from the detector to an audio amplifier, which helps to amplify the signal until it is sufficiently enough to drive the speakers [1].

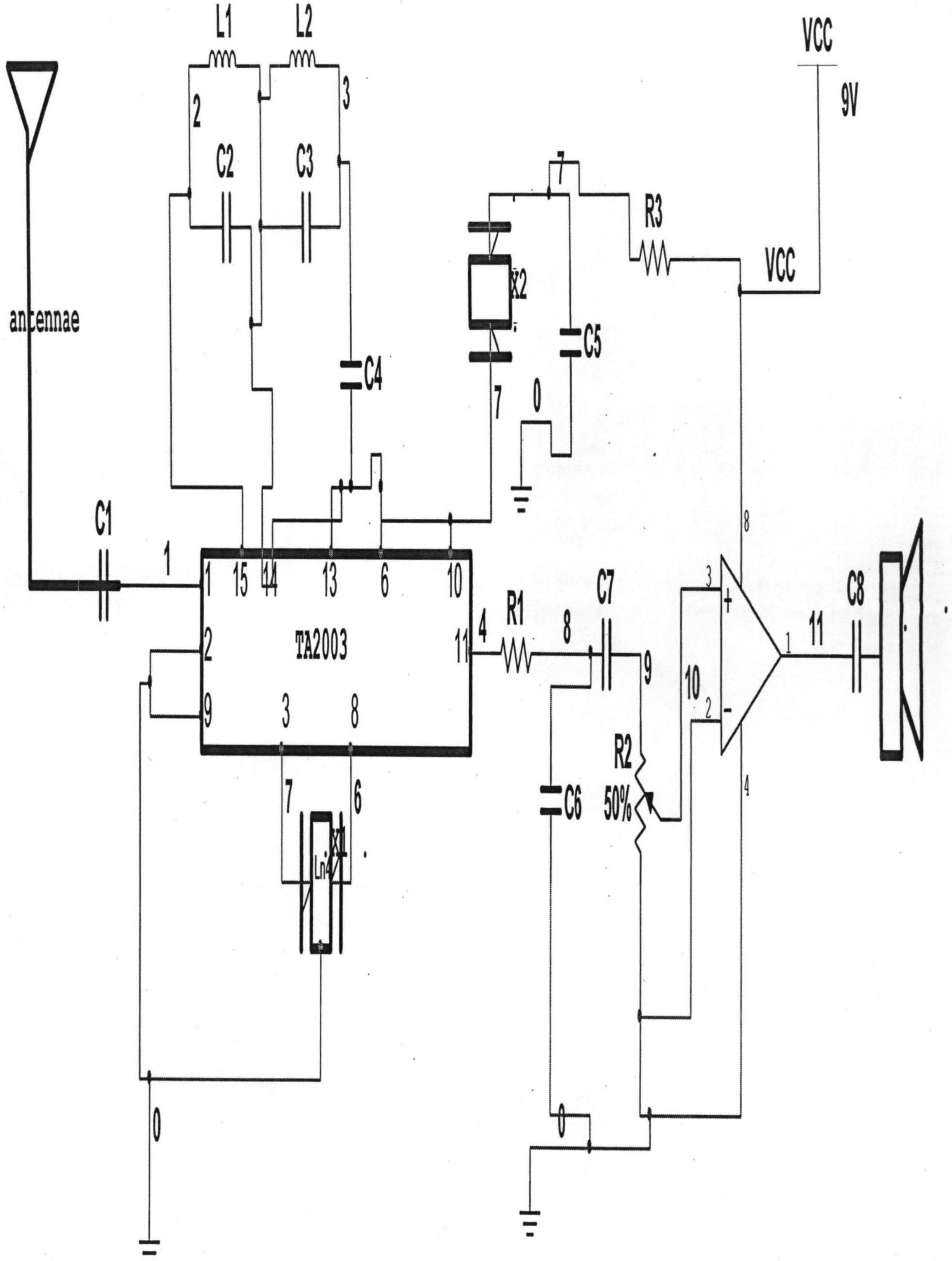

Fig 3.6 Circuit diagram of TA2003

3.3.1 Calculation for length of Receiver Antennae

Antennae Length (L) = $\lambda/4$

But $f\lambda = c$ (frequency of carrier = 98MHz)

$\lambda = c / f$

$= (3\times10^{8}) / (98\times10^{8})$

$= 3.06m$

$L = \lambda / 4$

$= 3.06 / 4$

= 0.765m (0.20m was chosen for suitability).

3.4 Design of Amplification Unit

This unit consist of just the power amplification unit. The main aim of this unit is to amplify the output signal from the radio receiver unit.

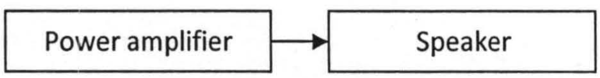

Fig 3.7 Block diagram of amplification unit

3.5 Power amplification unit: This unit amplifies the voltage or power needed to drive the speakers. The I.C used for this purpose was **TDA7295.** It is a monolithic integrated circuit in Multiwatt15 package, intended for use as audio class AB amplifier in Hi-Fi field applications (Home Stereo, self powered loudspeakers, Top-class TV). With its wide voltage range (±40v) and high out current capability, it is able to supply the highest power into both 4Ω and 8Ω loads even in presence of poor supply regulation, with high Supply Voltage Rejection. The built in muting function with turn on delay simplifies the remote operation avoiding switching on-off noises [11].

3.5.1 Features of TDA7295 amplifier

- It has a very high operating voltage range of **±40v.**
- It has high output power of up to 80watts.
- It has muting or standby functions.
- It has no switch ON/OFF noise.
- It has very low distortion and very low noise.
- It has shut circuit protection.

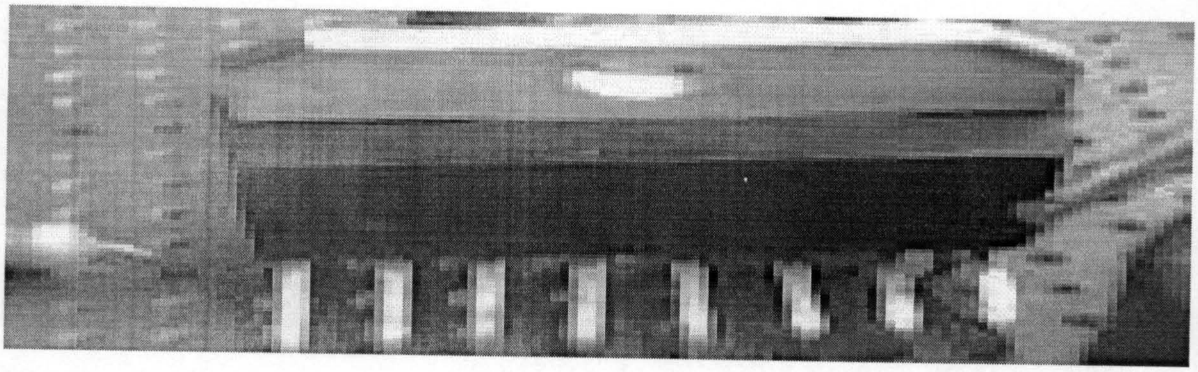

Fig 3.9 TDA7295

3.5.2 Pin Description of TDA7295: The table below gives a summary function of each individual pin.

Table 3.1 shows the summary of the function of each individual pin

PIN 1	STD-BY GND
PIN2	INVERTING INPUT
PIN3	NON-INVERTING INPUT
PIN4	SVR
PIN5	N.C
PIN6	BOOTSTRAP
PIN7	+VS (SGN)
PIN8	-VS (SGN)
PIN9	STD-BY
PIN10	MUTE
PIN11	N.C
PIN12	N.C
PIN13	+VS (PWR)
PIN14	OUT
PIN15	-VS (PWR)

Table 3.1 pin description of TDA7295

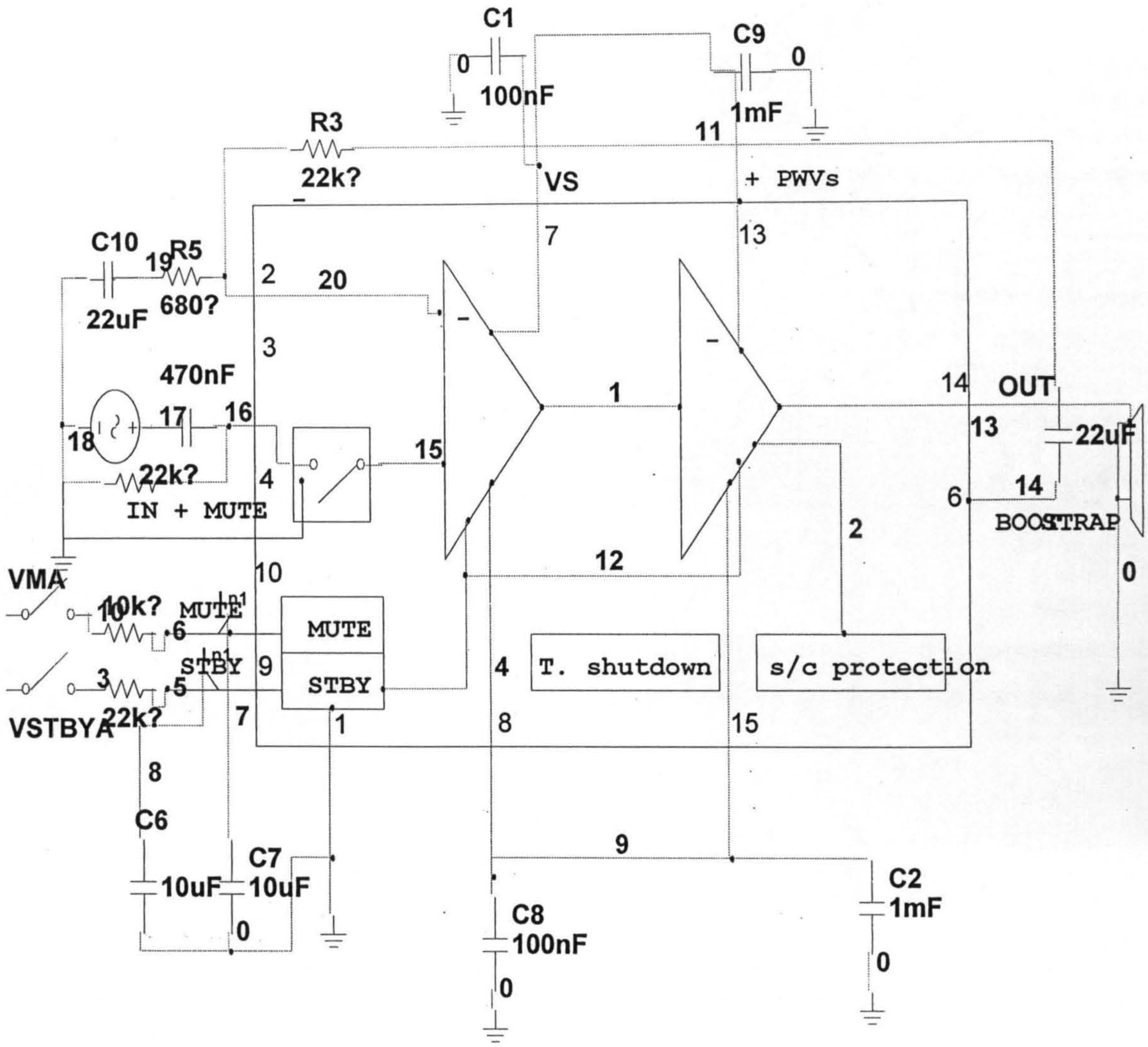

Fig 4.0 Complete circuit diagram of TDA7295

3.6 Tone Control Unit: The tone control unit, the bass, mid range, and treble, which are low pass, band pass, and high pass filters respectively, improve the quality of the signal. Low pass cut off is 20hz to 200Hz, band pass is between 200Hz and 2kHz while high pass cut off is 2khz to20kHz above. The volume control calibrates the input signal strength to the power amplifier and the power amplifier amplifiers the whole signal to 100W. The I.C LM358 was found most suitable for this design [13].

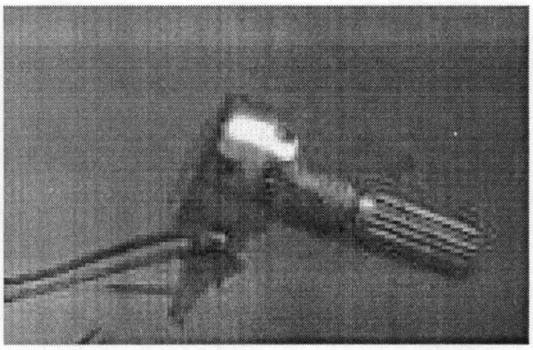

Fig 4.1 Volume Controlling knob

3.7 Output Unit: This unit consist basically of the speaker, which outputs the signal sent by the power amplification unit.

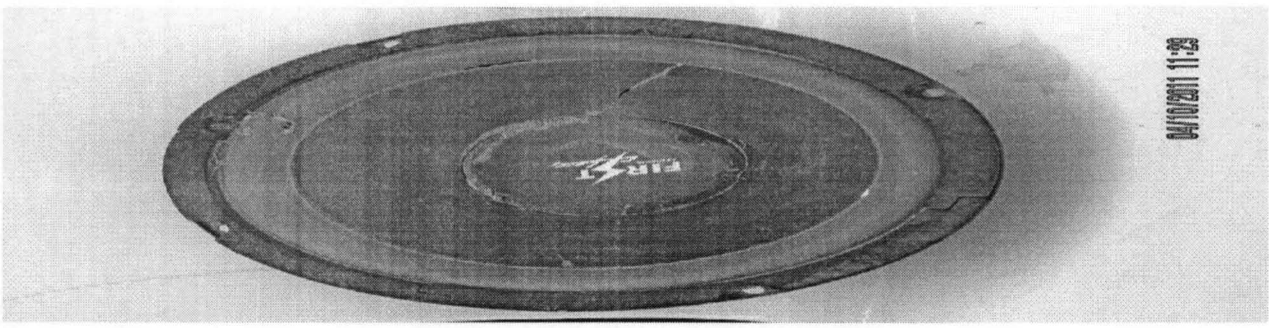

Fig 4.2 Speaker for Output Unit

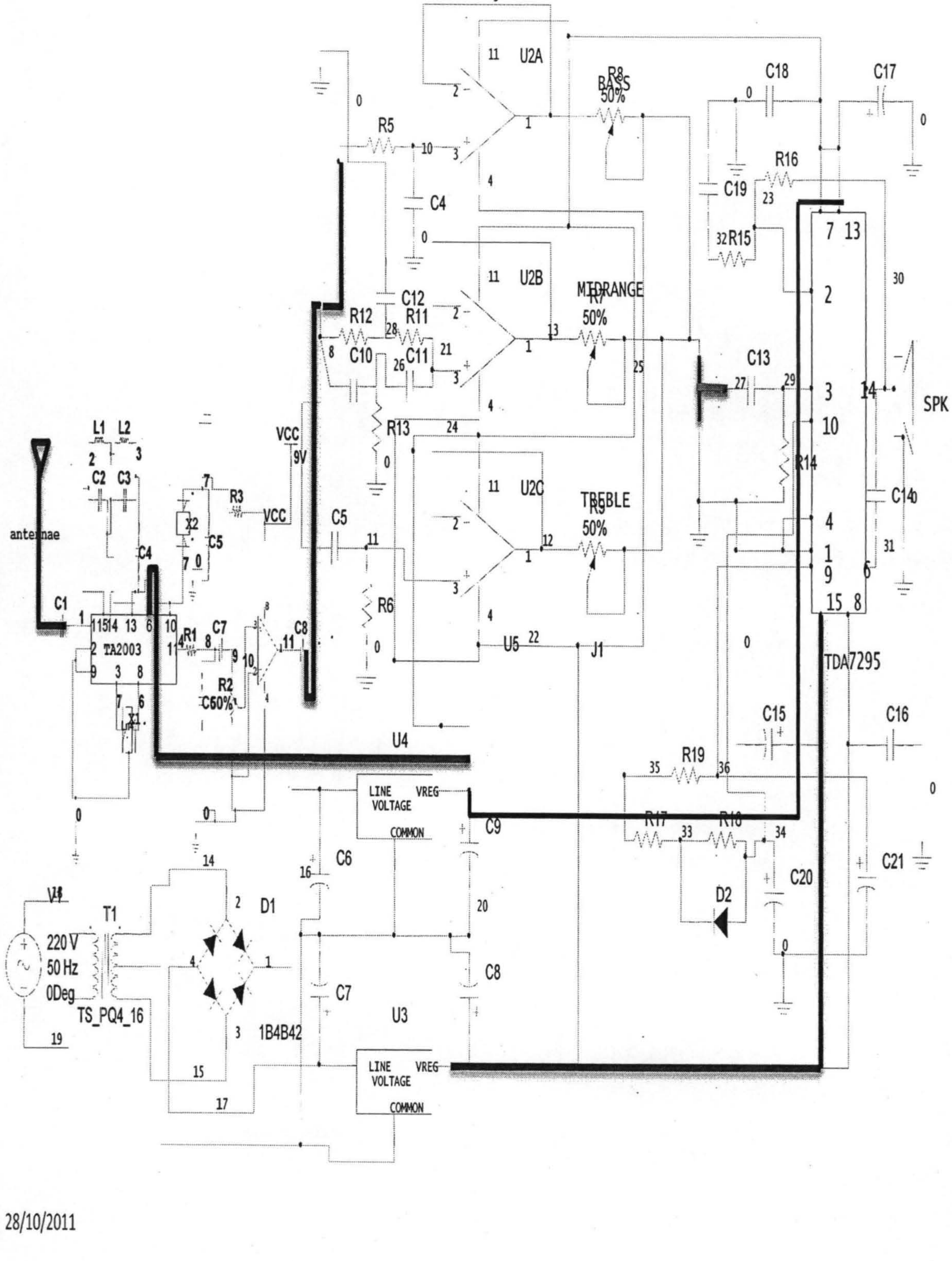

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Fig 4.3 COMPLETE CIRCUIT DIAGRAM OF THE WIRELESS PUBLIC ADRESS SYSTEM

3.8 Construction

The circuit was constructed on a 15 by 10cm Vero-board. The power supply unit was constructed on a separate board from which wires were drawn to feed the main driving circuit.

The power amplification and receiver units were soldered respectively on the same board. As a precaution adopted during the construction, IC sockets of the receiver; TA2003 and tone control units; LM358, were soldered to the board before the insertion of the ICs. This was aimed at ensuring that the ICs were maximally protected from getting damaged by the excessive heat generated in the course of the soldering. Also, heat sink was attached to the power amplifier; TDA7295 to help protect it from getting over heated (by its high temperature dissipation) and burnt.

All soldered points were scrupulously checked for continuity using multi-meter to prevent the occurrence of dry joint and possible bridging of components.

A list of all components used for the entire construction processes are listed below:

I. <u>Power Supply Unit</u>

   a) 25v transformer
   b) KPC3510 Bridge Rectifier
   c) 2200µf capacitors

II. Transmitter Unit

a) 9v dc battery
b) Condensed microphone
c) Two 6 -turns of inductors
d) Two 10kΩ Resistors
e) 100Ω Resistors
f) 1μf Capacitor
g) One 10pf Capacitor
h) One 30pf Capacitor
i) One 2pf Capacitor
j) 39kΩ Resistors
k) One 103μf Capacitor
l) One C9015 Transistor
m) One Antennae
n) One Battery cap

III. Receiver Unit

a. TA2003
b. Two 6-turns inductors
c. One Gang capacitor
d. Two 10.7MHz
e. Two 30pf capacitor
f. One 150Ω

g. One 15kΩ

h. One 220 μf

i. One 104 capacitor

j. One 502 capacitor

k. One 5v regulator

IV. Power amplification Unit

a. One TDA7295 amplifier

b. One 10μf

c. One 220μf

d. One 1μf

e. Two 10kΩ

f. One 100k Ω

g. One 1k Ω

h. 0ne heat sink

V. Tone Control Unit

a. Four LM358

b. Five Volume control knobs

c. Three -8leg I.C sockets

VI. Output unit

a. One 100 watt (8Ω) Speaker

b. Two long Connecting wires.

CHAPTER FOUR

TESTS, RESULTS AND DISCUSSION

4.1 Testing: It was found very imperative to test each unit separately at the end of its construction before linking it to the next one. The main aim of this was to ease troubleshooting processes. Input and the output readings of each units were duly noted, to know comparatively, if a unit has sufficiently received the input/output requirements of voltage values specified by its design blue-print or datasheet.

A speaker was used instead at the receiver and power amplification or TDA7295 units to test for the sound output signal. This was to ensure that the configurations stated in the complete design circuit were strictly adhered to and that the units worked as expected.

Also, the transmitter was tested to ascertain its communication with the receiver.

Lastly, haven certified all units functional and ok for linking with other units to produce a system, a total linking of all the units was carried out to produce a complete circuit. This was also tested to ensure a complete and functional system.

4.2 Results: After testing each of the units, the following voltage values were collected from pin 13, 14 and 15 respectively of the power amplifier (**TDA7295**):

Table 4.1 Results obtained from testing TDA7295

SYMBOL AND PIN	PARAMETER	VALUE	UNIT
V_s of pin 7	INPUT VOLTAGE	+15	V
V_s of pin 13	INPUT VOLTAGE	+15	V
V_s of pin 15	INPUT VOLTAGE	-15	V
V_s of pin 8	INPUT VLOTAGE	-15	V
V_s of pin 14	SIGNAL OUTPUT	Variable ac signal	V

Table 4.2 Results obtained from testing Receiver (TA2003)

SYMBOL AND PIN	PARAMETER	VALUE	UNIT
V_{cc} of pin 6	INPUT VOLTAGE	2.92	V
V_{cc} of pin 11	Output Voltage	1.1	V

Table 4.3 Results obtained from measuring transmitter Distance

PARAMETER	VALUE	UNIT
Distance of transmission	10	m

4.3 Discursion of Results: The results above were obtained by placing the probes of the multimmetre; one on the ground pin and the other to the pins which gave output. The various output voltage readings are a clear indication of input or output signal to a given I.C. The supplied voltage (Vcc) of 2.90v measured at pin 6 of the receiver (i.e. TA2003), indicates the voltage rating that powers it. The voltage reading at pin 13 and 7 of TDA7295 (i.e. +15v), is the value as supplied directly from the positive section of the power supply, where as the -15v measured at pin 15 and 8 is supplied from the negative of same power supply. The varying ac voltage obtained at pin 14 of the TDA7295, is due to the varying strength of input signal which enters it from the microphone.

4.4 Limitation: There is virtually no system on earth that is limitation free, this system inclusive. Thus, it has the following limitation:

1. It is monophonic not stereo.

CHAPTER FIVE

CONCLUSION

5.1 Conclusion: The wireless public address system was designed and constructed. Thus, the following intended aims were achieved:

i. A wireless transmitter with good strength of transmission was in-cooperated with the project, for long distance of transmission.
ii. A receiver unit was provided for adequate signal reception.
iii. Tone control unit was provided for signal quality improvement.

5.2 Problems Encountered: The major challenges encountered with in the design and construction of this project work, were basically;

i. The Construction of power supply unit using +15v and -15v regulators respectively.
ii. The construction of power amplification unit, using TDA7295.

5.3 Possible Improvement: Further step at improving the functionality and reliability of this project is highly called for and possible in the following units:

i. Inco-operating a display unit, for show-casing signal strength.
ii. Inco-operating an inverter battery as a substitute for power failure.

5.3 Recommendation

i. From the ample experience derived in this course, it is worth of recommendation that all institutions of technology incorporate this project in their practical course Synopsis. I see it to be the basis of electronics.

ii. Considering the features of this project, it is recommended for use in lecture and conference halls with large number of audience.

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APPENDIX A: USER'S MANUAL

WIRELESS PUBLIC ADRESS SYSTEM

A. Power Supply

Plug in the power cable into the ac main. Then turn ON the toggle switch to power the device. The power indicator (Red LED) glows, meaning that the device is now working.

B. Transmitter

Turn ON the toggle switch to power on the device. The power indicator (Green LED) glows, meaning that the device is now working and ready for use. Talk into the microphone attached to the transmitter. The speaker responds, indicating that the wireless public address system is now working and ready for use.

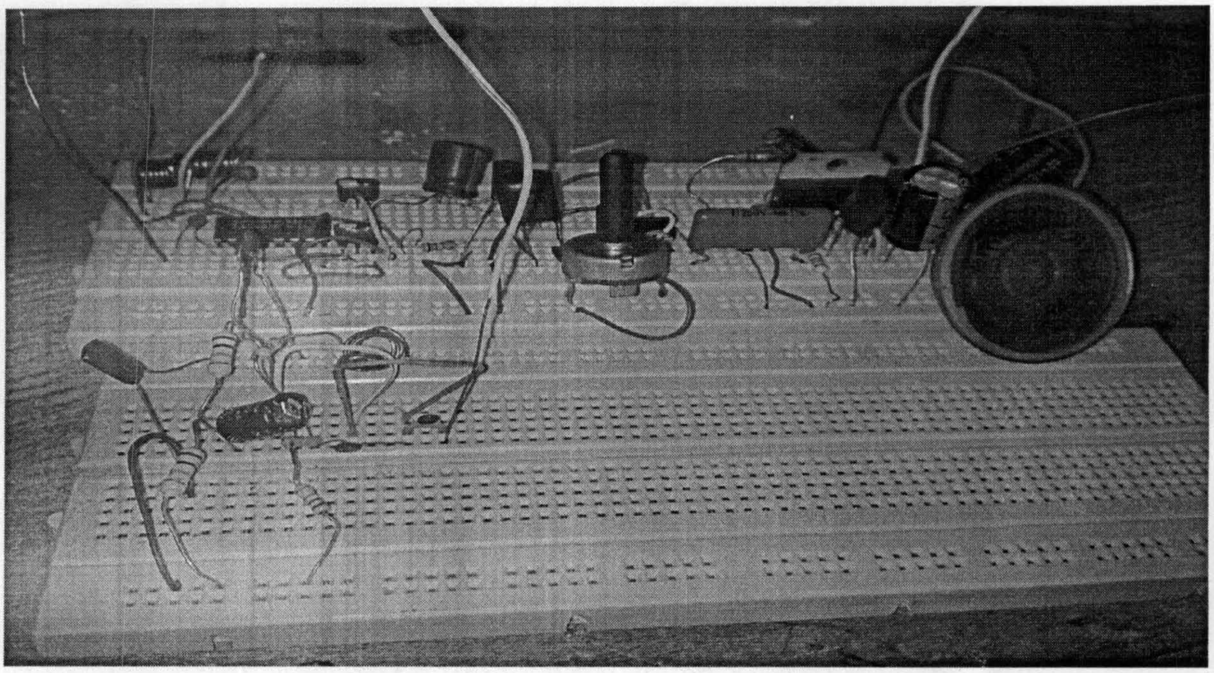
C. Volume Control

Adjust the volume of the transmitter using a volume control knob located at the side.

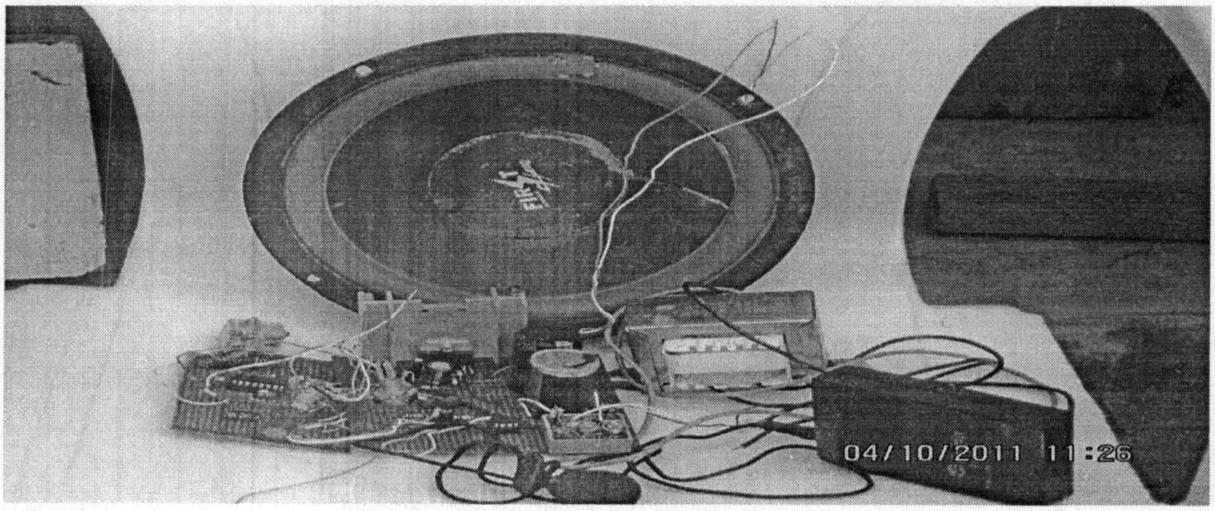
D. Tone Control

For treble, bass and mid-range adjustment use the tone controlling knobs at the front of the speaker.

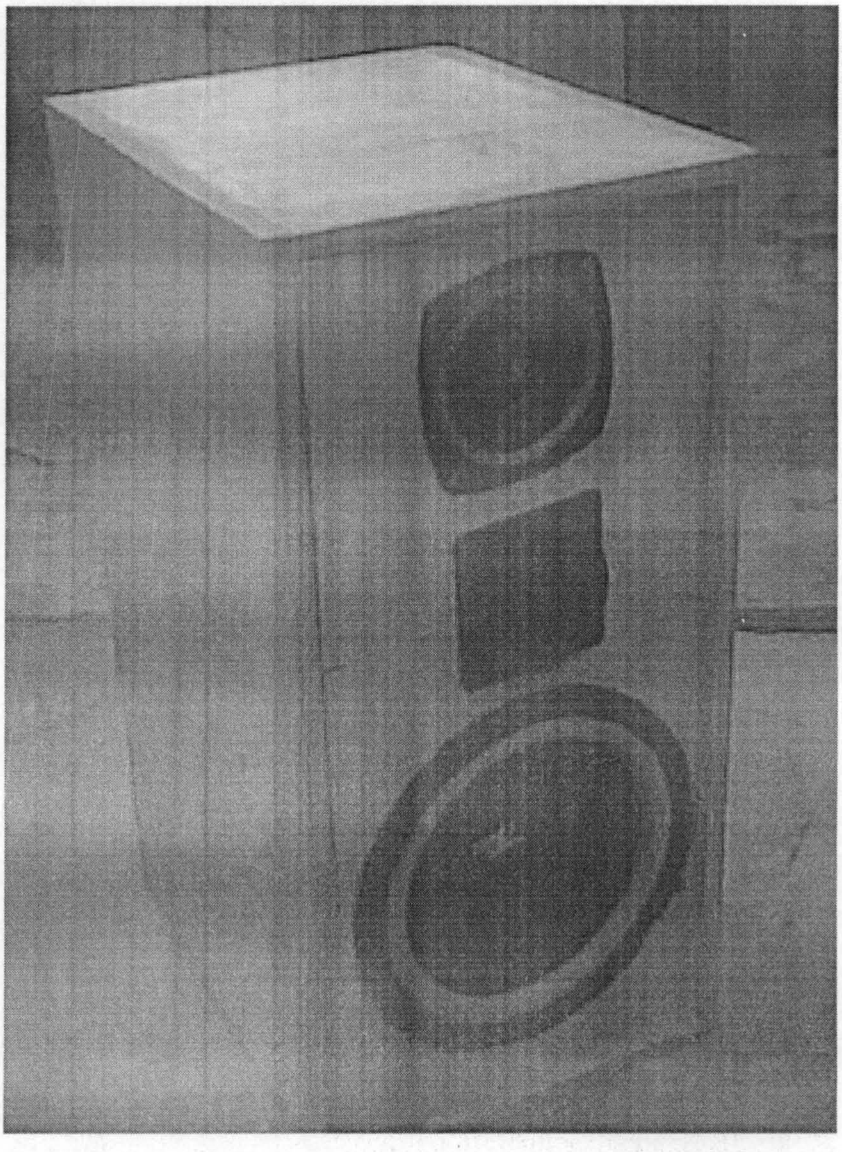
Appendix B: Construction Stages



Bread board Stage



Vero board Stage



Complete Construction