DESIGN AND CONSTRUCTION OF A 50 – WATT PUBLIC ADDRESS SYSTEM (PAS)

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BEING A PROJECT WORK PRESENTED TO THE DEPARTMENT OF ELECTRICAL/ ELECTRONIC ENGINEERING TECHNOLOGY, SCHOOL OF ENGINEERING TECHNOLOGY, AUCHI POLYTECHNIC, AUCHI.

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CERTIFICATION

This is to certify that this project work **Design and Construction of 50 – Watts Public Address System (PAS)** was carried out by:

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DEDICATION

To God Almighty for His grace mercy in the life of his children.

ACKNOWLEDGMENT

We wish to appreciate our supervisor, **Mr. Aigbe S.O** and **Mrs. Shaibu** for given us great guide throughout the period of our research work. Thanks to the Head of Department, Electrical/ Electronic Engineering Technology, **Engr. Ovbiagele Umahon** and all the lecturers in the department, for their advice and support throughout our academic pursuit.

We are really grateful to our parents for their loves and financial supports throughout our academic periods in schools.

Finally, we would like to thank our friends, course mates and well wishers for their prayers and love. May God Almighty reward you all (Amen).

ABSTRACT

It was obvious that there would be construction of Public Address System due to the limitation of the human voice. A Public Address System which is also called the "P.A SYSTEM" is an electronic system which consist of microphones, pre amplifier, amplifier, and loud speaker. It increases the volume or loudness of human voice, musical instrument, or other acoustic sound source or recorded sound or music. When the voice signal enters the microphone, it converts the sound energy to electrical energy, the electrical signal being transmitted is received by the amplifier circuit for amplification. The output of the amplifier is fed into the loud speaker. The loud speaker converts the electrical energy back to the original form but an amplified sound energy. This work is made up of the power supply unit, the pre – amplifier, the tone control unit and power amplifier units. This system is capable of delivering 50w of electrical power into a 8 ohm loudspeaker.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

A public address system which is also called a PA system is an electronic system which comprises microphone, amplifier, and loudspeakers. It increases the loudness of the sound of the human voice, musical instrument or other acoustic sound source or recorded sound. PA systems are used in any public venue that requires that an announcer, performer, etc. be sufficiently audible at a distance or over a large area. Typical applications include sports stadiums, mosque, churches and live or recorded music venues and events. A PA system may include multiple microphones, a mixing console, multiple amplifiers and loudspeakers for louder volume or wider distribution. We could either use wireless microphones or cord microphones.

1.2 PROBLEM STATEMENT

This project is meant to solve communication problems that takes place in areas where it is hard to find a device for making important announcements so that everyone can listen precisely to what the announcer is saying. This project may also be used by lecturers in lecture halls to communicate and interact with their student in a lecture, as shouting during lectures may be very exhausting and frustrating.

1.3 AIM AND OBJECTIVES

1.3.1 AIM

The major aim of this work is to design and construct a public address system with relatively unique operational characteristics that is capable of delivering 50 watts of electrical power into 8 ohms (loudspeaker). This can be achieved with adequate tone controls and pre –

amplifier stage so as to enable communication or reproduction of speech and recorded music in building, mosques, churches and also institutions.

1.3.2 Objectives

1. To acquaint the student with the use of basic electronics compounds to developing circuits and system
2. To understand the basic principle of operation of an amplifier.
3. To improve communication.

1.4 LIMITATION OF THE STUDY

There are lots of devices that emit radio waves and If those radio wave are on the same frequency as with the transmitter and receiver the radio signal could get some distorted signals as you listen to the output. This can be referred to as **INTERFERENCE.** Therefore interference could serve as a limitation.

When a transmitter or receiver stops working or drops out, it could affect the sound. This kind of problem can be referred to as **DROP SIGNALS.**

BANDWITH: A well wired PA System carries "lots of information" represented in electrical form. These might also be a limitation as the signal could either be bulky or less – full. Therefore we can say that a bandwith is another limitation.

1.5 SIGNIFICANCE OF THE STUDY

PA System is often used in venues such as school auditurum, churches, mosques, small bars, institutions where there are crowd. In high populated area it is important to ensure everyone's safety. In case of emergency, provision of proper and quick instructions is great way to evacuate everyone. Our PA System helps you to deliver clear instructions to all your employees in a company or in an organization.

CHAPTER TWO

LITERATURE REVIEW

2.1 RELATED WORKS

Communication has been an age long process in which information is passed from generation to generation. The idea of public address system was borne out of the necessity and importance to reach out to a large audience in churches, lecture halls, mosque, as stated in the introduction in chapter one. It would have been impossible to transmit and receive without the use of radio waves and radio receivers. The applications of the wireless communication and remote control technology were practically implemented by Nikola Tesla. The world's first radio receiver was designed by a man called Alexander Stepanovich Popov, and it was first seen at the All-Russia exhibition in 1896. He was the first to demonstrate the practical application of electromagnetic (radio) waves (CG Montoro and Mc Schneider, 2007).

2.1.1 ANCIENT MEDIUM OF INFORMATION TRANSMISSION

In the ancient days information is passed across using drums, wooden gongs and gongs to get people's attention before passing on the information, a rimmed cattle horn was also used as a PA System.

2.1.2 MODERN DAY MEDIUM APPROACH

It has been recently witnessed that the advent of a durable, wider coverage and more reliable and more dependable means that could be seen as announcement. It is known as a PUBLIC

ADDRESS SYSTEM. This system consists of a Microphone, Mixer, Tone control, Amplifier and Speaker (Ezeorah Chidiebere, 2009).

Problems Associated with Earlier Systems

- There are complex circuitry due to the absence of integrated circuit chips for higher reliability higher efficiency and easier trouble shooting.
- Discomfort while handling the microphone due to the wire connecting it to the speakers.
- The range of movement is restricted by the length of the cable

2.2 SCOPE OF THE STUDY

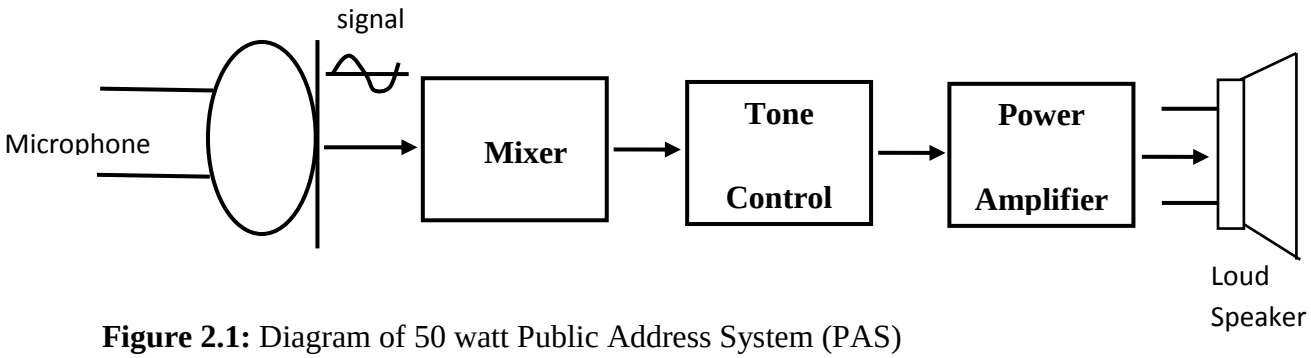


Figure 2.1: Diagram of 50 watt Public Address System (PAS)

BLOCK DIAGRAM OF 50 WATTS PUBLIC ADDRESS SYSTEM (PAS)

This system is for public address, it has an estimated power rating of 50 watts. The flow for the complete system are:

- Power Supply Unit
- Microphone
- Mixer
- Tone Controls
- Power Amplifier
- Speakers

- **Microphone (Input transducer)**

Microphone is a transducer that converts sound into electrical signal. Microphones are used in many applications such as live and recorded audio engineering, in radio and television broadcasting telephones and in computers for recording voice, and music for non-acoustic purposes such as ultrasonic checking. The sensitive transducer element of a microphone is known as its element. Since a wire microphone is used in this project; a wire microphone is one in which the range of movement is restricted by the length of the cable.

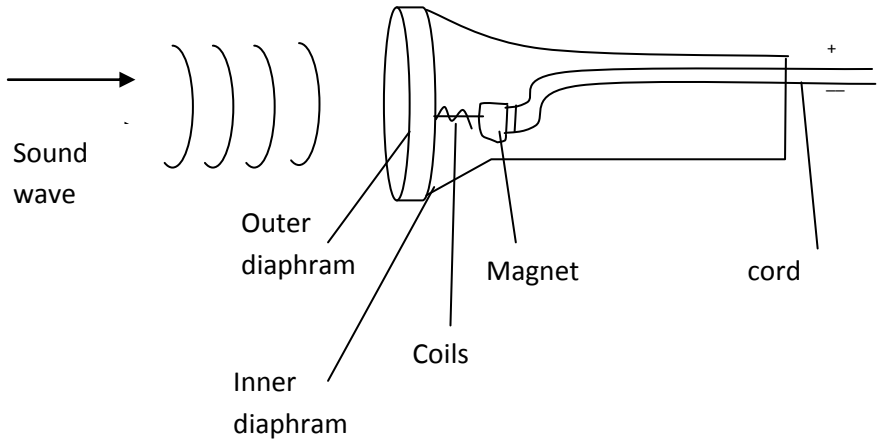


Figure 2.2: Diagram of a moving coil microphone

- **Mixer**

An audio mixer is a device that joins two or more different signals. Mixers range from a couple of variable resistors with knobs to the big and complicated – looking consoles used in the largest multi – performance events. Digital mixer are becoming increasingly common in large – scale productions early digital mixers tended to be more menu –m driven, but recent products generally favour a more analogue layout, with a ‘virtual’ on – screen mixer similar to the type of analogue mixer described here.

Function:

Basically, a mixer simply combines a set of individual signals, together. In most live event applications, signals are generated from the sources (instrument amplifiers, electronic instruments, and microphones covering everything from soft voices to every loud drums). It is the mixer's job to combine these so that they can work together.

Tone control is a type of equalization used to regulated specific pitches or " frequencies" in an audio signal. It allows a listener to adjust the tone of the sound produced by an system to their liking. For example to compensate for inadequate bass response of loudspeakers or even earphones, tonal qualities of the room, or hearing impairment. A tone control circuit is an electronic circuit that consists of network of filters (capacitors are used for filtering) which modify the signal before it is fed to speakers, headphones or recording devices by way of an amplifier. Tone controls are found on many instrument amplifiers as its function cannot be overemphasized.

- **Amplifier**

Amplifier or simply amp is any device that changes, usually increases, the amplitude of a signal. The "signal" is usually current or voltage. An amplifier usually "increases" the power of a signal Amplifier is a device for increasing the power of a signal. It does this by taking energy from a power supply and controlling the output to match the input signal shape but with larger amplitude. Routing the low-frequency parts of the signal to an amplifier can substantially improve the clarity of the overall sound reproduction.

In this work, the audio amplifier used is capable of delivering 50watts continuously. The term "power amplifier" is a relative term with respect to the amount of power delivered to the load and/or sourced by the supply circuit.

In general a power amplifier is designated as the last amplifier in a transmission chain (the output stage) and is the amplifier stage that typically requires most attention to power efficiency. Power amplifiers have also become lighter, smaller, more powerful and more efficient due to increasing use of Class A amplifiers, which offer significant weight and space savings as well as increased efficiency.

Inverting and Non – Inverting

In this classification we shall consider the phase relationship at the input signal to the output signal.

The inverting amplifier gives the output of 180^0 out of phase with the input signal. While the non – inverting amplifier is the continuous phase of the input signal waveform and the emitter is a non – inverting amplifier. It has a unity gain , therefore the voltage follower is known as non – inverting amplifier.

- **Power Amplifier**

Power amplifier circuits (output stages) are classified as A, B, AB and C for analog designs, and class D and E for switching designs, based upon the conduction angle or angle of flow, Θ, of the input signal through the output amplifying device, that is, the portion of the input signal cycle during which the amplifying device conducts. The image of the conduction angle is derived from amplifying a sinusoidal signal. (If the device is always on, Θ = 360o.) In this project a class A amplifier is used because it offers low signal distortion.

- **Loud Speaker**

Loudspeaker is an electro-acoustical transducer that converts an electrical

signal to sound. A transducer that turns an electrical signal into sound waves is the functional opposite of a microphone.

Since a conventional speaker is constructed much like a dynamic microphone, (with a diaphragm, coil and magnet), speakers can actually work "in reverse" as microphones. The speaker pushes a medium in accord with the pulsations of an electrical signal, thus causing sound waves to propagate to where they can then be received by the ear. The loudspeaker used in this project is a load of 8 Ohms.

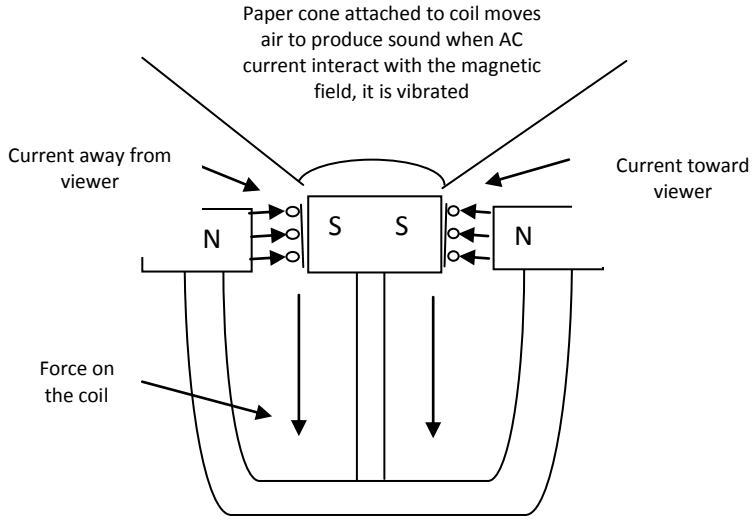


Figure 2.3: Diagram of the Loud speaker

- **Design Parameters**

Key design parameters for audio amplifiers are frequency response, gain, noise, and distortion. These are interdependent; increasing gain often leads to undesirable increase in noise distortion. While negative feedback actually reduces the gain, it also reduces distortion. Most audio amplifier are linear amplifiers operation in class AB.

- **The Audio Amplifier**

It is a two port device that accepts an externally applied signal, which is known as the input and creates a signal called output such that output gain is multiplied by the input, where gain is suitably proportionality constant. An amplifier receives its input from a source up stream and delivers its output to a load downstream. The most common type of amplifier is the voltage amplifier whose input Vi and output Vo are voltages. The essential role of this active element is to magnify an input signal to yield a significantly larger output signal. The amount of magnification (the "forward gain") is determined by the external circuit design as well as the active device.

Types of Audio Amplifiers

The power amplifier is an important component of the audio signal chain in home stereo systems and can have a significant effect on the quality of sound from the system. There are many choices available in amplifier design and each has its strength and weaknesses.

- **FET**

A FET which is an acronym of Field Effect Transistor. It is a solid state design amplifier. Solid state amplifier run much cooler than tube amps (which create a lot of heat from the output tubes). A MOSFET (Metal Oxide Semiconductor Field Effect Transistor) is probably the most popular solid state amplifier design. MOSFETS can create very high gain amplifier.

- **Tube Amplifiers**

Tube amplifiers use vacuum tubes to convert the AC signal to a DC current that can power speakers. Combinations of multiple tubes increase the overall gain of the signal.

Higher powered tube amps often use a pentode circuit design, while lower powered tube amps use a single ended triode (SET) design. SET amps are very popular with people who have high efficiency speakers (typically horns).

(Bruce,R, (1997). Beginner's Guide to Tube Audio Design)

- **Bipolar Transistors**

This type of amplifier are current devices, while MOSFETS and tubes are voltage devices. They are not as common as tubes or MOSFETS.

Class A, Class AB, Class B, Class D

The class of amplifier refers to the circuit design in a Class A design, the amplifier is always producing its maximum power output, whether it has a source playing or not Class A amps are very inefficient, but people like them because they have extremely low distortion. Class B amplifier idle at no current, and then turn on when an input source hits them. Class AB is a combination of the two, where the signal drives on circuit in Class A, and then when it turns off, the amp switches to the second circuit. Another circuit that is being used in amps is Class D. Contrary to popular opinion the D does not refer to "digital. Class D amps are very efficient, even more so than Class B, and due to their topology don't need heavy sinks so the amps are more compact and light.

- **Stereo, Monoblock and Multichannel**

Amplifiers can be created in several configurations. Stereo amplifiers, which can drive a pair of speakers, are probably the most common. Some people prefer monoblock amplifiers, which typically have higher power ratings. Monoblock amplifier drive a single speaker, so you need pair of monoblock amps in a stereo setup. Multichannel amplifier are used in home theater applications and are typically designed to drive five channels, through some can drive seven.

Classes of Audio Amplifier

There are a number of different classes of amplifiers;

Class A

The output devices of a Class A amplifier are always conducting for the duration of the cycle, or in other words, bias current is always flowing in the output devices. This topology has the least distortion and is the most linear, but it is also the least efficient, with an efficiency of roughly 20%.With both high and low side output devices, the design is often not complimentary.

Class B

This just works in the reverse direction as Class A amplifiers. The output devices only conduct for half of a sinusoidal cycle (one conducts in the positive area and the other conducts in the negative region), or in other words, if there is no input signal, the output devices do not conduct. The class of amplifier is clearly more efficient than Class A, with an efficiency of around 50%, but has some issues with linearity at the cross over point due to the time it takes to switch one device off and while it turns the other on.

Class AB

Its combines the two types of amplifiers above, and its currently one of the most common types of power amplifier in existence. Here both devices are allowed to conduct at the same time, but just a small amount close to the crossover point. Here each device is conducting for more than half a circle but less than the whole circle, so the inherent non – linearity of Class B designs is overcome, without the inefficiency of a Class A design.

Efficiency of Class AB amplifier is about 50%. (That is 0.5)

Class D

Class D is the lowest classification of amplifiers. A switching amplifier, often known as a Class D amplifier, is an electrical amplifier in which all power components (typically MOSFETs) function as binary switches. A switching amplifier, often known as a PWM amplifier, is what a Class D audio amplifier is. There are just two options: totally on or fully off. In an ideal world, there would be no time spent transitioning between the two states. Class D amplifiers include output stages like those seen in pulse generators. However, the names were most commonly used to describe power amplifiers that were designed to replicate signals with bandwidths much below the switching frequency. The basic block design for a half bridge Class D amplifier is shown above, along with waveforms for each stage. This circuit uses feedback from the half-bridge output to compensate for fluctuations in pulse voltage.

Basic Operation

Basic Functioning Class D amplifiers work by generating a square wave in which the low-frequency portion is essentially the desired output signals, and the high-frequency portion serves no use other than to make the wave form binary so that it may be amplified by

switching the power devices. A Class D amplifier functions in a similar fashion to a PWM power supply. The audio line level signals are sinusoidal, with a frequency that commonly ranges from 20 Hz to 20 kHz. The PWM signals are created by comparing this signal to a high frequency triangle or saw tooth waveform, as seen below. Microphone, Amplifier, Various Cables, Loud Speaker, and other materials are necessary. Microphones, DI boxes, and amplifiers are the basic components of a Public Address System (PAS).

Materials required; Microphone, Amplifier, Various Cables, Loud Speaker etc.

The main parts of a Public Address System (PAS) are:

a. Microphones, DI boxes and other sources
b. A Mixer
c. Power Amplifier
d. Speakers
e. An arrangement of cable to interconnect the equipment

PA System For addressing a big crowd, a PA system is an electronic sound amplification and distribution system that includes a microphone, amplifier, and speakers. The principle is the same, whether it's a modest speaker that gives a statement at school or several clock loads of equipment used by large turning acts. One or more microphones receive the original sound. The microphone serves as a transducer, converting sound into an electrical signal that is sent to a mixing console via another wire. The mixing console combines and balances all of the signals before sending the mixed' signal down another wire to an amplifier. This electrical signal is converted by the amplifier into much larger ones, which are then sent down to the speaker (s) The output speaker acts as a speaker.

The original sound travels to one or more microphones

a. The microphone acts as a transducer which convert the sound to electrical signal and send it down another wire to a mixing console
b. The mixing console mix all the signal together and balance the signal, and send this 'mixed' signal down through another wire to an amplifier.
c. The amplifier covert this electrical signal into much larger ones and send them down to the speaker(s)
d. The speaker which is the output serves as a transducer which convert the electrical signal into mechanical vibration, setting up sound wave
e. The audience hear this sound waves. This is the purpose of the circuit.

Pre – Amplifier

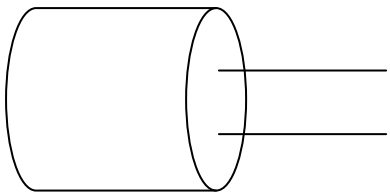
A pre-amplifier is an electronic amplifier that converts a weak electrical signal into an output signal that can be processed further or sent to a power amplifier. The final signal will be distorted if this is not done.

CHARACTERISTICS OF PASIVE COMPONENTS

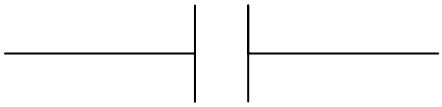
Generally speaking electronic passive components are components that do not introduce any amplification of signal to a system or circuit. They mostly do not have directions. Examples of these circuit are; Resistors (resistance), Capacitors (Capacitance or even inductance)

Capacitor

This is a device that store electrical energy in an electric field



(a) Physical appearance



(b) Symbolic representation

Figure 2.4: Diagram of a Capacitor.

Capacitance: Capacitance of the capacitor is directly proportional to the electric charge (Q) and inversely proportional to the voltage i.e $C = \frac{Q}{V}$

where C = Capacitance in Farad
Q = Charges in Coulombs
V = Voltage in volts (v)

Also note that the capacitance of plates capacitor is proportional to the permittivity (Ɛ) times the plate area divided by the distance between plate s

i.e $C = Ɛ \times \frac{A}{d}$

Where C = Capacitance of the capacitor in farad

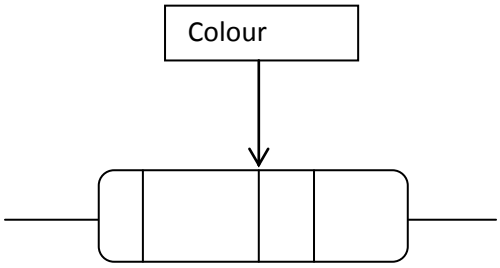
Ɛ = permittivity of the capacitors dielectric material in farad per meter (F/m)

A = the area of the capacitor's plate in squared meter (m^2)

D = Distance between the capacitor's plate in meter (m)

Resistor

This is a passive two terminal electrical component that implement electrical resistance as a circuit element. In other word, resistors are use to reduce the current flow in a circuit. Resistors do not have polarity and are of different types and values. Osme have fixed values and some can be varied.



In this project the following are used:

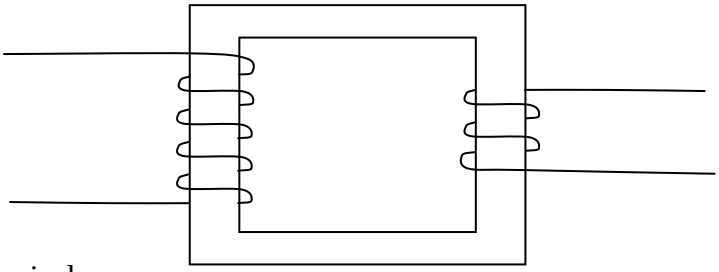
- Fixed resistor

- Variable resistor

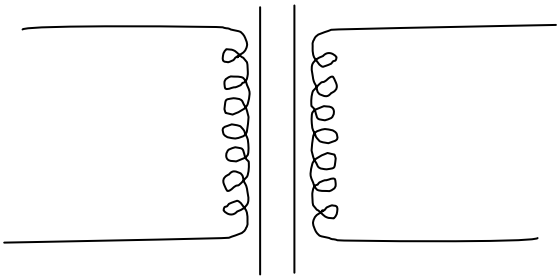
Figure 2.5: Diagram of a Resistor.

Transformer

This is a passive component that transfers electrical energy from one electrical circuit to another circuit or multiple circuits.



(a)Physical appearance



(b) Electrical symbol

Figure 2.6: Diagram of a Transformer.

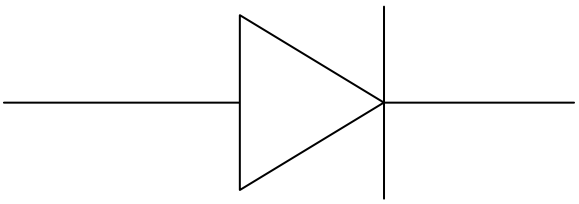
CHARACTERISTICS OF ACTIVE COMPONENT

These are component which requires external source to their operation and they provide power gain. Examples are Diode, IC, Transistors etc.

Diode

This is two electrode vaccum tubes containin g a cathode that emits electrons by thermionic emission surrounded by a anod (plate). This is a rectifier since the plate is positive in the anode, it attracet electrons and there is current flow, while when the plate is negative in respect to the cathode, it repels electrons and prevents current flow.

(a) Physical appearance



(b) Symbolic representation

Figure 2.7: Diagram of a Diode

Integrated Circuit

Integrated circuits ICs are the brain of most circuits.

They are small chips that can perform the function as an amplifier, timers, oscillator or even microprocessors.

An IC is usually made of silicon that can hold anywhere from hundreds to millions of transistors, resistors, diodes or even capacitors

Introduction to TDA 2050

Integrated Circuit TDA 2050

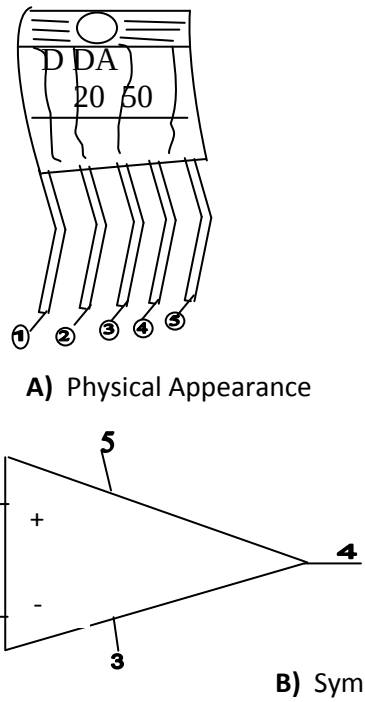


Figure 2.8: Diagram of Integrated Circuit (TDA) 2050

Pin Configuration

Pin 1 is known as the Non – inverting input which is denoted as the positive side of the amplifier.

Pin 2 is known as the inverting input. It is denoted as the negative terminal of the amplifier.

Pin 3 is the ground. This is also known as the earth terminal.

Pin 4 is the pin output of the amplifier signal.

Pin 5 is the supply voltage. This is where the voltage is being connected. The voltage is usually between 6v minimum and 36v maximum.

CHAPTER THREE

PROJECT METHODOLOGY

3.1 CIRCUIT DIAGRAM

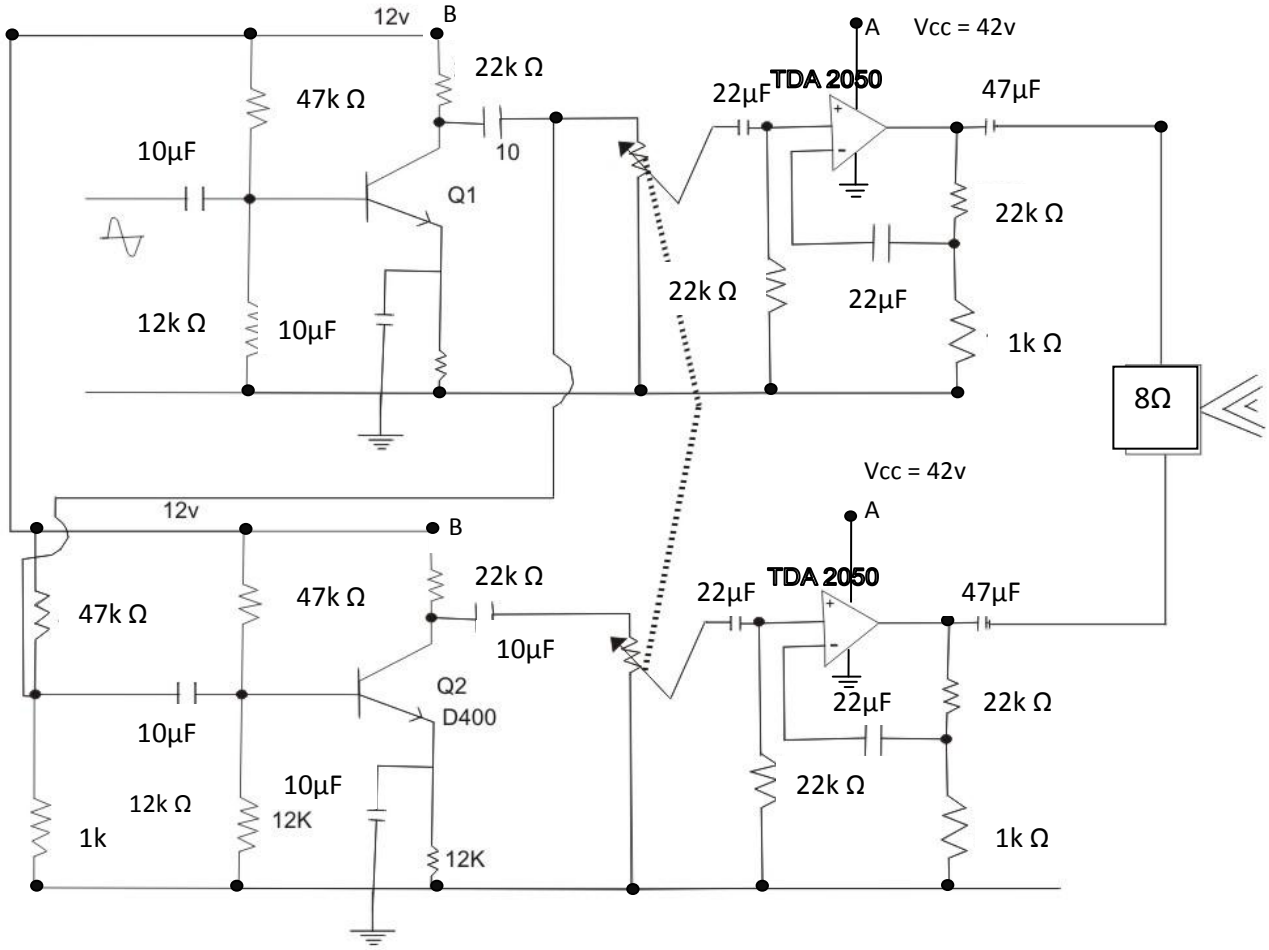


Figure 3.1: Circuit Diagram of Pre – amplifier and Power amplifier Circuit.

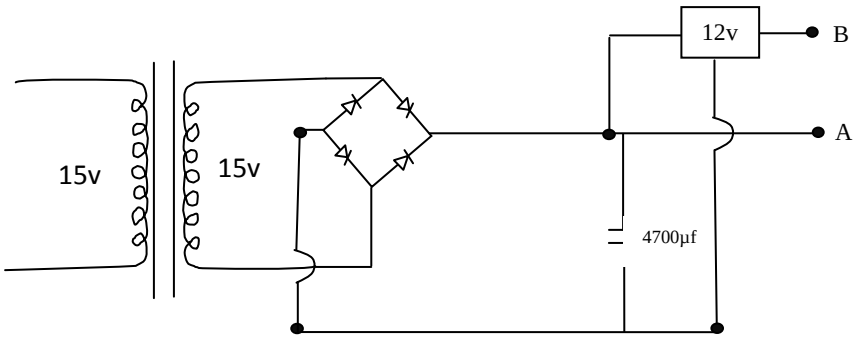


Figure 3.2: Circuit Diagram of the Power Supply Unit

For power supply of 42v

For undistorted signal let $V_P = \frac{V_{CC}}{2} - 1 = \frac{42}{2} - 1 = 20V$

TDA 2050, has characteristics of power supply operating from – 25V to ± 25V

Power output maximum = 50W at 4Ω

Use IC for 30W at 4Ω

Use two ICs in parallel for 60W to 8Ω

$P = + \frac{V^2}{R} = \frac{V_P^2}{2R} = \frac{20^2}{2x8} = \frac{400}{1} = 25W$

Gain of amplifier

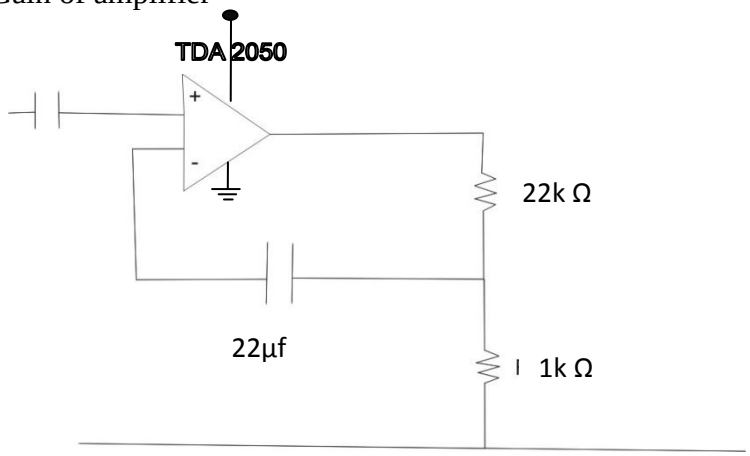


Figure 3.3 : Diagram of Amplifier Connection

$A_v = 1 + \frac{R_1}{R_2}$

$= 1 + \frac{22k}{1k} = 1 + 22$

$A_v = 23$

$23 = \frac{R_1}{R_2} + 1$

$\frac{R_1}{R_2} = 23 - 1$

$\frac{R_1}{R_2} = 22$

$R_1 = 22 \times R_2$

Let $R_2 = 1k$

$R_1 = 22x1k$

$R_1 = 22k$

$$A_V = \frac{V_0}{V_1}$$

For $20V_P$ output, the peak input voltage:

$V_{iP} = \frac{20}{23} = 0.86V$ Approximately 1V.

$$Vrms = \frac{V_P}{\sqrt{2}} = \frac{1V}{1.414} = 0.7V$$

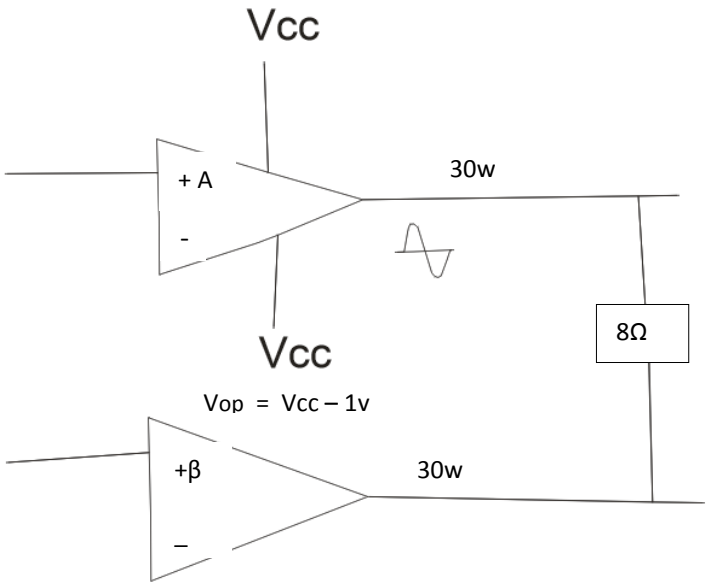


Figure 3.4: Diagram of Amplifiers Connected in Parallel

3.2 CONSTRUCTION

Initially the components were mounted on breadboard and tested, some of the mistakes encountered were corrected before finally transferred onto the vero board for permanent soldering.

3.2.1 Power Supply

Since the power supply is one of the most important part of the circuit, it made use of high current rating diodes. Components were soldered properly and carefully to avoid short circuit and also to avoid excessive heating which may damage the circuit.

3.2.2 Dissipation of Excessive Heat

Electronic components such as power transistors have thermal limit. When they exceed it, the component damages. This damage can also cause reduction in system reliability or reduction in system efficiency. Therefore there is need for heat dissipation so as to avoid inefficiency and damages. Heat dissipation in this project was effected by incorporating heat sink in the circuit which reduces the temperature of the whole circuit.

3.2.3 The Output Power Amplifier

At this stage, the positive rails were carefully considered. They were located at little distance from each other to avoid short circuit. The earth terminal was also connected to avoid problems due to ground effects. Therefore effective and efficient performance of the system was achieved.

3.2.4 Soldering

Soldering is a means of joining components firmly during connection. Some factors were taken into consideration during this stage

i. The soldering equipment (soldering iron etc) where kept clean always for proper soldering.

ii. ICs were not soldered directly but mounted on their base which were already soldered.

iii. Excessive heat application was avoided to prevent damage especially in components like: transistors and ICs.

3.2.5 Packaging

The circuit was packaged in a very convenient way to avoid damage to its component. This was the steps taken after the circuit has been successfully soldered and tested.

3.3 SYSTEM TESTING

The complete circuit was connected together and tested. Short circuiting problems were encountered which damage some of the components. And proper care was taken during the replacement to avoid reoccurrence of same problem.

3.3.1 Circuit Diagram

The circuit diagram used in this project is a very simple diagram. It mode of operation can easily be understood by anyone who is interested in this project.

3.3.2 Continuity Test

The various units of the circuit**,** the power supply unit, the pre – amplifier and the power amplifier etc. were tested with multi - meter.

3.3.3. Performance Evaluation

The complete circuit was successfully tested and it was observed that the system is functioning properly before it was packaged.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 RESULTS

The resistors, capacitors and diodes were tested using a multi – meter before they were mounted on the PCB. The complete system was subjected to various test using a multi – meter to check for continuity. The point – to – point connection test was also carried out, i.e. short circuit test, and continuity test starting from the pre – amplifier to the control unit and to the power amplifier stage.

4.2 DISCUSSION

4.2.1 PROBLEM ENCOUNTERED

The problem encountered in the implementation of these project work were:

- Epileptic power supply by the Power Holding Company (PHCN) which cause a major setback in the implementation of this project work.
- Poor assess to materials needed for the project
- Regulators were damaged due to excess current from the supply. This problem was solved by connecting more resistors in parallel at the power supply unit to reduce the excess current.
- Lack of workshop equipment for students to work.

4.2.2 PRECAUTION

To ensure that the circuit functions properly, the following precautions were observed

- The right choice of components were used, in order to improve system efficiency.
- The components were carefully handled to avoid damage.

- The soldering iron was not placed directly on the component during soldering, so as to prevent the semiconductor from damage due to overheating.
- Heat sinks were used appropriately to dissipate heat.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 BILL OF ENGINEERING MEASUREMENT AND EVALUATION

The total expenses made at the cause of the design and implementation of this project is analyzed as follows;

Table 5.1

S/N	ITEM	QUANTITY	UNIT PRICE	TOTAL AMT
1	Resistor	13	20	260
2	Capacitor	10	50	500
3	Capacitor of 470µF and above	3	300	900
4	Transistor	2	100	200
5	Microphone	`1	5500	5500
6	Microphone port	1	500	500
7	Variable resistor	1	250	250
8	Lead	-	500	500
9	Speaker	1	25000	25000
10	Rectifier IC	1	250	250
11	Transformer (15v)	1	3500	3500
12	Connecting wire	-	750	750
13	Vero board	1	400	400
14	Regulator	1	150	150
15	Switch	1	100	100
16	TDA2050IC	2	250	500
17	Transportation	-	10000	10000
18				
			Total	**49,260**

5.2 CONCLUSION

The major aim and objective of this project which is the Design and construction of a 50 – watt public address system has been achieved. The system will function properly when operated within the limits of safety. It is therefore safe for use both in the school environment and in other public places, provided it is operated in a room temperature and pressure.

5.3 RECOMMENDATIONS

Despite the problems encountered before completing this project, we considered it necessary to make some recommendations that will be of great benefit if adopted.

The PA system should be well kept in a safe environment, that is, to help protect the system from overheating. The system should be handled by a person who understands its operation and also should not be over loaded.

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APPENDIX

PAS …….. Public Address System

MOSFET ……Metal Oxide Semi Conductor Field Effect Transistor

FET ……..Field Effect Transistor