DESIGN AND CONSTRUCTION OF A WAILING ALARM SIREN SYSTEM

BY

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DEDICATION

This project is dedicated to Almighty Allah, whose grace and mercy I have enjoyed throughout my stay in school. I also want to dedicate this to my parents and siblings whose constant support has been immeasurable.

DECLARATION

I, Zubair Laraba Rakiya, declare that this work was done by me and has never been presented elsewhere for the award of a degree. I also hereby relinquish the copyright to the Federal University of Technology, Minna.

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for successful completion of my programme at F.U.T Minna. May Allah be with everybody in all their future endeavours.

ABSTRACT

This project is all about design and construction of a wailing alarm siren to get through traffic easily whenever there is an emergency. This is achieved through the use of two 555 timer integrated circuit used as astable multivibrator. A regulated power supply of 9volts was designed and constructed with the use of a 240/12volt transformer, a bridge rectifier, a filtering capacitor and a 7809 voltage regulator. A power amplifier transistor was used to amplify the sound produced by the oscillator circuit. An indicator was also used to signify the frequency sweeping high and frequency sweeping low of the system.

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CHAPTER ONE

GENERAL INTRODUCTION

1.1 DEFINITION OF AN ALARM

An alarm system is a device purposely designed to give an audible or visual warning about a problem or condition. A very good example is the wailing alarm siren in a police car. The system is operated so that whenever there is an emergency, it is used to get through traffic safely.

1.2 HISTORICAL BACKGROUND OF WAILING ALARM SIREN

The electronic siren, which is the main concern of this constructional project, comes in several designs, but the understanding of the components which constitute the main design of the electronic siren makes it possible to modify existing ones to suit both the social and economic needs of the society in particular and the recipient country in general.

Siren is an outdoor noise making device capable of producing a loud audible frequency and continuous warning sound to unsuspecting populace. It was originally designed for the measurement of audible frequency by comparison, but it is used today as a high volume sound signal. Its name originates from the sea nymphs of Greek mythology and was given after it was found that the siren would produce effectively while operating under water. The need for the construction of a wailing alarm siren brings about the modification of the existing ones to suit both the social, economic trends and need of the society. Electronic siren can be used for many applications such as military escorts; police cars usually to get through traffic safely.

1.3 FUNCTION OF A WAILING ALARM SIREN

This circuit provides a warbling sound to any alarm circuit to get through traffic safely.

1.4 AIMS AND OBJECTIVES

This project work is aimed at building a siren system that can produce or generate a warbling sound. Its produces a sound similar to a police siren.

1.5 METHODOLOGY

This siren system makes use of two 555 timer integrated circuit used as a stable multivibrators.IC1 is wired as a low frequency astable with a cycle period of about 6 seconds,3 seconds for frequency sweeping up and 3 seconds for frequency sweeping down. In this alarm siren circuit, the first oscillator is employed to produce modulating signal while the second oscillator is employed to produce an audio frequency. This modulating signal makes this alarm to generate a warbling sound. The circuit works with 9 volts power supply but the 555 timer will suffer a significant self-heating when 12 volt or higher and this may cause a shorter lifetime for the 555 timer IC chips.

CHAPTER 2

1.6 LITERATURE REVIEW/THEORETICAL BACKGROUND

Siren systems have been in existence for a long time and have undergone fundamental change, which produces the basis of the devices in general. Sirens have an advantage that they can be made to function anywhere there is an Alternating current or Direct current electricity supply with the use of very low frequency ramp signal generator circuit, a warbling sound shall be produced. This kind of sound is typically used in British police cars, American police cars. It is generally similar to British police cars. The noise from wailing siren of a police car is “WEU WEU”. The following are the components that make up the wailing alarm siren.

1. Integrated circuits

2. Transistor

3. Passive components

4. Loudspeaker

1.7 INTEGRATED CIRCUITS

Integrated Circuits are usually called ICs or chips. They are complex circuits which have been etched onto tiny chips of semiconductor (silicon). The chip is packaged in a plastic holder with pins spaced on a 0.1" (2.54mm) grid which will fit the holes on strip board and breadboards. Very fine wires inside the package link the chip to the pins. The most popular of the present IC, which is available in an eight pin dual in-line package in both bipolar and CMOS form. The 555 timer is a relatively stable IC capable of being operated as an accurate bistable, monostable and astable multivibrators. IC has low power requirements and low cost because of simultaneous production of hundreds of alike circuit on a small semiconductor

1.8 Pin numbers

The pins are numbered anti-clockwise around the IC (chip) starting near the notch or dot. Chips are easily damaged by heat when soldering and their short pins cannot be protected with a heat sink. Instead we use an IC holder, strictly called a DIL socket (DIL = Dual In-Line), which can be safely soldered onto the circuit board. The IC is pushed into the holder when all soldering is complete. IC holders are only needed when soldering so they are not used on breadboards.

1.9 The 555 Timers

The 8-pin 555 timer IC is used in many projects, a popular version is the NE555. Most circuits will just specify '555 timer IC' and the NE555 is suitable for these. The 555 output (pin 3) sink and source up to 200mA. This is more than most ICs and it is sufficient to supply LEDs, relay coils and low current lamps. With just a few external components it can be used to build many circuits, not all of them involve timing! A popular version is the NE555 and this is suitable in most cases where a '555 timer' is specified. The circuit diagram shown below is a 555 timer IC.

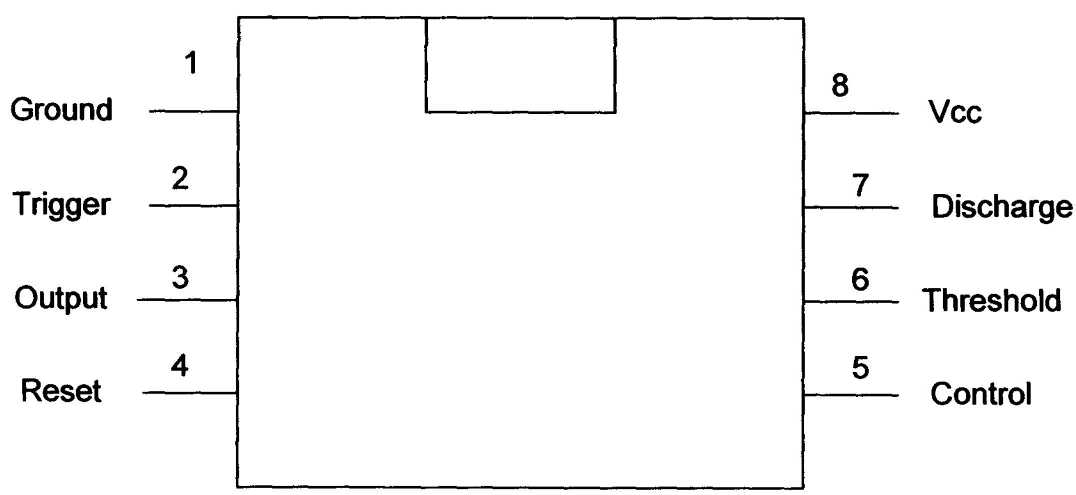

Fig.2.1 DIAGRAM OF A 555 IC TIMER

The circuit symbol for a 555 is a box with the pins arranged to suit the circuit diagram: for example 555 pin 8 at the top for the +Vs supply, 555 pin 3 outputs on the right. Usually just the pin numbers are used and they are not labeled with their function. The 555 timer can be used with a supply voltage (Vs) in the range 4.5 t0 15V.

Standard 555 IC create a significant 'glitch' on the supply when their output changes state. This is rarely a problem in simple circuits with no other ICs, but in more complex circuits a **smoothing capacitor** (eg 100µF) should be connected across the +Vs and 0V supply near the 555s.The input and output pin functions of an astable 555 timer will produce a square wave form.

2.0 INPUT OF 555 TIMER

Trigger input; when < $^1/_3$ Vs ('active low') this makes the output high (+Vs). It monitors the discharging of the timing capacitor in an astable circuit. It has a high input impedance > 2M

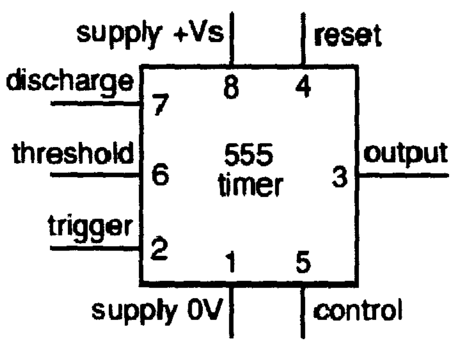

Fig 2.2 555 TIMER INTEGRATED CIRCUIT

Threshold input: when > $^{2}/_{3}$ Vs ('active high') this makes the output low. It monitors the charging of the timing capacitor in astable and monostable circuits. It has a high input impedance > 10MΩ.

Providing the trigger input is > $^{1}/_{3}$ Vs, otherwise the trigger input will override the threshold input and hold the output high (+Vs).

Reset input: when less than about 0.7V ('active low') this makes the output low (0V), overriding other inputs. When not required it should be connected to +Vs. It has an input impedance of about 10kΩ.

Control input: this can be used to adjust the threshold voltage which is set internally to be $^{2}/_{3}$ Vs. Usually this function is not required and the control input is connected to 0V with a 0.01μF capacitor to eliminate electrical noise. It can be left unconnected if noise is not a problem.

The discharge pin is not an input, but it is listed here for convenience. It is connected to 0V when the timer output is low and is used to discharge the timing capacitor in astable and monostable circuits.

2.1 Output of 555 TIMER

The output of a standard 555 can sink and source up to 200mA. This is more than most ICs and it is sufficient to supply many output transducers directly, including LEDs (with a resistor in series), low current lamps, piezo transducers, loudspeakers (with a capacitor in series), relay coils (with diode protection) and some motors (with diode protection). The output voltage does not quite reach 0V and +Vs, especially if a large current is flowing.

2.2 Transistors

The transistors are the fundamental building block of modern electronic devices, and its presence is everywhere in modern electronic systems. Following its release in the early 1950s, the transistor revolutionized the field of electronics and paved the way for smaller and cheaper radios, calculators and computers among other things.

A transistor is a semiconductor devices used to amplify and switch electronic signal. It is made up of a solid piece of semiconductor material, with at least three terminals for connections to an external circuit. A voltage or current applied to one pair of the transistor's terminal changes the current flowing through another pair of terminals. Amplification consists of magnifying a signal by transferring energy to it from an external source; whereas a transistor switch is a device for controlling a relatively large current between or voltage across two terminals by means of a small control current or voltage applied at a third terinal. Today, some transistors are packaged individually, but many more are found embedded in integrated circuit. Transistor is the key active component in practically all modern electronics and is considered by many to be one of the greatest inventions of the twentieth century. Its importance in today's society rests on its ability to be mass produced using a highly automated process [semiconductor device fabrication] that achieves astonishingly low per transistor cost.

The two main types of transistors are; BIPOLAR AND UNIPOLAR

Bipolar transistor whose operation depends on the flow of both minority and majority charge carriers, and the Unipolar or Field Effect Transistor called FETs in which current is due to majority carriers only either electrons or holes. A bipolar junction transistor is a three-terminal electronic devices constructed of doped semiconductor material and may be used in amplifying or switching application. Bipolar transistors are so named because their operation involves both electrons and holes. Charge flow in a BJT is due to bidirectional diffusion of charge carriers across a junction between two regions of different charge concentration. This mode of operation is contrasted with unipolar transistor, such as Field-effect transistor, In which only one carrier type is involved in charge flow due to drift. By design collector current is due to the flow of charges injected from a high-concentrated emitter into the base where they are minority carriers that diffuse towards the collector, and so BJT are classified as minority carrier devices. There are two types of a standard transistor; NPN and PNP.

NPN is one of the two types of bipolar transistors, in which letters 'N' (negative) and 'P' (positive) refers to the majority charge carriers inside different region of the transistor. Most bipolar transistor used today are NPN, because electron mobility is higher than hole mobility in semiconductor, allowing greater currents and faster operation. NPN transistors consist of a layer of p-doped semiconductor (the "base") between two N-doped layers. A small current entering the base in common emitter mode is amplified in the collector current.NPN transistor is "ON" when its base is pulled high relative to the emitter. An NPN transistor is considered to be two diodes with a shared anode. In typical operation, the base-emitter junction is forward biased and the base-collector junction is reversed biased. In an NPN transistor, for example, when a positive voltage is applied to the base-emitter junction, the equilibrium between thermally generated carriers and the repelling electric field of the depletion region becomes unbalanced allowing thermally excited electron to inject into the base region. This electron diffuses through the base from the region of high concentration near the emitter towards the region of low concentration near the collector. The electron in the base is called minority carriers because the base is doped p-type which would make the holes of the majority charge carrier in the base. To minimize the percentage of the carriers that recombine before reaching the collector-base junction, the transistors base region must be thin enough that carriers can diffuse across it in much less time than semiconductor's carrier lifetime. In particular, the thickness of the base must be much less than the diffusion length of the electrons. The collector-base junction is reverse biased and so little electron injection occurs from the collector to the base.

PNP

The other type of BJT is the PNP with the letter "P" and "N" referring to the majority charge carriers inside the different region of the transistor. PNP transistors consist of a large N-doped semiconductor between two layers of P-doped material. A small current leaving the base in common-emitter mode is amplified in the collector output. In other terms, a PNP transistor is "ON" when its base is pulled low relative to the emitter.

FIG 2.3 DIAGRAM OF A TRANSISTOR

2.3 PASSIVE COMPONENT

Passive components are components, which cannot amplify power and require an external power source to operate. They include resistors, capacitors, diode, indicators, and transformers etc. their application range from potential dividers to control of current (as in resistors), filtration of ripples voltages and blocking of unwanted D.C voltages (as in capacitors). They form the elements of the network circuit oscillator stages and are also used generally for signal conditioning in circuits.

2.4 CAPACITOR

Capacitors are widely used in electronic circuits for blocking direct current while allowing alternating current to pass, in filter network, for smoothing the output of power supplies, in the resonant circuits that tune radios to particular frequencies and for many other purposes. The effect is greatest when there is a narrow separation between large areas of conductor, hence capacitors conductor are often called PLATES referring to an early means of construction. In practice, the dielectric between the plates passes a small amount of leakage current and also has an electric field strength limit, resulting in a breakdown voltage while the conductors and leads introduces an equivalent series resistance.

Therefore, a capacitor formerly known as condenser is a passive electronic component consisting of a pair of conductors separated by a dielectric (insulator). When there is a potential difference across the conductor, a static electric field develops in the dielectric that stores energy and produces a mechanical force between the conductors. In this constructional project, the two types of capacitor used are electrolytic and ceramic.

2.5 ELECTROLYTIC CAPACITOR

Electrolytic capacitor uses an aluminum or tantalum plate with an oxide dielectric layer. It offers very high capacitance but suffers from poor tolerance, high instability, gradual loss of capacitance especially when subjected to heat and high leakage current. The two electrolytic capacitor used are:

1. 100 microfarad /25V
2. 3300 microfarad /16V

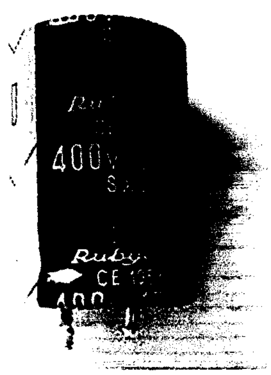

Fig 2.4 DIAGRAM OF AN ELECTROLYTIC CAPACITOR

2.6 CERAMIC CAPACITOR

Ceramic capacitor absorbs sound waves resulting in a microphonic effect. Vibration moves the plates, causing the capacitance to vary, in turn inducing AC current. In the reverse, microphonic effect, the varying electric field between the capacitor plates exerts a physical force, moving them as a speaker which will generate audible sound but drain energy and stresses the dielectric and electrolytic, if any. The two ceramic capacitor used both have a value of 0.01microfarad each. Ceramic capacitors are reliable and cheap.

FIG 2.5 DIAGRAM OF A CERAMIC CAPACITOR

2.7 RESISTORS

A resistor is a two-terminal electric component that produces a voltage across its terminal that is proportional to the electric current passing through it in accordance with ohms law (V=IR). Resistors are element of electrical network and electronic circuits and are ubiquitous in most electronics equipment. Practical resistors can be made of various compounds and films as well as resistance wire (wire made of a high-resistivity alloy, such as nickel, chrome).

The primary characteristics of a resistor are the resistance, the tolerance, maximum working voltage and the power rating. Other characteristics include temperature coefficient, noise and inductance. Resistors can be integrated into hybrid and printed circuits as well as integrated circuits. Size and position of leads or terminal are relevant to equipment designers, resistors must be physically large enough not to overheat hen dissipating their power. The resistors used are:

1. R1/R5...........................4.7K ohms

2. R2...............................47K ohms

3. R3/R9.................................10K ohms

4. R4..................................100K ohms

5. R6..................................2.7K ohms

6. R7..................................33 ohms

7. R8.....................................1K ohms

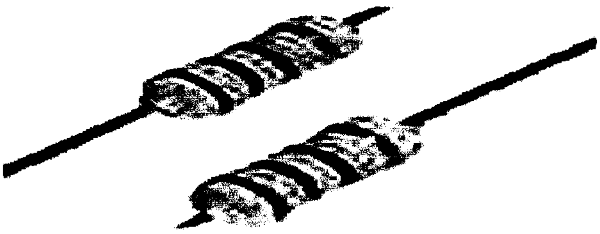

FIG 2.6 DIAGRAM OF A RESISTOR

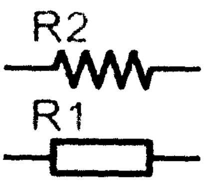

FIG 2.7SYMBOL OF A RESISTOR

CHAPTER THREE

2.8 DESIGN AND IMPLEMENTATION

The design and implementation stage is the most important aspect of the entire project work. The design and implementation involves the assembling and arrangements of various component that were used in the design and building of the final circuit. The equipments needed for the construction of this project are;

1. Breadboard
2. Vero board
3. Jumper wires or connecting wires
4. Soldering Iron
5. Multimetre
6. Soldering lead

The design and construction of a wailing alarm siren was based on the modules represented in the figure below.

Wailing alarm siren comprises of the following modules;

1. POWER SUPPLY UNIT
2. MODULATOR UNIT
3. OSCILLATOR UNIT
4. AMPLIFIER UNIT
5. OUTPUT UNIT

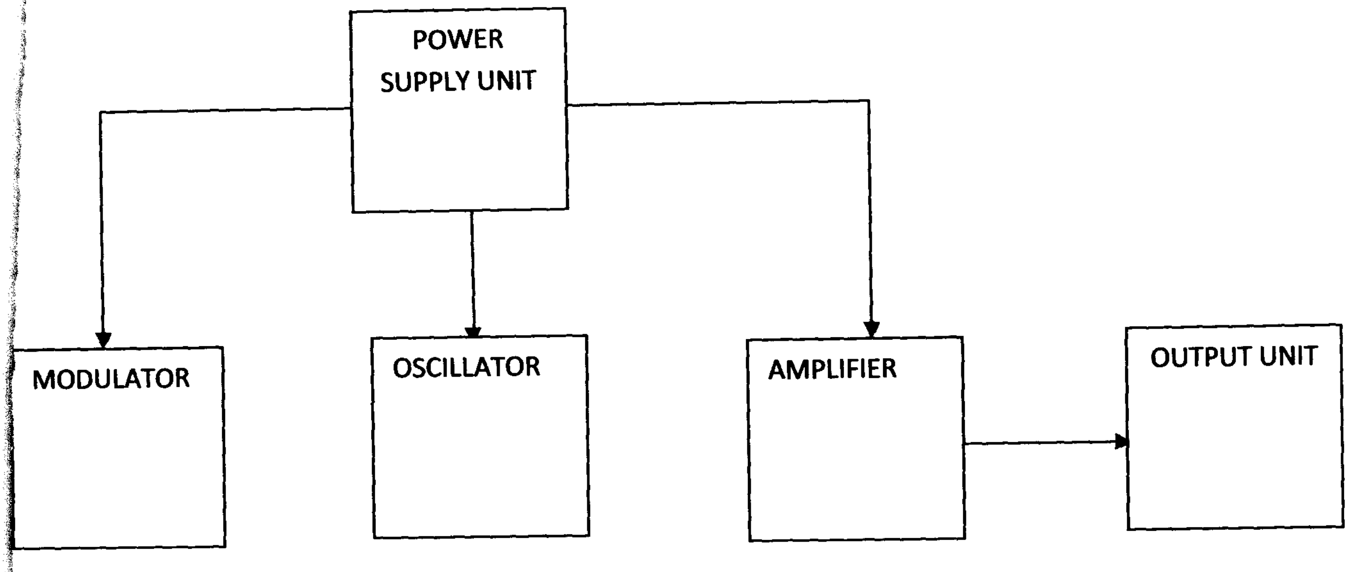

FIG 3.1 BLOCKS DIAGRAM OF A WAILING ALARM SIREN

2.9 POWER SUPPLY UNIT

Most of the electronic devices and circuits requires a dc source. They have the advantage of being portable and ripple-free. Since the most conventional and economical source of power supply is the domestic ac supply, it is advantageous to convert this alternating ac voltage (usually, 220V rms) to dc voltage (usually smaller in value). This process of converting ac voltage into dc voltage is called RECTIFICATION and is accomplished with the help of a rectifier, filter and voltage regulator circuit. All these put together constitute the dc power supply.

A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or a PSU. Electricity is produced in two different ways and both serves different purposes; the two ways in which electricity is produced are Direct current and Alternating current. Most electronics equipment requires direct current voltages for its operation. They can be provided by batteries or by internal supplies that convert alternating current as available at the home electric outlets, into regulated DC voltages. The first element in an internal DC power supply is a transformer, which steps up or steps down the input voltage to a level suitable for the operation of the equipment. A secondary function of the transformer is to provide electrical ground insulation of the device from the power line to reduce potential shock hazards. The transformer is then followed by a rectifier normally a diode. In the past, vacuum diodes and a wide variety of different materials such as germanium crystals or cadmium sulfide were employed in the low-power rectifiers used in electronic equipment. Fluctuations and ripples superimposed on the rectified DC voltage can be filtered out by a capacitor, the larger the capacitor, the smaller is the amount of ripple in the voltage. More precise control over voltage levels and ripples can be achieved by a voltage regulator, which makes the internal voltages independent of fluctuations that may be encountered at an outlet. Here, the power supply is made up of:

1. Bridge rectifier (equivalent to 4 diodes)

2. Transformer 240/12V

3. Voltage regulator 7809

4. Filtering capacitor 3300F/16V

The power supply used for the construction of this project is a direct current. The voltage used was based on the rating of the loudspeaker used and 9V was used and it worked efficiently and effectively with the 555 IC timers. Below is the circuit diagram of the power supply unit used for the construction of this project work. The block diagram of the power supply is shown below

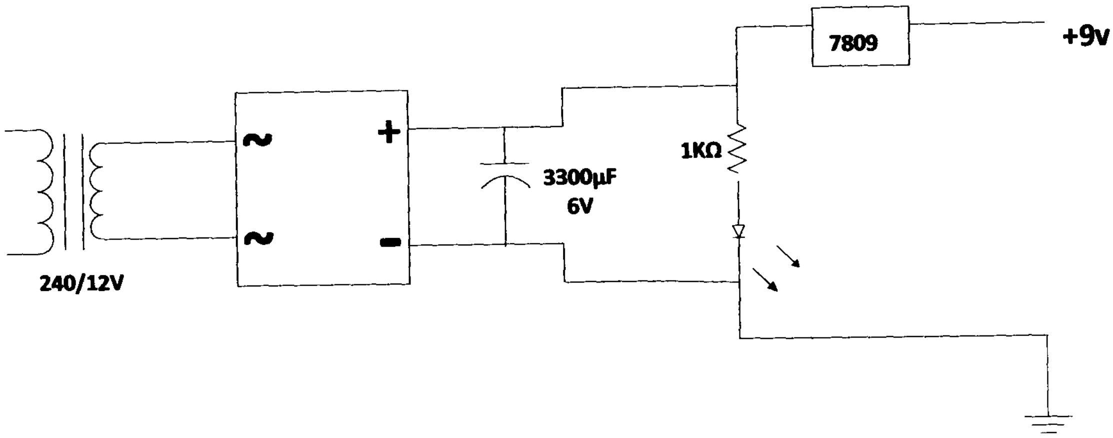

Fig 3.2 CIRCUIT DIAGRAM OF THE POWER SUPPLY UNIT

The job of the transformer is either to step-up or mostly steps down the AC supply voltage to suit the equipment of the solid state electronic devices and circuits fed by the DC power supply. The rectifier is a circuit which employs one or more diodes to convert AC voltages into pulsating DC voltage. The function of the filtering capacitor is to remove the fluctuations or pulsations called RIPPLES present in the output voltage supplied by the rectifier and the voltage regulator keep the terminal voltage of the DC supply constant even when AC input voltage to the transformer varies or the load varies.

3.0 MODULATOR UNIT

In electronics, modulation is the process of varying one or more properties of a high frequency periodic waveform, called the CARRIER SIGNAL with respect to a modulating signal. The three key parameters of a periodic waveform are its amplitude (volume), its phase (timing), and its frequency (pitch), all of which can be modified in accordance with a low frequency signal to obtain the modulated signal. Typically a high frequency sinusoid waveform is used as carrier signal, but a square wave pulse train may also occur. A device that performs modulation is known as a MODULATOR and a device that performs the inverse operation of modulation is known as a DEMODULATOR. A device that can do both operations is a MODEM.

Here, the modulator changes the amplitude (volume) as the time changes from 3 seconds high to 3 seconds low which makes it to generate a warbling sound.

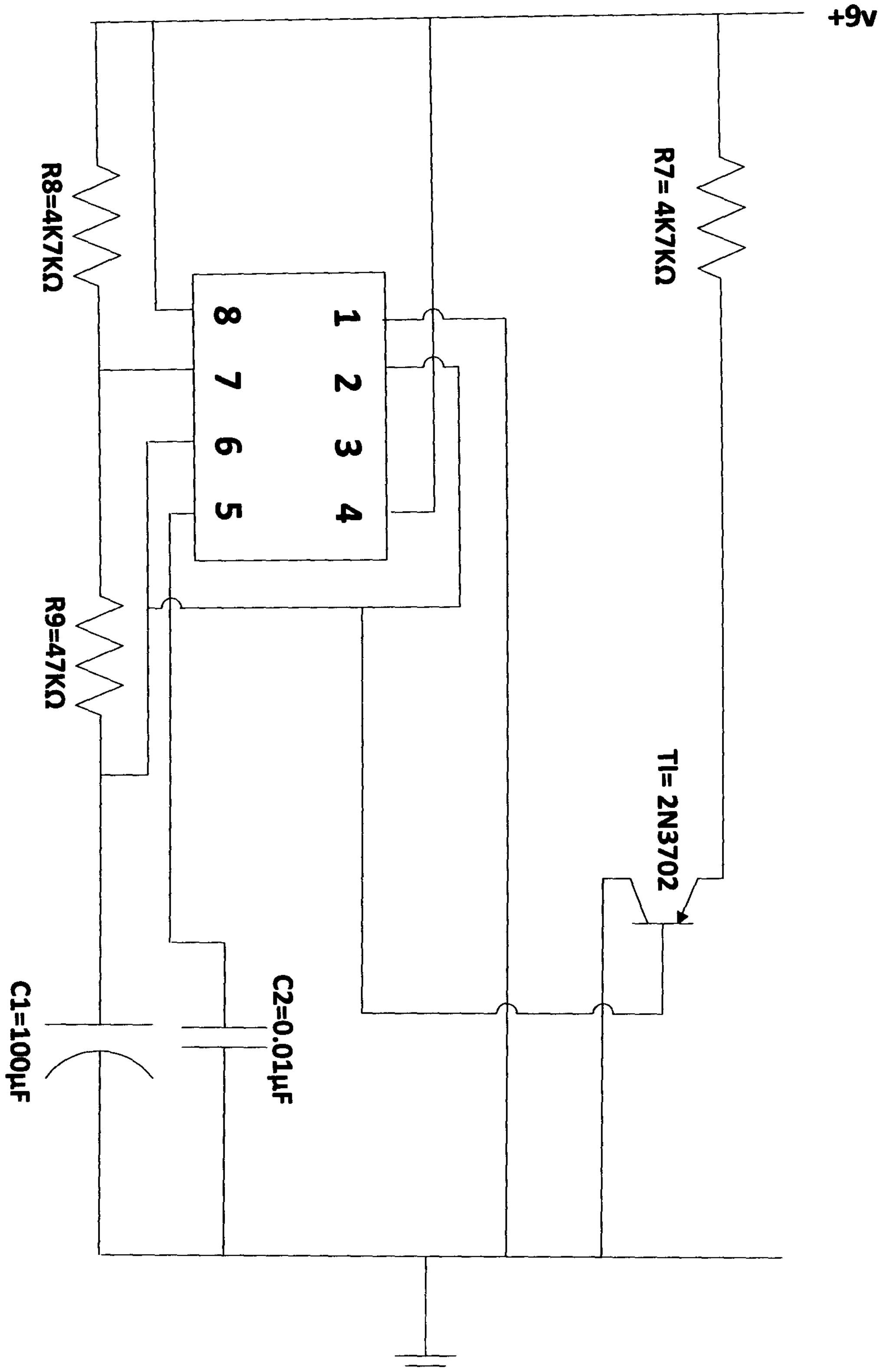

FIG3.3 CIRCUIT DIAGRAM OF THE MODULATING UNIT

For the modulating unit, taking a duty cycle of 52%,

Capacitor (C2) = 100μF

Resistor (R7) = 47KΩ

Duty ratio = [(R7+R10)/(R7+2R10)]*100%

52% = [(R7+47K)/(R7+94)]*100%

0.52 = [(R7+47K)/(R7+94)]

0.52(R7+94) = (R7+47K)

0.52R7+48.88 = R7+47K

Collecting like terms

R7-0.52R7 = 48.88-47K

0.48R7 = 1.88K

R7 = 1.88/0.48

= 3.9Ω

3.1 OSCILLATOR

Oscillators generally consist of an amplifier and some type of feedback. The output signal is fed back to the input of the amplifier. Oscillators are used to produce audio and radio signals for a wide variety of purpose, for example, simple audio frequency oscillators are used in modem push button telephones to transmit data to the central telephone station for dialing. Audio tones generated by oscillators are found in alarm clocks, electronic organs, computers and warning systems. High frequency oscillators are used in communications equipment to provide tuning and signal-detection functions. Radio and television stations use precise high frequency oscillators to produce transmitting frequencies. Here, the oscillator is used for the audio (sound) of the wailing alarm siren and its stands as the output for the modulator.

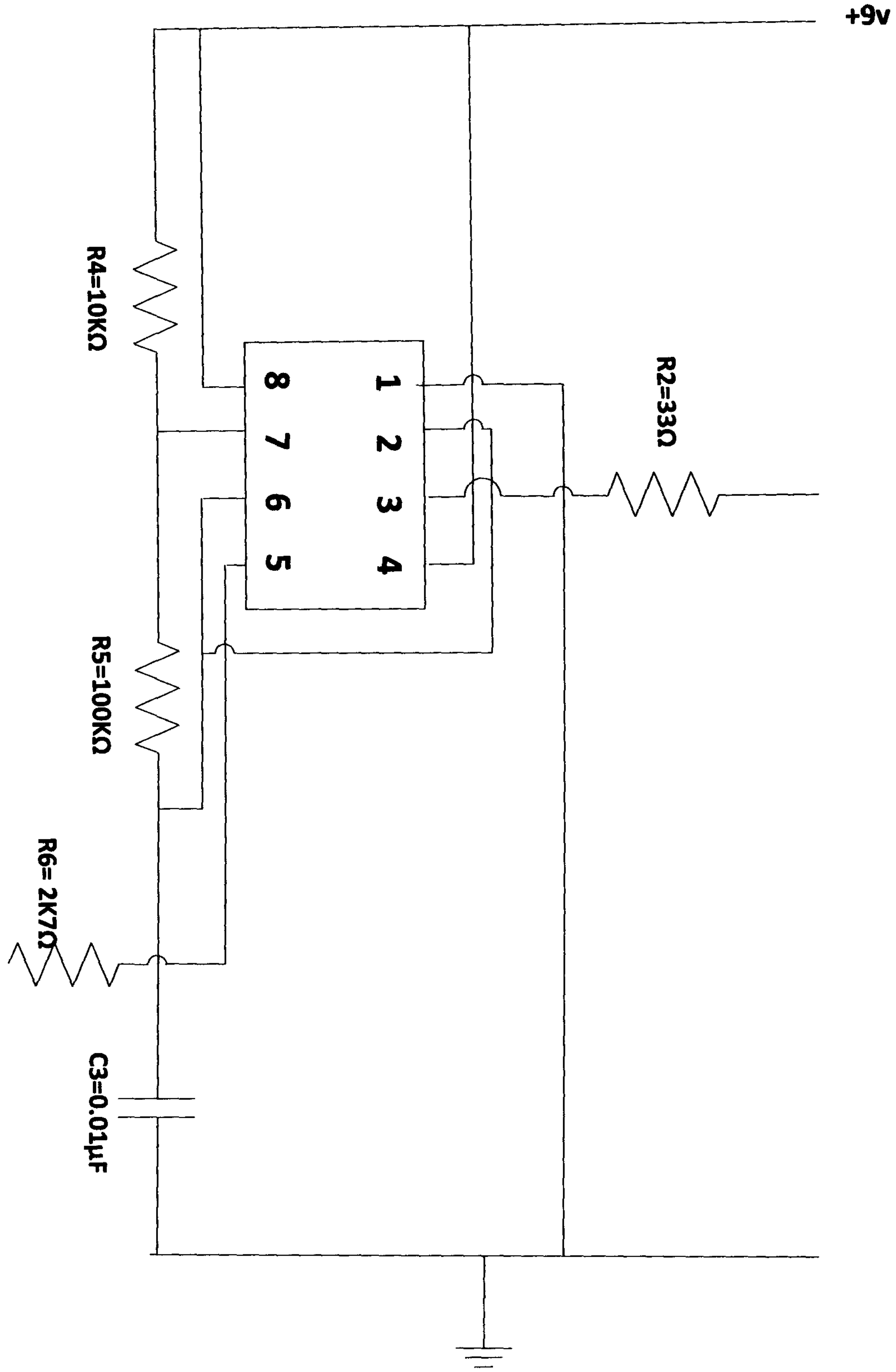

FIG 3.4 CIRCUIT DIAGRAM OF THE OSCILLATING UNIT

For the oscillator unit, choosing a duty ratio of 52%,

Capacitor (C1) = 0.01μF

Resistor (R1) = 10KΩ

Duty cycle = [(R1 +R4)/(R1+2R4)]*100%

52% = [(10K+R4)/(10K+2R4)]*100%

0.52 = [10k+R4)/10k+2R4)]

0.52(10k+2R4) =10k+R4

5.2k+1.04R4 = 10k+R4

1.04R4-R4 =10k-5.2k

0.04R4= 4.8k

R4= 4.8/0.04

R4 = 120kΩ

3.2 AMPLIFIER

A practical amplifier always consists of a number of stages that amplify a weak signal until sufficient power is available to operate a loudspeaker or other output device. The range of human hearing extends from 20Hz to 20 KHz which make the audio amplifiers amplify electrical signals that have a frequency range corresponding to the range of human hearing. In this circuit, the transistor amplifier which raises the power level of the signals is the one that drives the speaker which produces a sufficient output. An amplifier or simply an amp is therefore any device that changes, usually increases, the amplitude of a signal. The relationship of the input to the output of an amplifier usually expressed as a function of the input frequency is called TRANSFER FUNCTION of the amplifier, and the magnitude of the transfer function is termed the GAIN.

In popular use, the term usually described an electronic amplifier, in which the input "signal" is usually a voltage or current. In audio application, amplifiers drive the loudspeakers used in public address systems (PA) to make the human voice louder or play recorder music. Amplifiers may be classified according to the inputs(source) they are designed to amplify such as a guitar amplifier, to perform with an electric guitar, the device they are intended to drive such as a headphone amplifier and a loudspeaker, the frequency range of the signal (audio, IF, RF, and VHF amplifiers, for example), whether they invert the signal (inverting amplifiers and non-inverting amplifiers), or the type of device used in the amplification (valve or tube amplifiers, FET amplifiers e.t.c).

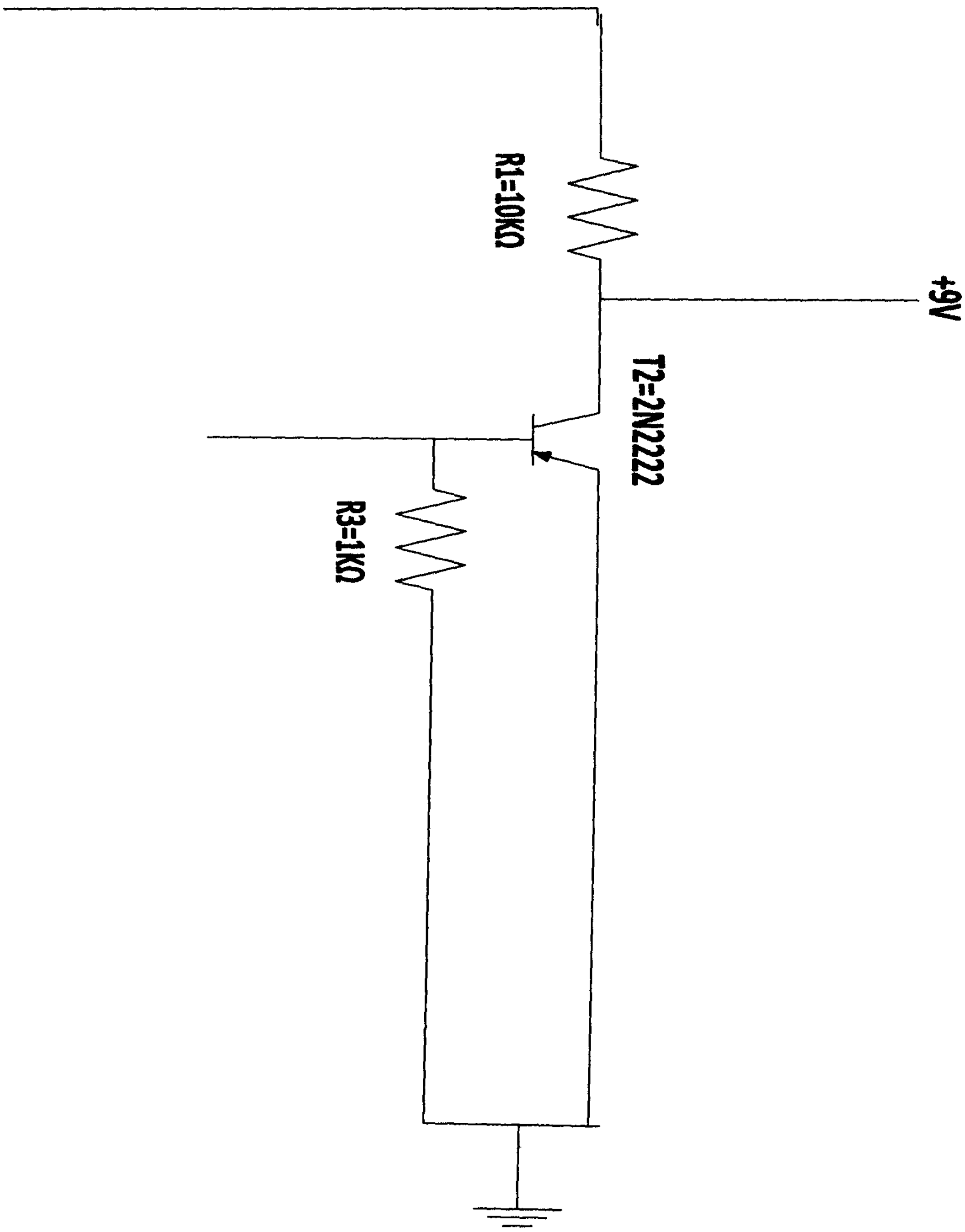

Fig 3.5 DIAGRAM OF THE AMPLIFIER UNIT

3.3 OUTPUT UNIT

The output is usually termed as an exist or changes which exit a system and which activate or modify a process. It is an abstract concept, used in modeling, systems design, and systems exploitation. The output unit of this alarm siren was made up of 70Ω loudspeaker which was activated by the output of IC1 and the alarm was activated for about 6 seconds, 3seconds for frequency

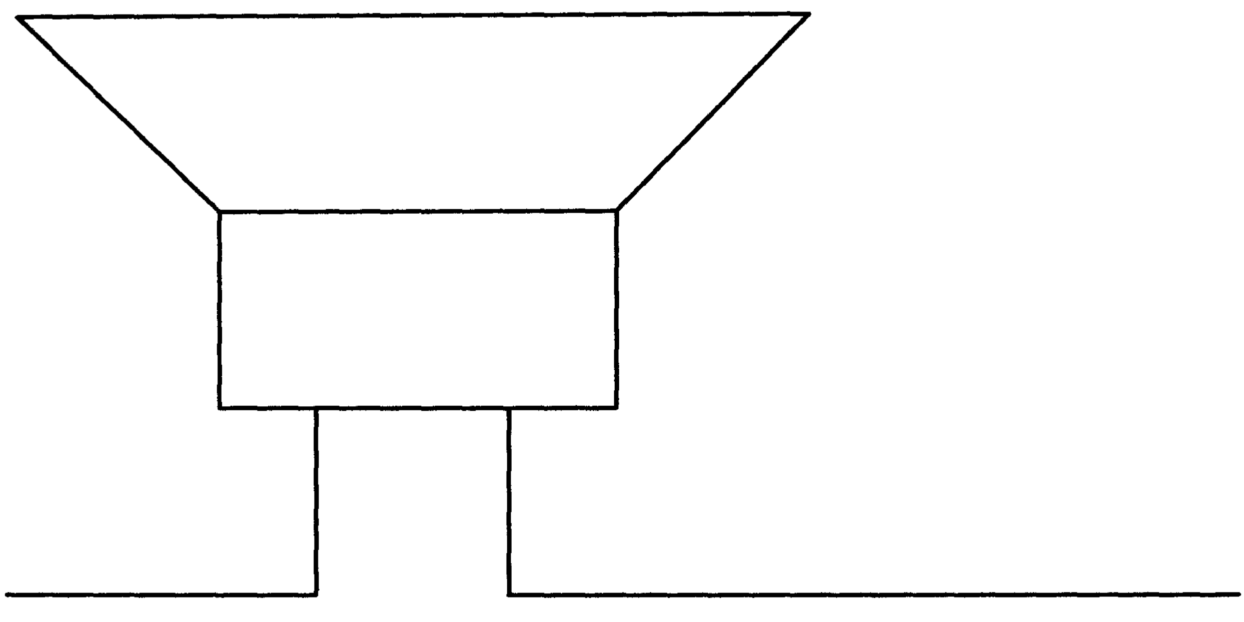

FIG 3.6 DIAGRAM OF THE OUTPUT UNIT

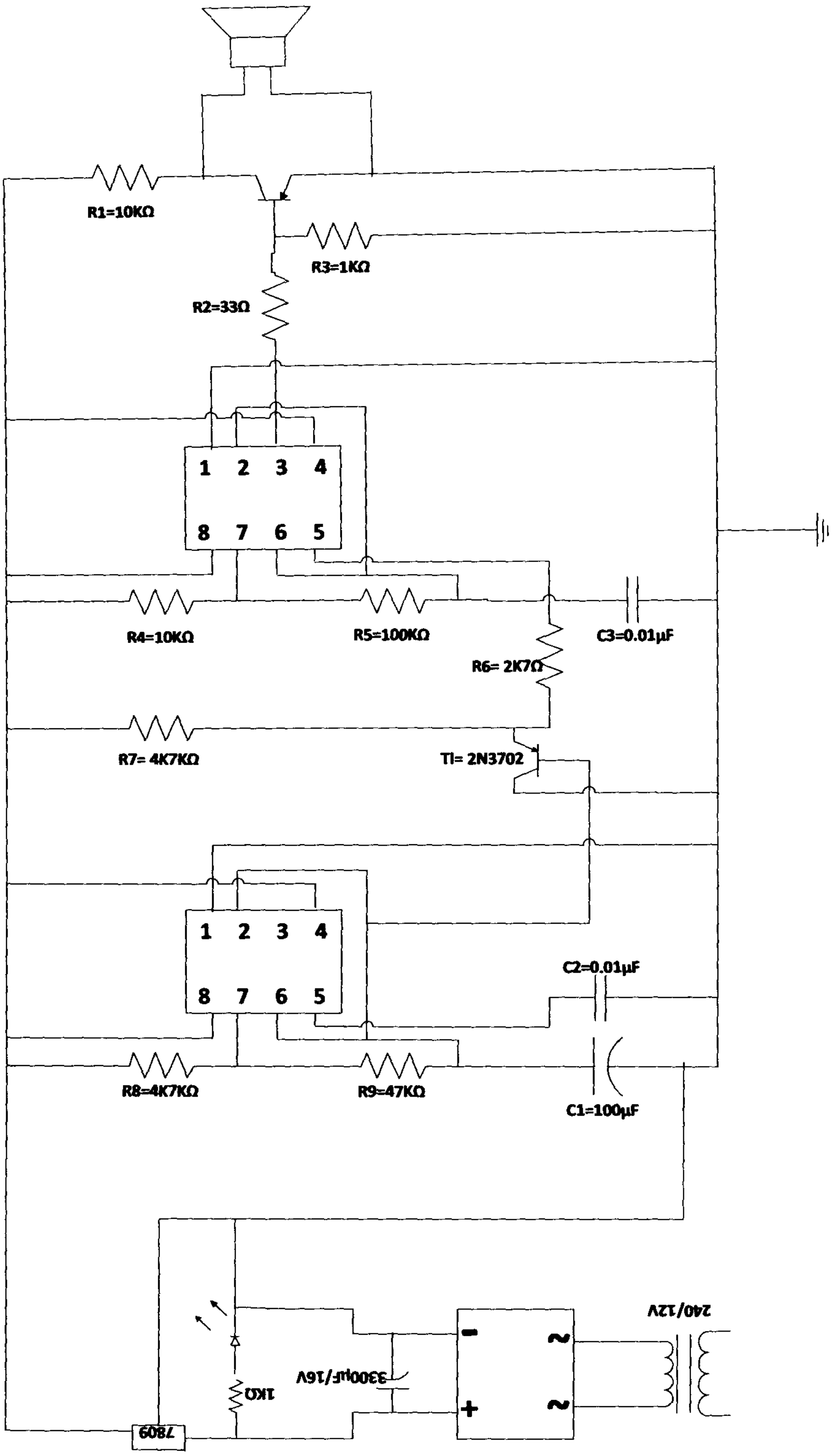

FIG 3.7 GENERAL CIRCUIT DIAGRAM

CHAPTER FOUR

3.5 TESTING, RESULT AND DISCUSSION

The first thing to considered when laying components on the Vero board is to decide the positive and negative terminal, taking note of the polarity of various components and the two terminals chosen. The circuit diagram provided a guide for the construction process. The construction of this project was done in two different stages;

1. The soldering of the circuit to the board

2. The coupling of the entire project to the casing

The circuit was divided into different stages so that each stage is completed before the other. The circuit connection was first performed in breadboard before the circuit component was transferred to the Vero board. All the components were tested for polarity and direction of current flow before it was carefully dipped into the holes of the breadboard. The IC chips were first mounted and properly spaced to allow for fixing of other components. After mounting of the IC's, transistor which was an active element was next which is contained in the circuit, followed by other passive elements (resistors and capacitors). Jumpers (connecting cables) were used where necessary to connect two points together. This provided a base for testing the performance of the circuit so that any necessary correction can be effected before transferring from breadboard to Vero board.

Power supply unit was also constructed and immense care was taken when connecting the PSU to avoid short circuit or any form of wrong connection. The power supply was able to power the system for testing, when the initial testing on breadboard was done, some modification and observation was made and carried out successfully. The modification was effected on final circuit construction on the Vero board. Soldering of the component was done on the IC socket and on the legs of other components ensuring no bridge of lead between two points of the component.

3.6 CASING

After carrying out all the paper design and analysis, the project was tested to ensure a successful result. Wooden casing was used since the output is sound in order to produce a suitable sound coming from the speaker. The casing was constructed based on the required dimensions. The speaker was fixed at one side with a net to provide ventilation for it and for the sound to be loud enough. The power supply was also located at a corner where holes were drilled at the end to provide cooling for the transformer. The Vero board was also fitted into the casing and it was finally covered using nuts to ensure tight fixing. The casing was also sprayed to make it look attractive and presentable.

3.7 TESTING

On completing the connections, a thorough check on the process was made to ensure there were no partial contacts as well as short circuit or open circuit on the Vero board. The positive and negative terminals were sorted out and the process ready for the supply. The DC supply was tested first which is 9V. The circuit was tested at each stage before the finally testing. During the finally testing, the power switch was on and a wailing alarm siren was achieved. The output waveforms were observed using oscilloscope. The output of the dc supply is shown below

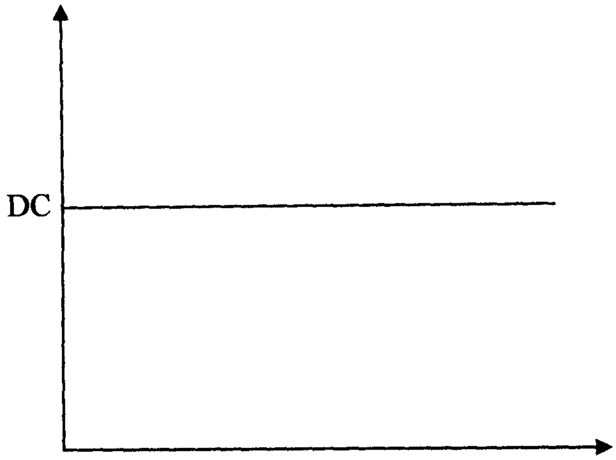

FIG 4.1 DIRECT CURRENT

3.8 PROBLEMS ENCOUNTERED AND SOLUTION

A lot of problem was encountered during the testing of the final circuit. Firstly, there was short circuit between the source and ground which result into current not flowing through the circuit, causing overheating of the power supply. Point to point testing was done to ensure continuity of the circuit. Secondly, during the initial testing, the sound produced by the speaker was not loud enough, so the speaker was changed from 68Ω to 70Ω. After this the speaker started working effectively

CHAPTER FIVE

3.9 CONCLUSION

The project which is the design and construction of a wailing alarm siren was designed considering factors such as economic application, availability of components, efficiency, and durability. This project has also exposed the student to various aspects of electronics in relation to integrated circuits design. The system constructed achieve its set objectives as its relates to functionality and efficiency. The aim was achieved as its generated or produces a warbing sound, a sound similar to a police siren.

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