INTRUDER DETECTOR WITH BURGLAR PROOF, AUTO LIGHT AND ALARM

BY

KAFIDIPE B. ADEDAYO
2000/9855EE

A PROJECT SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF ENGINEERING (B.ENG) DEGREE IN THE DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA NIGERIA.

SEPTEMBER 2006

DEDICATION

I hereby declare this project to Almighty God for being there for me and my Guardian throughout my Research that has finally culminated in this completely feasible work piece. May His Grace Continue to protect and be my strength (amen)

DECLARATION

I Kafidipe B. Adedayo hereby declare that this is an original work constructed and analyzed, by me and it has never been presented to any form for the award of either Diploma or Degree Certificate anywhere.

All information I Acquired from published and unpublished work have been worthy acknowledge.

KAFIDIPE B. ADEDAYO
Name of Student

Name of Supervisor

14/10/16
Signature and Date

Signature and Date

Name of H.O.D

Name of External Examiner

Signature and Date

Signature and Date

ACKNOWLEDGMENT

With all honor and a deep sense of appreciation my gratitude goes to Almighty God for his protection provision guidance and his inspiration during and after the completion of this project work.

My profound gratitude goes to my Supervisor Mr. Eronu for his encouragement, timely and useful suggestions and contribution. And I wish him success in his endeavors

To my ireplaceably family Alh. and Mrs. Kafidipe. Miss Moji and Doyin Kafidipe (my sisters), Kafifoluwa Kafidipe, My brother, Martins and Miss Chigozie Iwuafor for their prayers, support and love, (HOD) of the Department Engr. M. D. ABDULLAHI and other lecturers in the department for the sound academic knowledge they have imparted to me throughout any stay in school you are the best.

Wont forget my friends for continuous persuasion and advice for the successful realization of the project, to mention but few, Gbojega Osijo, Gozie Iwnafor, Ochware Igbedume, Engr. Macpaul Ojukwu.

Finally all those who in different and immeasurable way have been instrumental to my achievement remain forever grateful.

ABSTRACT

The project Design is a Burglar Alarm that is supposed to provide a state of Security for both homes and industries and wherever needs to be protected. The core of the project is the senor, which is the dark, light and burglar proof stage. There are responsible for detecting intrusion by an authorized person thru the door (i.e) main entrance in a secured area.

TABLE OF CONTENTS

CHAPTER THREE: DESIGN ANALYSIS

CHAPTER FOUR: IMPLEMENTATION

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

CHAPTER ONE

1.1 HISTORICAL BACKGROUND

Engineering Design is the creative process of identifying need and then designing a product to fulfill those needs. Electrical Electronic serves as those identified needs, which are energized by electricity. The need for engineering design and infrastructure and system usually arise out of the pressing needs.

They usually have a feedback influence (i.e) good influence on society thus, bringing about a proffer change and safety of lives and property in a society's way of live. This is because, before any product comes into the market a problem must have been identified of which the product is designed and aimed at solving it. Steps of solving several problems are as follows

1 Identification of an area of interest

2 Formation of a problem statement

3 Design a set of chosen component to make a feasible circuit that can solve the problem

4 Choosing the must effective component

5 Particularizing the chose components with necessary details

6 Implement the circuit electrically

7 Testing the implement work

1.2 AIM AND OBJECTIVES

A common problem that occurs frequently in our homes, places of business or work and industries, bank and more is attach by burglars (thefts). It has become a common occurrence in our modern world hereby causing a state of insecurity of life and properties. Certain measures are taken to avoid such attack and they are listed as follows:-

* Employing use of wild, strong and Scary Animals like (Rottweiler Dog, Snakes)
* Barricading the solid doors, windows
* high Fencing and Mounting of Electrocuted Barbed Wires

Even with all these Burglars still attack but for the development in technology burglar alarms of varying complex are being designed to counter the ever impending threat of burglars but most time designed to operate under particular specific conditions. Some condition are listed below:-

8 As professional burglar alarm that triggers when a particular circuit or line of sight is broken.

9 As intrusion detection alarm that triggers as soon as any intruders or even an unexpected guest approaches your vicinity or property.

10 As an open current burglar alarm that triggers when all open protective devices that are connected in parallel are closed an example is a pressure pad switch concealed in the floor mat of houses, holes banks and industries. But what happens when the intruder is sensitized

and does not violet any of these condition the essence of the project which is to design a burglar alarm system that will function using different and various condition so as to increase of authenticity and effectiveness of the burglar alarm device

The alarm triggers under the following condition

(1) When the light falls on the light dependent diode is broken

1.3 SECURITY AND INTRUDING

Security is defined as "the act that provides safety", freedom from danger and worry" [1]

Security should be one of the most important considerations for your home/work place.

Why fill your home with your personal effects and decorate it if the home can be so easily burgled?

It makes more sense to have a security system fitted that will deter intruders and send them elsewhere.

Break-ins are an unfortunate fact of life. Breaking into a residential properly/work place is obviously distressing. Although vandalism is rare, the loss of sentimental artificial can be most upsetting.

Burglars, and indeed all intrudes are overwhelmingly deterred by burglars alarm more than any forum of home /work place security.

There are different types of security gadgets ranging from common

padlock &key to the more sophisticated electronic . Security system.

1.1 intrusion detection system can be divided into three (3) categories namely

(i) Perimeter Protection

(ii) Object/Spot Protection

(iii) Are Space Protection

(i) Perimeter Protection:- it is the first line of defense to detect an intruder.

The most common point equipped with sensing devices for perimeter protection are doors, windows vents, skylights or any opening to the area.

The major disadvantage is that protect only the openings.

(ii) Object/spot Protection:- such detection methods are the final stage of an in depth system for protection the most common protection are "magnet-operated switches" placed on a door or window to detect opening of these areas.

(iii). Area/Space Protection:- these are devices use to protect the interior spaces in an area. They protect against intrusion whether or not perimeter protection was violated.

Space protection devices are only a part of the complete alarm system. They should always be supplemented with perimeter protection. The major advantage of space protection devices is that they provide a highly sensitive, invisible means of defection. The major disadvantage is that improper application and/installation by user or the alarm company can result in frequent false alarms.

Jurisdictions in the United States

Burglary is a felony and involves trespassing, or entering a building or remaining unlawfully with intent to commit any crime, not necessarily a theft -- for example, vandalism. Thus, a conviction for burglary may qualify as a conviction under a three strikes law or habitual criminal statute. It's against the law even if only something of low value or nothing at all was stolen. Some burglaries have rape as an objective, so the crime of burglary cannot be trivialized as a mere property crime. As with all legal definitions in the U.S., the foregoing description may not be applicable in every jurisdiction since there are 51 separate criminal codes in force

Entry as a trespasser

Trespass means that any presence, even partial, on the premises is without the consent of the owner. This requires that the defendant knows the entry to be unlawful. To avoid a conviction, the defendant must prove either that he or she had the owner's consent to be on the premises for the particular purposes, or that the owner would have consented had he or she been aware of all the material circumstances. Thus, if the defendant enters the common part of a shop, there is a license to be on the premises for the purposes of buying any of the goods on display

REFERENCE

1. How burglar alarm works,www.howstuffworks.com

2. www.web ee.com

3. I. Jones, Basic Electronics for tomorrow's world, Low Price Ed, University Press, Cambridge-Great Britain, 1996, pp. 55-87, 102-122.

4. The Art of Electronics (Lab Manual), Hayes & Horo witz

5. Fair chits Semiconductor Company Datasheet on CD4060B 14 Stage Ripple Carry Burglar Counter, Revised Edition www. Fairchildsemi.com 2005.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

Man has always felt the need for security to alert and to protect him against predators and fellow men that pose a threat to them. This can be seen in the use of dogs, (which are still been used till today) and other crude means from the early centuries when men dwelt in caves to sophisticated security systems in our modern day.

Alarms as the name implies are used to alert in the event of any situation that is a threat indicate a particular situation particularly in industrial and scientist process. There are several kinds of alarms. Some of them include fire alarms, burglar alarms, Indicator alarms, Heat and smoke detectors etc. the major emphasis would be on burglar alarms since that is what the project is all about.

2.2 EVOLUTION OF ALARMS

According to Joe Maurath the development of alarm started by the man being above all other animals, requires a way of giving information, which was in form of sign by exclamation. After some time this was replaced by clapping of hands. In most places of the word today this still exists. When a hand is classed at a particular time and environment a sign has been initiated which is interpreted by another person. A serious decision will be taken to combat the situation. Sooner the military introduced the use of whispering to indicate action

while laying ambush. This will give them all the information that is going to be carried out. All thease method of giving warning or information about the state of nature were crude and unreliable. It is when technology evolved that the solution to the limitation encountered in the use of those methods was solved. It started with the building of an electronic alarm system. This is operated without human intervention. Once it gets information on the state of the system it will indicate.

The indication of alarm depends on the configuration of the system.

Soon after the invention of the telegraph by Samuel FB Morse in 1884, the concept of utilizing the Boston alarm telegraph system of communication for reporting incident by means of alarm signal boxes, wired to the nearest station, was realized. Here the dispatch teams know of the citizen call for help immediately and could respond to the location much more rapidly. Pioneer alarm telegraph system originated in the larger United States cities and had greatly spread in popularity in most other communities, especially in the east, by 1900. of interest is the Boston alarm system, since it was among the first and certainly utilized a great many glass insulations that are highly sough after today. The introduction of this system revolutionized communication by permitting massage to be transmitted instantly over long distances.

On May 30, Dr William F. Channing of Boston and graduate of the university published an article in the Boston daily advertiser. He described in general terms how a practical alarm telegraph system in the city of Boston could

be constructed. He convinced the such a system based upon plans he devised with the associates. Moses G. Farmer, a telegraphic engineer. This was to be the first alarm first alarm telegraph system of its type in the word

This system embodied all of the principles of fire alarm telegraph in use today, namely, a closed electrical supervised assembly of circuits street fire alarm boxes with code wheels and key breaks determining the number of current interruptions which produced coded signals on local instruments at a central offices. The central office is where an operator-transmitted signal is received over separate alarm circuits to the appropriate firehouse. The system also featured telegraphic communication key and sounder between individual street boxes and the central office. The completed system was placed in service at 12noon on April 28, 1852 with the first alarm office located in the city building at Court Square and William Court. Staff included a superintendent, fire alarm operators and repairmen. These were the first position of their type in the world.

The original system had 40 streets boxes on 3-box circuit and 19 alarm bells on three circuits. The first alarm sent on the system took place on April 29, 1852 at 8.25pm. All of the boxes were of the manual crank type boxes started by simply pulling the hook were introduced experimentally in 1864. A new fire alarm office with improved equipment was placed in serve on December 26, 1564 in the top story of the then New City Hall building at 45 school street. Here, as was the case at the court square office, all the circuits

entered the office over head, all outside wiring being of the aerial type. On December 11, 1868 the purchase and delivering of the sector types boxes was authorized and within a short time all of the original crank type units were replaced. To established communication between head quarters in the city, the central office and various district headquarters, so called dial telegraph instruments were introduced in 1874. To provide more rapid access to the boxes for the purpose of giving alarms the first keyless door was placed in service on box No. 42 at the intersection of Tremont and winter streets on April 16, 1881. On May 2, 1881 it was ordered that fire alarm boxes in the city were to be painted black.

On February 28, 1882 the fire alarm Division ordered the installation of telephones at the fire alarm central office, headquarters and most firehouses. However the system was not entirely completed until about 1885. during late 1892 the first underground fire connections were made to this cable on June 14, 1893, the first box to be connected to this underground service was box 54 on Beech Street. In 1894 a few boxes were equipped with red electric lamp indictors for the first time. On May 20, 1895 a new fire alarm office was placed into service and the new headquarters at 60 Bristol street featured modern equipment. Here, for the first time, all fire alarm circuits entered the building through underground ducts. By October 29, 1907 all fire alarm boxes in the city of Boston were equipped with keyless doors.

Finally, other different alarms emerged as the technology advanced.

These systems were built based on the function to be performed by each one. Today we have a large numbers of different types of alarm system you can ever think of.

2.3 TYPES OF ALARM SYSTEM

There are different types of alarm system in existence today. The function of each alarm depends on the system configuration and are thus classified by their configuration some type of alarm are listed below:-

1. Loop Alarm
2. Anti Theft Car Alarm
3. Open Circuit Alarm
4. Speed Limit Alarm on Residential and Highway
5. Latching Burglar Alarm
6. Professional Burglar Alarm
7. Industrial Alarm
8. Intrusion Detection Alarm System
9. Circuit Alarm
10. Refrigerator Door
11. Indoor Alarm

1. LOOP ALARM SYSTEM

This alarm system was originally designed to protect the contents of a garden shed, although it would also be ideal for other outside buildings. In addition it would offer a good basic security system for small residential areas,

such as flats and beds sits. It may be installed without drilling or attaching to the building, which could be an advantage in rented accommodation. The unit features two separate protection arrangements. The entry/exit is protected using standard normally-open and/or normally-closed sensors such as magnetic switches and pressure mats. Entry and exit delays are independently adjustable, from 5 to 30 seconds, during which time a warning sounder operates and a status LED flashes. Valuable items are protected by a wire loop system similar to that used in shops etc. This uses a two core cable which is threaded through the items to be protected, and the alarm will be triggered immediately if either core becomes open-circuit or if the two cores are shorted together. Suggestions are given later for making the system even more tamper-resistant. The loop system can be used independently from the entry/exit system. This would be useful if a shed or garage needs to be left open when working in the garden, while still providing protection for valuable bicycles and power tools.

The unit is battery powered, and will give at least six months continuous operation from a PP9 battery.

2. OPEN CIRCUIT BURGLAR ALARM

These simple electronic latches up alarm circuit handles normally open protective devices such as conceal floor mat switches. All protective devices are connected in parallel and the alarm is tripped as soon as any of the devices are closed. There is on stand by current and a battery power source will last its sheaf life. Either a line powered 9VDC supply or a 6V lantern battery is used.

Once the alarm is tripped opening the master switch can only turn it off.

3. ANTI-THEFT CAR ALARM

Electronic magazine of March, 1983 affirmed that, the unit is mounted somewhere in the care where it will be difficult to find and removed. The switch is located under the dashboard where the driver can reach it but where a thief will not easily find it. When the ignition is turned on with the switch closed, whether by using the key or by "hot" wiring the circuit will be activated.

4. SPEED LIMIT ALARM

It is wireless portable unit adaptable with most internal combustion engine vehicles. This circuit has been designed to alert the vehicle driver that he has reached the maximum fixed speed limit (i.e in a motor way). It eliminate the need to look at the tachometer and to be distracted from driving. There is a strict relations between engine RPM (revolution per minute) and vehicles speed. So this devices control RPM and start beeping and flashing a LED (light emitting diode), once per second when maximum fixed.

5. LATCHING BURGLAR ALARM

This makes use of relay latching circuit. The input terminals are connected to parallel wired Normally Open (N.O) magnetic switches, or wire type security switches stretched across a window that closes a ball contact circuit when the is wire is pushed or pulled. When a security switch closes the

series battery circuit the replay pulls in, one set of contacts closes the alarm bell circuit. While the second set "latches" the battery circuit even if the security switches are opened the alarm remains on to disable the alarm of for reset, a concealed switch in series with one battery lead is installed.

6. PROFESSIONAL BURGLAR ALARM

Joe Maurath said that using window foil that "breaks" a circuit, as glass is broken, could use the professional type burglar alarm to protect windows or glass areas. It is an alarm that is triggered when the protective glass is broken. It is an alarm that is triggered when the protective circuit is opened. All protective door and window circuits must be normally closed and series connected so that an opening of any protective device will trigger the alarm. Once the alarm is triggered it can be turned off only be opening master switch. The recommended power supply is an AC powered 6VDC source or a alarm battery, standing current is about 100μA

7. INDUSTRIAL ALARMS

This alarm comes in three versions as stated in RS book of October 1992. The 12V dc GREY bell are affordable home security. Whenever any vehicle. This is ideal for use in security system and complies with the requirements of BS 4737 intruder alarm system in buildings. The unit must be mounted within a bell enclosure when used in external environments of BS5839 fire detection and alarm systems in buildings. The 240Vac GREY bell is an extremely effective

signaling unit for use in industrial environments. The design avoids the need for mechanical contacts resulting in greater reliability efficiency and longer operating life. All units may be ceiling or wall mounted, with flush or surface wiring and requires no final setting up adjustment. A chip holds the movement to a tough polycarbonate base, and a twist lock mechanism holds the going in position.

8. INTRUSION DETECTION ALARM SYSTEM

The intrusion detection alarm system provides effective and affordable home security when ever any vehicle, intrusion detection as unexpected guest approaches your property. This perimeter intrusion detection system alerts you of arrival. It is simple to operate yet technically sophisticated and is completely wire-less. It is ideal for monitoring your drive way, yard, house, etc. The system, consist of two basic components: an infrared sensor detects the presence of a vehicle or person through heat and motion, and then immediately transmits via a 300MHZ radio signal to the receiver in the house which sounds the alarm. It has an exceptional range of up to 1500 feet. The sensor/transmitter is a special military version. Its military colour of green is to blend it directly in outdoor installations. It is completely weather proof, includes mounting hardware, operates in temperature below 40f and meets mil standard 2000. it mounts easily on a tree or fence in the garage at a pool entrance or anywhere security is desired. The sensor has an adjustable field of view with a 30 feet detection zone and is powered by a 9 volts battery. The battery can last over a

year since the circuit draws just 0.05 milliamps. The receiver/alarm unit is plugged into a standard electrical outlet inside the house. Upon receipt of the alarm transmission signal from the sensor unit the receiver unit sounds its alarm activates a LED light for five seconds and then reset itself. The receiver has a volume control for the alarm and terminal board for connection of an optional external siren

9. CIRCUIT ALARMS

This type of alarm take care of guarding the perimeter of a building such as the gates and entry points to the building, while the latter alarm is used for guarding the interior of a building. For the first type of alarm, the basic principles of working could either be an open or a closed circuit. For the open circuit type, the circuit used is normally open. Once closed the alarm triggers. For example floor mats. A basic floor mat uses an open circuit design with two metal strips spaced apart. When somebody steps on the mat, the pressure pushes the two metal strips together, completing a circuit hence triggering the alarm.

The closed circuit type is normally closed. Once opened the alarm triggers. For example, an intruder might break through a window, so you could make the glass itself a circuit. The easiest way to do this is run a current through a thin line of foil wire affixed to the surface of the glass. If a burglar breaks the glass, the circuit is broken, and the alarm is triggered. Other forms of open and closed circuits include magnetic and infrared-based burglar alarms.

10. INDOOR BURGLAR ALARMS

While these circuits afore mentioned may be suitable for guarding the perimeter of a house or business premises, they are not suitable for guarding the interior of a building. This is because the intruder's actions are highly unpredictable – it is not known where they would go or what they would touch. Motion detectors are most commonly used for this purpose. There are several different sorts of motion detectors. The most common type is the one based on microwave radio energy (or ultra sonic sound waves. There

REFERENCE

1. P. Horowitz, The art of electronics, 2nd Ed, University Press, Cambridge-Great Britain, 1995.
2. R.L. Tokheim, Digital electronics: Principles and application, 5th Ed. The McGraw-Hill Companies Inc.USA,1999.

CHAPTER THREE: (DESIGN ANALYSIS)

3.0 PRINCIPLE OF OPERATION

The general working principle of this project is based on decoding the intensity of light rays, to detect on intruder, trigger on alarm and drop a trap as well as turn on the lights in the home

A light dependent resister (LDR) is used to detect the shadow of the intruder when the beam of light focused on it is broken.

The LDR is connected to a potential divider to a voltage comparator, whose output goes low when the beam of light is broken. This output is fed a D-flip-flop that is configured to give a high output at its inverting output when it is clocked.

The output of the D-flip flop is used to trigger a 20Hz astable 555 timer, which drives a buzzer, which serves as the alarm.

A trap is also dropped by the mechanical action of a DC motor which is driven by a 5s monostable 555 timer, triggered by the inverting output of the D-flip flop.

The lights in the rooms are automatically put-on by a relay which is triggered by a switching transistor biased with a base voltage from the output of the D-flip flop.

The system is powered by a 9V DC regulated power supply.

3.1 DESIGN SPECIFICITIES

Supply voltage - 19vDC

Input voltage - 220v AC.

Mar-current - 1A

LDR range - 1m.

BLOCK DIAGRAM

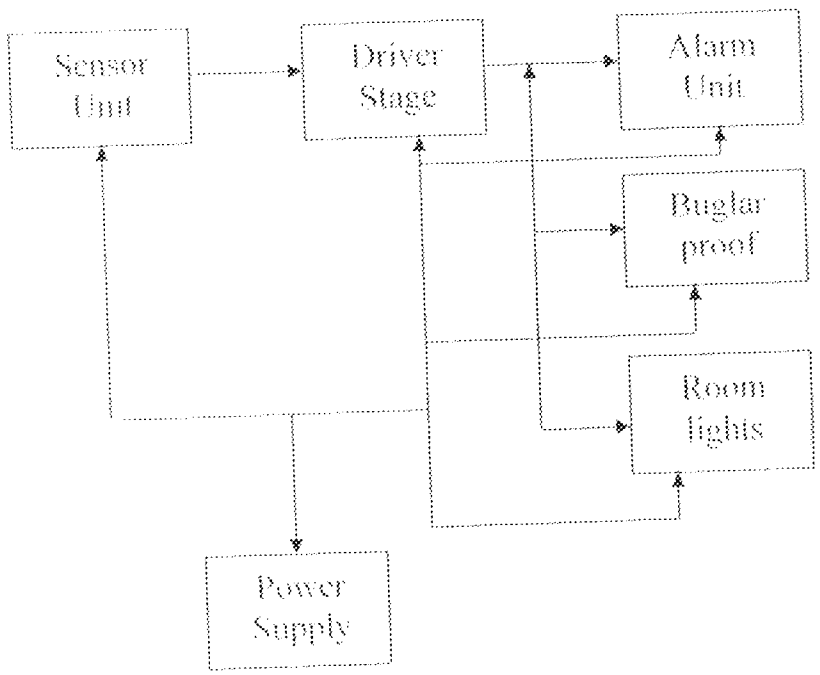

Fig 3.1.1 Block diagram of an intruder detector,burglar proof auto lights alarm

3.2 POWER SUPPLY

All stages in this project uses +9vDV. The power supply stage is a linear power supply type and involves step down transformer a filter capacitor, and a voltage regulator. The various stages of the power supply was designed as follows:

3.3 THE RECTIFIER UNIT

The rectifier is designed with 4 diodes to form a full wave bridge network. The rectifying diodes employed were the IN4007, this is because, the maximum current in the circuit is 1A, which is the rating of the IN4007 (1A, 600v). the full wave bridge network is shown below:

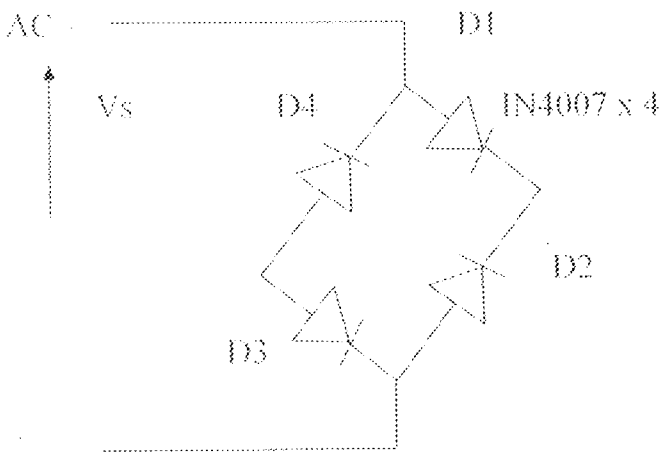

Fig.3.3.1 Rectifier unit

Filtering Capacitor

The filter capacitor is required to filter off ripples from the rectified AC power. The filter capacitor is inversely proportional to the ripple gradient of the power supply. The ripple gradient is shown below:

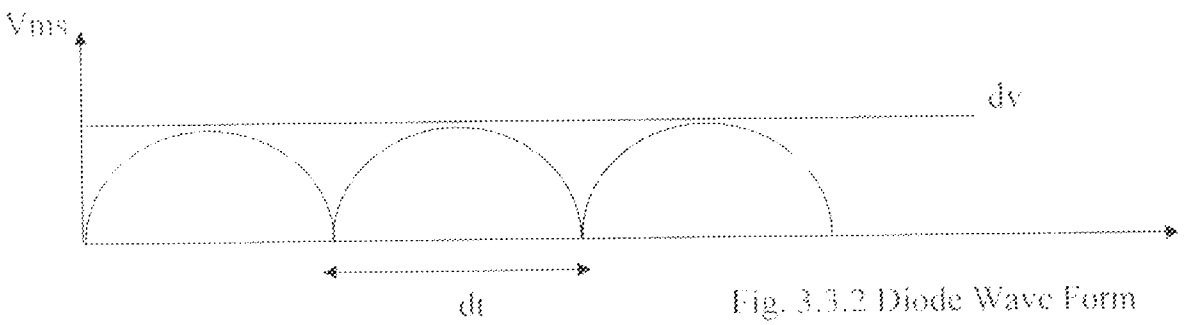

Fig. 3.3.2 Diode Wave Form

Where dv is the ripple voltage for timer dt, where dt is dependent on the

For an Rms voltage of 15V (from the transformer)

Vpeak = 15 x √2 (i.e rms x √2)

= 21.2v.

Hence letting a ripple voltage of 15% makes dv = 3.10

But $I_c = dv/dt$.

$\therefore C = dt/dv = \frac{10ms}{3.1v}$

Where dt = 10ms for 50Hz

i.e dt = 1/f = $T_{hf} = 1/(50 \times 2) = 1/100$ S = 10ms.

∴C = 3225.8μf

VOLTAGE REGULATION

Since 9v is required for the circuit, a 7809 voltage regulator was used, because it gives +9vDC regulated output.

The circuit diagram of the power supply is shown below:

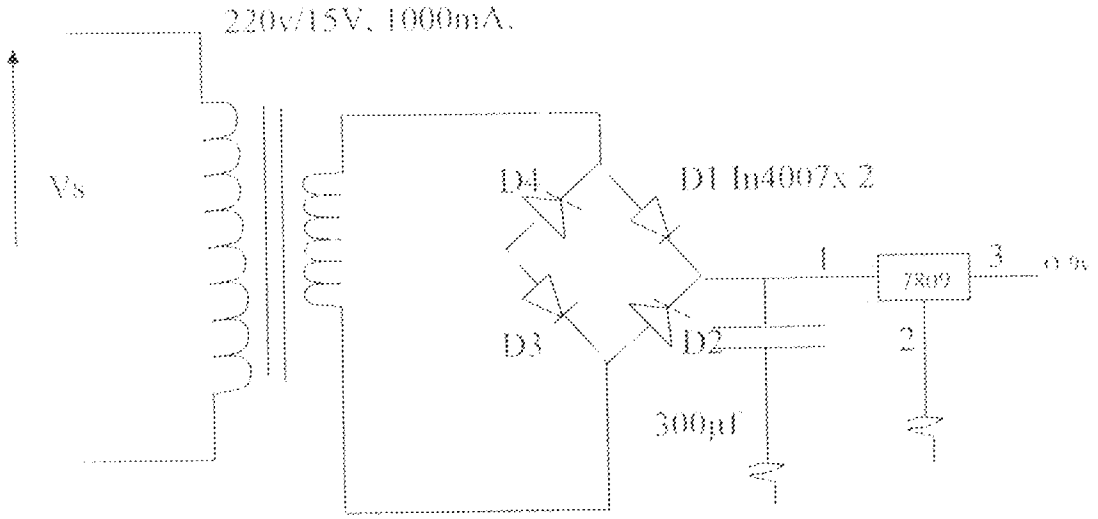

Fig: 3.3.3 Voltage Regulation

3.4 SENSORS UNIT

This is made up of a voltage comparator, an LDR and a light source.

The resistance of the LDR reduced when light shines on it, and increased in resistance when the light intensity reduced. A 10k LDR is used, which has a resistance of 1m in total darkness and ~200Ω in bright light.

The LDR is connected to the inverting input of the comparator in a potential divider as shown below:

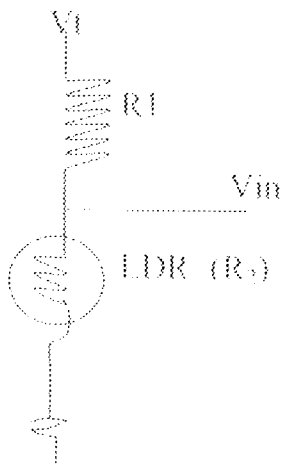

Fig: 3.4.1 Sensor Unit

Let V in = 2v in bright light.

∴ from voltage divider theorem.

$$V_{in} = \frac{R_2 \times V_t}{R_1 + R_2}$$

$$2 = \frac{220 \times 9v}{R1 + 220}$$

$$\therefore 2R_1 + 440 = 1980$$

$$\therefore 2R_1 = 1980 - 440$$

$$= 1540$$

$\therefore R_1 = \frac{1540}{2} = 770\Omega$

This means that in darkness, the Vin $\geq$ 9v.

The reference voltage at the non-inverting input is then set to 4v which causes the comparator's low when the beam of bright light is broken.

(The comparators output goes high when the voltage at the non-inversing input is greater than the voltage at the inverting input).

Here, using voltage divider theorem.

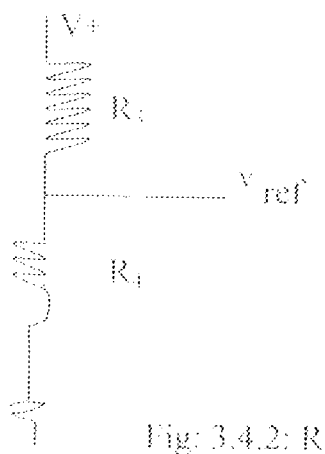

Fig: 3.4.2: Reference Voltage

$$V_{ref} = \frac{R_2 V_+}{R_1 + R_2}$$

Let $V_{ref} = 4v$
And $R_2 = 1k$
$\therefore 4v = \frac{1k}{R4} \times 9v$
$4k + 4R4 = 9R4$
$\therefore 5R4 = 4K$
$\therefore R4 = \frac{4k}{5} = 800\Omega$

A preferred value of 1K variable resistor was used. The circuit of the sensor unit is shown below:

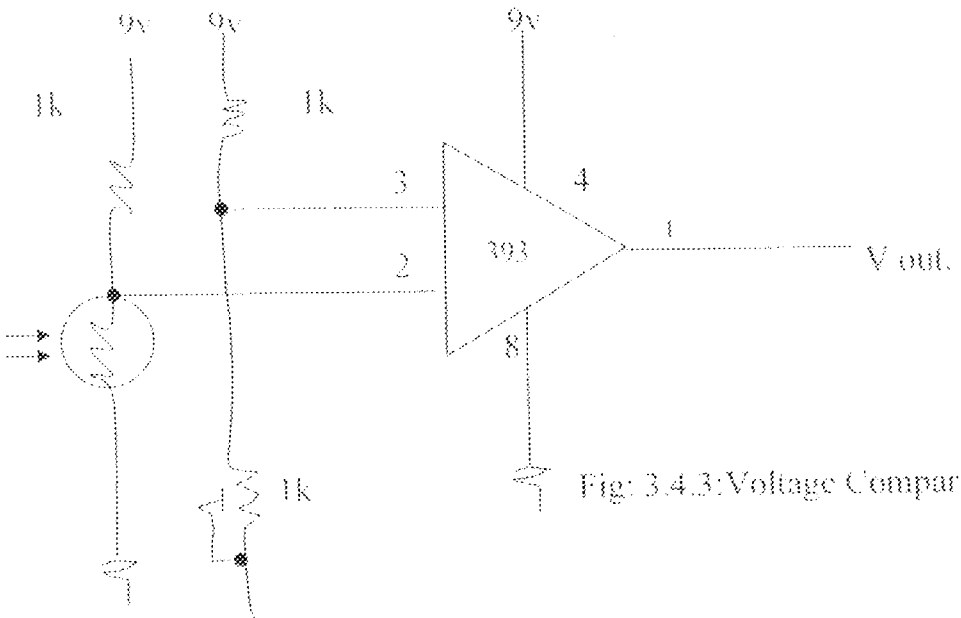

Fig: 3.4.3:Voltage Comparation

3.5 IIIF DRIVER STAGE

This was up of a 7474 D-flip flop. The output of the comparator which is a clock pulse, is fed to the clock of the D flip flop and the data present at the D input is passed to the output Q.

The D input is set at a high logic level (1), so when there is a clock pulse as a result of an intruder breaking the seam the Q out put goes high. The circuit diagram is shown below:

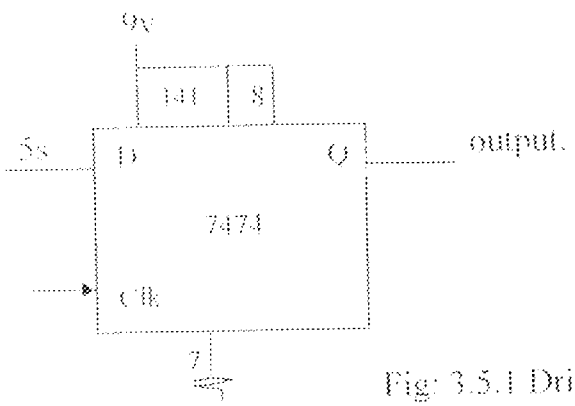

Fig: 3.5.1 Driver Stage

3.6 ALARM UNIT

This used a 555 timer in the astable configuration to generate a 20Hz audio frequency to sound an alarm a 555 timer astable configuration is shown below:

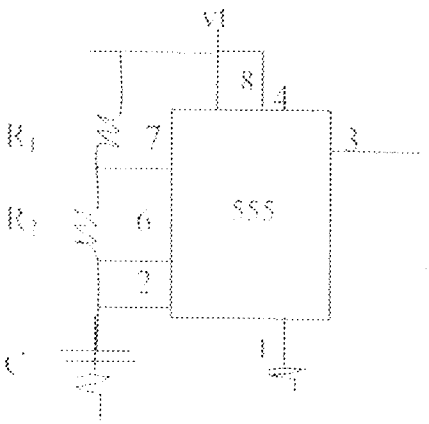

Fig: 3.6.1: Frequency Generation, astable configuration.

Formula: $F = \frac{1.44}{(R_1 + 2R_2)C}$

Since F = 20Hz.

Let R1 = 10k

And C = $^1\mu F$

$= 20Hz = \frac{1.44}{(10K + 2R_2)\,{}^1\mu}$

$\therefore 20k + 40R_2 = 1.44 \times 10^6$

$= 40R2 = 1440000 - 20,000$

$\therefore R_2 = \frac{142\,0000}{40}$

$= 35,500$

$= 35.5k$

A preferred value 47k variable resistor was employed.

The circuit is show below:

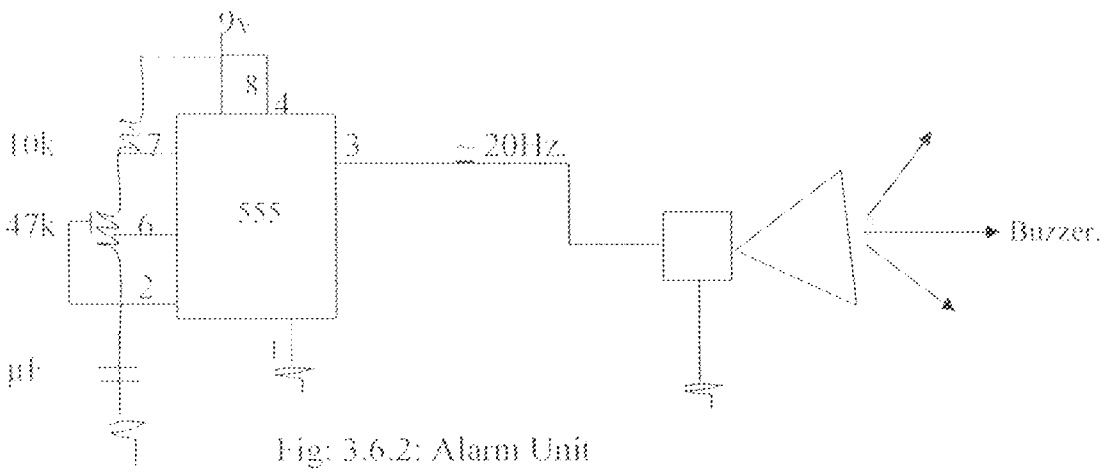

Fig: 3.6.2: Alarm Unit

3.7 BURGLAR PROOF SYSTEM

This employs the use of a 555 timer monostable configuration to activate a relay via a switching transistor.

The relay connects the motor to power and this drops the burglar proof.

The 555 timer monostable configuration is shown below:

The circuit is show below:

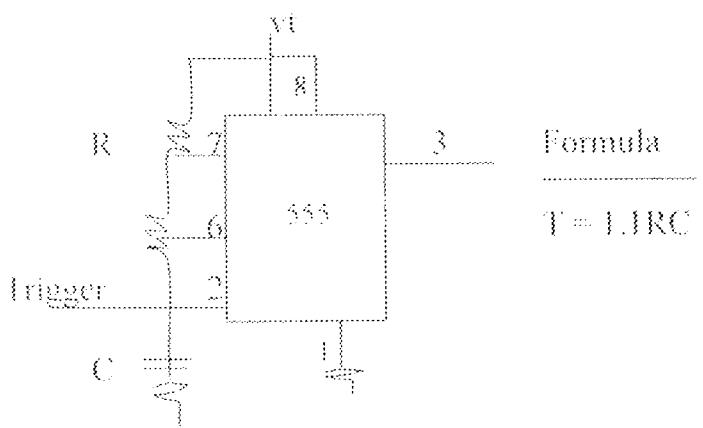

Fig: 3.7.1: Monostable Configuration

A time of 5s is required:

Let R = 47k

5 = 1.1 x 47k x C

C = $\frac{5 \times 10^{-3}}{1.1 \times 47}$

= $\frac{5 \times 10^{3}}{51.7}$

= 0.0967 x 10^{-3}F

= 96.7 x 10^{-6} F

= 96.7μF

A preferred value of 10^{0}μF was used.

A transistor is biased to drive the relay as shown below:

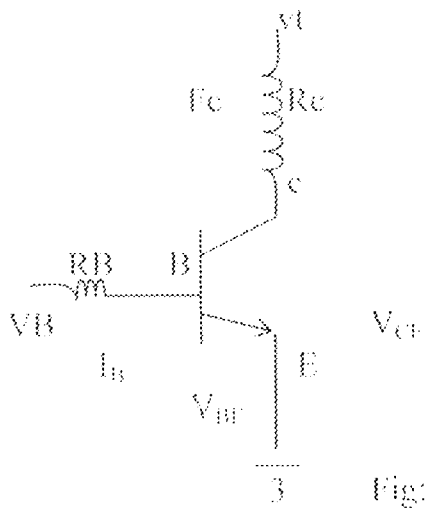

Fig: 3.7.2: Transistor Biased

From transistor equations.

$V_B = I_BR_B + V_{CE}$

For transistor to out as switch, it must be constructed to work in the active

region.

$VCE = 0$

$= V = IcRc$

RC = resistance of 6v relay coil = 400Ω

$\therefore Ic = \frac{V}{Rc} = \frac{9v}{400} = 0.0225A$

Since $I_B = {}^{I_C}/_{hfe}$

And hfe of Bc 337 transistor is 300, from the data sheets 0.0225.

$= IB = /300 = 0.000075A.$

$VB = IBRB + VBE$

$= RB = \frac{VB - VBE}{IB} = \frac{9v - 0.6}{0.000075} = \frac{8.2}{0.000075} = 109333.333$

$= 109.333k\Omega$

A preferred value of 100kΩ was used.

Where VBE for silicon transistor = 0.6v.

The circuit of the burglar proof stage is show below:

The circuit is show below:

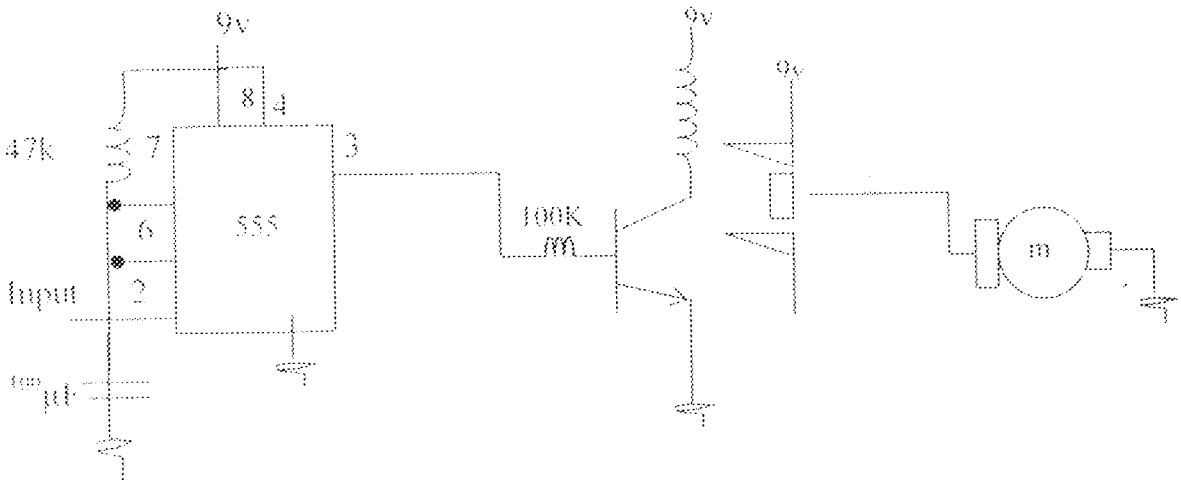

Fig: 3.7.3: Burglar Proof Stage

ROOM LIGHTS AUTOMATIC SWITCHING

This is done via a relay driven by a transistor switch. The circuit diagram is shown below:

From transistor equations

$V_T = I_cR_c + V_{CE}$

For transistor to out as switch, it must be constructed to work in the active region

$\therefore VCE = O$

$\therefore V_T = I_cR_c$

RC = resistance of 6v relay coil = 400Ω

$\therefore Ic = \frac{V_T}{Rc} = \frac{9v}{400} = 0.0225A$

Since $I_B = \frac{I_C}{h_{fe}}$

And hfe of Bc 337 transistor is 300. from the data sheets 0.0225.

$\therefore IB = \frac{}{300} = 0.000075A.$

$VB = IBRB + VBE$

$\therefore RB = \frac{VB - VBE}{IB} = \frac{9v - 0.6}{0.000075} = \frac{8.2}{0.000075} = 109333.333 = 109.333k\Omega$

A preferred value of 100kΩ was used.

Where VBE for silicon transistor = 0.6v.

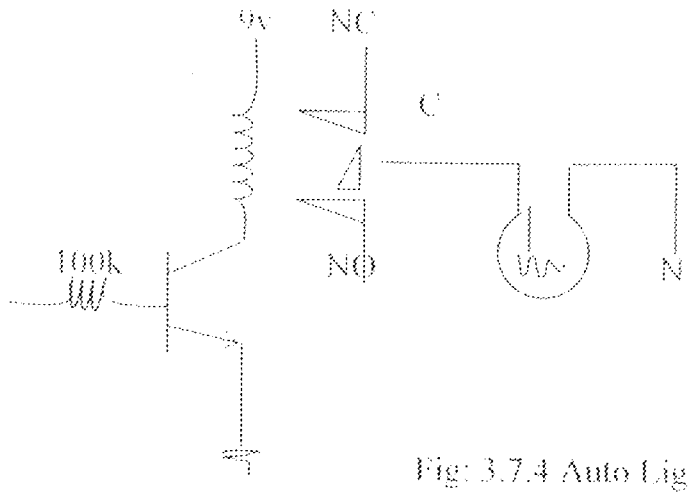

Fig: 3.7.4 Auto Lighting

REFERENCE

The Art of electronics (LAB MANUAL), Hayes & Horowitz.

The art of electronic & (text), by Horowitz & Hill.

How Burglar Alarm works www.howstuffworks.com2005

Fair chits Semiconductor Company Datasheet on CD4060B 14 Stage Ripple Carry Burglar Counter, Revised Edition www. Fairchildsemi.com 2005.

CHAPTER FOUR

4.1. INTRODUCTION

This chapter summaries the method that were used in assembling the different component that were chosen from the design calculation in chapter three makes a workable and functional unit.

Breadboard: Another name for it is the prototype board; this is a perforated board measuring approximately 6.5cm x 17.5cm on which electronic components are mounted to allow for a preliminary evaluation of any circuit. The prototype board construction starts with the Circuit diagram.

Soldering Iron: An electrical tool, having a heated tip for melting solder. The type.

Vero board: This is another perforated board on which the previously prototype electrical electronics circuit is finally mounted after ascertaining that is has measured favorably with the aims and objectives for which it is meant to serve.

Sniper: This tool was used for removing excess soldering lead from the board after soldering.

Wires: These are tiny telecommunication wires and are insulated in nature used in connecting the various junctions/components that constituted the complete circuit together.

4.2. IMPLEMENTATION/TESTING

The components was first mounted on the bread board and tested to ensure that the respective modules operate efficiently after testing on the board.

The components were then transferred to a Vero board and soldered strongly on it.

The components layout of the Vero board is shown in the circuit diagram. The transformer and the components on Vero-board were mounted separately on the base of a transparent plastic casing which serves as an insulating material to prevent shock on handling the casing. The wires were properly spaces to reduce induces magnetic flux that could create unwanted replies, care was taken to avoid bad or dry joints as well as to much heat to prevent damage to component and circuit board taking this in consideration the house casing as a removable roof.

4.3. CASING DESIGN

The casing is fabricated with transparent plastic, Perforation were made to serve as outlet for the sensors and output device so they could be placed in them required position perforation where also made for the speaker unit. The casing was made portable so it can be hidden or conspicuously placed to avert easy detection by the intruder.

In addition the suppose burglar house with burglar proof was modeled to ensure proper test of design

4.4. METHOD OF OPERATION

The general working principle of this project is based on decoding the intensity of light rays to detect an intruder, trigger an alarm and drop a burglar proof to secure the house as well as turn on the light in the house.

4.5. PROBLEMS ENCOUNTERED

Several problems were encountered during the design of the project. The problem range from design problems to implementation problems and also construction problem. The major problems are as follows:

(1). Inability to turn motor. This was the first design challenge the project posed the problem was solved by using a transistor to boost the power supply.

(2). Other problem include soldering and measurement work but these problem were solved by proper trouble shooting serious care in the construction of the project.

(3). Also, exact calculated values for components were gotten but preferred values were used instead and this caused drifts in the same constant of the timers but these drifts were negligible sure they were within range like in the cease of the following capacitor the calculated value was 3225.8 NF but we used the proffered value of 3300 UF.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

The burglar alarm with burglar proof system is a device designed to provide warning signal when there is a breach of security that is to say when there is an unauthorized person (i.e. include) within an incorporated 240V/12V transformer to make the system work under low voltage. This makes it versatile it's major objective revolved around providing securely to the districts area or vicinity where the alarm is operational and the design has a built in burglar proof systems that automatically shoots down after the circuit is completed.

5.2. RECOMMENDATION

Every functional system, even operating normally without faults has imperfections in its design. The duty of design specialist to seek out these imperfections and try to proffer solutions to these problem in other improve system efficiency.

The aspects on the system that can be improved upon.

(1). The stability of the system can be improved upon by making these susceptible to interference.

(2). The use of backup battery could be incorporated

(3). Indicator could be added in order to show which areas are or have been intruded upon.

(4). The sensitivity of the burglar alarm sensor in order to make the sensor more responsive.

BILL OF ENGINEERING MESUREMENT AND EVALUATION

Component Resistors	Amount	Cost per unit (N)	Total Cost (N)
1K	2	10	20
1k preset	1	20	20
47K preset	1	20	22
100K	2	20	40
10K	1	10	10
Compactors			
47UF	1	20	20
100UF	1	20	20
3300UF	1	50	50
1UF	1	20	20
7809	1	100	100
LM393	2	150	300
7474	1	100	100
555	2	150	300
LDR	1	200	200
6Vrelays	2	150	300

6V motor	1	100	100
Buzzer	1	30	30
220V/15V,Transformer	1	300	300
IN4007	4	30	120
Connecting Wires		500	500
Casing		1500	1500
House		2000	2000

Fig: 5.2.1 BEMI:

Components	Values	Power Description	
Resistor R_1	1KN	1/4w	5%
Resistor R_2	1KR preset	1/4w	5%
Resistor R_3	47KN preset	1/4w	5%
Resistor R_4	100KR	1/4w	5%
Resistor R_5	10KR	1/4w	5%
CAPACITOR			
C_1	47UF	Electrolytic type	
C_2	100UF	Electrolytic type	
C_3	3300UF	Electrolytic type	
C_4	1UF	Electrolytic type	
Buzzer	12V 16N		
Diode 1 to 4	IN 4007	1A, 600V	
Relay	9V,5A		

Fig: 5.2.2 Factory Specification of Component

The complete circuit diagram is shown:

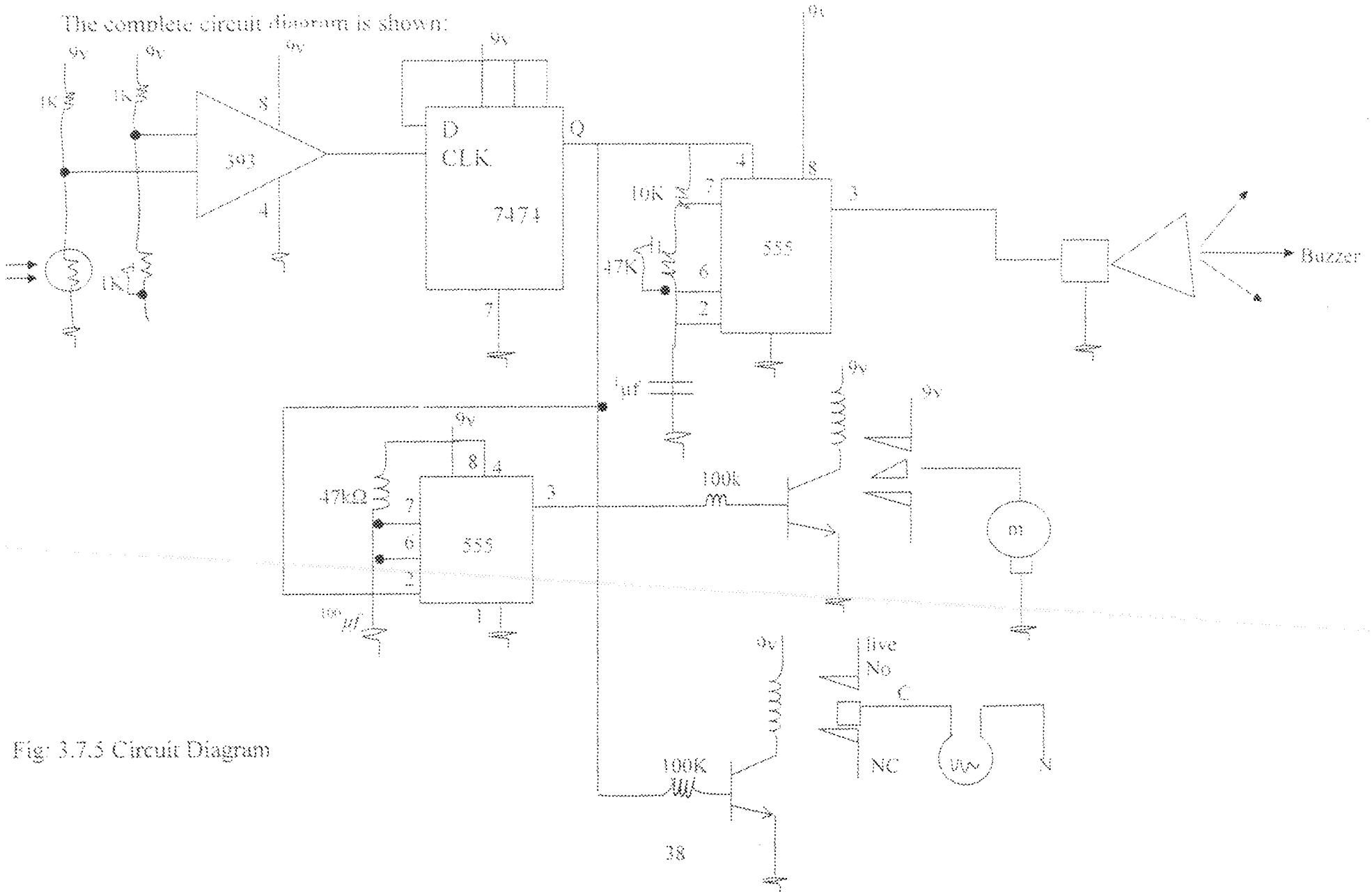

Fig: 3.7.5 Circuit Diagram

REFERENCE AND BIBLIOGRAPHY

The following materials were consulted in the course of writing this report.

1. P.Horowitz, the Art of Electronics, 2nd Ed., University Press, Cambridge-Great Britain, 1995, pp.

2. R.L. Tokhiem, Digital Electronics: Principles Applications, 5th Ed., The McGraw-Hill Companies Inc. USA, 1999, pp 155-203.

3. L. Jones, Basic Electronics for tomorrow's world, Low Price Ed, University Press, Cambridge-Great Britain, 1996, pp. 55-87, 102-122.

6 The Art of Electronics (Lab Manual), Hayes & Horo witz

7 How Burglar Alarm works www.howstuffworks.com2005

8 Fair chits Semiconductor Company Datasheet on CD4060B 14 Stage Ripple Carry Burglar Counter, Revised Edition www. Fairchildsemi.com 2005.

APPENDIX