AUTOMATIC WATER LEVEL DETECTOR USING SEVEN SEGMENTS DISPLAYS

BY

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NOVEMBER, 2011

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H/EEET/09/13936

THIS PROJECT IS SUBMITTED TO THE DEPARTMENT OF ELECTRICAL ELECTRONICS ENGINEERING TECHNOLOGY,
IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE SCHOOL AND INSTITUTION AWARD OF HIGHER NATIONAL DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING TECHNOLOGY

NOVEMBER 2011.

DECLARATION

I hereby declare that this project has been conducted solely by me under the guidance of Mr Y Y Dangana of the Department of Electrical Electronics Engineering Technology Nuhu Bamali Poytechnic Zaria, the author work have been referred to in project have been duly acknowledge.

A. JERE

4/01/2012

ABUBAKAR ALIYU JERE

DATE

HND/EEET/09/13936

DEDICATION

is work is dedicated to my parents, brothers, and sisters for their support and encouragement
y Allah (S.A.W) bless you all.

APPROVAL

This work is certify that is the original work undertaken by Abubakar Aliyu Jere, HND/EEET/09/13936 and has been prepared in accordance with the regulation governing the preparation and presentation of project in Nuhu Bamali Polytechnic Zaria.

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MR. Y Y DANGANA DATE

(Project Supervisor)

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MAL GARBA MUHAMMED DATE

(Head of Department)

ACKNOWLEDGEMENTS

I wish to express my warmest gratitude to almighty Allah for giving me the wisdom, strength and determination to present this project.

Special thanks goes to my parents, Aliyu Saeed, Ibrahim Sama'ila, Muktar Saeed, Shehu Zubairu and my grandfather in person of Abubakar Muhammad (Na'ibi) and my beloved mother Hulera Isma'il. The contribution of my others relatives are not forgotten so may Allah grand them with jannatul Firdausi.amen.

Also special regard goes to my supervisor Mr YY Dangana for sparring his time in making sure that this project was successfully, and also special thanks to all staff and management of electrical electronics engineering department may Allah bless you all.

Finally special regard goes to the following people Abdulkareem bajan, Nasiru Officer, Khidir Ibrahim, Jamilu Muhammad, Aliyu Ahmad, Adam Man, Abubakar Rabi'u, Abdullahi Baffa, and also my roommates Hayatu Mahmud, Ummar Shitu, and my class mates Suleman Salisu, Sani Alhasan (ameer) and others may Allah bless them all.

ABSTRACT

The project present the design and construction of water level detector using a seven segment display. This project is limited to building the circuit with the discrete component, and ics [integrated circuit]. Because of the availability of the components. This device employs the use of electronics seven segment display circuits to replace the mechanical [analogue] display used in the presentation or demonstration of liquid level. Hence the display circuit that performs this function is referred to as the seven segment display device. The design work was constructed, tested and worked perfectly hence it is recommended for both domestic and industrial application in the new era.

TABLE CONTENT

CHAPTER ONE

INTRODUCTION

PREAMBLE

The rapid development of today's technology is as a result of the expansion in the field of electronics and future has no apparent restriction over it. In keeping with this technological advancement, the field of electronics has grown out uniquely to make human endeavour, at many facets of living, more meaningful.

Alarm device, operate electronically, are very important in the field of security as well as saving human being from problems of constant monitoring of processes. To this end electronic indicators and alarms system are very useful and without which life of today's man would seriously encounter a lot of setbacks.

MOTIVATION

As a result of complex and technical difficulties in the process of ascertaining the level of water, oil or fuel in its tank or its reservoir. It becomes pertinent that the design and construction of water level indicator be done. The analogue or manual implementation largely been responsible for water spillage which result in fire outbreak in refinery, and makes it quit difficult to maintain and measure the volume the volume of the content in the tank. Or even for expansion work.

Individual and cooperate bodies now have to be acquaint themselves with ways they can help themselves to it. A simple and economic way of doing this whole project is aimed at achieving.

BACKGROUND OF THE PROJECT

Switching system were basically on manual operations, which require an operator, with the development in electronics, devices being encountered.

In manual (analogue) operation methods it is time consuming, there is no precision, and there is need for an operator.

Today, electronics is a substitute for human beings, capable of making fast and accurate decisions based on basic instructions on the electronic device called a program; this property has lead to its application in performing efficiently and accurately many tasks that any human being can ever imagine. Due to recent technology it is possible to use electronics to design various sort of warning system which can serve to warn people against water caused disasters before lives and properties are affected.

In 2004 Ahmadu Dodara of Department of electrical engineering, Ahmadu Bello University Zaria in his work titled " the design and construction of water level circuit that would automatically turn off water supply after a reservoir reached a predetermined level " he used majorly a transistor and a relay to for his design achieve the switching in the system.

In 2002 Abdulkadir Amadu of Department of electrical engineering, Ahmadu Bello University Zaria in his work titled" the design and construction of power supply unit that could work with water control circuit" he used majorly a transistor and a regulator IC for his design .

In 2005 Rahamani Obaid Department of electricai engineering, Ahmadu Bello University Zaria in his work water titled" the design and construction of a water level detector alarm system" he used a majorly a transistor, 555 timer IC and regulator IC for his design which provides switching to trigger alarm system that will continue sounding as long as the terminals are still in water.

Haruna Fatima (2006) of the Department of Electrical Engineering, Ahmadu Bello University Zaria in her project work" the design and construction of three-step water level indicator with a three alarm " she use majorly a transistor and regulator IC for her design which provided the three levels of water, using three diodes to represent the levels.

This project s based on using a different method, which is the seven segment display, to represent due to the advantage of transistors most of today's electronic switching and oscillator are made using discrete transistors of integrated circuits (IC) which are mostly comprised of logic gates. However, for this reason, both the switching and display sections of the water level indicator are made using logic gates.

PROBLEMS DEFINITION AND METHODOLOGY

The designed water sensitive level indicator which incorporates the water security system constructed around semiconductor devices and associated components such as resistors, capacitors, and light embittering diodes, useful in places such as domestic water storage tank, town water storage systems, some water supply farmyards. To realize a circuit capable of detecting the level of water in a tank and display the result using a seven segment display.

The circuit operation is based on the use of water, serving as a conductor which closes the circuit when the terminals are in the water tank (filled with water) and when the terminals are not in the water, the circuit is in OFF state. With thorough understanding component characteristics, this makes up the circuit diagram design. The light emitting diode LEDs in the seven segment display are the sole indicators of the water level in conjunction with the 7408 and the 7404 IC.

The device provides the switching which enables the alarm to continue sounding as long as the terminals is still in the water tank.

PROJECT OUTLINE

The implementing of any project needs careful planning and systematic approach. The project is divided into five chapters.

Chapter one is the introductory chapter while chapter two gives theoretical background on the design, which is the facus of chapter three.

Chapter three gives the circuit procedures and analysis.

Chapter four analyses the result especially the cost implication while chapter five concludes and give recommendation for further work.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents the basic building block of the device "An automatic water level detector system"

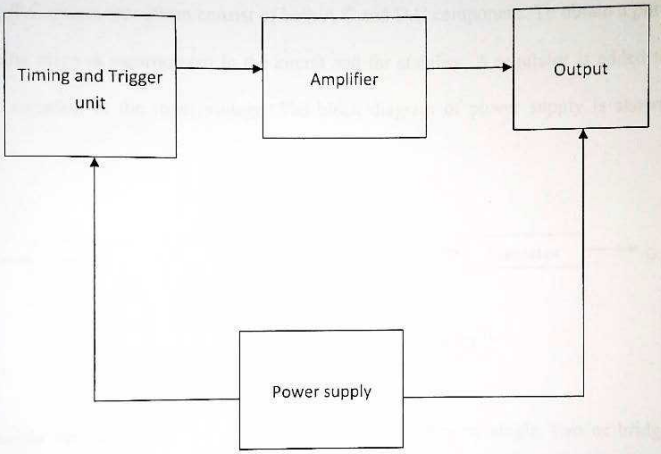


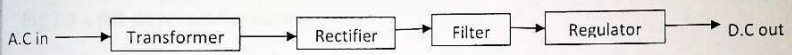
Fig: 2.1 Block diagram of an automatic water detector

POWER SUPPLY

The means of supplying electrical power to an electronic circuit is generally term as power supply in electronics; only D.C supply is convenient and is mostly obtained from wet /dry cells or means of rectifying A.C to D.C. in this project, the means of supply is of wet cell with voltage rating of 6V or power supply directly from A.C which is rectified to D.C.

Power supply is necessary for the operation of virtually every electronics equipment both digital and analogue, in case of any variation in voltages adversary that load, temperature and D.C output must be maintained within about 10% of the desire value, although this will depend on the specific application.

The main supply provides an alternating current (A.C) this A.C is considered into pulsating D.C output waveform consist of both A.C and D.C component. To obtain a pure D.C, a filter stage is incorporated in the circuit and for stability. A regulator is added to maintain variation in the input voltage. The block diagram of power supply is shown below.



sFigure 2.2 A Block Diagram of a power Supply

Power supply can either be a half-wave or full wave employing single, two or bridge diodes respectively. But for the design of water level

(D.C/ A.C detector), the two diodes for full wave rectification is employed as shown below.

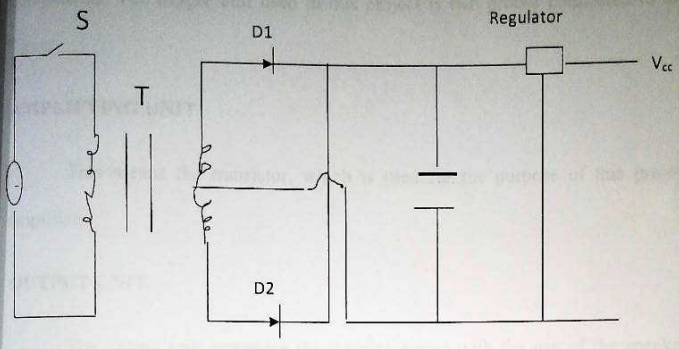


Fig 2.3 a full wave rectifier circuit

The diagram above consists of transformer stage, rectifier stage and the filter stage.

TIMING AND TRIGGER UNIT

This trigger may be applied to the circuit in various forms. The trigger should be coupled to the multi- vibrator through a small capacitor so that loading be the same source is negligible. The period of the multi- vibrator is controlled by pulse (trigger) from an external source.

Triggers are usually applied to the appropriate input but they may also be applied to the output and reach the input through the coupling network.

The input consists of timing resistor, capacitor and two probes. In the configuration of 555 Timer IC as a mono-stable multi-vibrator, the input trigger is connected to the positive polarity of the capacitor and discharge output to the timing

resistor R. the timing cycle output to the width is dependent on the value of the timing components. The trigger unit used in this project is two probes connected to the IC555 Timer.

AMPLIFYING UNIT

This means the transistor, which is used for the purpose of this project as an amplifier.

OUTPUT UNIT

The output unit generates the warning sound with the use of the speaker in the form of alarm, each time the two probes come in contact with water.

This alarming sound is produce by the use of speak.

COMPONENTS ANALYSIS

RESISTOR

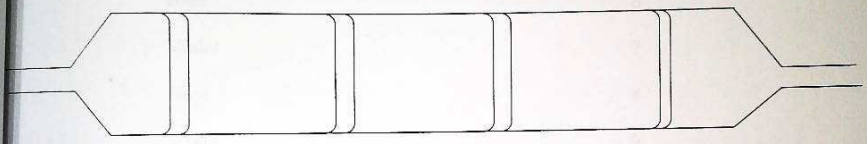
This is an electrical device that offers opposition to the free flow of current in a circuit. It is connected in series or in- parallel as desired, the type of resistors used in this project are fixed resistors whose values can be identified by calculating it from the colour coding of the resistor or even using digital / analogue meter. However, the resistors are of three types: fixed value resistor, variable resistors and light dependent resistors.

FIXED VALUE RESISTORS

These fixed value resistors are usually so small in structure, it is impractical to try and print each one with one with its value that is why they are marked with a code printed on them. in bands of different coloured prints.

READING A FIXED VALUE RESISTORS

It starts with the band closed to the end, the bands are arranged or shown in the figure below:



1st Band of Figure vale | 2nd Band | Multiplieier/ number of zero | tolerance bands

Fig 2.4 Pictorial view of a fixed value resistor

With reference to the above resistors, let assume that the first band is orange from the table below (resistor colour coding), it shows that orange color means three. If the second band is blue, then its value is six, and finally, if the third band is brown, we then have value of one zero, so we add one zero to the first two figures: 36 and 0=> 360Ω. The fourth band or tolerance band is silver; 10%. Therefore the resistor is 360Ω, 10 % tolerance or for somewhere between 351 and 429Ω. This is more than adequate for most circuit requirements.

The table below shows the resistor's colour coding:

Colour	code
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9
Gold	0.1
Silver	0.01

Table 1: resistor colour coding

LIGHT EMITTING DIODE

As the name implies, it is a forward –biased P-N junction which emits visible light when energized. The colour of the emitted light depends on the type of material used as shown below:

1. GaAS – infrared radiation (invisible)
2. GaP – red or green light
3. GaAsP red or yellow (amber) light

Here, the red and green colours are used. Also LEDs emit no light when reverse-sbiased.

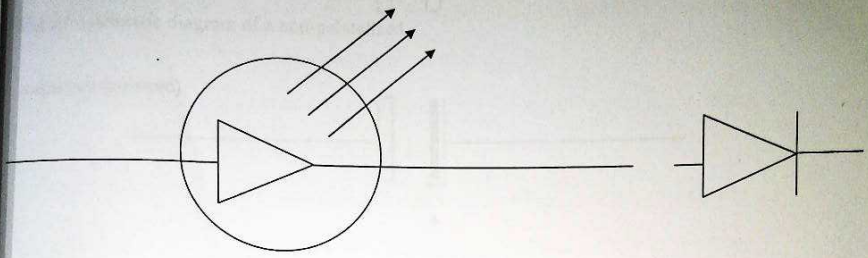


Fig 2.5 Schematic Diagram of a lightening LED

CAPACITOR

A capacitor is an electrical device that stored and discharge electric charges or electrons.

The unit of a capacitor is in farad (F) and it can be measure in nano farad (nF), pico farad (pF) and micro farad (mF).

There are different types of capacitor s, while the one used for this project is the ceramic capacitors and a polarizes capacitor which is used to filter the changes passing through the circuit.

The ceramic D.C type capacitor does not respect polarity while the other type has polarity; they are as shown schematically below:

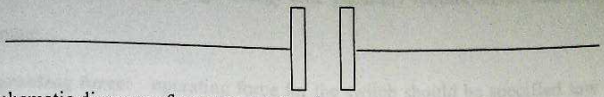


Fig.2.6 schematic diagram of a non-palatalized capacitor (ceramic)

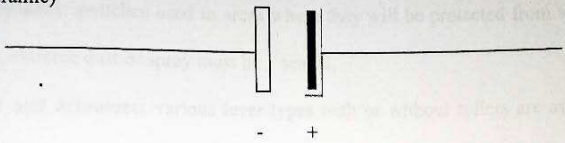


Fig 2.7 Schematic diagram of a polariesd capacitor

The electrolyte capacitor is always operated with a standing D.C voltage across v them, if the voltage is reversed in polarity, the dielectric oxide film will break.

6 SWITCH

A switch is a device that makes or breaks connections is an electrical or electronic circuit. In computing systems, it is also used to make selections; the toggles are usually manually operated but can also work by mechanical, barometric, hydraulic or gravitational means.Switches are frequently customs made to meet the needs of a particular application. Each application usually requires some modification in which movement terminal types, size, electrical/mechanical life or other characteristics.

4.7 SELECTION CRITERIA FOR USING SWITCH

I. **Electrical load**: low voltage, low current application where no arc is likely to occur are best met with gold contacts. For driving of inductive loads, diode suppression across the load will prevent energy discharge across the switch

contacts. High voltage, high-energy load generally require silver cadmium oxides contact.

II. **Operating force:** operating force for the switch should be specified low enough so that it can withstand environmental vibrations.

III. **Environment:** switches used in areas where they will be protected from weather, silicon, extreme dust or spray must be sealed.

IV. **Levers and actuators:** various lever types with or without rollers are available. Buttons should be of a material that can sustain any operations with minimal wear; acetol and nylon are suitable.A mechanically protected switch is incorporated in this circuit. This is because, it is easy to come-by, easy to operate and above all this high resistance and low resistance when the circuit is in the "off" and "on" position respectively.

8 TRANSISTOR

A transistor is a semiconductor device used to control the flow of current through a lead in a circuit. There are two types of transistors: NPN and PNP transistors. The bipolar NPN transistor is the one used in this project. This is shown below

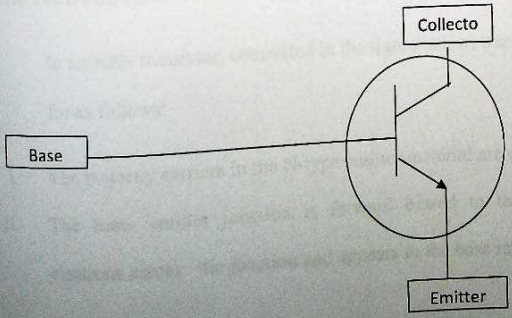


Fig 2.8 a schematic diagram of a bipolar NPN Transistor

NPN BIPPOLAR TRANSISTOR

The bipolar NPN transistor consists of three regions of semiconductors materials. It has two regions of n-type materials and with a very thin layer of p-type material. It consist of two p-junction placed closed to one another in black – to – black arrangement on a single piece of semiconductor material.

Diagram depicting this type of transistors is shown below

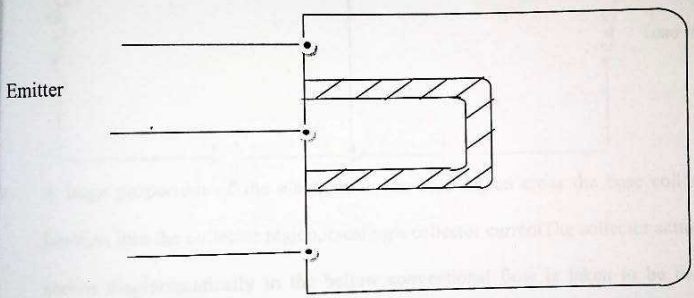


Fig 2.9 Cross section of an NPN bipolar transistor

2.5.0 TRANSISTOR ACTION

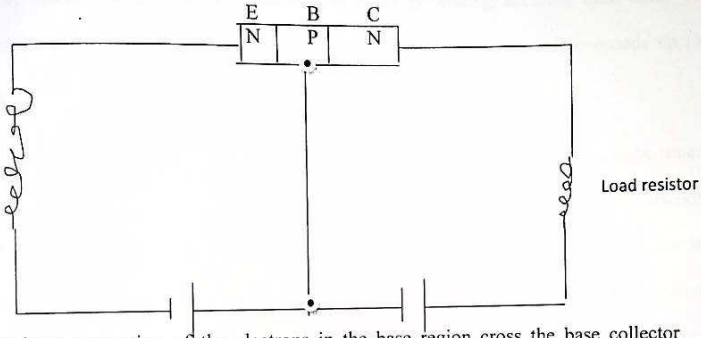
In an NPN transistor, connected in the figure below, transistor action is accounted for as follows;

I. The majority carriers in the N-type emitter material are electrons.

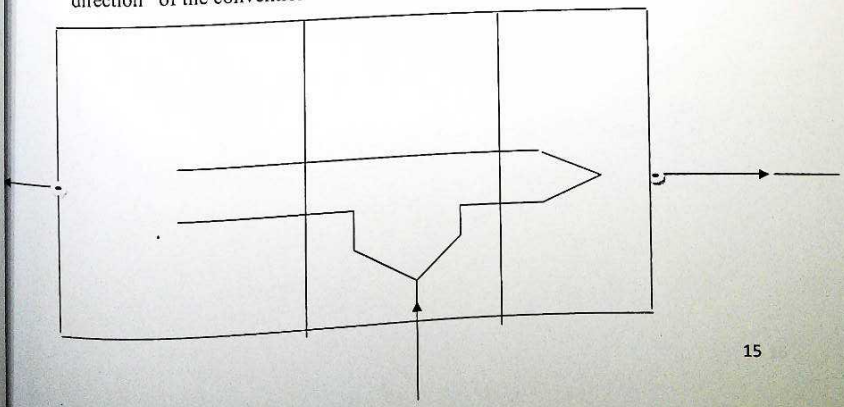
II. The base- emitter junction is forward biased to these majority carriers and electrons across the junction and appears in the base region.

III. The base region is very thin and only lightly doped with holes, so some recombination with hole occurs, but many electrons are left in the base region.

IV. The base collector junction is reversed biased to hole in the base region and electrons in the collector region, but is forward biased to electrons in the base region.



V. A large proportion of the electrons in the base region cross the base collector junction into the collector region, creating a collector currentThe collector action is shown diagrammatically in the bellow conventional flow is taken to be in the direction of hole flow, that is, in the opposite directions to electron flow, hence the direction of the conventional current flow are shown below



Common emitter is so called because as far as alternating is connected, the emitter is common to both input and output terminals. The common emitter is by far the most frequently used which R_1 and R_2 are the base biased resistor

IC555 TIMER

The IC555 Timer is a high stable device for generating accurate time delay or oscillation. The single 555 Timer can operate accurately from microseconds up to seven minutes.

Theoretically, this timing range can be extended indefinitely by cascading the timer packages if a single timer is operating it outer-most limit, the amount of error between the actual and calculated time period increases. By cascading thus error, the factor is reduced. The 555 timer consist of two operation amplifier components, three equal value, and two transistors, switch, a control flip-flop and an output stage as shown below.

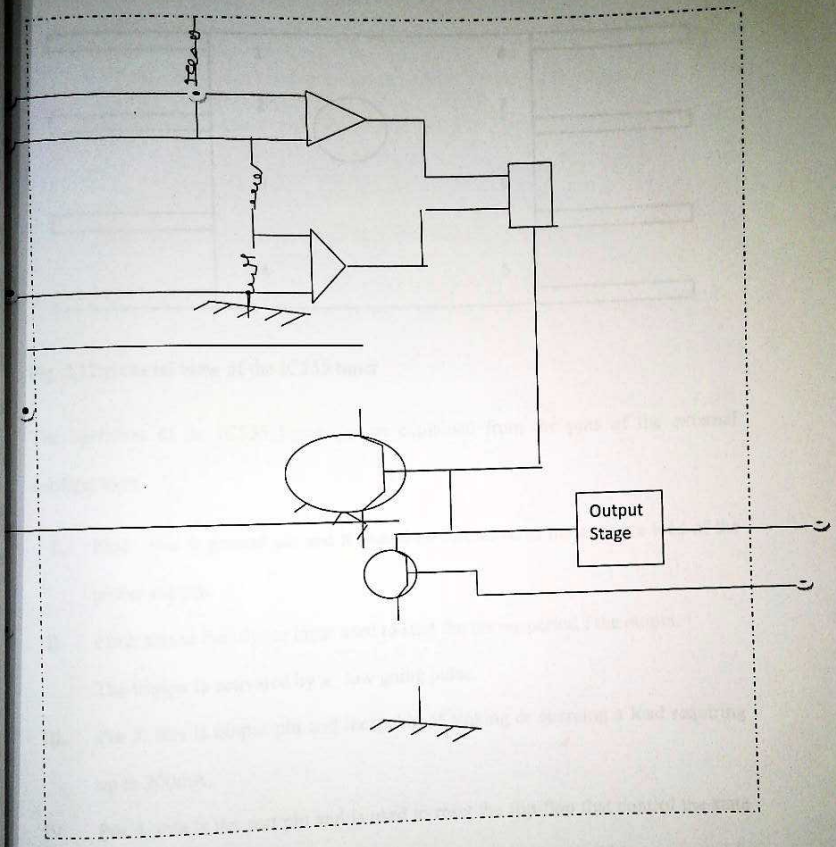


Fig 2.11 the internal configuration structure of an IC555 timer

2.5.2 OPERATION OF AN IC555 TIMER

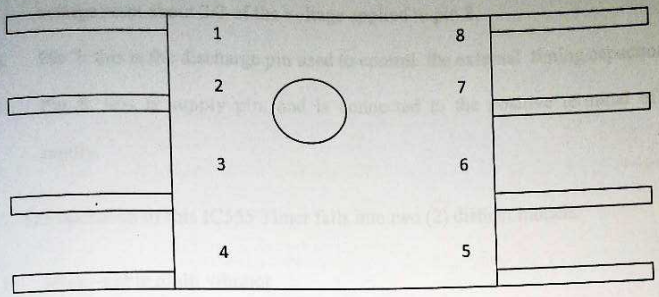


Fig. 2.12 pictorial view of the IC555 timer

The operation of an IC555 timer can be explained from the pins of the external configuration.

I. **Pin1**: this is ground pin and it should be connected to the negative load of the power supply.

II. **Pin2**: this is the trigger input used to start the timing period f the output. The trigger is activated by a low going pulse.

III. **Pin 3**: this is output pin and incapable of sinking or sourcing a load requiring up to 200mA.

IV. **Pin 4**: this is the rest pin and is used to reset the flip-flop that control the state of the output pin 3. If the reset is not required, this pin should be connected in the same point as in pin 8 to avoid accidental resetting.

V. **Pin 5**: this is the control voltage input used to alter the threshold and trigger operating voltage. When not tie to the used tie to the ground.

VI. **Pin 6**: it reset the flip-flop and hence drives the output load if the applied voltage reset about 2/3 of the voltage applied to pin 8.

VII. **Pin 7**: this is the discharge pin used to control the external timing capacitor,

VIII. **Pin 8**: this is supply pin, and is connected to the positive terminal of the supply.

The operation of this IC555 Timer falls into two (2) distinct models:

I. Mono-stable multi vibrator

II. Astable multi vibrator

To base on this project, the IC555 Timer can be explained as a mono stable multi vibrator as shown below:

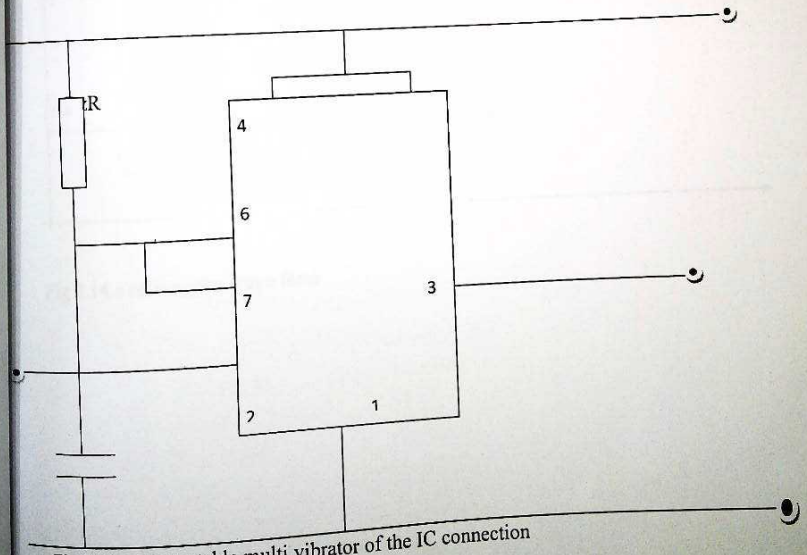


Fig 2.13 a mono stable multi vibrator of the IC connection

The mono –stable multi vibrator produces a single fixed pulse out each time a trigger pulse is applied to pin 2. When the trigger input is slightly less than $+V_{cc3}$, the lower output amplifier has a high output and reset the flip-flop, this cut-off the transistor, allowing the capacitor to charge.

When the threshold voltage is slightly greater than $+V_{cc3}$, the upper output amplifier has a high output, which sets the flip- flop. As soon as Q2 goes high, it turns on the transistor, this quickly discharge the capacitor thereby resulting to on rectangular output as shown below:

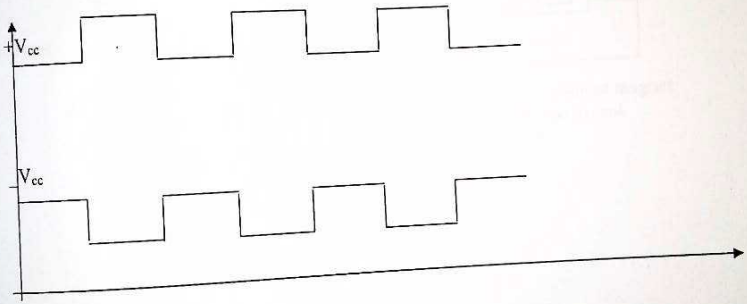


Fig 2.14 a rectangular wave form

LOUD SPEAKER

This is output transducer for conveying electrical audio frequency signal into corresponding sound signal. For this project an 16,15Watts speaker was used. The figure below shows the internal structure of the speaker.

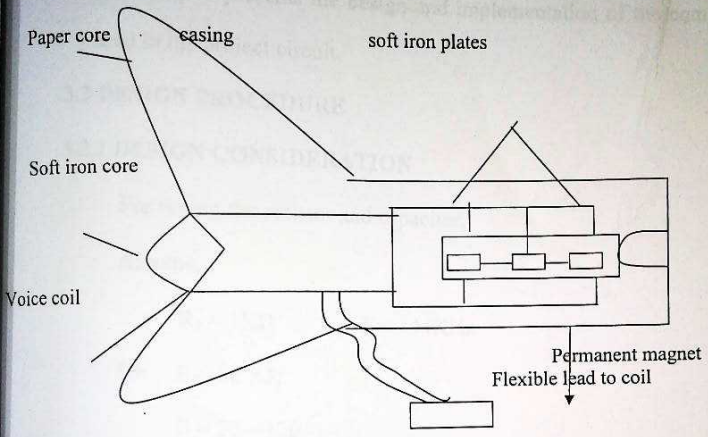


Fig 2.15 A moving coil lever speaker

CHAPTER THREE

3.0 DESIGN AND ANALYSIS

3.1 INTRODUCTION

This chapter presents the design and implementation of the components used in the project circuit.

3.2 DESIGN PROCEDURE

3.2.1 DESIGN CONSIDERATION

For timing the resistor and capacitor,

Assume,

$R_2 = 1K\Omega$ $F = 144KHz$

For R_2 and R3;

$B = 20 - 120$

Assuming $B = 27$, $IC = 1000mA$

$VBE = 0.7v$ for silicon transistor

3.2.2 DESIGN CALCULATION

Frequency, $F = 1/T$

Where $T = 1/F$

ξ $1/144,000 = 0.000006944$ seconds

$T = 0.69R_1C_1$

And $C_1 = T/R_1 \times 0.69$

ξ $0.000006944/1000 \times 0.69 = 0.000006944/690$

$= 0.00000001F$

$= 0.01uF$

$V_{CC} = V_{BE} + 1_B R_E$

$1_B = I_C/B$

ξ $1000 \times 10^{-3}/27$

$= 0.0370A$

$R_E = V_{CC} - V_{BE}/1B$

ξ $9 - 0.7/0.0370 = 224.3\Omega$

The nearest standard value is 220Ω

$R_4 = 220v$

$Vcc = 9v$

$V_{CE} = 4.5v$

$Vcc = V_{CE} + I_C R_C$

$Rc = Vcc - V_{CE}/Ic$

$= 9 - 4.5/1000 \times 10^{-3}$

$= 4.5/1000 \times 10^{-3}$

$= 4.5\Omega$

While the nearest value is 10Ω

$R_5 = 10\Omega$

From, T =RC

C = T/R

3.2.3 IN SELECTING A POLARIZED CAPACITOR

If Io = t/div = 200mA. i.e for half cycle.

Then for full cycle it will be 400mA

From $C = T/R \Rightarrow 400 \times 10^{-3}/330 = 0.00121212$

$= 0.001$

C = 1000uf

3.2.4 IN SELECTING A TRANSFORMER

The point of consideration includes the required output voltage (Vo) and the maximum output current (Io). Since it is required to switch on the circuit with a 9v expected output, voltage shall be 9.3v maximum output current shall be 200mA and 100mA for turning "ON" the transistor.

Therefore, Vo = 9.3v

Io = 200mA

From the above voltage and current, the secondary of the transformer can be determined for a full-wave rectifier.

Therefore from our equations:

Vs = 0.87Vo but Vo = 9.3v

$Vs = 0.87 \times 9.3 = 8.091v$

Also $Is = 2.3Io$ but $Io = 200mA$

$Is = 2.3 \times 200 \times 10^{-3} = 0.46A$

$Vs + Is \Rightarrow 8.091 + 0.46 = 8.55 = \underline{8.6A}$

3.2.5 IN SELECTING A DIODE

We are expected to consider or keep in mind that (a) $Prv = 2Vo$; and (b) the maximum forward current.

This implies that the peak reverse voltage (Prv) of the diode to be use must have at least or be twice the output voltage i.e $Prv = 2Vo \Rightarrow 2 \times 9.3 = 18.6v$.

The maximum forward current I_f = output current Io = 200mA

3.2.6 IN SELECTING FILTER-CAPACITOR (POLARIZED CAPACITOR)

The time taken for the device to discharge is taken into consideration. A switching time is required in the circuit and therefore time constant: $T = Rc$ is employed.

T = time taken for one complete cycle

Io = 200mA

R = load resistance = 330Ω

3.3 COMPONENT SELECTION DATA

In the design and construction of this project "an automatic AC/DC water level detector", the following components were used.

S/N	COMPONENTS	VALUES
1	Capacitor (C_1)	1000uf, 16v
2	Capacitor (C_2)	0.1uf
3	Resistor (R1)	220Ω
4	Resistor (R_2)	1K Ω
5	Resistor (R_3)	120 Ω
6	Resistor (R_4)	220Ω
7	Resistor (R_5)	10 Ω
8	Resistor (R6)	220 Ω
9	Transistor (Q_1)	3904
10	IC type	555 Timer
11	Loud speaker	
12	Power ON/OFF toggle switch	
13	Regulator	7806
14	Rechargeable battery	6v
15	Diode (D_1)	IN4001
16	Diode (D_2)	IN4001
17	Diode (D_3)	IN4001
18	Transformer (T-1)	240/9v

CHAPTER FOUR

4.0 CONTRUCTION, TESTING AND RESULT

4.1 INTRODUCTION

This chapter presents the construction and the testing that was carried out on the project, the result that was obtained, the discussion and the casing construction.

4.2 CONSTRUCTION

The construction of the automatic A.C/D.C water level detector circuit is as follows: One of the terminals from the main was tapped with the switch before going into the transformer while the other terminal was then tapped with the transformer then at the output of the transformer; there are three (3) terminals (two positives and a neutral). The positive terminals each was tapped with a diode (D) of value N400l. the positive terminals of these diodes was soldered with the regulator the (in) terminal, the middle terminal of the regulator which is the (com) was soldered with the negative terminal of the circuit which came from the transformer and the leg of the circuit. The regulator has a value of 5806. There is a capacitor of 1000uF/16V which is used to filter the current going into the circuit.

The positive terminal of the capacitor was soldered with the positive side of the circuit and the other terminal was soldered with the negative part

of the circuit. After the capacitor there is an LED diode which indicates A.C source in the circuit. One terminal of the LED was soldered with a resistor of value 220Ω which resists any current from damaging the LED, then the other terminal of the resistor was soldered with the positive line of the circuit and the other terminal of the diode was soldered with negative line of the circuit. Along the positive line there is a diode of N4001 which prevent current from the battery going/reversing backward.

Resistor (R_2) of value 1KΩ was soldered with one terminal of the resistor (R3) of value 120Ω, the other terminal of R2 was soldered with positive line of the circuit, then the other terminal of R3 was soldered with pin 6 of the IC555 timer also with one of the probe. Then in between the R2 and R3 there tapped with pin 7 of IC555. pin 2 of IC was soldered with the other probe and one terminal of the capacitor was soldered with the negative line of the circuit. Pin 1 was soldered with the negative line of the circuit, pin 4 and 8 were joined together and was soldered with one terminal of a resistor, valued 220Ω which the other terminal of the resistor was soldered with the base terminal of a transistor, valued 3904, the Emitter was soldered with the negative line of the circuit and the collector was soldered with one terminal of the speaker, the terminal of the speaker was soldered with a terminal of a resistor 10Ω which the other terminal of the resistor was soldered with the positive line of the circuit.

There is an opening along the positive line, which one part was soldered with the TOGGLE switch and also the other part was soldered with the switch and then passed to the positive terminal of the wet battery; along the line, there is an LED which indicates the functions of the battery. This LED's one terminal of the resistor was soldered with the positive line and the other terminal of the LED was soldered with the negative line of the circuit. The LED was/is connected in parallel with the battery.

As the process progress, digital multi-meter was used to test each stage Before all the above process, the components of the circuit were firstly mounted on a bread board to test for reliability and mode of their operations.

4.3 TEST AND RESULTS

After the soldering, the battery (6V) was incorporated and the switch (sw) was closed. The two probes were extended and brought into water. When the probes came in contact with the water, the device produced sound which can be heard continuously at the speaker and the same process/steps did to the A.C source, as it was plough to the mains, then switched "ON" the device produces that same sound.

Why this circuit is called "an automatic A.C/D.C water level detector" is because it has two sources, one is the A.C source and the other one is the

D.C source battery. When using the A.C, the battery will keep on charging immediately when the AC is off then the battery will carry on the process.

The red LED indicates AC source and the green LED indicates the battery.

4.4 DESIGN OF THE CASING

The casing (structure) of the water detector is made up of wooden plain (plank) that have been cut into the required size and specific measurement, smoothed and rapped to give it a fine-finished look. It is fitted with an "ON" and "OFF" switch (toggle switch) and two probes.

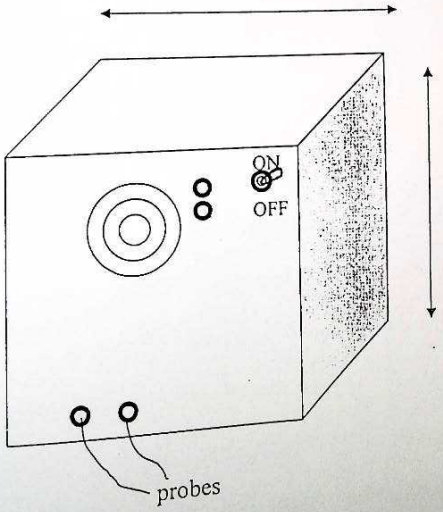


Fig 4.1 Casing of the Automatic A.C/ D.C water level detector

4.5 TOOLS AND MATERIAL USED

The following tools and materials were used to achieve the sources of the construction of the casing.

i. Multimeter
ii. Soldering iron and tin lead
iii. Pairs of pliers
iv. Screw driver
v. Jumper wires
vi. Saw
vii. Nails
viii. Hammer
ix. Drill
x. Tri square
xi. Chisel
xii. Tape

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The main aim of this automatic water level detector (A.C/D.C) is to detect the presence of water at the rim of water tank when pumping the water to avoid overflow or spillage. It also found application in water resources management. The system is designed to operate immediately to trigger an alarm that makes a loud alarming sound indicating the presence of water when the probes come in contact with water. By constructing more of this circuit to be installed in houses, this will help to reduce water spillage or wastage when pumping water/liquid in a tank (reservoir).

5.2 RECOMMENDATION

The circuit of this automatic water level detector can be attached with an amplifier circuit in order to amplify the output of the speaker with greater sound. It can also be produce in-mass for the commercial purposes to generate revenue for the school from the department.

For automatic control of water pumping system, the pumping machine should be fitted with sound de-activated switch which will switch the

pumping machine "OFF" whenever the switch senses the alarming sound from the speaker.

A dry cell can also be use in place of the A.C to D.C source and wet cell source which supplies this circuit of the project for simple construction and for a cheaper rate.

It can also be constructed with hanger which it can be simply be hang on pole and also with pulley which it will be easier to adjust the probes.

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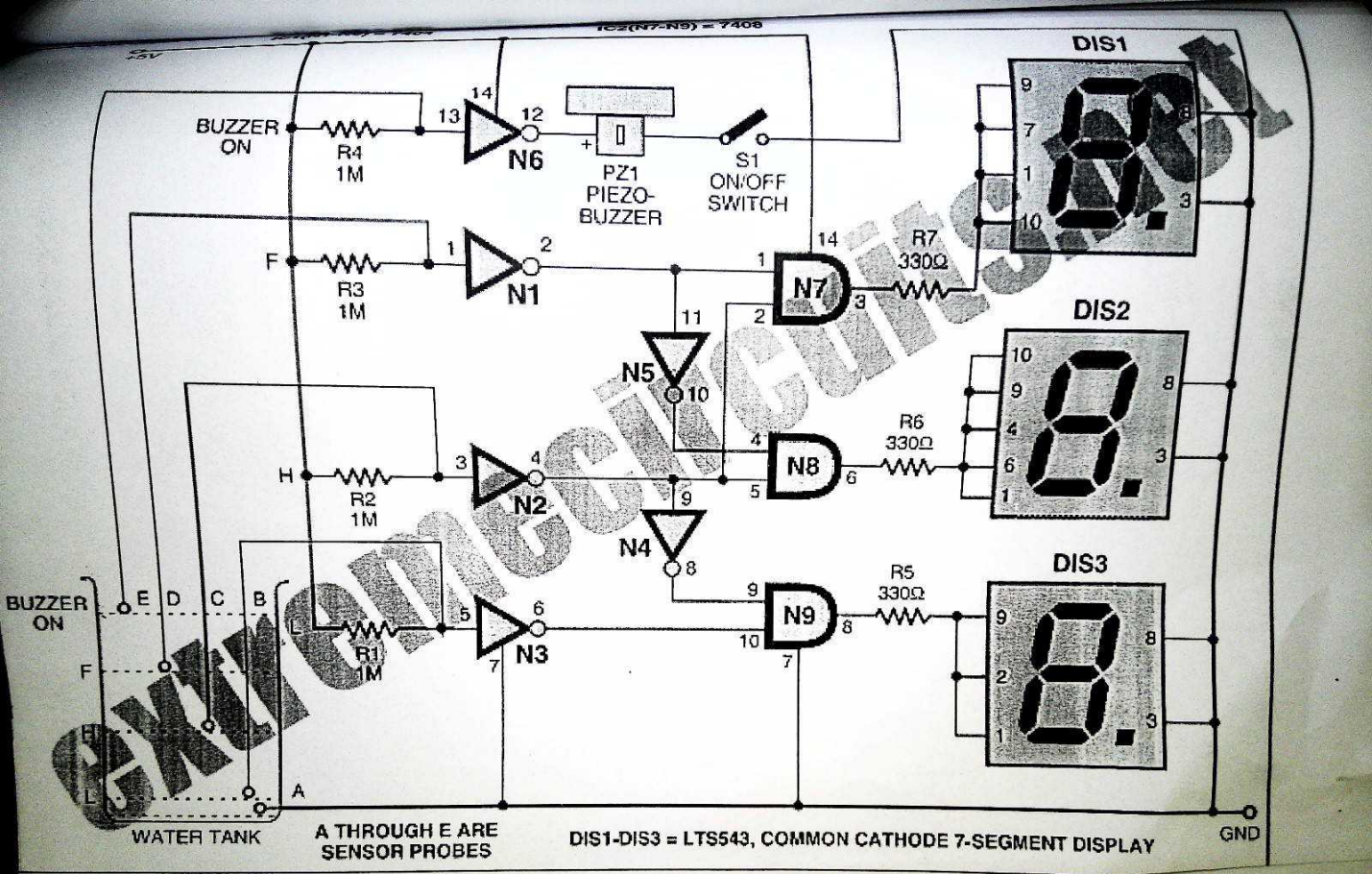
IC2(N7-N9) = 7408
+5V
BUZZER ON
R4 1M
13
14
12
N6
PZ1 PIEZO-BUZZER
S1 ON/OFF SWITCH
DIS1
F
R3 1M
1
2
N1
14
1
N7
R7 330Ω
3
2
11
N5
10
DIS2
H
R2 1M
3
4
N2
4
5
N8
6
R6 330Ω
9
N4
8
DIS3
BUZZER ON
E
D
C
B
F
B
L
R1 1M
5
6
N3
7
9
10
N9
8
R5 330Ω
7
A
WATER TANK
A THROUGH E ARE SENSOR PROBES
DIS1-DIS3 = LTS543, COMMON CATHODE 7-SEGMENT DISPLAY
GND