NEAR EAST UNIVERSITY

Faculty of Engineering

Department of Electrical and Electronic Engineering

Designing Of Steam and lighting Alarm system

Graduation Project
EE 400

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IN THE NAME OF ALLAH, MOST GRACIOUS, MOST MERCIFUL.

I wish to express my deepest appreciation to my **ALLAH** who stood beside me all the time,who supported me in all my achievements and who has given me the power and patience to finish my college studies successfully.

I dedicate my work and my success to my great parent, individualizing my father **KHALID DAOUD**, my whole family and my friends who provided me the encouragement and assistance that have made and making the completion of this work possible and I hope them success and happiness in life.

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ABSTRACT

As the life is getting more complicated, every one is this world searches for the safety for his environment and that leads to designing some protection instruments such as alarm systems.

One of these alarms system is steam alarm and lighting alarm which are consider as an important tools in our life to give us in the protection and safety.

First the steam alarm system, its simple circuit that is designed to feel the sensitivity of vapours which makes a small electrical current which passes through a conductive medium when it comes in to contact with both probes that leads to operate the alarm system.

For the lighting alarm system which is a bit complicated circuit as it includes many sensitive instruments especially light sensing element (l.d.r) which is designed to act as high resistances under dark conditions and as low resistance when brightly illuminated, the operation of the (l.d.r) reaches the circuit to unbalanced level so it turns on and activates the alarms.

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Introduction

Generally, electronic security alarm systems are recognized in all the world as an important contributor to the securing of life, property and possessions. A security system is an effective tool when used in conjunction with other sensible, overall crime prevention measures. Independent studies clearly show that premises with alarm systems are less likely to be broken into. As illustrated by these studies, electronic alarm systems, without question, contribute to a safer environment for you and your family. An alarm system is installed to deter and detect intruders. A basic security system will consist of both perimeter and space protection to secure your premise. The first stage secures vulnerable perimeter access points such as doors and windows; the second stage consists of space detection such as interior motion detectors which monitor movement inside the premise. The level of security you purchase is determined by the number of protective devices and the sophistication of the system you will have installed.

In this project we are designing simple alarm systems such as steam alarm system and lighting alarm system which has a lot of application in our real life.

Chapter one will represent components which will be used in building the circuits of the alarms, their characteristics, properties and functions will also be discussed. Also safety guidelines, which must be kept in mind when working on electronic projects, will be described.

Chapter two will represents the hardware approach in detail the operation of the circuit, starting with the input and how it is processed, through each component until it is ready to leave the circuit as a sound. (alarm).

CHAPTER ONE

ELECTRONIC COMPONENTS

1.1 Overview

This chapter presents an introduction to electronic components that are commonly used in hardware projects. Safety guidelines for electronic projects will also be described.

1.2 Components

In this section a detailed explanation will be given for each hardware component used in setting up the electronic circuit.

1.3 Resistors

Resistors are electronic components used extensively on the circuit boards of electronic equipment. Resistors are usually used to limit current.

Resistors are electronic components used extensively on the circuit boards of electronic equipment. They are color coded with stripes to reveal their resistance value (in ohms) as well as their manufacturing tolerance.

Resistors, like diodes and relays, are another of the electrical components that should have a section in the installer's parts bin. They have become a necessity for the mobile electronics installer, whether it is for door locks, timing circuits, remote starts, or just to discharge a stiffening capacitor.

Resistors are components that resist the flow of electrical current. The higher the value of resistance (measured in ohms) the lower the current will be.

Resistors are color coded to read the color code of a common 4 band 1K ohm resistor with a 5% tolerance, start at the opposite side of the GOLD tolerance band and read from left to right. Write down the corresponding number from the color chart below for the 1st color band BROWN. To the right of that number, write the corresponding number for the 2nd band BLACK. Now multiply that number (you should have 10) by the corresponding multiplier number of the 3rd band (RED) (100). Your answer will be 1000 or 1K. As shown in figure 1.1

If a resistor has 5 color bands, write the corresponding number of the 3rd band to the right of the 2nd before you multiply by the corresponding number of the multiplier band. If you only have 4 color bands that include a tolerance band, ignore this column and go straight to the multiplier.

The tolerance band is usually gold or silver, but some may have none. Because resistors are not the exact value as indicated by the color bands, manufactures have included a tolerance color band to indicate the accuracy of the resistor. Gold band indicates the resistor is within 5% of what is indicated. Silver = 10% and None = 20%. Others are shown in the chart below. The 1K ohm resistor in the example above, may have an actual measurement any where from 950 ohms to 1050 ohms. If a resistor does not have a tolerance band, start from the band closest to a lead. This will be the 1st band. If you are unable to read the color bands than you'll have to use your multimeter. Be sure to zero it out first [7].

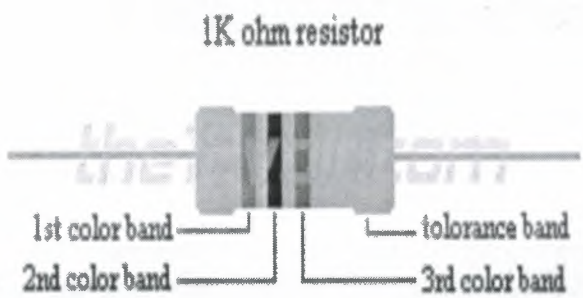


Figure1.1 Resistor.

How to read resister color codes:

Table 1.1 Resistor color code.

Band Color	1st Band #	2nd Band #	*3rd Band #	Multiplier x	Tolerances ± %
Black	0	0	0	1	
Brown	1	1	1	10	± 1%
Red	2	2	2	100	± 2 %
Orange	3	3	3	1000	
Yellow	4	4	4	10,000	
Green	5	5	5	100,000	± 0.5 %
Blue	6	6	6	1,000,000	± 0.25 %
Violet	7	7	7	10,000,000	± 0.10 %
Grey	8	8	8	100,000,000	± 0.05 %
White	9	9	9	1,000,000,000	
Gold				0.1	± 5 %
Silver				0.01	± 10 %
None					± 20 %

1.3.1 Types of Resistor

- **Carbon film resistor:** cheap general purpose resistor, works quite well also on high frequencies, resistance is somewhat dependent on the voltage over resistor (does not generally have effect in practice).

- ***Composite resistor:*** *usually some medium power resistors are built in this way. Has* low inductance, large capacitance, poor temperature stability, noisy and not very good long time stability. Composite resistor can handle well short overload surges.

- **Metal film resistor:** good temperature stability, good long time stability, cannot handle overloads well.

- **Metal oxide resistor:** mostly similar features as metal film resistor but better surge handling capacity, higher temperature rating them metal film resistor, low voltage dependently, low noise, better for RF than wire wound resistor but usually worse temperature stability

- **Thick film resistor:** similar properties as metal film resistor but can handle surges better, and withstand high temperatures,
- **Thin film resistor:** good long time stability, good temperature stability, good voltage dependently rating, low noise, not good for RF, low surge handling capacity.

- **Wire wound resistor:** used mainly for high power resistors, can be made curate for measuring circuits, high inductance because consists of wound wire.

1.3.2 Variable Resistors

Variable resistors consist of a resistance track with connections at both ends and a wiper which moves along the track as you turn the spindle. The track may be made from carbon, cermets (ceramic and metal mixture) or a coil of wire (for low resistances). The track is usually rotary but straight track versions, usually called sliders, are also available. Variable resistors may be used as a rheostat with two connections (the wiper and just one end of the track) or as a potentiometer with all three connections in use. Miniature versions called presets are made for setting up circuits which will not require further adjustment. Variable resistors are often called potentiometers in books and catalogues. They are specified by their maximum resistance, linear or logarithmic track, and their physical size. The standard spindle diameter is 6mm. The resistance and type of track are marked on the body

- **4K7 LIN** means 4.7 kΩ linear track.

- **1M LOG** means 1 MΩ logarithmic track.

Some variable resistors are designed to be mounted directly on the circuit board, but most are for mounting through a hole drilled in the case containing the circuit with stranded wire connecting their terminals to the circuit board.

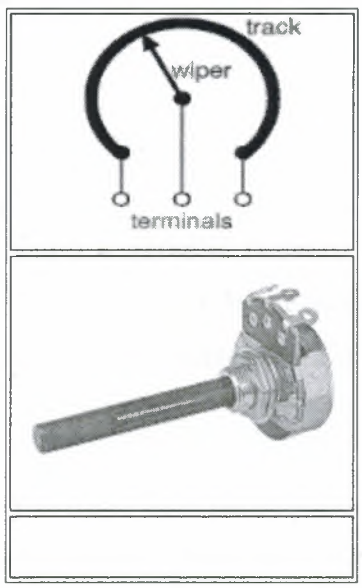


Figure1.2 Standard Variable Resistor

1.3.3 Linear (LIN) and Logarithmic (LOG) tracks

Linear (LIN) track means that the resistance changes at a constant rate as you move the wiper. This is the standard arrangement and you should assume this type is required if a project does not specify the type of track. Presets always have linear tracks.

Logarithmic (LOG) track means that the resistance changes slowly at one end of the track and rapidly at the other end, so halfway along the track is not half

The total resistance! This arrangement is used for volume (loudness) controls because the human ear has a logarithmic response to loudness so fine control (slow change) is required at low volumes and coarser control (rapid change) at high volumes. It is important to connect the ends of the track the correct way round, if you find that turning the spindle increases the volume rapidly followed by little further change you should stop the connections to the ends of the track.

1.3.4 Rheostat

This is the simplest way of using a variable resistor. Two terminals are used one connected to an end of the track, the other to the moveable wiper. Turning the spindle changes the resistance between the two terminals from zero up to the maximum resistance.

Rheostats are often used to vary current, for example to control the brightness of a lamp or the rate at which a capacitor charges. If the rheostat is mounted on a printed circuit board you may find that all three terminals are connected! However, one of them will be linked to the wiper terminal. This improves the mechanical strength of the mounting but serves no function electrically

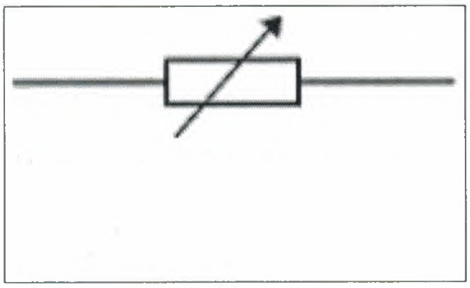


Figure1.3 Rheostat Symbol

1.3.5 Potentiometer

Variable resistors used as potentiometers have all three terminals connected. This arrangement is normally used to vary voltage, for example to set the switching point of a circuit with a sensor, or control the volume (loudness) in an amplifier circuit. If the terminals at the ends of the track are connected across the power supply then the wiper terminal will provide a voltage which can be varied from zero up to the maximum of the supply.

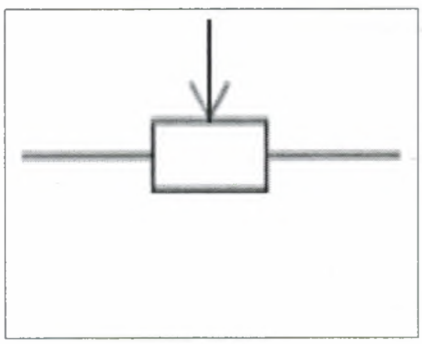


Figure1.4 Potentiometer Symbol

1.3.6 Presets

These are miniature versions of the standard variable resistor. They are designed to be mounted directly onto the circuit board and adjusted only when the circuit is built. For example to set the frequency of an alarm tone or the sensitivity of a light-sensitive circuit. A small screwdriver or similar tool is required to adjust presets.

Presets are much cheaper than standard variable resistors so they are sometimes used in small circuit where a standard variable resistor would normally be used.

Multiunit presets are used where very precise adjustments must be made. The screw must be turned many times (10+) to move the slider from one end of the track to the other, giving very fine control.

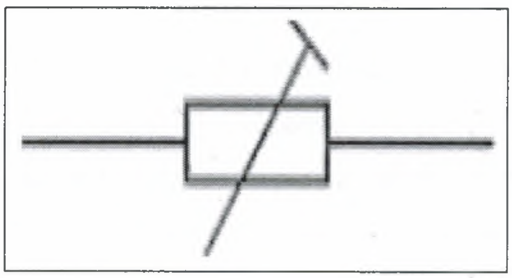


Figure1.5 Preset Symbol

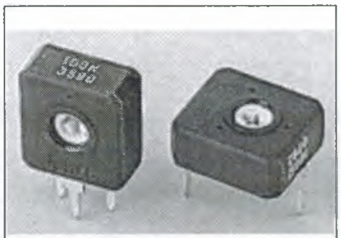
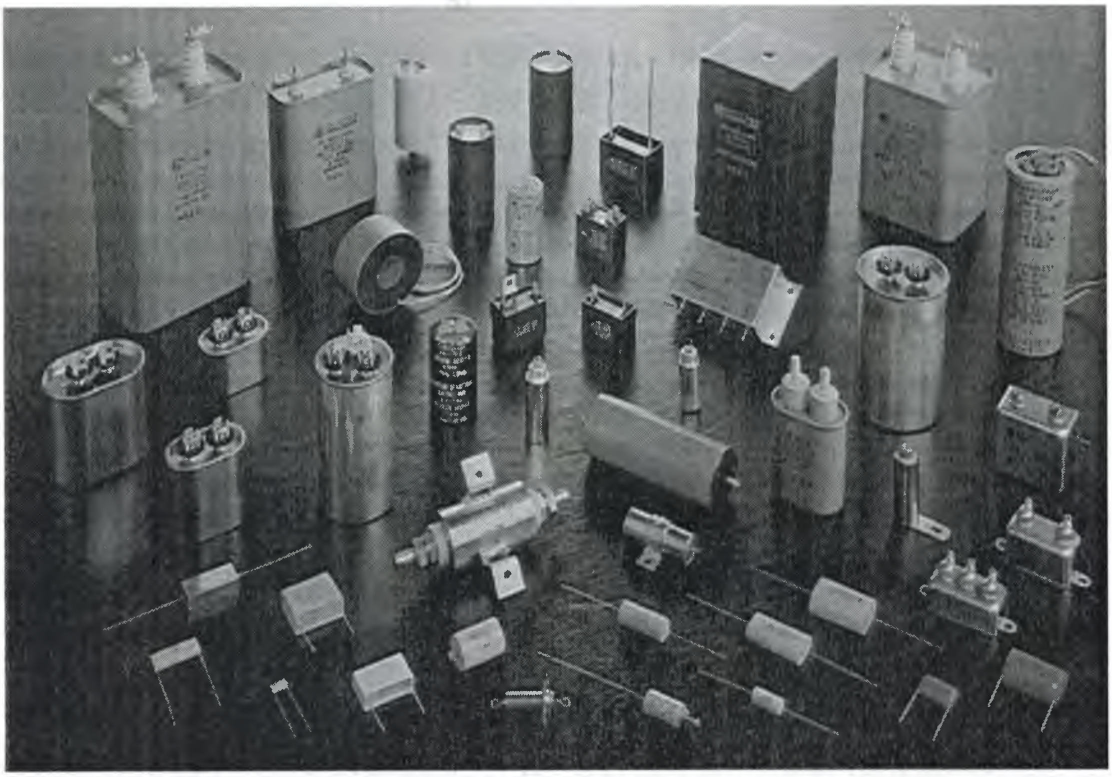
		
Preset (open style)	Presets (closed style)	Multi turn preset

Figure1.6 Types of Preset

1.4 Capacitors

A capacitor is an electronic device which consists of two plates (electrically conductive material) separated by an insulator. The capacitor's value (its 'capacitance') is largely determined by the total surface area of the plates and the distance between the plates (determined by the insulator's thickness). A capacitor's value is commonly referred to in microfarads, one millionth of a farad. It is expressed in micro farads because the farad is such a large amount of capacitance that it would be impractical to use in most situations. In figure 1.7 shown the types of capacitors [2].



. **Figure1.7** Types of capacitors.

1.4.1 Capacity

This analogy should help you better understand capacity. In the following diagram (Figure 1.8), you can see 2 tanks (capacitors) of different diameter (different capacitance). You should readily understand that the larger tank can hold more water (if they're filling to the same level (voltage)). The larger capacitor has more area in which to store water. Just as the larger capacitor's larger plate area would be able to hold more electrons.

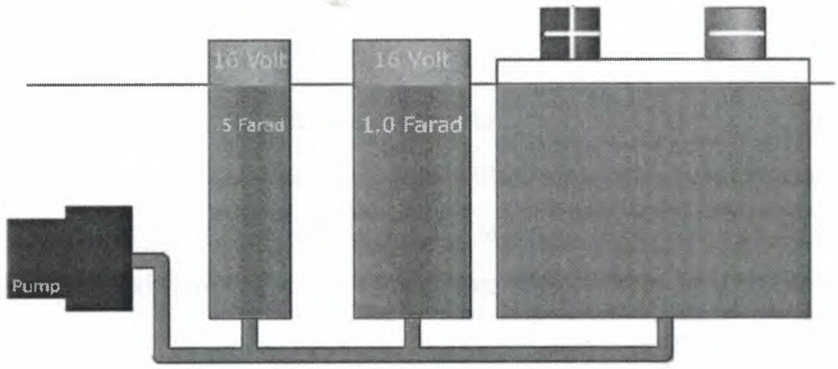


Figure 1.8 Capacities.

1.4.2 Capacitor and DC voltage

When a DC voltage source is applied to a capacitor there is an initial surge of current, when the voltage across the terminals of the capacitor is equal to the applied voltage, the current flow stops. When the current stops flowing from the power supply to the capacitor, the capacitor is 'charged'. If the DC source is removed from the capacitor, the capacitor will retain a voltage across its terminals (it will remain charged). The capacitor can be discharged by touching the capacitor's external leads together. When using very large capacitors (1/2 farad or more) in your car, the capacitor partially discharges into the amplifier's power supply when the voltage from the alternator or battery starts to fall. Keep in mind that the discharge is only for a fraction of a second. The capacitor can not act like a battery. It only serves to fill in what would otherwise be very small dips in the supply voltage [2].

1.4.3 Capacitors and AC voltage

Generally, if an AC voltage source is connected to a capacitor, the current will flow through the capacitor until the source is removed. There are exceptions to this situation and the A.C. current flow through any capacitor is dependent on the frequency of the applied A.C. signal and the value of the capacitor.

1.5 Semiconductor

Semiconductor has a large amount of types. Transistors have three lead-out wires are called the base, emitter and conductor. It is essential that these are connected correctly, as there is no chance of project working if they are not. Fortunately modern transistors are not easily damaged, and incorrect connection is not likely to damage a device (or other components in the circuit) only one type is used in this project.

1.5.1 Diodes

Diodes are non-linear circuit elements. It is made of two different types of semiconductors right next to each other. Qualitatively we can just think of an ideal diode has having two regions: a conduction region of zero resistance and an infinite resistance non-conduction region. For many circuit applications, the behavior of a (junction) diode depends on its polarity in the circuit. If the diode is reverse biased (positive potential on N-type material) the current through the diode is very small. The following figure is shown the characteristic of diode.

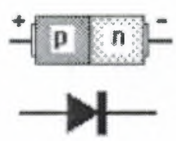


Figure 1.9 Diode.

- **Forward Biased P-N Junction:** forward biasing the **p-n junction** drives holes to the junction from the **p-type** material and electrons to the junction from the **n-type** material. At the junction the electrons and holes combine so that a continuous current can be maintained.

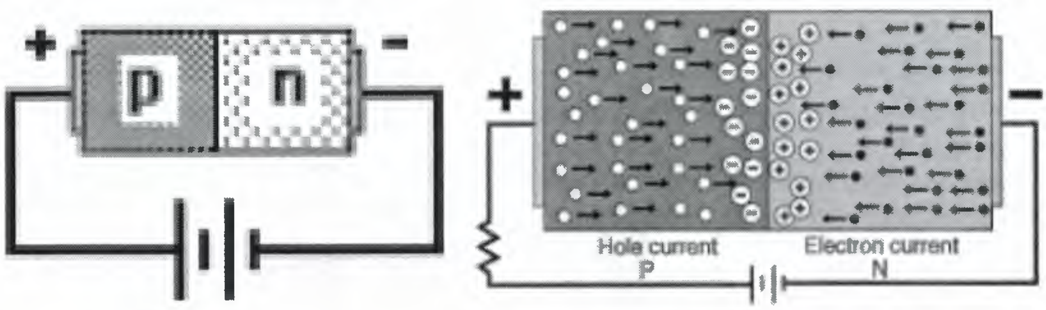


Figure 1.10 Forward Biased P-N Junction

- **Reverse Biased P-N Junction:** the application of a reverse voltage to the **p-n junction** will cause a transient current to flow as both electrons and holes are pulled away from the junction. When the potential formed by the widened depletion layer equals the applied voltage, the current will cease except for the small thermal current [3].

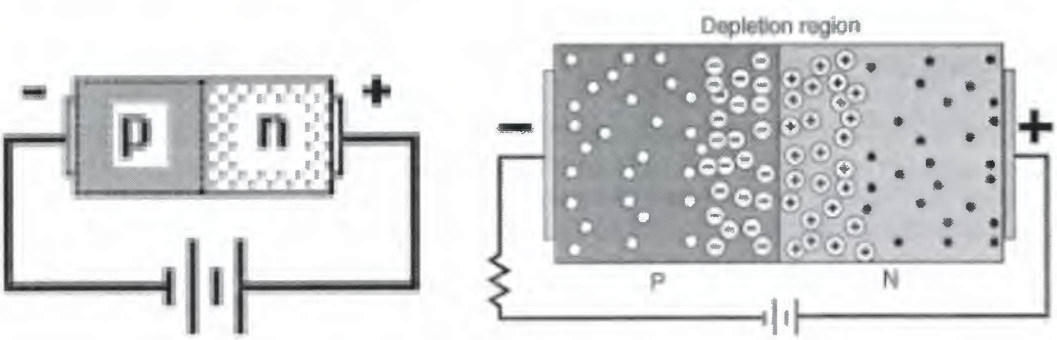


Figure 1.11 Reverse Biased P-N Junction

1.5.2 Transistors

A Bipolar Transistor essentially consists of a pair of PN Junction Diodes that are joined back-to-back. This forms a sort of a sandwich where one kind of semiconductor is placed in-between two others. There are therefore two kinds of bipolar sandwich, the NPN and PNP varieties. The three layers of the sandwich are conventionally called the Collector, Base, and Emitter. The reasons for these names will become clear later once we see how the transistor works. As shown in the figure 1.12 there are two symbol of type of bipolar transistors.

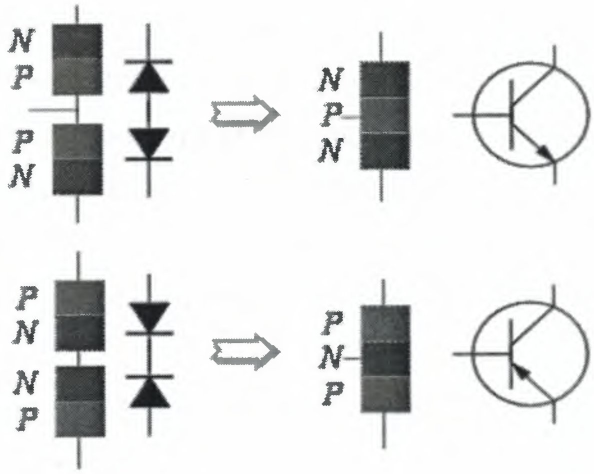


Figure 1.12 Symbol of NPN and PNP transistors.

Some of the basic properties exhibited by a Bipolar Transistor are immediately recognizable as being diode-like. However, when the 'filling' of the sandwich is fairly thin some interesting effects become possible that allow us to use the Transistor as an amplifier or a switch. To see how the Bipolar Transistor works we can concentrate on The NPN variety. The figure 1.13 shows the energy levels in an NPN transistor.

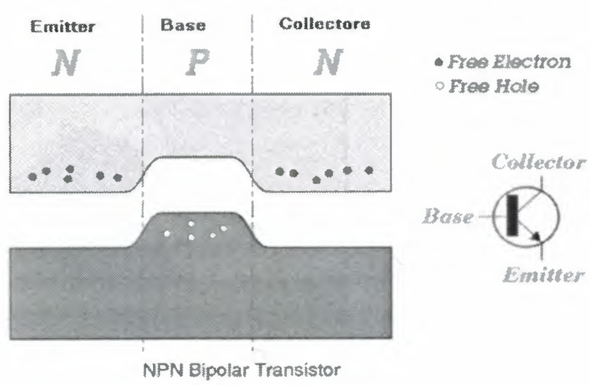


Figure 1.13 the energy levels in an NPN transistor.

Figure 1.13 shows the energy levels in an NPN transistor when we aren't externally applying any voltages. We can see that the arrangement looks like a back-to-back pair of PN Diode junctions with a thin P-type filling between two N-type slices of 'bread'. In each of the N-type layers conduction can take place by the free movement of electrons in the conduction band. In the P-type (filling) layer conduction can take place by the movement of the free holes in the valence band. However, in the absence of any externally applied electric field, we find that depletion zones form at both PN-Junctions, so no charge wants to move from one layer to another [3].

Consider now what happens when we apply a moderate voltage between the Collector and Base parts of the transistor. The polarity of the applied voltage is chosen to increase the force pulling the N-type electrons and P-type holes apart. (I.e. we make the Collector positive with respect to the Base.) This widens the depletion zone between the Collector and base and so no current will flow. In effect we have reverse-biased the Base-Collector diode junction. The precise value of the Base-Collector voltage we choose doesn't really matter to what happens provided we don't make it too big and blow up the transistor! So for the sake of example we can imagine applying a 10 Volt Base-Collector voltage. As shown in the figure 1.14 the applying collector-base voltage.

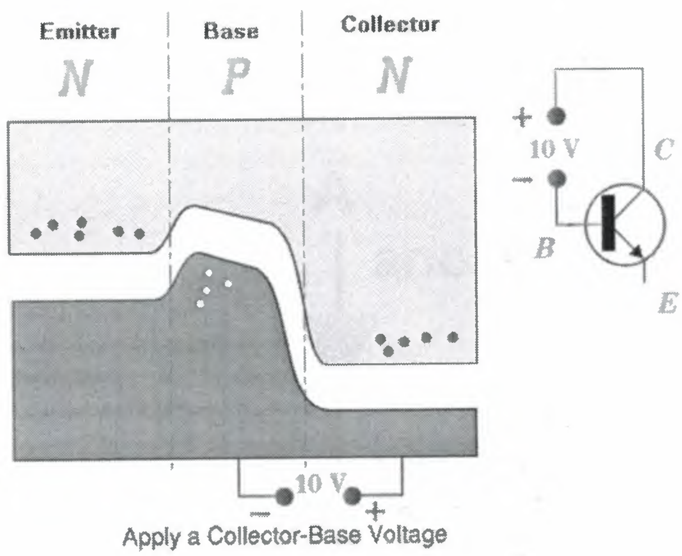


Figure 1.14 the applying collector-base voltage.

1.5.3 The Thyristors

A thyristors is an electronic switch it's also known as the silicon controlled rectifier (S.C.R.). , it's similar to a diode, but where in instant of condition can be controlled. Like diode possesses an anode and cathode, plus third terminal called agate (figure 1.15).if the gate is connected to the cathode, the thyristors will not conduct, even if the anode positive. The thyristors is said to be blocked figure (figure 1.16).to initiate conduction, to conditions have to be met:

a) The anode must be positive

b) Current Ig must flow into the gate for at least a few microsecond .in practices;

The current is injected by applying a short positive voltage pulse Eg to the gate (figure 1.16). In some applications, it is useful to prolong the pulse for several milliseconds .as soon as conduction starts, the gate losses all further control. conduction will only stop when anode current I falls to zero, after which the gate again exerts control .basically, thyristors behaves the same the diode does except that the gate enables us to initiate conduction precisely when we want to .this seemingly slight advantage is profound important .it enables us not only to convert ac power into dc but also to do the reverse convert dc power into ac power.

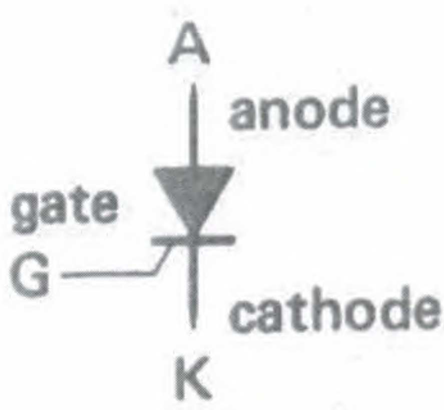


Figure 1.15 the Thyristors

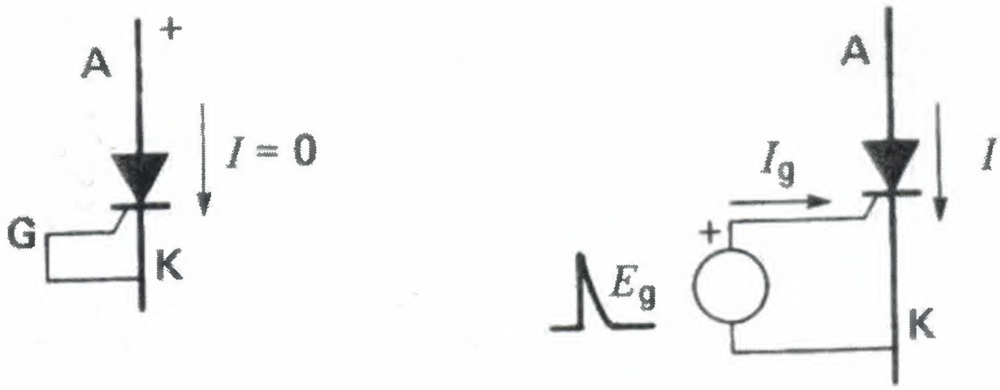


Figure 1.16 operations of the thyristors

1.6 Light Dependent Resistor (LDR)

An LDR is an input transducer (sensor) which converts brightness (light) to resistance. It is made from cadmium sulphide (CDS) and the resistance decreases as the brightness of light falling on the LDR increases. A millimeters can be used to find the resistance in darkness and bright light; these are the typical results for a standard LDR:

- **Darkness**: maximum resistance, about 1MΩ.
- **Very bright light**: minimum resistance, about 100Ω.

This is about 13mm diameter. Miniature LDRs are also available and their diameter is about 5mm. A variety of light-operated alarms are described in this section, and all use l.d.r. As a light-sensing element. An act as a high resistance under dark conditions and as a low resistance when brightly illuminated. All types will work with almost any l.d.r. with face diameters in the range 1/8 in to1/2 in; no precise l.d.r. types are thus specified in these circuits; notes on l.d.r.

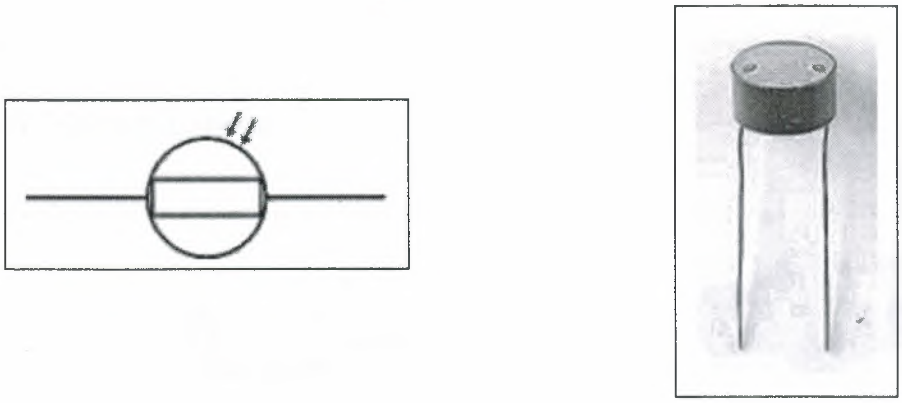


Figure 1.17 Light Dependent Resistors (LDR)

1.7 Switches

1.7.1 (ON)-OFF Push-to-make

A push-to-make switch returns to its normally open (off) position when you release the button, this is shown by the brackets around ON. This is the standard doorbell switch.

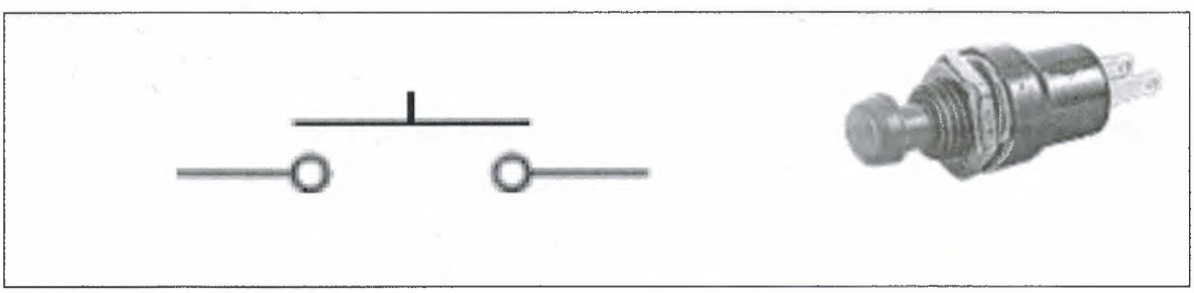


Figure 1.18 Push-to-make switches

1.7.2 ON-(OFF) Push-to-break

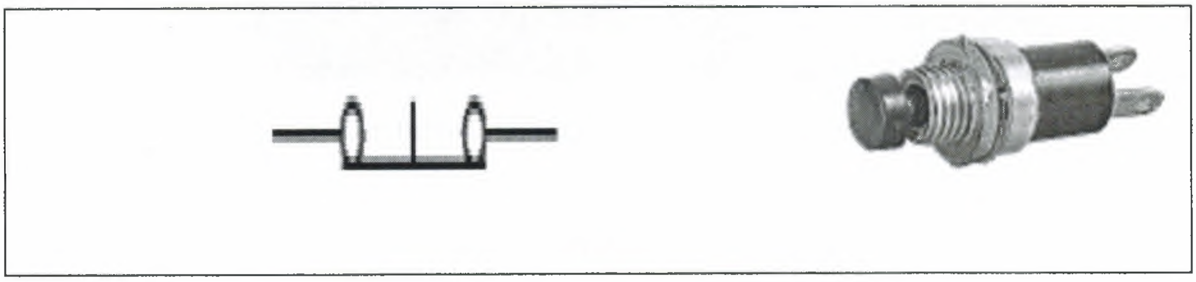
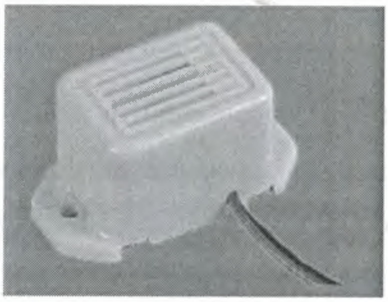


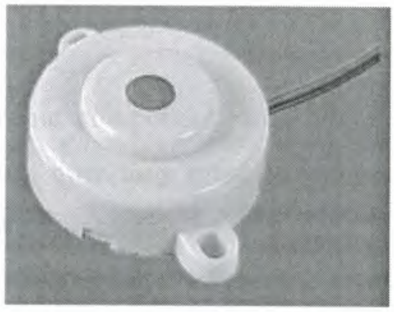
Figure 1.19 Push-to-break switches

1.8 Buzzer and Bleeper

These devices are output transducers converting electrical energy to sound. They contain an internal oscillator to produce the sound which is set at about 400Hz for buzzers and about 3 kHz for bleeper's. Buzzers have a voltage rating but it is only approximate, for example 6V and 12V buzzers can be used with a 9V supply. Their typical current is about 25mA. Bleeper's have wide voltage ranges, such as 3-30V, and they pass a low current of about 10mA. Buzzers and bleeper's must be connected the right way round, their red lead is Positive (+).



Buzzer (about 400Hz)



Bleeper (about 3kHz)

Figure 1.20 Buzzer and Bleeper

1.9 Safety

In this project, low voltage applications are used. Thus, safety guidelines are not in concern of human safety but in components safety, although we cannot avoid the technical mistakes witch can occur during connecting parts and soldering them to the circuit, so we have to be careful from current and heat.

- One of the components which are used in this circuit is the chemical capacitor, this element has two poles and when connected to the circuit we have to care about its polarity so as to avoid damaging it.
- An other component used in this circuit is Buzzer, which has to be chosen suitable to the out put signal so as not to destroy diaphragm.
- While connecting the circuit components to the power supply we have to be aware of misconnecting its polarity to assure the safety of used components.
- While the circuit is on, avoid touching the sensitive components like the transistor, diodes to avoid interfering with the out put signal.
- While soldering the parts to the circuit we have to be careful so as not to burn the parts which are sensitive and can be harmed by heat.

1.10 Summary

This chapter presented an introduction to electronic components that are commonly used in hardware projects and how they function, how they must be connected. By applying the safety guidelines, the circuit should work smoothly.

CHAPTER 2
HARDWARE APPROACH

2.1 Overview

This chapter presents the components used in the circuit and the circuit diagram. The operation of each part of the circuit will be described.

2.2 steam alarm Circuit

The circuit as shown in fig. 2.1 is a bit complicated and it is difficult to understand the function of each component, so it is better to understand some other circuits so we can analyze our circuit.

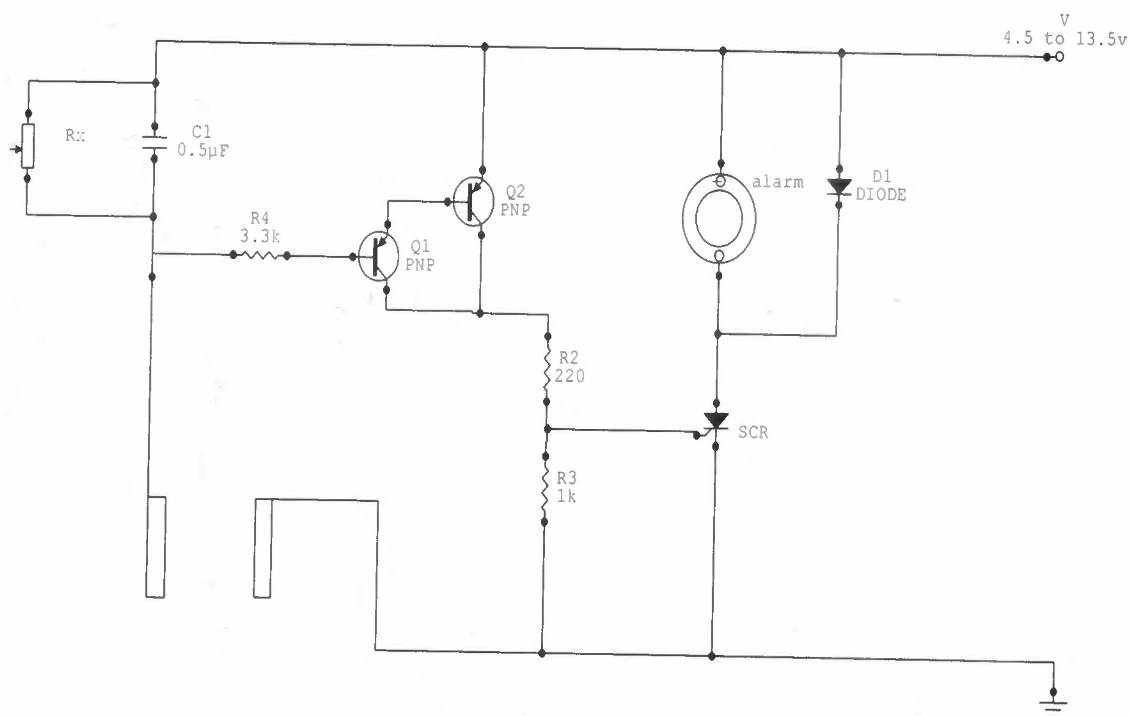
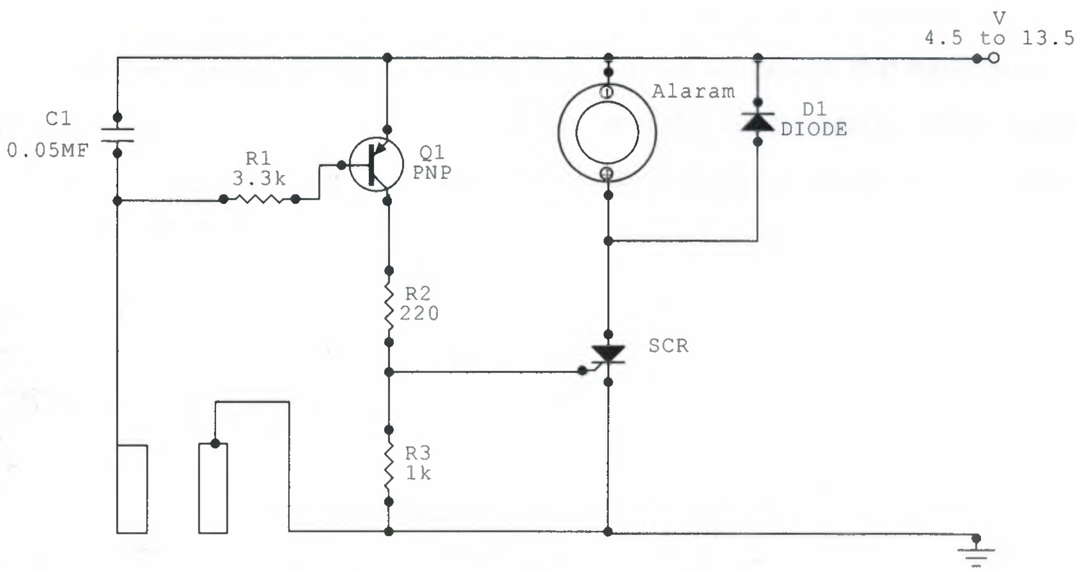


Figure 2.1 Steam _operated alarm

The impurities in normal water cause the liquid to act as a conductive medium that exhibits the characteristics of a resistor. Many vapors such as steam exhibit similar resistive qualities consequently the resistance across a pair of isolated metal probes falls from near infinity to some moderately low value whenever the probes are placed together in these conductive media. These resistance changes can be use to active variety of electronic alarm systems. Such a system may be used as water or steam-operated alarms



Figures 2.2 water operated alarm .

Both ' of these circuits are operated in the non-latching mode, and use a transistor amplifier to effectively increase the s.c.r. gate sensitivity to such a degree that the s.c.r. is triggered by the small electrical currents that pass through the conductive medium when it comes into contact with both probes simultaneously.

In Figure 2.2 circuit a one-transistor amplifier is used, and the circuit sensitivity is such that the alarm is driven on whenever a resistance of less than 220 k ohms appears across the probes. This sensitivity is sufficient to cause the circuit to act as a water-operated alarm.

The Figure 2.1 circuit used a two-transistor amplifier, and the circuit sensitivity is such that the alarm is driven on whenever a resistance of less than 1Q me ohms appears across the probes. This sensitivity is sufficient to cause the circuit to act as either a water or Steam - operated alarm. The circuit sensitivity can be reduced to a preset level, if required, by wiring a one-me ohm pot across C1, as shown dotted in the diagram. C1 in these two circuits is used to suppress any a.c. pick-up from long connecting leads, which might otherwise cause the circuits to operate erratically, and *R*\ is used to protect fee circuits in the event of a short being placed directly across the probes.

2.3 Application of these circuits

These two circuits have a variety of applications in the home and in industry. They can be used to sound an alarm when it .rains, when flooding occurs in cellars when water rises to a preset level in tanks or baths, or when steam is ejected from kettle spout as the liquid in the kettle starts to boil. It can be used as an alarm for the people that have an asthma problem, if a parson is having a hot shower so if the concentration of the steam is more then the normal case for these people so it gives an alarm also its used in storage the place that we can store our goods which are very sensitive from humidity it may spoil it

2.4 Light-operated alarm

In figure 2.3 which shows the unbeatable light beam alarm is complicated to understand the function of it, to know how does this circuit performs its function we have to learn about some simple light alarms so we can analyze our circuit easily

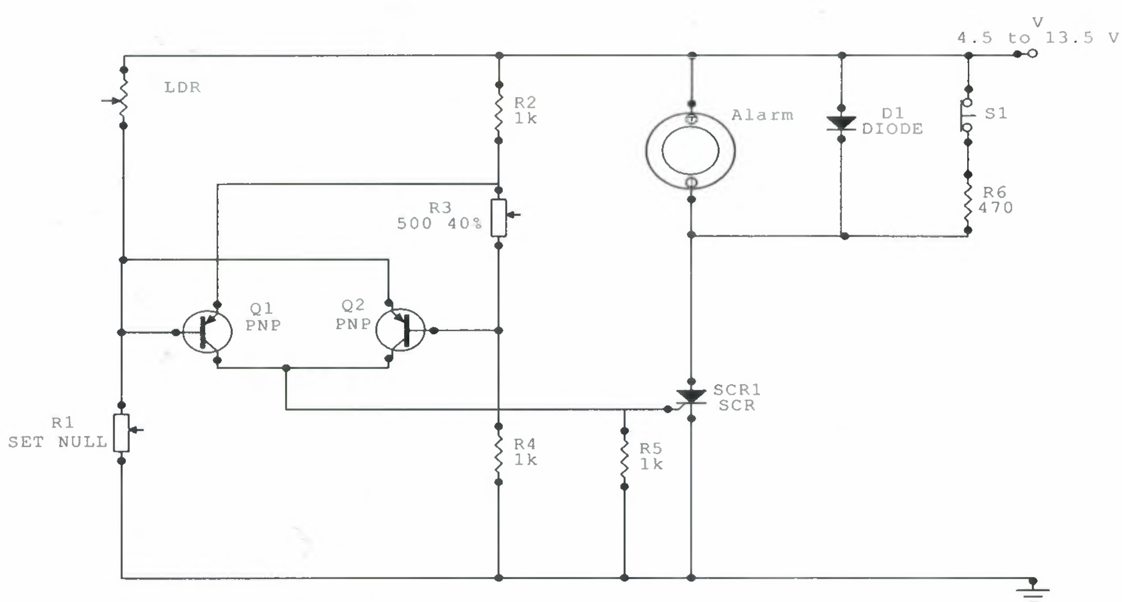


Figure 2.3 Unbeatable light beam light

A variety of light-operated alarms are described in this section, and all us an l.d.r. As a light-sensing element. This light-dependent resistor is a cadmium-sulphide photocell, and acts as a high resistance under dark conditions and as a low resistance when brightly illuminated. All these circuits are versatile types, and will work with almost any l.d.r. with face diameters in the range 1/8 in to1/2 in; no precise l.d.r. types are thus specified in these circuits; notes on l.d.r. Selection are, however, given where applicable.

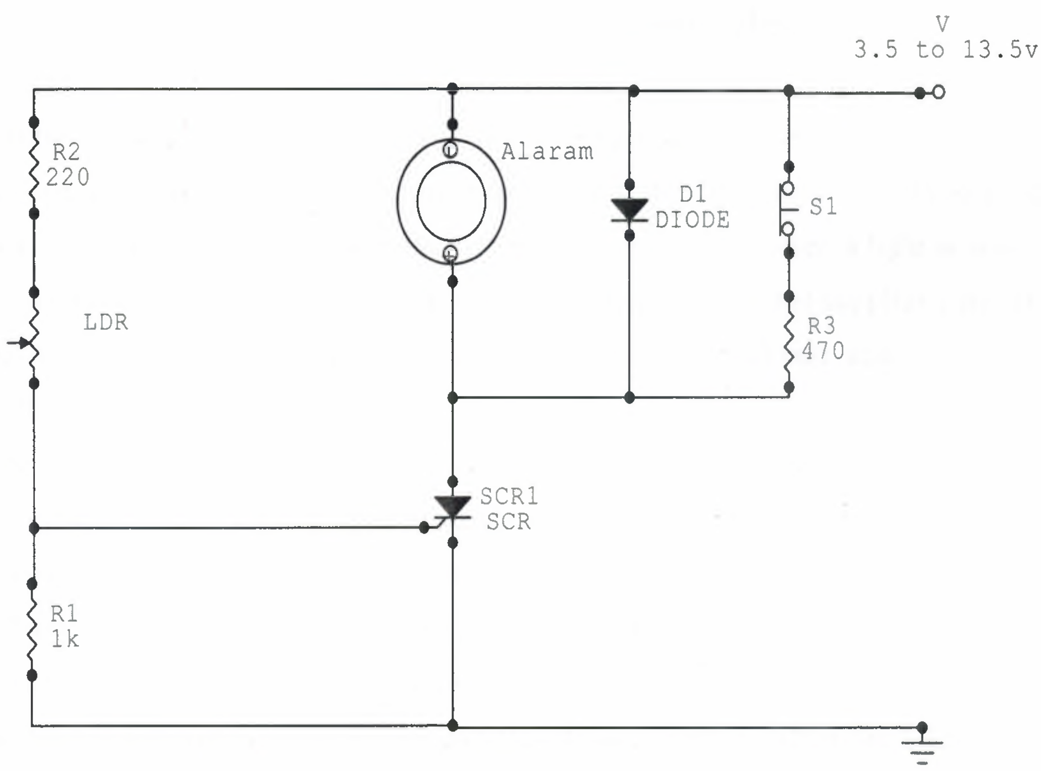


Figure 2.4 Simple light activated alarm

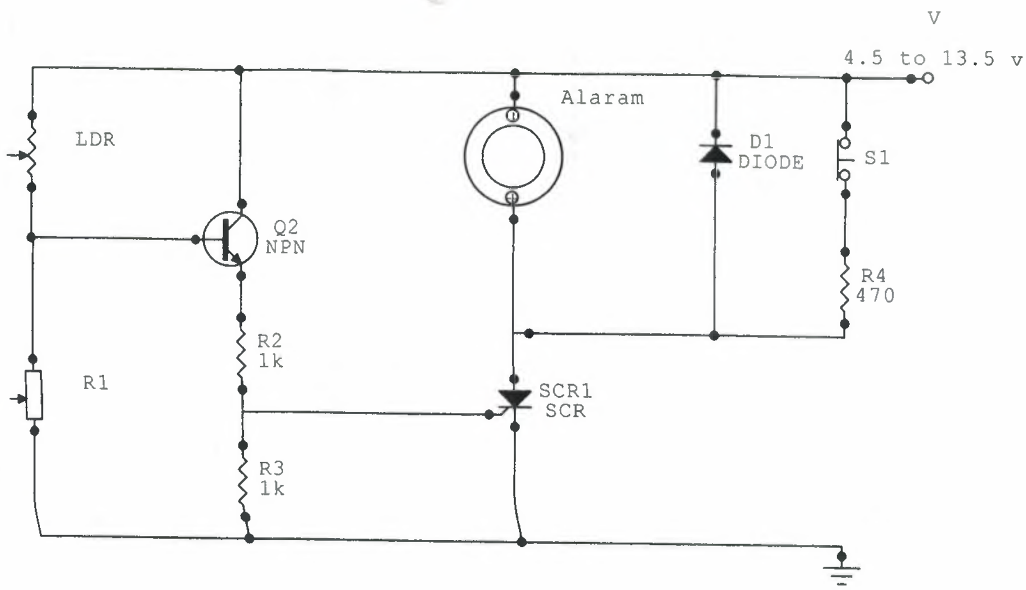


Figure 2.5 sensitive Light _activated alarms

Figures 2.4 and 2.5 shows the circuits of two simple light-operated alarms. The l.d.r. in each of these circuits is meant to be mounted in normally dark area such as a safe or strong _room and the designs are such that the alarm sounds when a light is shone into the protected area .The l.d.r. and R1 from a potential divider that supplies gate drive to the s.c.r .Gate drive is supplied directly in the figure2.4circuit and via an emitter _follower in the figure2.5circuit.

Circuit operation is very simple .Under dark conditions the l.d.r.presents a high resistance, so zero drive is applied to the s.c.r. gate. When the l.d.r is illuminated its resistance falls to low value, and gate drive is then applied to the s.c.r, which turns on and activates the alarm .The sensitivity of the figure2.4 circuit is such that the alarm turns on when the l.d.r. resistance falls to less than about 10000 ohms .The sensitivity of the figure2.5circuit is much higher and this design turns on when the l.d.r. resistance falls to less than 200000 ohms.

The sensivity of the figure 2.5rcuit can be reduced via R1.The operation of the figure 2.4 and 2.5 circuits can be reversed, so that the alarm sounds when the l.d.r. illumination is decreased, by simply transposing the R1 and l.d.r. positions as shown in figures 2.6. And 2.7 these two circuits can be used as simple inferrupted-light-b-i alarms. Normally, the l.d.r. is brightly illuminated via a projected light beam and lens system. The l.d.r. presents a low resistance under this condition, and zero drive is applied to the gate of the s.c.r., which is thus off. When a person or object enters the light Bearn the l.d.r.

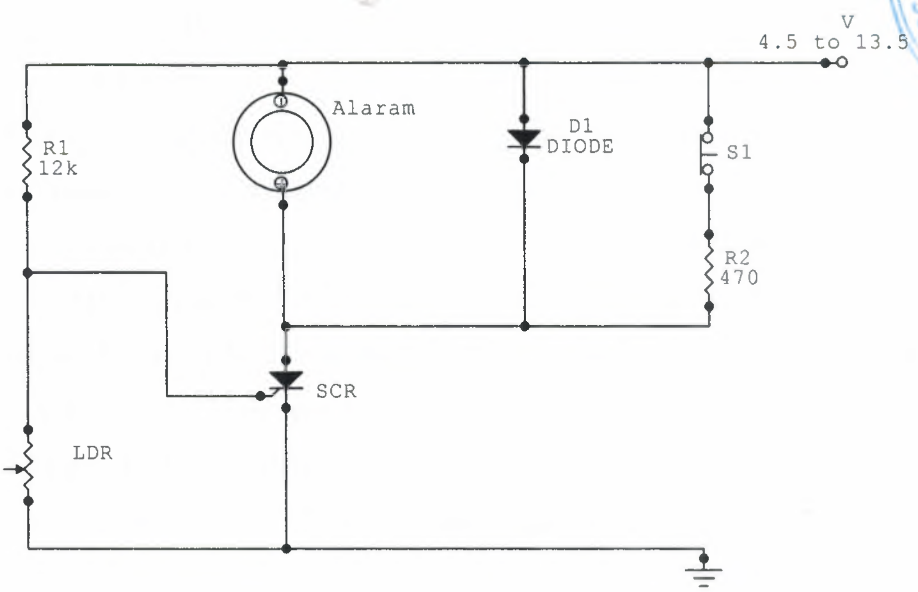


Figure 2.6 simple light beam alarms

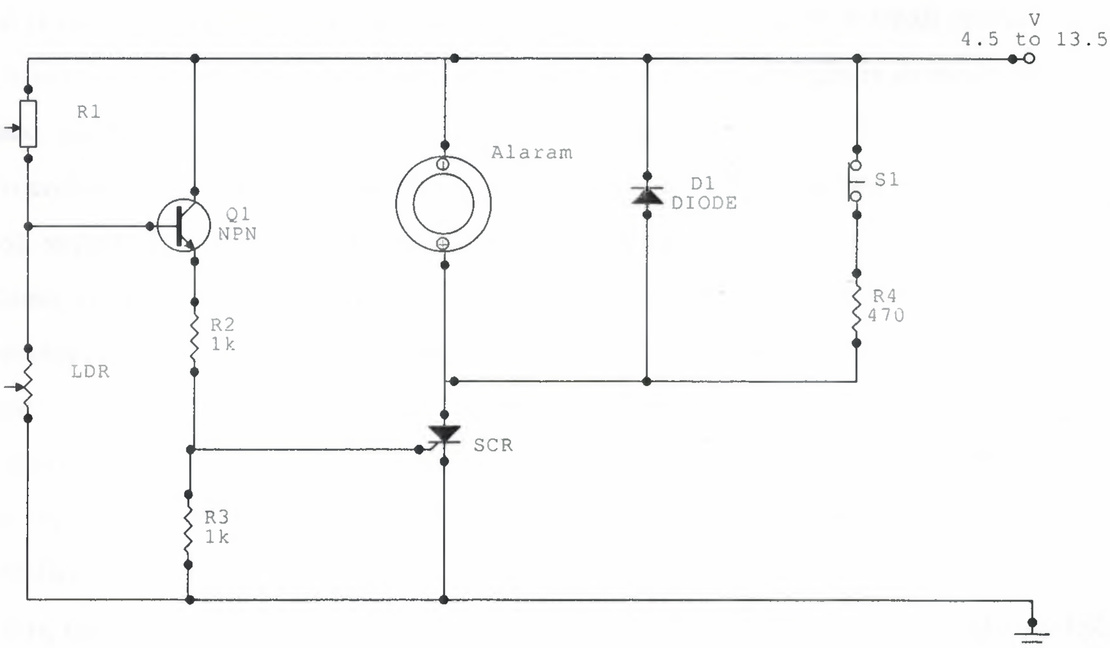


Figure 2.7 Alternative light beam alarm

Resistance rises to a high value, and gate drive is then applied to the s.c.r., which turns on and sounds the alarm.

The l.d.r. in the Figure 2.6 circuit can be any type that offers a resistance less than 1 000 ohms under the illuminated condition, and more than 3000 ohms under the "interrupted* condition. The Figure 2.7 circuit can be used with any l.d.r that offers a resistance less than about 50 000 ohms under the illuminated condition.

The circuits of Figures 2.6, 2.7 as useful intrusion alarms in many applications, but are not suitable for use as high-security burglar alarms. Both circuits can be disabled by shining a bright light, with intensity greater than that of the normal light-beam, on to the l.d.r. face. This vulnerability of the basic light-beam alarm can be overcome in a number of *ways.*

Figure 2.3 shows one circuit that overcomes the problem. The l.d.r. is wired in a bridge network formed by *R1 – R2*-R3-R4 and the l.d.r., and Q1 and Q2 are wired as bridge balance detectors that apply gate drive to the s.c.r. The circuit action is such that the bridge is balanced and the alarm is off when the l.d.r is illuminated normally by the light beam, and is such that the bridge goes out of balance and the alarm goes on if the l.d.r. illumination varies from the normal level by even a small amount. The alarm thus goes on if the light-beam is interrupted or if a bright light is shone on the l.d.r. face, and the circuit acts as an 'unbeatable' light-beam alarm.

To understand circuit operations assume the following point the circuit is power from 10 volt supply. R1 is adjust it so its resistance is equal to that of the l.d.r in the normal balanced condition on which the l.d.r is illuminate by the light beam so 5 volt is developed on Q1 base and Q2 ammeter under this condition. R3 is adjust it so that 5.6 volt is developed it on Q1 ammeter, and 4.4 volt is develop it on Q2, i.e., I forward bis of 600mv is develop b/w the base-emitter junctions of Q1 and Q2 under the normal balanced condition. Q1 and Q2 each turn on when the forward base-emitter bias rises to 650 mV.

Thus, under the normal balanced condition a forward bias is applied to both Q1and Q2, but is not sufficient to cause either transistor to conduct, so the s.c.r. and alarm are off. |Suppose, however, that the light-beam is interrupted, so that the l.d.*r.* resistance increases. Under this condition the voltage at the LDR-R1 junction falls appreciably below 5 V, so the Q1 forward base-emitter bias rises above 650 mV, and Q1 conducts and drives on the s.c.r. and the alarm.

Alternatively, suppose that a bright light, with intensity greater than that of the basic light-beam, is shone on the l.d.r. face, so that the l.d.r. resistance decreases. In this case the voltage at the *LDR-R*\ junction rises appreciably above 5 V, so the Q2 forward base-emitter bias rises above 650 mV, and Q2 conducts and again drives on the s.c.r. and the alarm.

The circuit thus operates the alarm if the l.d.r. illumination varies from the normal light-beam level by an amount sufficient to cause a voltage change greater than 50 mV at the *LDR-R1* junction. The sensitivity of the circuit can be varied via R3, and can be set to such high levels that the alarm can be activated by changes in light level too small to be detected by the human eye.

The l.d.r. used in the Figure 2.3 circuit can be any type giving a resistance in the range 200 ohms to 2000 ohms when illuminated by the light-beam.*R* \ should have a maximum value roughly double that of the l.d.r under the above condition. To set up the circuit, proceed as follows.

First, adjust R1 so that roughly half-supply voltage is developed at the LDR-R1 junction when the l.d.r illuminated, and then adjust *R3* so that roughly400 mV is developed across *R5* Now readjust *R1* to give a minimum reading across *R5*; readjust *R3,* if necessary, so that this reading does not fall to less than 200 mV. When the *R1* adjustment is complete the bridge is correctly balanced. *R*3 can then be adjusted to set the sensitivity of the circuit to the required level. If *R3 is* set so that zero voltage is developed across *R5 a* fairly large change in light level will be needed to operate the alarm, and if it is set so that a few hundred mill volts are developed across R5 only a very small change in light level will be needed to operate the alarm.

2.5 Application of light alarm

Light-operated alarms have a number of applications in the home and in industry. They can be used to sound an alarm when light enters a normally dark area, such as the inside of a safe or strong-room, or they can be used to sound an alarm if an intruder or object breaks a projected light beam. They can also be used as smoke-sensitive alarms; also it can be used in the picture developing shops.

2.6 Summary

This chapter has presented the components of the Steam and light of the alarm system. But it is not guaranteed 100 % to work properly using exactly the theoretical way of connection as described, because practical work has very different circumstances than theoretical one, and so many problems may occur.

CONCLUSION

After a great deal of working over this experiment of preparing this project theoretically and practically; we found out how much knowledge we gained and how much techniques we learnt that with using simple components we gain at the output some kinds of alarm system .

These circuits which are shown in chapter two are been drown using circuit maker student V6.2C and all these circuits has been tested and it gives a completed simulation as well as the main two circuits which are steam operated alarm (figure2.1)and the unbeatable light beam alarm (figure 2.3)has been tasted practically .

These two circuits have a variety of applications in the home and in industry. They can be used to sound an alarm when it .rains, when flooding occurs in cellars when water rises to a preset level in tanks or baths, or when steam is ejected from kettle spout as the liquid in the kettle starts to boil. Light-operated alarms, they can be used to sound an alarm when light enters a normally dark area, such as the inside of a safe or strong-room, or they can be used to sound an alarm if an intruder or object breaks a projected light beam.

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