NEAR EAST UNIVERSITY

Faculty of Engineering

Department of Electrical and Electronic Engineering

Modular Burglar Alarm

Graduation Project
EE 400

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ABSTRACT

There are different types of alarm systems, some of them are for detection and other are for security which can be classified as the most popular alarm systems.

Every building, banks, supermarkets, storage rooms, jewelry shops, etc..., needs to be secured for different reasons. The aim of this project is to apply a full protection for buildings with identifying which of the zones that has been attacked.

Some of the improvements are described in this project which we can be added depending on the desire of the user.

INTRODUCTION

Now a day all the electrical equipments are designed regarding to basic components of electronic parts, such as resistors, capacitors, diodes, etc....
For security reasons, burglar alarms were invented, in this project I am going to talk about an effective alarm system that divides the area which has to be secured into zones to obtain more efficient data about the small holes that can be broken into building, shops, etc....

First chapter of the project present the electronic components especially the components were used in this project such as resistor, capacitor, diodes, integrated circuits ICs switches, LEDs, and bells. Safety guideline also showed the ways that leads how to use the components in correct way, because if it done in wrong way it will burn or break the components. So that before doing any electrical project this chapter should be taken care.

Second chapter of the project is about the alarm systems in general, the types of alarm systems are presented and explained briefly.

Third chapter of the project is most important one, which explains the components that has been used in the project, the connection of the circuits, how they work briefly, integrated circuit types, their applications.

Forth chapter will show us the operation system of the project, and some of the improvements that we can apply to the circuit.

1. BASIC COMPONENTS

1.1 Basic Definitions

1. Resistance is the opposition to current.

The schematic symbol for resistance is shown in figure 1.1.

When current flows through any material that has resistance, heat is product by the collisions of electrons and atoms. Therefore, wire, which typically has a very small resistance, becomes warm when there is current through it.

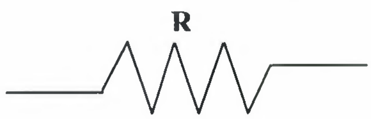


Figure 1.1 Resistances / Resistor Symbol.

2. Ohm: The Unit of Resistance

Resistance, R, is expressed in the unit of ohms, named after George Simon Ohm and is symbolized by the Greek latter omega (Ω).

One ohm (1Ω) of Resistance exits when one ampere (1A) of current flows in a material when one volt (1 V) is applied across the material.

3. Resistors

Components that are specifically designed to have a certain amount of Resistance are called resistors. The principle applications of resistors are to limit current, divide voltage, and, in certain cases, generate heat. Although there are a variety of different types of resistors that come in many shapes and size, they can all be placed in one of two main categories: fixed or variable.

4. Fixed Resistors

The fixed resistors are available with a large selection of resistance values that are set during manufacturing and cannot to be changed easily. Fixed resistors are constructed using various methods and materials. Several common types are shown in figures 1.2.

One common fixed resistor is the carbon-composition type, which is made with a mixture of finally ground carbon, insulating filler, and a resin binder. The ratio of carbon to insulating filler sets the resistance value. The mixture is formed into rods, and lead connections are made. The entire resistor is then encapsulated in an insulated coating for protection. The chop resistor is another type of fixed resistor and is in the category of SMT (surface mount technology) components. It has the advantage of a very small size for compact assemblies.

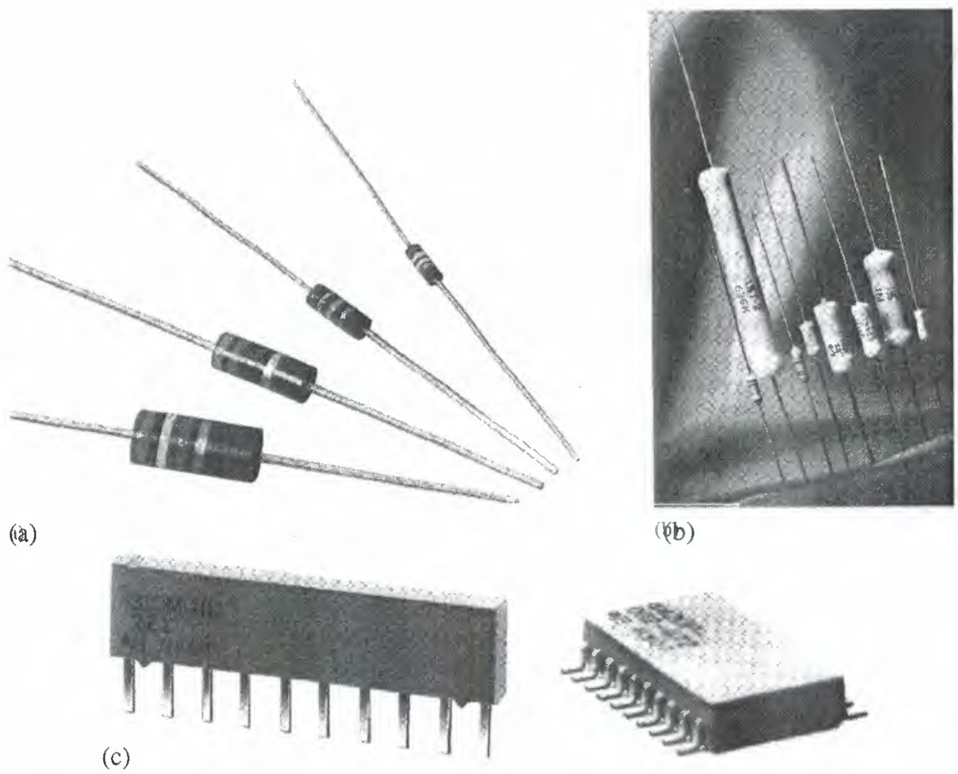


Figure 1.2 Typical Fixed Resistors. Parts (a) and (b) Courtesy of Stack pole Carbon Co. (c) Resistor Networks.

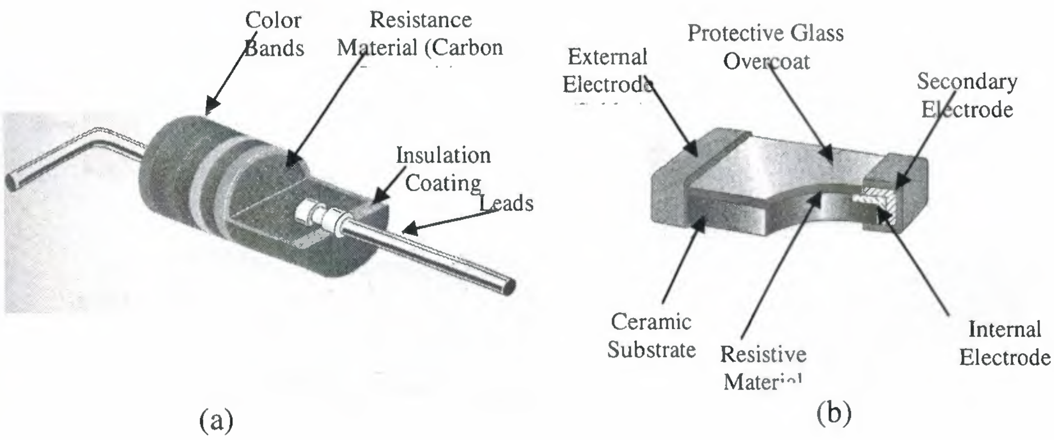


Figure 1.3 Two Types of Fixed Resistors (a) Cutaway View of a Carbon-Composition Resistor, (b) Cutaway View of a Chip Resistor

Figure 1.3 (a) shows the construction of a typical carbon –composition resistor and figure 1.3 (b) shows the construction of a chip resistor.

Other types of fixed resistors include carbon film, metal film, and wire wound. In film resistors, a resistive material is deposited evenly onto a high-grade ceramic rod. The resistive film may be carbon (carbon film) or nickel chromium (metal film). In these types of resistors, the desired resistance value is obtained by removing part of the resistive material in helical pattern along the rod using a spiraling technique as shown in figure 1.4 (a). Very close tolerance can be achieved with this method. Film resistors are also available in the form of resistor networks as shown in figure 1.4 (b).

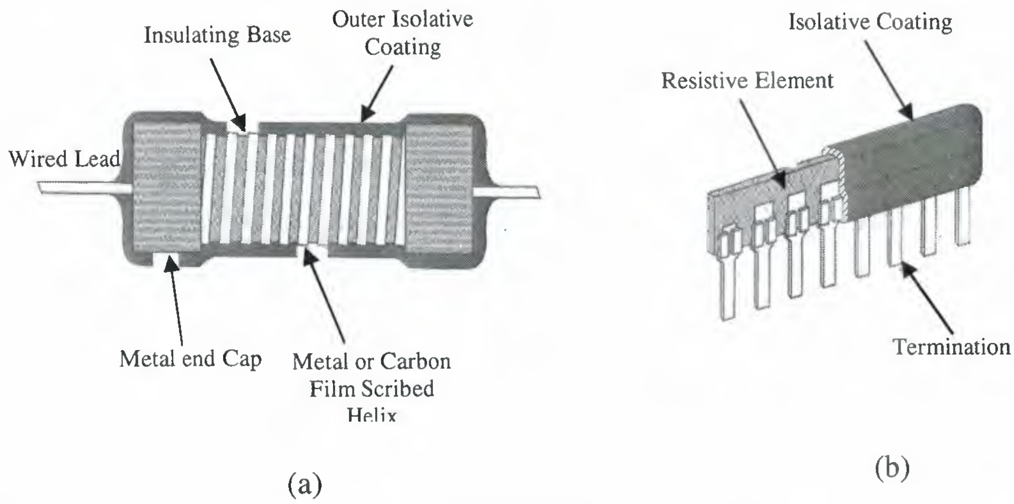


Figure 1.4 Construction Views of Typical Film Resistors: (a) Film Resistor Showing Spiraling Technique, (b) Resistor Network

Wire wound resistors are constructed with resistive wire wound around an insulating rod and then sealed. Normally, wire wound resistors are used because of their relatively high power ratings. Some typical fixed resistors are shown in figure 1.5.

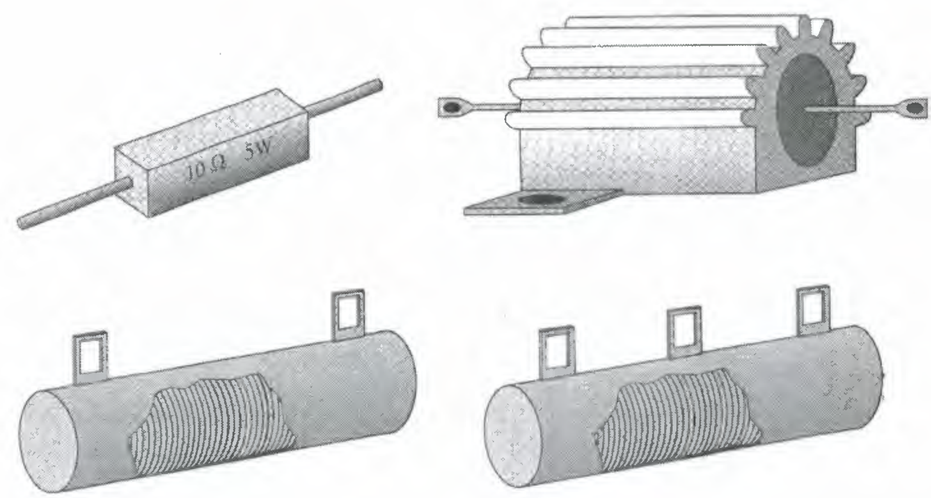


Figure 1.5 Typical Wire wound Power Resistors

5. Resistor Color Codes

Many types of fixed resistors with value tolerances of 5%, 10%, or 20% are color coded with four bands to indicate the resistance value and the tolerance.

This color-code band system is shown in figure 1.6, and the color code is listed in Table 1.1.

The color code is read as follows:

1. Beginning at the banded end, the first band is the first resistance value. If it is not clear which is the banded end, start from the end that does not begin with a gold or silver band.

The second band is the second digit.

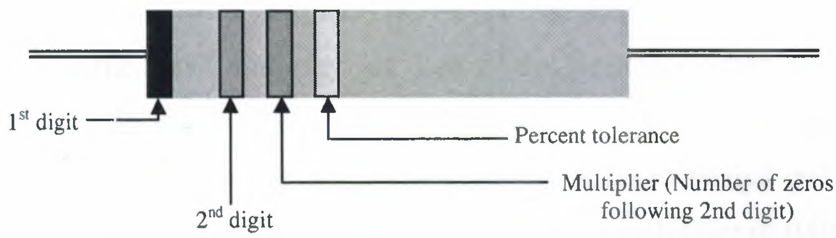


Figure 1.6 Color-Code Bands on a Resistor

Table 1.1 Resistor Color Code

	DIGIT	COLOR
	0	Black
Resistance value, first	1	Brown
Three bands:	2	Red
First band – 1st digit	3	Orange
Second band – 2nd digit	4	Yellow
Third band – number	5	Green
Of Zero following	6	Blue
The 2nd digit	7	Violet
	8	Gray
	9	White
	5%	Gold
Tolerance, fourth	10%	Silver
band	20%	No band

The third band is the number of zeros following the second digit, or the multiplier. The fourth band indicates the tolerance and is usually gold or silver.
For example, a 5% tolerance means that the actual resistance value is within ± 5% of the color-coded value. Thus, a 100 Ω resistor with a tolerance of ± 5% can have acceptable value as low as 95 Ω and as high as 105 Ω.

For resistance values less than 10 Ω, the third band is either gold or silver. Gold represents a multiplier of 0.1, and silver represents 0.01. For example, a color code of red, violet, gold, and silver represents 2.7 Ω with a tolerance of ± 10%.
Certain precision resistors with tolerance of 1% or 2% are color coded with five bands. Beginning at the bands end, the first digit of the resistance value, the second band is the second digit, the third is the third digit, the fourth band is the multiplier, and the fifth band indicates the tolerance. Table 1.1 applies, except that gold in the fourth band indicates a multiplier of 0.1 and silver indicates a multiplier of 0.01.
Brown in the fifth band indicates 1% tolerance and red indicates 2% tolerance.

Numerical labels are also commonly used certain types of resistors where the resistance value and tolerance are stamped on the body of the resistors. For example, a common system uses R to designate the decimal point and letters to indicate tolerance as follows:
F = ± 1%, G = ± 2%, J = ± 5%, K = ± 10%, M = ± 20%

For values above 100 Ω, three digits are used to indicate resistance value, followed by a fourth digit that specifies the number of Zeros. For values less than 100 Ω, R indicates the decimal point.

Some examples are as follows: 6R8M is a 6.8 Ω ± 20% resistor; 3301F is a 3300 Ω ± 1% resistor; and 2202J is a 22,000 Ω ± 5% resistor.

6. Resistor Reliability Band

A fifth band on some color-coded resistors indicates the resistor's reliability in failures per 1000 hours (1000 h) of use. The fifth-band reliability color code is listed in Table 1.2. For example, a brown fifth band means that if a group of like resistors are operated under standard conditions for 1000 h, 1% of the resistors in that group will fail.

Table 1.2 Fifth-Band Reliability Color Code

Color	Failures During 1000 H of Operation
Brown	1.0%
Red	0.1%
Orange	0.01%
Yellow	0.001%

7. Variable Resistors

Variable resistors are designed so that their resistance values can be changed easily with a manual or an automatic adjustment.

Two basic uses for variable resistors are to divide voltage and to control current. The variable resistor used to divide voltage is called a Potentiometer. The variable resistor used to control current is called a rheostat. Schematic symbols for these types are shown in figure 1.7. The potentiometer is a three-terminal device, as indicated in part (a). Terminals 1 and 2 have a fixed resistance between them, which is the total resistance. Terminal 3 is connected to a moving the contact up or down.

Figure 1.7 (b) shows the rheostat as a two-terminal variable resistor. Part (c) shows 1 or terminal 2. Part (d) shows a basic simplified construction diagram of a potentiometer.

Some typical potentiometers are pictured in figure 1.8.

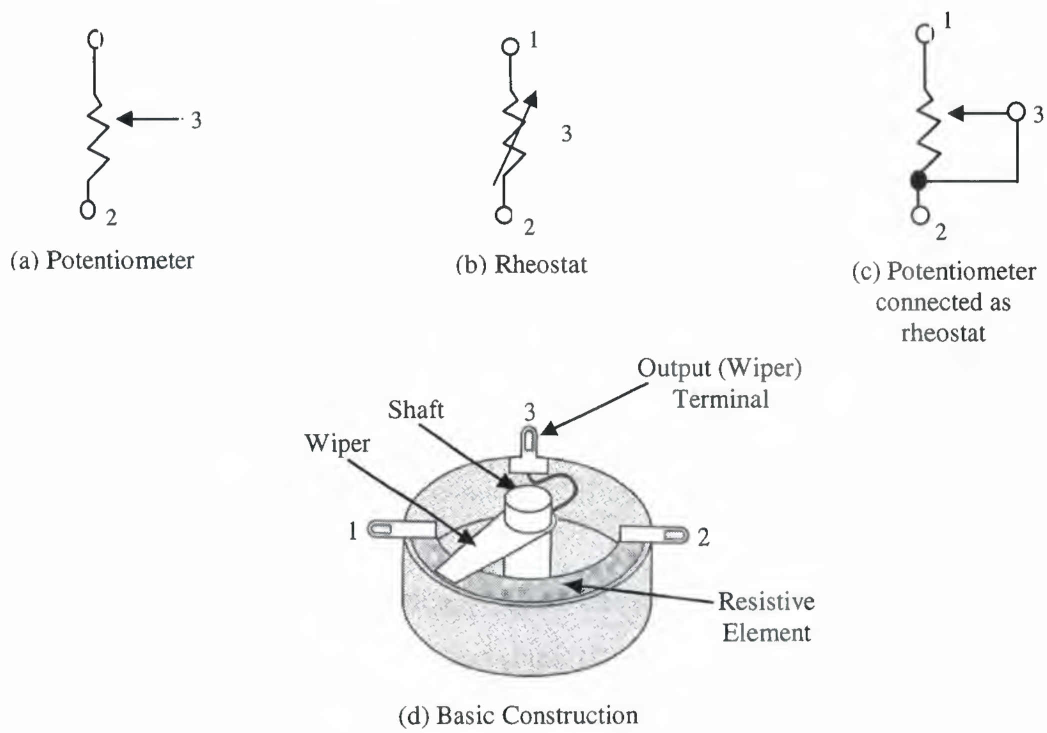


Figure 1.7 Potentiometer and Rheostat Symbols and Basic Construction of One Type of Potentiometer

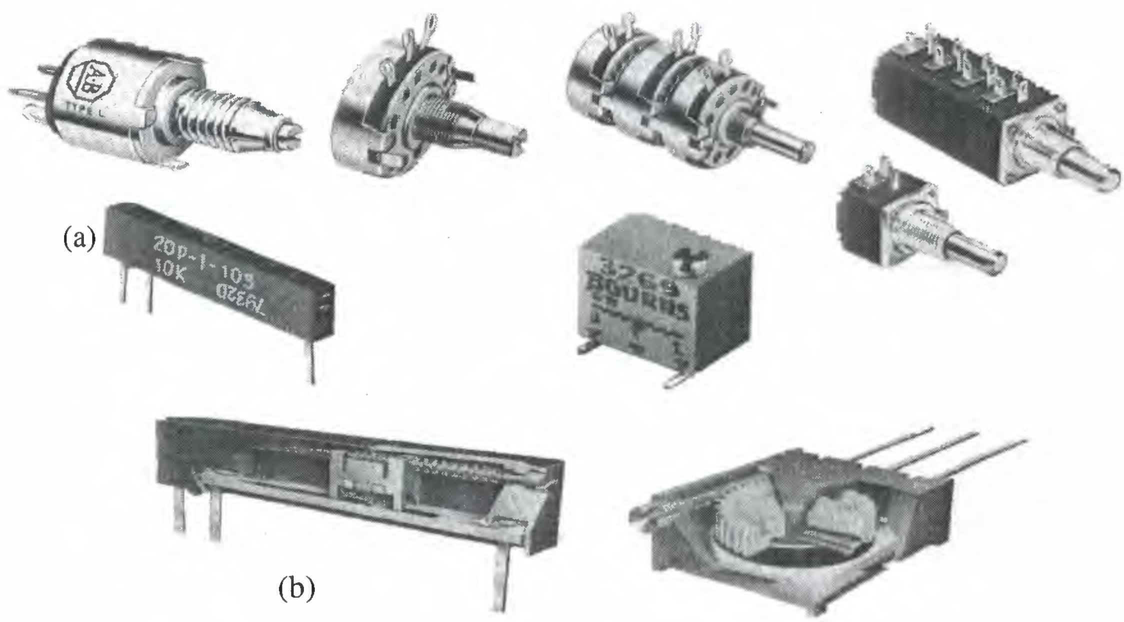


Figure 1.8 (a) Typical Potentiometers, (b) Trimmer Potentiometer

Potentiometers and rheostats can be classified as linear or tapered, as shown in figure 1.9, where a potentiometer with a total resistance of 100 Ω is used as an example. As shown in part (a), in a linear potentiometer, the resistance between both terminal and the moving contact varies linearly with the position of the moving contact. For example, one-half of a turn results in one-half the total resistance. Three-quarters of a turn results in three-quadrates of the total resistance between the moving contact and one terminal, or one-quarter of the total resistance between the other terminal and the moving contact.

In the tapered potentiometer (non-linear), the resistance varies nonlinearly with the position of the moving contact, so that one-half of a turn does not necessarily result in one-half the total resistance. This concept is illustrated in figure 1.9 (b), where the nonlinear values are arbitrary.
The potentiometer is used as a voltage-control device because when a fixed voltage is applied across the end terminals, a variable voltage is obtained at the wiper contact with respect to either end terminal.

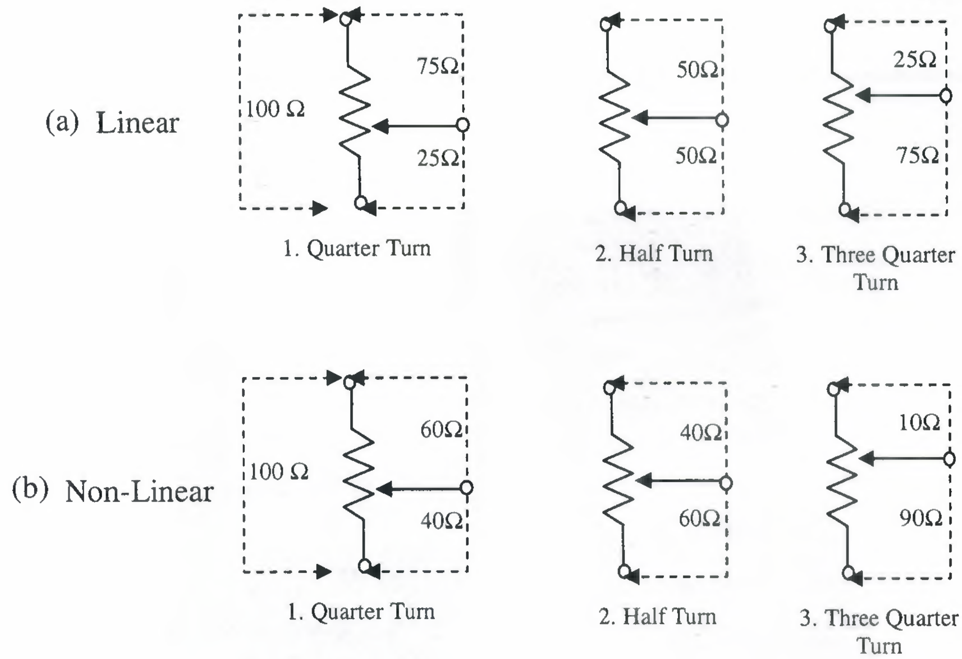


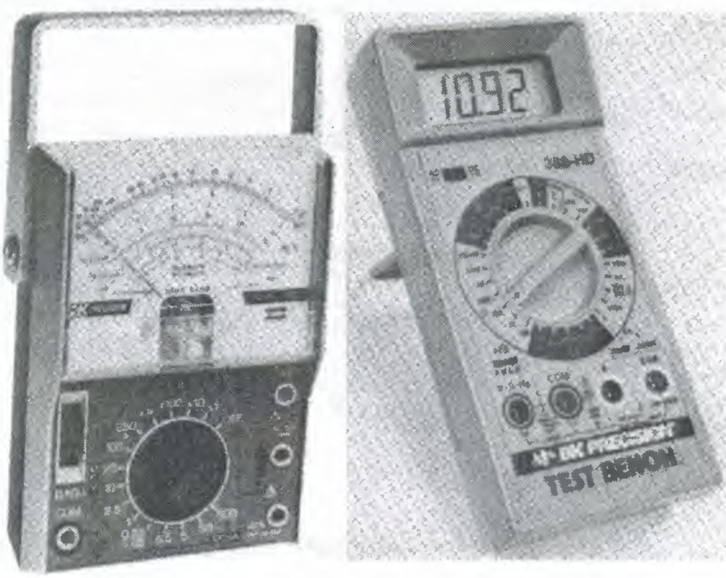
Figure 1.9 Examples of (a) Linear, (b) Non-Linear Potentiometer

1.2 Basic Circuit Measurements

Voltage, current, and resistance measurements are commonly required in electronics work. Special types of instruments are used to measure these basic electrical quantities.

The instrument used to measure voltage is a voltmeter, the instrument used to measure current is an ammeter, and the instrument are combined into a signal instrument known as a multimeter, or VOM (volt-ohm-millimeter), in which you can choose what specific quantity to measure by selecting the switch setting.
Typical multimeters are shown in figure 1.10. Part (a) shows an analog meter, that is, with a needle pointer, and part (b) shows a digital multimeter (DMM), which provides a digital readout of the measured quantity.

An electronics technician cannot function without knowing how to measure current, and resistance.



(a) (b)

Figure 1.10 Typical Multimeters. (a) Analog, (b) Digital

Meter symbols

Throughout this course, certain symbols will be used in circuits to represents the different meters, as shown in figure 1.11. You may see any of three types of symbols for voltmeters, ammeters, and ohmmeters, depending on which symbol most effectively conveys the information required. Although the digital meter is much more widely used than the analog meter in industry, we will used the analog meter symbol in certain situations to illustrate better the operation of a circuit when relative measurements or changes in quantities need to be depicted by the position or movement of the needle. The digital meter symbol is used when fixed values are to be indicated in a circuit. The general schematic symbol is used to indicate placement of meters in a circuit when no values or value changes need to be shown

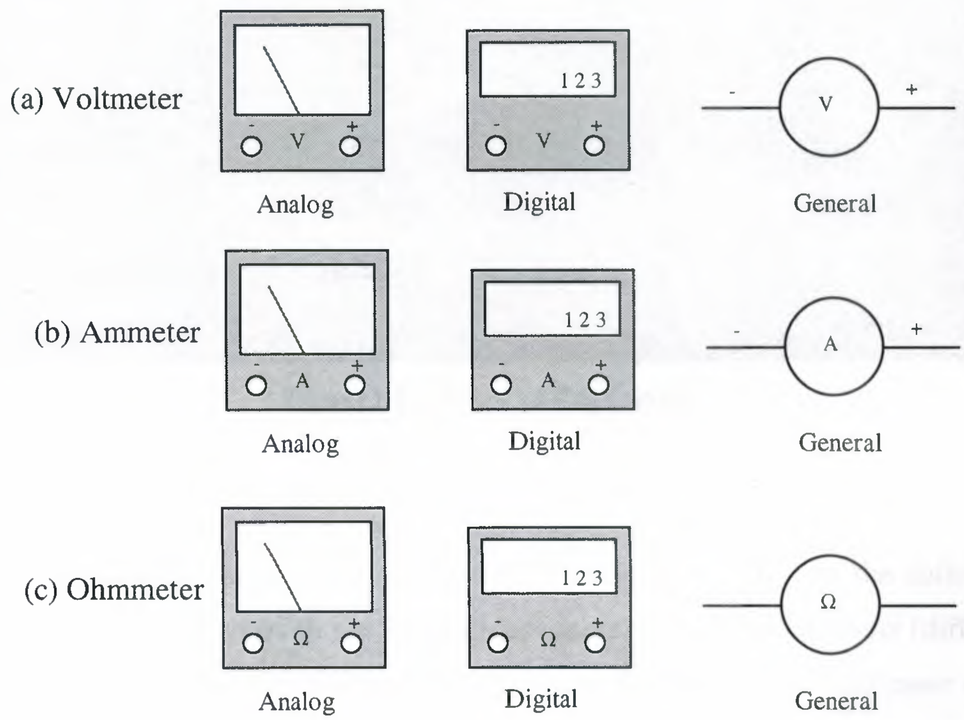
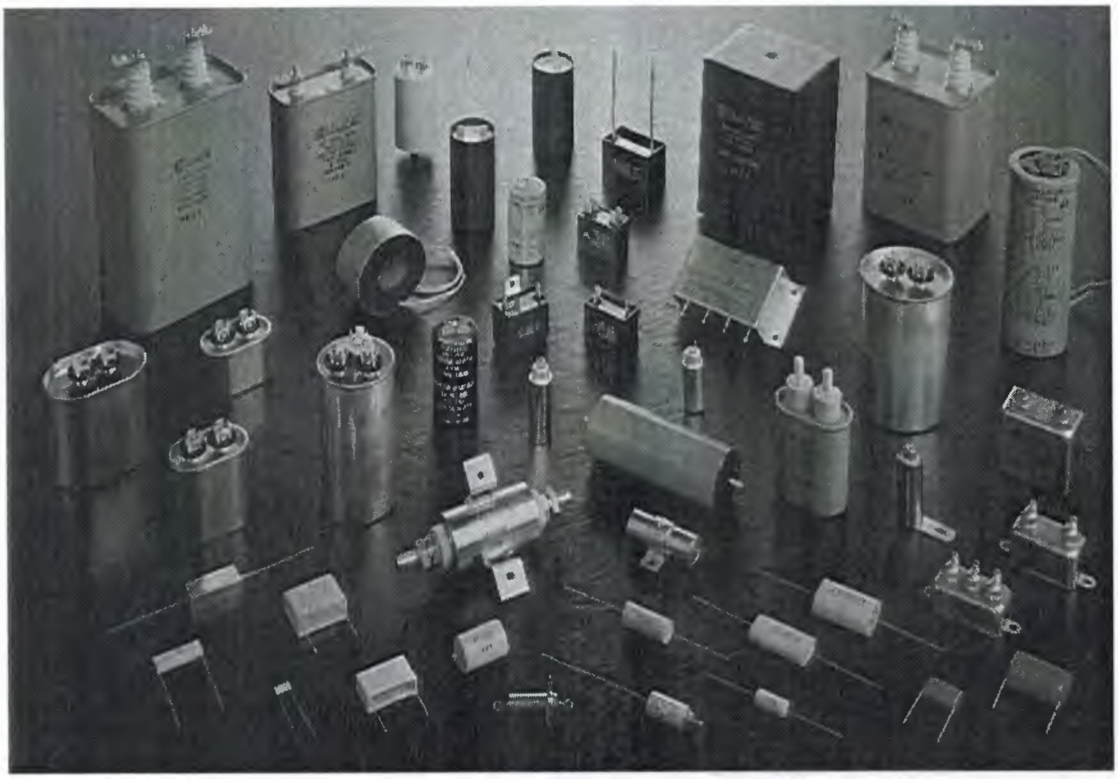


Figure 1.11 Meter Symbols used in this Course

1.3 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 1.12 shown the types of capacitors [2].



. **Figure1.12** Types of Capacitors

1.3.1 Capacity

This analogy should help you better understand capacity. In the following diagram (Figure 1.13), 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.

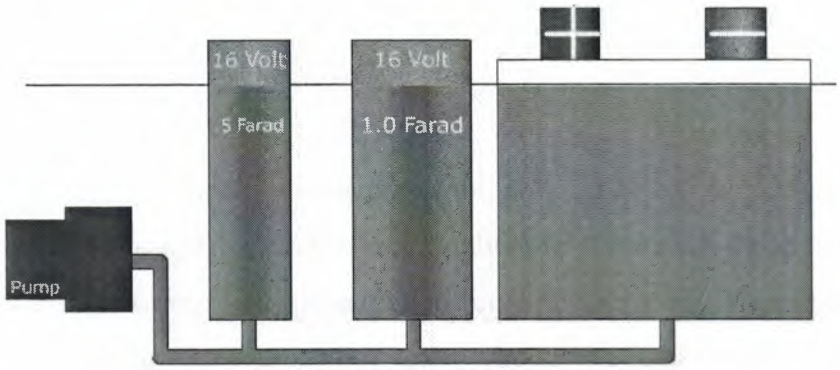


Figure 1.13 Capacities.

1.3.2 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].

1.3.3 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.

1.4 Semiconductor

Semiconductor has a large amount of types. Transistors have three lead-out wires are called the base, emitter and collector. 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.

1.4.1 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.

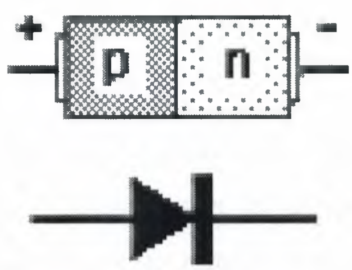


Figure 1.14 Diode

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.

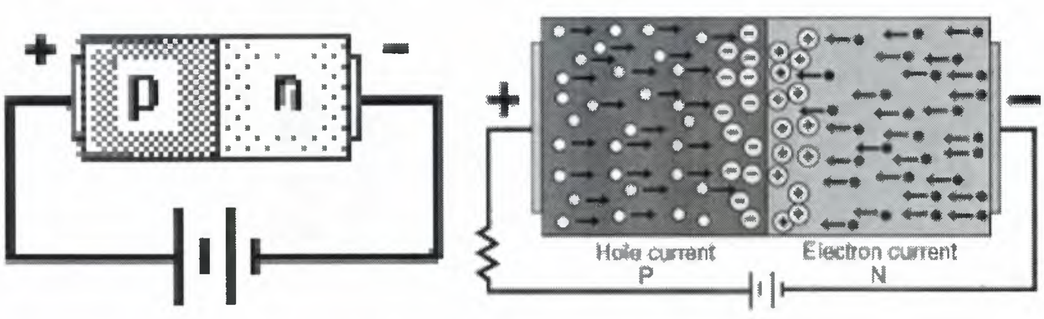


Figure 1.15 Forward Biased P-N Junction

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].

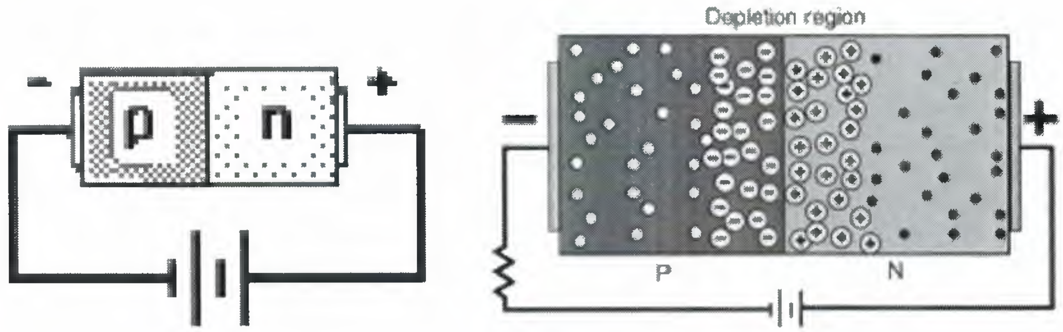


Figure 1.16 Reverse Biased P-N Junction

1.4.2 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 1.17 there are two symbol of type of bipolar transistors.

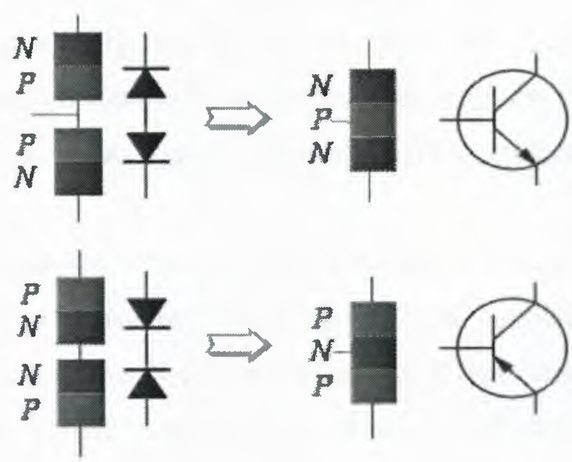


Figure 1.17 Symbol of NPN and PNP transistors.

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 1.18 shows the energy levels in an NPN transistor.

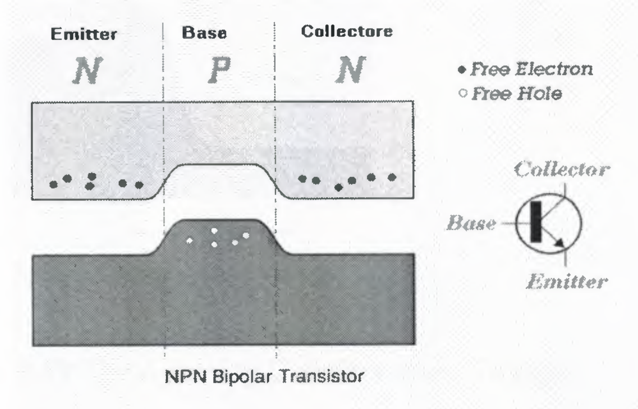


Figure 1.18 The Energy Levels in an NPN Transistor.

Figure 1.18 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 1.19 the applying collector-base voltage.

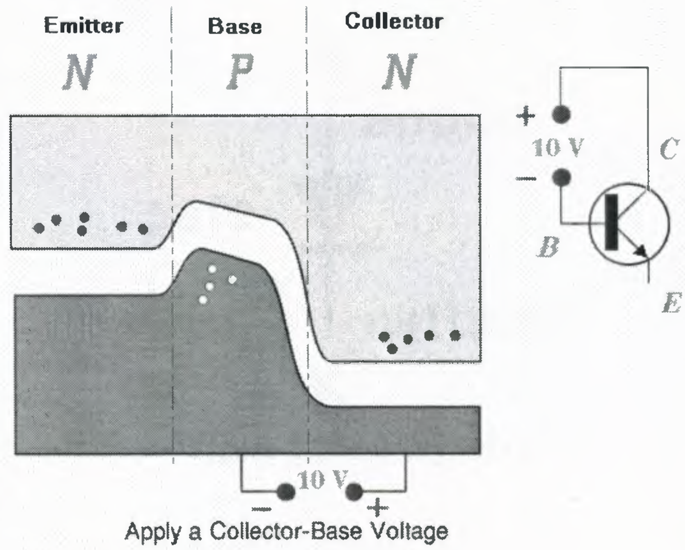


Figure 1.19 The Applying Collector-Base Voltage.

1.4.3 The Thyristors

A Thyristor 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 1.11).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 1.12).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 1.20). 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.

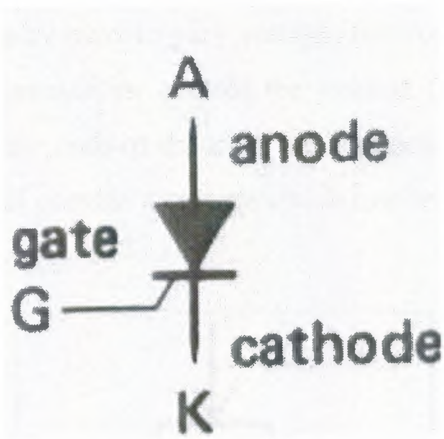


Figure 1.20 the Thyristors

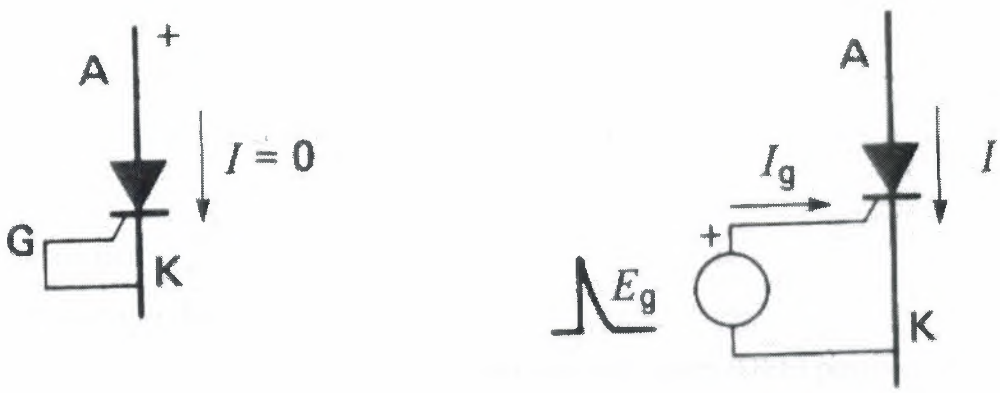


Figure 1.21 Operations of the Thyristors

1.5 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.

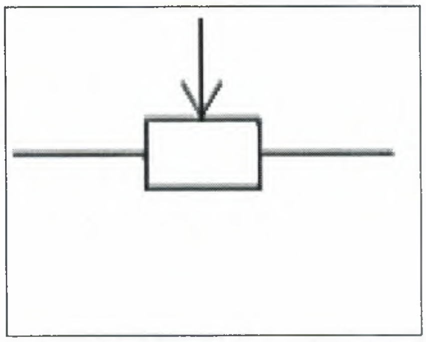


Figure1.22 Potentiometer Symbol

1.6 Switches

1.6.1 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.

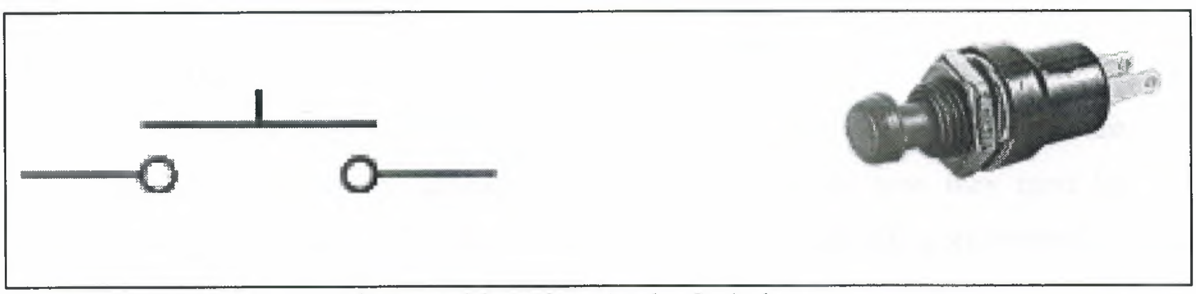


Figure 1.23 Push-to-Make Switches

1.6.2 Push-to-break

A push-to-break switch returns to its normally close (ON) position when you release the button, this is shown by the brackets around OFF.

1.7 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.

Another 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.

1.8 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.

2. INFORMATION ABOUT ALARM SYSTEMS

2.1 Overview

This chapter will present general information about alarm systems.

2.2 Alarm System Categories

The Alarm System it's a detection signaling system that is considered to be the combination of interrelated signal initiating devices, signal indicating devices, control equipment, and interconnecting wiring installed for a particular application monitored Alarm System.

An alarm system which reports detected conditions to a monitoring facility monitoring facilities are usually located off-site from the protected premises. When a monitoring facility is located within the building or complex that includes the protected premises, the alarm system is called a Proprietary system. Protected Premises the physical site at which an alarm system is installed and operational [9].

Figure 2.1 It Presented Water Activity Alarm Device.

2.3 Types of Alarm Systems

Alarm systems are divided into several broad categories, as listed below. The terms used to identify each type may vary, depending on who is using the term; however, the system we will description as we see later.

2.3.1 Fire Alarm

A system that detects and reports a fire in the protected premises, detects and reports water flowing in a sprinkler system, or detects and reports dangerous conditions such as smoke or overheated materials that may combust spontaneously. Household Fire Alarm: A fire alarm system that protects a household, as opposed to any other type of occupancy.

2.3.2 Hold-Up Alarm

A system that reports the presence of one or more criminals attempting to take goods or funds with implied or actual threat of force.

2.3.3 Duress Alarm

A system that reports the presence of one or more persons trying to force an individual to enter, or re-enter, a facility against the individual's will. Note: Although the triggering devices for hold-up, duress, and panic alarms are often the same or similar, police response may differ. A duress alarm, for example, may be designed to detect and silently report an employee being forced back into a protected facility to provide access to a safe, vault, drug storage area, or area containing confidential records. The intent is generally not to make the criminal aware that a call for help is being triggered to the monitoring facility. In a residential environment, a duress alarm could signal an abduction or rape attempt.

2.3.4 Panic Alarm

A system that reports a more general type of perceived emergency, including the presence of one or more unruly or inebriated individuals, unwanted persons trying to gain entry, ob-served intruders in a private yard or garden area, or a medical emergency. Provides police with little specific information, but is often the only way a user can call for assistance under abnormal conditions.

2.3.5 Medical Emergency (Service) Alarm

A system that reports a medical problem for response by relatives, friends, neighbors, or by a community's EMS personnel, paramedics, or ambulance, depending on arrangements made with the monitoring facility.

2.3.6 Heating, Ventilation, Air Conditioning (HVAC) Alarm

These systems are reports heating and ventilation as well as the air conditioning system problems, rather than life-threatening emergencies.

2.3.7 Single Sensor Alarm

Those types from (2.3.7-2.3.9) are important in my project because it is including some information about it.

A sensor detects the emergency condition and causes an alarm to be transmitted to the monitoring facility or to be indicated audibly or visually. Some sensors use single switches to trigger the alarm; other sensors require that two switches activate before the alarm is triggered. Some sensors use two or more detection technologies and require that two or more technologies sense the emergency condition before the alarm is triggered. All of these are single sensors.

2.3.8 Multiple Sensor Alarm

An alarm generated when at least two separate sensors detect the condition before the alarm is triggered. In some instances, redundant sensors in different system zones must trip before the alarm is triggered. However, activation of one sensor may trigger a trouble or pre-alarm signal. For example: Smoke detectors that is cross-zone-wired so that two or more zones must detect the smoke before an alarm condition is created.

Public emergency response or dispatch personnel are not normally contacted when these alarm systems detect a problem; protected property maintenance personnel tend to be notified by the monitoring facility.

2.3.9 Sequential Alarm

When two or more sensors sequentially detect a condition and each triggers an alarm. When this happens, there is a high probability that a real emergency exists.

2.3.10 Industrial Process Alarm

A system that provides supervision for a wide variety of commercial and industrial processes, including sump-pump operations, water levels, pressures and temperatures, chemical processes, and special furnace operations, to name but a few. Normally, user employees or sub-contractors are notified when these systems report problems.

2.4 Event Types

We will presents some information about event types alarms it is including explaining all types. The Event is one or more related alarm or trouble signals.
Alarm an electronic signal, transmitted to the monitoring facility. Indicates that an emergency require follow-up has been detected. When an alarm system is not monitored, the alarm condition activates one or more sounding or visual indicating devices.

2.4.1 Dispatch able Event

An unexpected alarm that triggers an event. An alarm does not become a dispatch able event until the monitoring facility has followed its established procedures such as verification or other confirmation that the alarm requires further action. Subsequent signals from the same type of alarm system are part of the original dispatch able event until the event is resolved and the system has been reset. When an alarm is determined to be a dispatch able event, a request for response is made to the appropriate response agency or agencies.

2.4.2 False Alarm

An alarm event indicating the presence of an emergency condition when none exists. Please visit our False Alarm Information page for more information

2.4.3 Test

The act of activating one or more sensors, devices, controls, communicating devices or other components of an alarm system in an effort to confirm proper operation of the equipment.

2.4.4 Transmission Test

Verification of the ability of a system control to send signals to the monitoring facility which it is intended to notify.

2.4.5 Inspection

A visual survey of the appearance of an alarm installation intended to discover any obvious problems. Typically these might be alarm system wires that have been covered up during building construction or remodeling, loose doors or windows that may cause false alarms during storms, sprinkler risers and controls that may be blocked by merchandise making fire department access difficult or impossible during emergencies, etc. An inspection may include actual tests of alarm system sensors, controls, or transmitters.

2.4.6 Reset

A return to normal operation for an alarm system that has been in a trouble condition, out of service, or in an alarm condition. When a system has been "reset" it is back in full operation and subsequent signals received from the system will be treated normally. A reset is more than merely the restoration-to-normal of a sensor, or an abort message or call from the user. With a reset event, the system is back in full and normal operation.

2.4.7 Abort

A telephoned voice call or an electronically transmitted message, with appropriate safeguards as to authenticity that indicates a just-transmitted alarm event is not to be reacted to as an emergency. An abort is also a procedure to prevent an alarm signal from being sent to the monitoring facility.

2.5 Users of Alarm Systems

User: The person responsible for the correct operation of the alarm system (the boss, the buyer). Not necessarily the person who actually operates the alarm system. System Operator: A person who operates an alarm system. Such person is assumed to have been taught how to arm, or how to arm and disarm the system, and how to prevent alarm signals from being transmitted to the monitoring facility unnecessarily or by mistake. A system operator may, or may not, be an authorized user agent.

2.6 Control Equipment at Protected Location

Equipment and devices that make the system at the user location function properly. We will explain about control equipment start by keypad. Keypad: The portion of the arming station containing numbered push buttons similar to those on telephones or calculators. These control the arming or disarming of the system. They may also perform other functions. And about key switch it is used an alternate device used to arm or disarm the alarm system, instead of a keypad.

2.6.1 Signal Indicating Device

A device that provides an audible or visual indication that an emergency condition has been detected. Audible devices include electronic sounders, bells, horns, and sirens. Visual devices include incandescent or strobe lights. Signal indicating devices also include panels that provide lamps or schematic building diagrams to identify the specific location of the sensor or sensors that detected an emergency, or that are in.

2.6.2 Delay Zone

One or more sensors in an alarm circuit that are wired so that, when triggered, a specific time delay results before an alarm condition is generated. Delay zones are often created for the most frequently used exit and entry doors to allow for sufficient time for normal entry and exit without causing alarm conditions.

2.6.3 Zone (with sensors)

An identifiable sensor or group of sensors, connected to an alarm control that can be addressed and manipulated from the control, from the monitoring facility, or from an arming station.

2.7 Sensors (In Alarm Systems)

Double-Action Trigger: A sensor that requires separate simultaneous actions, or closely-spaced sequential actions before an alarm is transmitted to the monitoring facility. If only one action is taken, a trouble signal may be transmitted or logged and annunciated. Dual-Technology Trigger: A sensor that uses two or more separate technologies, two of which must sense the designated condition before the device triggers an alarm signal. If only one technology senses the condition, a trouble signal may be transmitted or logged and annunciated.

Multiple-Activation Trigger: This is not really a special type of sensor. Rather it is a system-designed feature that requires two or more sequential activations of the sensor before an alarm signal is transmitted to the monitoring facility.

The mercury Switch: A set of electrical contacts that are opened or closed as a sphere of liquid mercury encompasses them or is re-moved from them inside a hermetically sealed enclosure. Usually the enclosure is tilted in one direction to close the switch and in the opposite direction to open it. The Capacity Sensor: A sensor that detects a change in capacitance when a person touches or comes in close proximity to an object, such as a safe or file cabinet, insulated from electrical ground potential. Vibration Sensor: A sensor that detects vibrations generated during forced entry or an attempted forced entry.

2.7.1 Fire Alarm Sensors

Flame Detector: A sensor that "sees" the flicker of light emanating from a fire. Manual Fire Alarm Station: A device that permits a fire alarm signal to be triggered manually.

2.7.2 Sprinkler System Water Flow Sensors

A sensor that detects the flow of water in a sprinkler system this type is present a one applied important in my project, so we will explain this in chapter three , The Wet-Pipe Flow Sensor, A sensor that detects the flow of water in a wet-pipe sprinkler system. Dry-Pipe Flow Sensor: A sensor that detects the flow of water in a dry-pipe sprinkler system. Open-Pipe (Deluge) Flow Sensor: A sensor that detects the flow of water in an open-pipe sprinkler system.

Figure 2.2 One Form Sensors

2.8 Summary

This chapter presented some information about alarm system. We have seen some types of Alarm Systems. One of which is related to the alarm in my project: Single Sensor Alarm. As well as there is information about event types, and how we can use the alarm systems in general.

3. MDULAR BURGLAR ALARM

3.1 Overview

This chapter presents the parts of this circuit, explanation about the operation, and circuit diagram.

3.2 Integrated circuits

A monolithic integrated circuit (also known as IC, microchip, silicon chip, computer chip or chip) is a miniaturized electronic circuit (consisting mainly of semiconductor devices, as well as passive components) which has been manufactured in the surface of a thin substrate of semiconductor material.

A hybrid integrated circuit is a miniaturized electronic circuit constructed of individual semiconductor devices, as well as passive components, bonded to a substrate or circuit Board.

The integrated circuit was made possible by experimental discoveries which showed that semiconductor devices could perform the functions of vacuum tubes and by mid-20th-century technology advancements in semiconductor device fabrication. The integration of large numbers of tiny transistors into a small chip was an enormous improvement over the manual assembly of vacuum tubes and circuits using discrete electronic components. The integrated circuit's mass production capability, reliability, and ease of adding complexity prompted the use of standardized ICs in place of designs using discrete transistors which quickly pushed vacuum tubes into obsolescence. There are two main advantages of ICs over discrete circuits - cost and performance. The cost is low because the chips, with all their components, are printed as a unit by photolithography and not constructed a transistor at a time. As of 2006, chip areas range from a few square mm to around 250 mm2, with up to 1 million transistors per mm2. Among the most advanced integrated circuits are the microprocessors, which control everything from computers to cellular phones to digital microwave ovens. Digital memory chips are another family of integrated circuit that is crucially important to the modern information society. While the cost of designing and developing a complex integrated circuit is quite high, when spread across typically millions of production units the individual IC cost is minimized. The performance of ICs is high because the small size allows short traces which in turn allows low power logic (such as CMOS) to be used at fast switching speeds[5].

ICs have consistently migrated to smaller feature sizes over the years, allowing more circuitry to be packed on each chip - see Moore's law. As the feature size shrinks, almost everything improves - the cost per unit and the switching power consumption go down, and the speed goes up. However, IC's with nanometer-scale devices are not without their problems, principal among which is leakage current, although these problems are not insurmountable and will likely be solved or at least ameliorated by the introduction of high-k dielectrics. Since these speed and power consumption gains are apparent to the end user, there is fierce competition among the manufacturers to use finer geometries. This process, and the expected progress over the next few years, is well described by the International Technology Roadmap for Semiconductors, or ITRS.

Digital integrated circuits can contain anything from one to millions of logic gates, flip-flops, multiplexers, and other circuits in a few square millimeters. The small size of these circuits allows high speed, low power dissipation, and reduced manufacturing cost compared with board-level integration. Analog integrated circuits perform analog functions like amplification, active filtering, demodulation, mixing, etc. ADCs and DACs are the key elements of mixed signal ICs. They convert signals between analog and digital formats. Analog ICs ease the burden on circuit designers by having expertly designed analog circuits available instead of designing a difficult analog circuit from scratch.

3.2.1 Popularity of ICs

Only a half century after their development was initiated, integrated circuits have become ubiquitous. Computers, cellular phones, and other digital appliances are now inextricable parts of the structure of modern societies. That is, modern computing, communications, manufacturing and transport systems, including the Internet, all depend on the existence of integrated circuits. Indeed, many scholars believe that the digital revolution brought about by integrated circuits was one of the most significant occurrences in the history of mankind.

3.2.2 What Can an IC Do?

In consumer electronics, ICs have made possible the development of many new products, including personal calculators and computers, digital watches, and video games. They have also been used to improve or lower the cost of many existing products, such as appliances, televisions, radios, and high-fidelity equipment.

3.2.3 IC Types

Integrated circuits are often classified by the number of transistors and other electronic components they contain:

SSI (small-scale integration): Up to 100 electronic components per chip

MSI (medium-scale integration): From 100 to 3,000 electronic components per chip

LSI (large-scale integration): From 3,000 to 100,000 electronic components per chip

VLSI (very large-scale integration): From 100,000 to 1,000,000 electronic components per chip. ULSI (ultra large-scale integration): More than 1 million electronic components per chip.

There are two major kinds of ICs:

Analog (or linear) which are used as amplifiers, timers and oscillators

Digital (or logic) which is used in microprocessors and memories

Some ICs are combinations of both analog and digital

Here I explained two types of integrated circuit, the LF356 - JFET Input Operational Amplifiers and the TL074C Quad Low-Noise J-FET Operational Amplifier. The LF356 has an 8-pin DIL and the TL074C has a 14-pin DIL.

LF356 this is op amps with JFET input devices. These JFETs have large reverse breakdown voltages from gate to source and drain eliminating the need for clamps across the inputs. Therefore large differential input voltages can easily be accommodated without a large increase in input current. The maximum differential input voltage is independent of the supply voltages. However, neither of the input voltages should be allowed to exceed the negative supply as this will cause large currents to flow which can result in a destroyed unit. Exceeding the negative common-mode limit on either input will force the output to a high state, potentially causing a reversal of phase to the output. Exceeding the negative common-mode limit on both inputs will force the amplifier output to a high state. In neither case does a latch occur since raising the input back within the common-mode range again puts the input stage and thus the amplifier in a normal operating mode.

Exceeding the positive common-mode limit on a single input will not change the phase of the output however, if both inputs exceed the limit, the output of the amplifier will be forced to a high state. This amplifier will operate with the common-mode input voltage equal to the positive supply. In fact, the common-mode voltage can exceed the positive supply by approximately 100 mV independent of supply voltage and over the full operating temperature range. The positive supply can therefore be used as a reference on an input as, for example, in a supply current monitor and/or limiter. Precautions

should be taken to ensure that the power supply for the integrated circuit never becomes reversed in polarity or that the unit is not inadvertently installed backwards in a socket as an unlimited current surge through the resulting forward diode within the IC could cause fusing of the internal conductors and result in a destroyed unit. All of the bias currents in these amplifiers are set by FET current sources. The drain currents for the amplifier are therefore essentially independent of supply voltage. As with most amplifiers, care should be taken with lead dress, component placement and supply decoupling in order to ensure stability. For example, resistors from the output to an input should be placed with the body close to the input to minimize "pickup" and maximize the frequency of the feedback pole by minimizing the capacitance from the input to ground. A feedback pole is created when the feedback around any amplifier is resistive. The parallel resistance and capacitance from the input of the device (usually the inverting input) to ac ground set the frequency of the pole. In many instances the frequency of this pole is much greater than the expected 3 dB frequency of the closed loop gain and consequently there is negligible effect on stability margin. However, if the feedback pole is less than approximately six times the expected 3 dB frequency a lead capacitor should be placed from the output to the input of the op amp. The value of the added capacitor should be such that the RC time constant of this capacitor and the resistance it parallels is greater than or equal to the original feedback pole time constant.

- Advantages

1. Replace expensive hybrid and module FET op amps
2. Rugged JFETs allow blow-out free handling compared with MOSFET input devices
3. Excellent for low noise applications using either high or low source impedance—very low 1/f corner
4. Offset adjust does not degrade drift or common-mode rejection as in most monolithic amplifiers
5. New output stage allows use of large capacitive loads (5,000 pF) without stability problems
6. Internal compensation and large differential input voltage capability

- Applications

1. Precision high speed integrators
2. Fast D/A and A/D converters
3. High impedance buffers
4. Wideband, low noise, low drift amplifiers
5. Logarithmic amplifiers
6. Photocell amplifiers
7. Sample and Hold circuits

- Common Features

1. Low input bias current: 30pA
2. Low Input Offset Current: 3pA
3. High input impedance: 1012□
4. Low input noise current:
5. High common-mode rejection ratio: 100 dB
6. Large dc voltage gain: 106 dB

TL074C This low noise JFET input operational amplifiers combine two state–of–the–art analog technologies on a single monolithic integrated circuit. Each internally compensated operational amplifier has well matched high voltage JFET input device for low input offset voltage. The BIFET technology provides wide bandwidths and fast slew rates with low input bias currents, input offset currents, and supply currents. Moreover, the devices exhibit low noise and low harmonic distortion, making them ideal for use in high fidelity audio amplifier applications. These devices are available in single, dual and quad operational amplifiers which are pin–compatible with the industry standard MC1741, MC1458.

- Features

1. Low power consumption
2. Wide common-mode and differential voltage range
3. Low input bias and offset currents
4. Low noise en=18nV/√Hz (typ)
5. Output short-circuit protection
6. High input impedance J-FET input stage
7. Low harmonic distortion: 0.01% (typ)
8. Internal frequency compensation
9. Latch up free operation

10 High slew rate: 13 V/μs (typ)

3.3 Components of project (Modular Burglar Alarm)

3.3.1 Primary circuit

In this circuit, the following resistors are used:

R1	2.2K (Red, Red, Red, Gold)
R2	2.2K (Red, Red, Red, Gold)
R3	10K (Brown, Black, Orange, Gold)
R4	10K (Brown, Black, Orange, Gold)
R5	1M (Brown, Black, Green, Gold)
R6	10K (Brown, Black, Orange, Gold)
R7	2.2K (Red, Red, Red, Gold)
R8	10K (Brown, Black, Orange, Gold)
R9	4.7K (Yellow, Violet, Red, Gold)
R10	560R (1 watt)
R11	2.2K (Red, Red, Red, Gold)

We also have three variable resistors. Sometimes, variable resistors comes with a stick on it so we can adjust it easily, but in my project I used the ones without sticks so not any one can play with it. And these variables are as below:

VR1	1M (Brown, Black, Green, Gold)
VR2	1M (Brown, Black, Green, Gold)
VR3	5M (Green, Black, Green, Gold)

There are nine capacitors, it is a difference in qualities; it will contact with a circuit as we will see in the figure (3.1).

C1	100 nF Ceramic
C2	100 μF 63 V
C3	220 μF 35 V
C4	100 nF Ceramic
C5	100 μF 63 V
C6	470 μF 25V
C7	100 nF Ceramic
C8	100 nF Ceramic
C9	100 μF 63 V

We have an integrated circuit, and three NPN Transistors, and they are as follow:

IC	CMOS 4001 (NOR Gate)
Tr1	BC 547
Tr2	BC 547
Tr3	BC 547

There are three types of diodes we are using, Five of Germanium diodes, three LEDs, and one Zener diode.

D1-D5	IN4148
Z1	Zener (9V)
LED1	Green
LED2	Red
LED3	Green

The Thyristor used in this circuit

SCR	TIC 106 D

Basically the relay had to be charged to activate the Bell

Coil resistance 270-Ω minimum

There is one switch that we are using in our project also we are using a reset switch.

SW1	Single Pole, Change over
SW2	Normally closed, push to break

The output sound is presented by two devices

Bell The value between (40 – 80 ohms)

Buzzer

We use it here one power supple in project:

Power supply PP6 Size 9 volt and connector to suit

We have here three LED photocells that were used in project. The red one shows that the circuit is at SET position, the two green LEDs shows that the loops are closed.

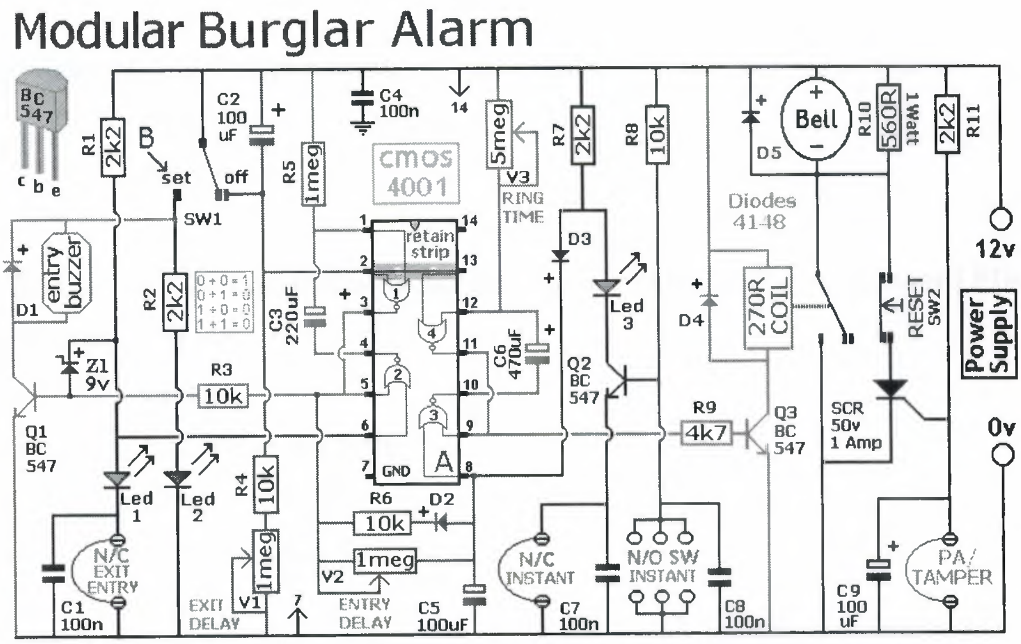


Figure 3.1 Circuit Diagram of Modular Burglar Alarm

3.3.2 Secondary circuit

In this circuit, the following resistors are used:

RZ1	2.2K (Red, Red, Red, Gold)
RZ2	10K (Brown, Black, Orange, Gold)
RZ3	4.7K (Yellow, Violet, Red, Gold)
RZ4	1K (Brown, Black, Red, Gold)
RZ5	2.2K (Red, Red, Red, Gold)
RZ6	27K (Red, Violet, Orange, Gold)
RZ7	27K (Red, Violet, Orange, Gold)
RZ8	2.2K (Red, Red, Red, Gold)
RZ9	4.7K (Yellow, Violet, Red, Gold)
RZ10	2.2K (Red, Red, Red, Gold)
RZ11	10K (Brown, Black, Orange, Gold)

There are six capacitors, with the same value.

CZ1-CZ6	100 nF Ceramic

We have an integrated circuit, and three NPN Transistors, and they are as follow:

IC	CMOS 4081 (AND Gate)
Tr1	BC 547

The diodes which are used in this circuit are six of Germanium diodes, and four LEDs

DZ1-DZ6	IN4148
LED1	Green
LED2	Red (Zone one fault)
LED3	Green
LED4	Red (Zone two fault)

There is one switch that we are using in our project also we are using a reset switch.

SW1	Normally opened, push to close

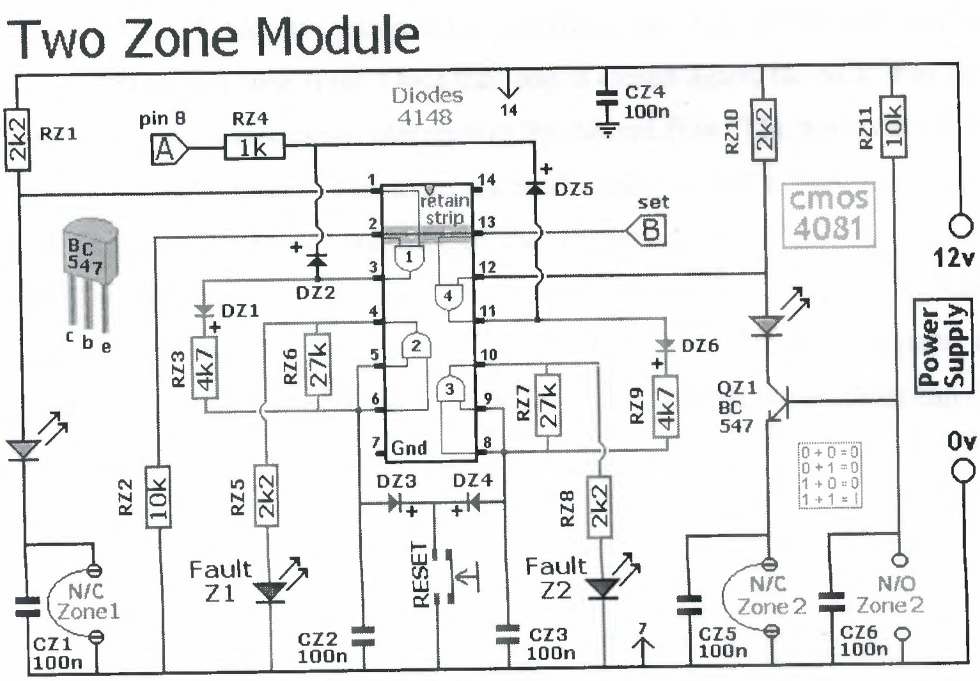


Figure 3.2 Two Zone Modules

3.4 Brief explanation of the Circuit

This circuit features automatic Exit and Entry delays and a timed Bell Cut-off. It has provision for both normally-closed and normally-open contacts, and a 24-hour Personal Attack/Tamper zone. It is connected permanently to the 12-volt supply and its operation is "enabled" by opening SW1. By using the expansion modules, you can add as many zones as you require; some or all of which may be the inertia (shock) sensor type. All the green LEDs should be lighting before you open SW1. You then have up to about a minute to leave the building. As you do so, the Buzzer will sound. It should stop sounding when you shut the door behind you. This indicates that the Exit/Entry loop has been successfully restored within the time allowed. When you re-enter the building you have up to about a minute to move SW1 to the off position. If SW1 is not switched off in time, the relay will energize and sound the main bell. It will ring for up to about 40 minutes. But it can be turned off at any time by SW1. The "Instant" zone has no Entry Delay. The 24 Hour PA/Tamper protections are provided by the SCR/Thyristor. If any of the switches in the N/C loop is opened, R11 will trigger the SCR and the bell will ring. In this case the bell has no time limit. Once the loop is closed again, the SCR may be reset by pressing SW2 and temporarily interrupting the current flow. The basic circuit will be satisfactory in many situations. However, it's much easier to find a fault when the alarm is divided into zones and the control panel can remember which zone has caused the activation. The expansion modules are designed to do this. Although they will work with the existing instant zone, they are intended to replace it. When a zone is activated, its red LED will light and remain lit until the reset button is pressed. All the modules can share a single reset button.

3.5 Summary

This chapter presented detailed technical information about the modular burglar alarm, circuit components, diagrams of the circuits, and I explained briefly about the operation.

4. SYSTEM DESCRIPTION AND IMPROVEMENT

4.1 Over View

In this chapter we are going to observe the operation of the project in details. And also we are going to see the ways that we can use to improve our project.

4.2 Circuit Description

In this project, I used three different wire colors, Red, Green, and White. Red ones show the positive side connection. The green wires show the negative side connection. The white wires show the internal connection of the circuit.

The CMOS 4001 is used to provide two Monostables. Gates 1 & 2 - together with R5 & C3 - form the exit/entry monostable. Gates 3 & 4 - together with V3 & C6 - form the bell monostable. While Sw1 is in the "off" position - it holds pins 2 & 13 high - and this prevents the two monostables from triggering.

Pin 6 is the trigger that activates the exit/entry monostable. Depending on the setting of V1 - when SW1 is moved to the "set" position - C2 will continue to keep pin 2 high for up to about a minute. During this time - the pin 6 trigger will not work. Therefore, you can open the exit/entry loop and leave the building.

During the exit delay - when you open the door to leave the building - current through R1 & Z1 will switch Q1 "on" and sound the buzzer. When you close the door behind you, the buzzer should stop. This confirms that the exit/entry loop has closed properly within the time allowed. The 9v1 zener is used to prevent the base-emitter junction of Q1 from holding pin 6 permanently low.

While the alarm is off - if V1 is accidentally adjusted to zero ohms - R4 prevents it from causing a short circuit. R2 & Led 2 provides an indicator that lights when the alarm is "set".

The buzzer is a small "bell" type. It should only take a few milliamps. With such a small buzzer - D1 is probably unnecessary - but its presence means that you are free to connect a small relay to the buzzer output. Such a relay may then be used to turn an "instant zone" into an "access zone" - or to switch on a light when you enter the building. The total load placed on the buzzer output by the buzzer and relay coil should not exceed about 50mA.

An "access zone" is an "instant zone" that will allow you to pass - provided you have first entered the building through the "exit/entry zone". To turn an "instant zone" into an "access zone" - connect the coil of a suitable relay to the buzzer output. Then use the relay contacts to disable the "instant zone" - while the buzzer is sounding.

After the exit delay - pin 2 is low - and the exit/entry monostable is enabled. When the door is opened - R1 will take pin 6 high - and the exit/entry monostable will trigger. This produces an output at pin 3 - for a period of time set by C3 & R5 - about 3 minutes.

During this time - current through R3 will switch Q1 on - and the buzzer will sound. At the same time - current through V2 will begin to charge C5. This is the entry delay. It can last up to about a minute - depending on the setting of V2. You will generally switch the alarm off during this period.

If you fail to do so - C5 will eventually take pin 8 high. When 8 go high - the bell monostable pin will trigger. This produces an output at pin 11 - for a period of time set by V3 & C6 - up to about 40 minutes. During this time - current through R9 will turn Q3 on - the relay will energize - and the bell will ring.

The bell monostable only works while pin 13 is low. Moving SW1 to the 'off' position takes pin 13 high - and stops the bell from ringing.

R6 & D2 provide a rapid discharge path for C5. So the entry delay will reset more quickly than it would if C5 had to discharge through V2 alone.

If any switch in the normally-closed "instant" Loop is opened - C5 will charge rapidly through R7 & D3. Pin 8 will go high - trigger the bell monostable - and the bell will ring immediately.

In the same way - if a normally-open switch takes the base of Q2 to ground - the transistor will switch off. This will allow C5 to charge rapidly through R7 & D3. Pin 8 will go high - the bell monostable will trigger - and the bell will ring immediately.

The PERSONAL ATTACK/TAMPER zone operates 24 hours a day. It will work even when the alarm is "off". If the PA/TAMPER loop is opened - current through R11 will trigger the gate of the SCR - and the Bell will ring.

If the SCR is to latch "on" - then it must have a constant minimum current flowing through it. R10 provides this current. Whether or not R10 is necessary depends on the type of sounder you use. If you are using an electronic siren - you probably don't need R10. However, a bell has a built-in switch that interrupts the current as it rings - so R10 is necessary to supply current during these interruptions.

To reset the PA/TAMPER zone after activation - first restore the normally-closed loop - and then temporarily interrupt the current flow by pressing SW2. This will unlatch the SCR - and the bell will stop ringing.

The wires that go to the switches on the doors and windows - can act like a radio antenna. They pick up stray signals that can cause "false alarms". C1, C7, C8, & C9 are there to de-tune the various circuits. Note that the gate of the SCR is much more sensitive than the other circuits - because it triggers at a much lower voltage. That's why C9 is much larger than the other capacitors.

Relay coils and some sounders produce large reverse-voltage spikes that will destroy CMOS ICs. D5 short-circuits these spikes at source - before they can do any damage. It is best to fit the diode as close to the bell as possible. Many bells come with a diode already fitted to the coil. If that's the case, mount D5 on the PCB. D4 does a similar job, removing spikes from the relay coil.

The following circuit description concentrates on the workings of Zone 2. Once its operation is understood - the workings of Zone 1 should be obvious. The Zone 2 trigger is connected to pin 12. This pin is held low by the normally-closed loop and by QZ1 which is kept switched on by current through RZ11. Current flowing through the transistor and the loop lights the green LED. This shows that the trigger circuit is closed.

When the alarm is "off" - RZ2 holds pin 13 low. This means that the output of gate 4 has to remain low. See the truth table for the 4081. As long as at least one of its inputs is low then the output will be low also.

When the alarm is "set" - SW1 on the main circuit board takes 'B' high. This takes pin 13 high - and enables gate 4. Now - if the N/C loop is opened - or QZ1 is turned off by an N/O switch connecting its base to ground - RZ10 will take pin 12 high. With both its inputs high - the output at pin 11 will go high. This output does two jobs:

a) Firstly - by taking pin 8 of the CMOS 4001 high through DZ5 - it triggers the "Instant" zone on the main circuit board.

b) Secondly - it takes the inputs of gate 3 high through DZ6 and RZ9 - causing pin 10 to go high. Pin 10 also does two jobs. Firstly - it latches itself on by taking its own inputs high through RZ7 - and secondly - it lights the red LED - to indicate that zone 2 has been activated.

When pin11 goes low again - either because the alarm has been switched off - or because the trigger circuit has been restored - DZ6 prevents pin 11 from taking pins 8 and 9 low. So the red LED will stay lit - and the module will "remember" that zone 2 has been activated.

With the exception of the trigger circuit - zone 1 operates in exactly the same way. The red LEDs indicate where in the building the intruder has tried to gain access - or in the case of repeated false alarms - which zone is giving trouble.

Once you have noted which zone has caused the activation - you may turn-off the red LED by pressing the reset button. This takes pins 8 and 9 low - so the output at pin 10 goes low also. DZ4 allows all the modules to share a single reset button - without their interfering with each other.

Note that the button only turns off the LED. It does NOT reset the zone. The zone resets itself automatically when the trigger circuit is restored and this happens regardless of whether or not the LED is lighting.

The Two-Zone Module is connected permanently to the 12-volt supply and its operation is enabled when SW1 takes 'B' high. DZ5 allows any number of zones to be connected to 'A' without their interfering with each other. RZ4 limits the current surge as the outputs of gates 1 and 4 charge C5 on the main circuit board.

The 100n capacitors are there to slow down the response time of the gates and to de-tune the alarm loops so that the alarm will not be activated by radio interference or spikes on the mains supply.

4.3 Circuit improvements

4.3.1 Inertia sensor module

This module allows you to use Inertia (Shock) Sensors with the Modular Burglar Alarm circuit. Although it's intended primarily for Inertia Sensors - a mixture of Sensors and Magnetic Reed Contacts etc. - may be included in the normally-closed loop.

Inertia Sensors are devices that react to vibrations. They do not react to constant low level vibrations of the sort you would get from loud music or heavy road traffic. Instead they have a certain amount of inertia that must be overcome before they react. In other words - they need a sharp blow - such as would be required to break a pane of glass.

Essentially - they are small normally-closed switches - the contacts of which are joined by a specially weighted bar. It's the weights on the bar that provide the inertia. When a blow is struck - the bar bounces - and the circuit opens briefly. The length of time the switch is open depends on the strength of the blow - i.e. how high the bar bounces.

4.3.2 Parts improvement

There are some parts that we can add to the circuit depending on the way we use the circuit

Passive infrared

Normally closed switch which opens if some one enters its field of view

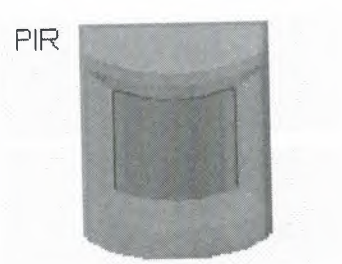


Figure 4.1 Passive infrared

Pressure mat

Place under carpets or doormats normally open switch which closes when someone steps on it

Figure 4.2 Pressure mat

Magnetic reed switch

Switch is mounted on door or window frame and magnet on door or window. Switch is held normally closed by magnet and opens when door or window is opened

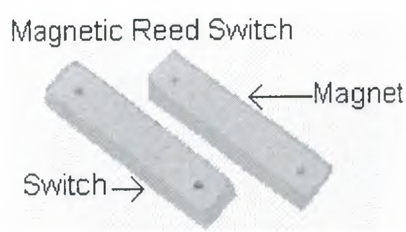


Figure 4.3 Magnetic reed switches

Window foil

Aluminum foil sticks to glass forming a normally closed loop about one inch from the edge of the pane. If the glass cracks the foil will break and open the loop

Figure 4.4 Window foil

Inertia sensor

A normally closed switch which opens briefly when the door or window receives a sharp blow, like if someone breaks the glass.

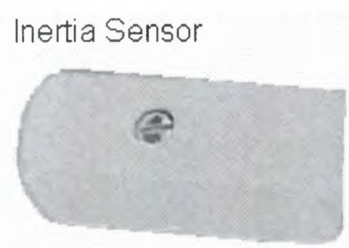


Figure 4.5 Inertia sensor

4.4 Summary

In this chapter I have presented the operation of my project, the inertia circuit, and some parts which we can add to the circuit to improve it.

CONCLUSION

During the making of this project we have seen the electronic parts and we have learned how o deal with them. This project presented some information about alarm system. We have seen some types of Alarm Systems. One of which is related to the alarm in my project: Single Sensor Alarm. As well as there is information about event types, and how we can use the alarm systems in general. Also we have seen the operation of this project. After that we have seen the ways that we can apply to the circuit in order to improve it.

After a great deal of working over this experiment of preparing this project theoretically and practically; it has been found-out that too much knowledge gained and too much techniques learned by using simple components to get our building secure and safe

From this project I get a lot of experience which help me in the end to finish this project. Also I learned how I can design, build and check the circuit and replace some component.

REFERENCES

[1] http://en.wikipedia.org/wiki/alarm_systems

[2] http://en.wikipedia.org/wiki/Resistor

[3] http://xtronics.com/kits/ccode.htm

[4] http://www.kpsec.freeuk.com/components/diode.htm

[5] http://en.wikipedia.org/wiki/Integrated_circuit

[6] http://en.wikipedia.org/wiki/Switch

[7] http://en.wikipedia.org/wiki/relay_coil

[8] http://en.wikipedia.org/wiki/CMOS 4001

[9] http://en.wikipedia.org/wiki/CMOS 4081

[10] Water activate alarm

[11] http://en.wikipedia.org/wiki/transistors