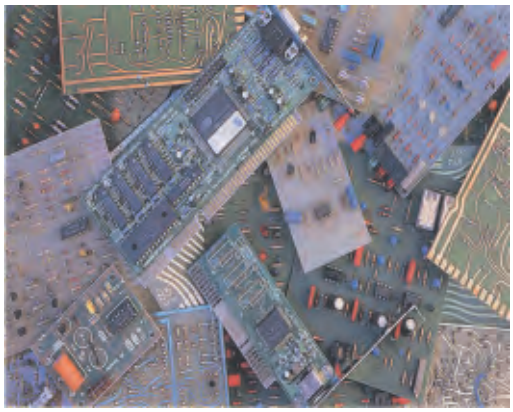
9 BASIC ELECTRONICS

In this chapter you will learn:

- Semi-conductors
- Semi-conductor Diode
- Radiowaves
- Radio System
- Televison
- Satellite T.V.
- Computer
- Analogue / Digital Converters
- Telecommunication
- Communication System

Revolutionary changes have occurred in the world during the last fifty years. Specially, there has been much progress in the field of electronics. Early radio set was so big that two persons could hardly move it . People used to have huge gramophones to enjoy music. Conquest of space was confined to only imagination. In the beginning, big valves were used in the T.V. set. Computer occupied many rooms.



Electronic Components

But today is the age of microchips. By the use of chips, T.V. and computers are reduced in size to such extent that they can be easily shifted from one place to another. Their efficiency has increased to many folds. Communication through satellites has become very common. Transmission from any place can be watched all over the world. This is all by virtue of electronics.

Electronics is the knowledge of behaviour and control of electric current.

Electronics uses the electric current to convert information into signals. These signals could be of sound, picture, number or other informations.

9.1 Semi-conductors

Electronic devices are used to control the electric current. Modern electronic devices mostly consist of semi-conductors. The major function of electronic devices is to amplify the week electric signals.

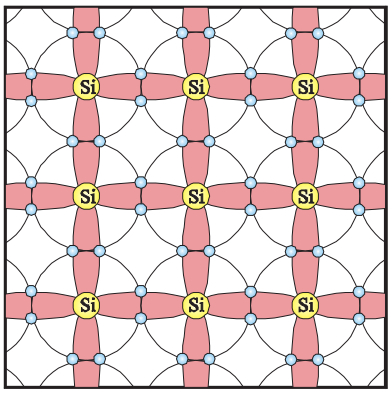


Fig. 9.1

Semi-conductor is such a substance which has the ability to conduct current in between conductors and insulators. Silicon and germanium are two common semi-conductors which belong to the fourth group of periodic table. In Fig. (9.1) a pure silicon crystal is shown.

In pure semi-conductors, no free electrons are available to conduct electric current at very low temperature but at ordinary temperature, some of the electrons get free. This makes it possible to conduct some current through the semi-conductor.

Semi-conductors are made more useful by increasing their conductivity. This is done by adding some quantity of trivalent or pentavalent atoms as impurity while growing the cyrstals of silicon or germanium. This process is called doping. This addition is usually done in the ratio of one to 10^8 atoms.

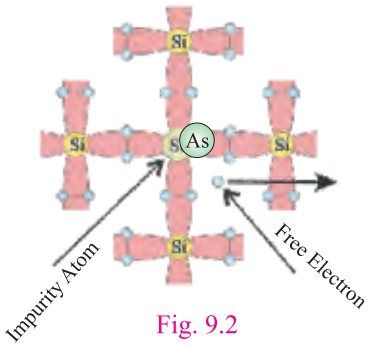


Fig. 9.2

N-type Semi-conductor

When a pentavalent impurity such as arsenic (As) is added to silicon crystals, then due to this process the number of free electrons in the semi-conductor increases (Fig. 9.2). Such a material is called as N-type semi-conductor. Most of the current flow through N-type semi-conductors is due to free electrons.

P-type Semi-conductor

If a trivalent impurity such as aluminium (Al) is doped in silicon crystal, then there is a deficiency of an electron in the outermost orbit of silicon atom. This deficiency of electron is called a hole (Fig. 9.3).

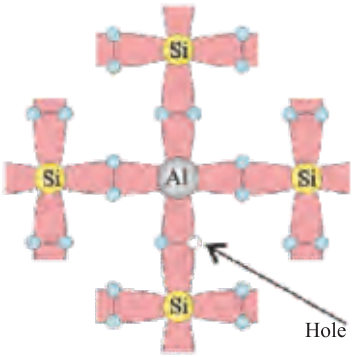


Fig. 9.3

Thus this type of doping increases the number of holes in the semi-conductor. Such material is known as P-type semi-conductor. The current flow through it is mostly due to the holes.

Semi-conductor Diode

If the silicon crystal is doped in such a way that its one end becomes N-type and the other P-type then it is called a P-N junction diode or semi-conductor diode. The P part of diode is known as anode and N part as cathode (Fig. (9.4).

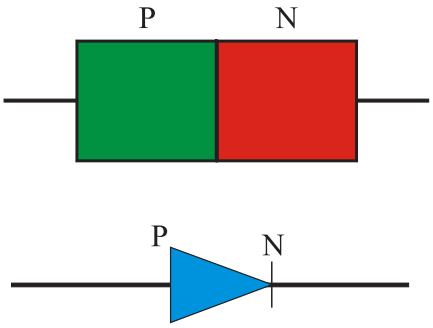


Fig. 9.4: Semi-conductor Diode

Forward Biased Diode

The symbol of diode is shown in (Fig. 9.4). When the anode of a diode is connected to the positive terminal of the battery and the cathode to the negative terminal, the current starts flowing through the diode from p-type to n-type of the junction. This is known as forward biased diode.

Reverse Biased Diode

When the anode of a diode is connected to the negative terminal of the battery and the cathode to the positive terminal, it is known as reverse biased diode. In this mode, the current flowing through the diode is almost zero.

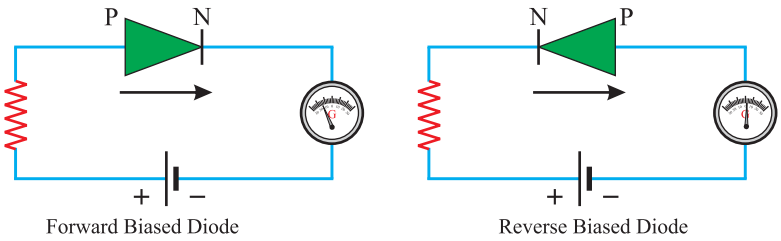


Fig. 9.5

9.2 Use of semi-conductor diode

There are many uses of semi-conductor diode. Some of them are given below:

Rectifier

The electricity supplied to the consumers is an A.C. But many appliances such as radio, T.V. and computer etc. work with D.C. voltage. Therefore, A.C. is to be converted to D.C. to run such appliances.

Process of converting alternating current to direct current is called rectification. The device,

which is used to convert A.C. is known as rectifier. A semi-conductor diode is also used as rectifier.

(ii) Light Emitting Diode

Light emitting diodes are made from specific compounds of gallium. It is forward biased. There is such a potential barrier in it at the P-N junction that when an electron occupies the hole after entering into P region from N, light is emitted. Such types of diodes are available in red, green, blue, yellow and white colours. These are also used as indicator lamps. Now a days these diodes are also used in the audio deck to display ups and downs in the loudness of sound.

Another important use of LEDs involve the display of seven segment digit in the digital clock, cash register and calculator. The English digit 8 has been divided into 7 segments as shown in Fig. (9.6).

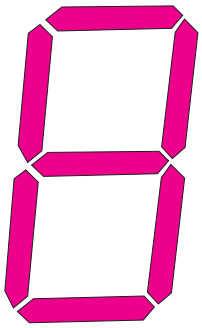


Fig. 9.6: Segment display be LED's

(iii) Photodiode

These are the diodes which are sensitive to light. Such diodes are used in the mode of reverse biased. When no light falls on them, their resistance is very high (in mega ohm). Its resistance goes on decreasing as the light falling on it increases. In this way the reverse current also increases with the increase of incident light. These diodes are used for detection of light and in the computer and video games etc. These are also used as automatic switches in the circuits.

9.3 Radiowaves

You know that sound reaches our ears in the form of waves. These waves require certain medium for their propagation. On the other hand light is also a form of waves, but it does not require any medium for its propagation. Light can pass through vacuum as well. Such waves are known as electromagnetic waves. Heat, light, x-rays etc., are all electromagnetic waves. These differ only in frequency. Radio waves are also electromagnetic waves.

Their frequency ranges between 10 Hz and 10^8 Hz and their speed is that of light. Radio waves are also called carrier waves, because these are used to carry radio and T.V. transmissions

For your information

Marconi was the inventor of radio system

from one place to another.

Radio System

Sound waves cannot travel through long distances. Moreover their speed is very low, that is about 340 metre per second. To carry sound waves to long distance, radio waves are used. For this purpose radio stations are built.

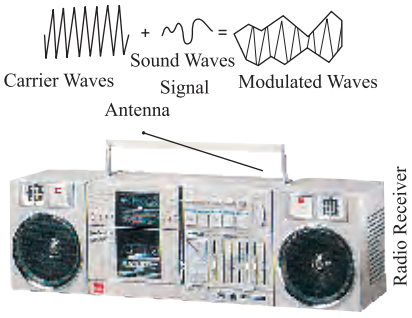


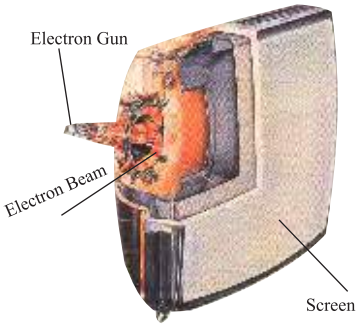
Fig. 9.7

At a radio station, microphone converts sound into electric signal. An electric circuit produces radio waves of some particular frequency. These are then mixed with sound signal. These carrier waves are transmitted all around through a transmitter antenna.

The carriers waves of up to 30 kHz are used for radio transmission. Different radio stations use carrier waves of different frequencies. Our radio set is a receiver. By its tuning, any desired frequency can be selected. A radio set receives the carrier waves of that particular frequency through its antenna for which it has been tuned. The receiver separates the sound signals from carrier waves. In the end, the receiver amplifies sound signals and send them to the speaker, which converts it again to sound.

Televison

The transmission of television also reaches far off places through carrier waves like radio. Video camera converts picture and microphone converts sound into electric signal. These signals are called video and audio signals respectively. At the T.V. station, carrier waves are mixed with these signals and transmitted in air through transmitter antenna.



Television

When these waves strike T.V. antenna, a slight alternating current of the same frequency is produced in it. The circuits of T.V. separates audio and video signals from each other. These signals are then amplified. Audio signal goes to the speaker which converts it into sound. Video signal goes to the picture tube.

In the picture tube, an elecron gun throws beam of electrons on the screen. The beam scans the screen just as you are reading every line of this page. A fluorescent material is coated on the inside of screen. When electrons fall on it, light is emitted. The beam of electrons produces bright dots on the screen according to video signal. Bright and dark parts compose the picture. About 25 pictures are completed on the screen in one second. That is why the picture looks moving. In a

colour television there are three electron guns, which form red, gren and blue pictures at a time on the screen. These three colours blend into a colourful picture.

Cable T.V

In cable T.V. electrical signals are not converted into radio waves, but these reach a T.V. set from T.V. station through cables. The companies providing cable connections also receive programme from satellites and thereafter transmit them to their consumers. High quality picture and sound is received through cable.

Cable T.V.

Satellite T.V

The range of a 100 meters high T.V. transmitter arial is about 30 kilometers. For inland transmissions, boosters or repeaters are installed at suitable distances. They transmit signals onward through microwaves after reinforcing them. However transmission cannot be carried to far away countries by this method. The reason is that our Earth is a sphere and the microwaves travel in a straight line. Describing a long distance they go much above the surface of Earth.

Repeator

To send waves to the other side of the Earth, they are transmitted via satellites. Satellites are orbiting the Earth. Such satellites which seem to be stationary at some particular positions, are called as hovering satellites. Their orbits are known as geostationary orbits. A satellite orbiting at a distance of about 36000 kilometres above the equator completes its rotation in 24 hours. In the same interval, the Earth also completes its rotation about its axis. In this way this satellite seems to be stationary at the same position. Microwaves are used to send signals to the satellite from a ground station (Fig. 9.8).

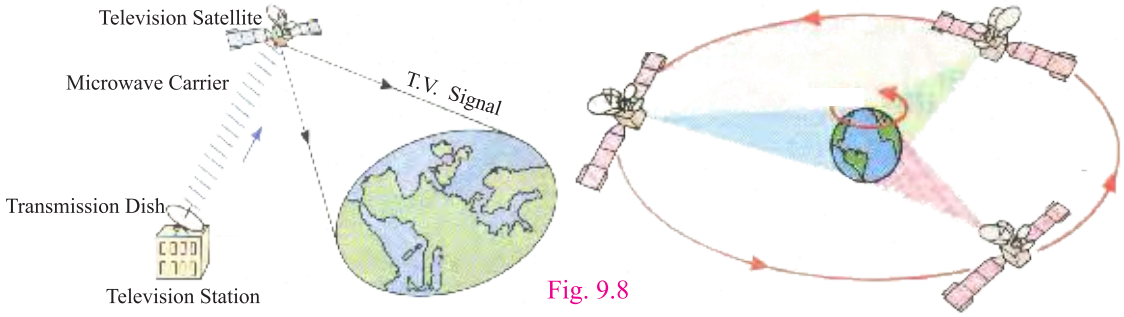


Fig. 9.8

On the ground, these transmission can be watched by receiving signals through dish antenna. Three hovering satellites can send transmissions to all over the world.

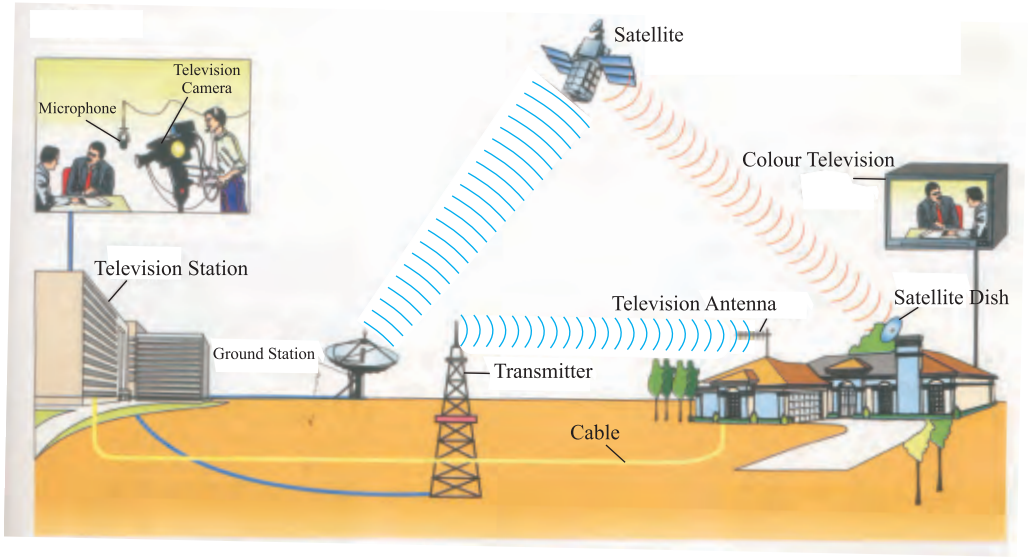


Fig. 9.9

In Fig. (9.9) T.V. Transmissions through radiowaves, cable and satellite are shown.

9.4 Computer

This is the computer age. Hardly a literate person could be unaware of the computer. In the homes, we use washing machine, microwave oven, satellite receiver, sewing machine and other electronic devices, which are all, being computerized. When you buy something from a big store the salesman on the counter just scans its bar code by laser light and all details including price etc. appear on the computer. Banks and other commercial institutes have computerized all of their business. Computerized machines are being used in the medical fields. Computers are controlling road traffic and air traffic. Electricity, water and gas supplying departments are keeping all their records on computers. Preparation of bills and receipts of money are made through computers. Before this, most of the people used to send letters for correspondence, but recently the use of E-mail has become very popular. Revolutionary

Computer

changes have been brought in the field of publishing, printing and graphics. Even the paintings are made on computers. Robots are assembling cars. Computerized machines are being used in industries. Computer games have changed the complexion of games. In short, the computer has brought revolution to our lives. The computer has made the world so small that people are calling it the global village. Let us know what is a computer?

Computer is an electronic machine that receives raw data and processes it into useful information under the given instructions.

Useful information includes rearrangement, analysis, explanation and arithmetic and logic solution. Apparently computers are very complicated but they are very simple as regards their functions and results.

A computer can be basically divided into two parts:

1. Hard ware 2. Software

1. Hardware

The components of computer that can be physically touched are called the hardware. For example key board, mouse, printer and monitor etc. There are four main parts of hardware.

i. Input devices
ii. Central processing Unit
iii. Output devices
iv. Information storage devices

For your information

It is a personal computer that looks like a briefcase. Monitor, Keyboard and others accessories are included in it.

i. Input Devices

The devices through which data is entered in the computer are known as input devices. The most common input device is the keyboard (Fig. 9.10). It is similar to a typewriter. Instructions to the computer are typed by keyboard. There are some functional keys on the keyboard, which serve different purposes.

Fig. 9.10: Keyboard

There is another device commonly used in place of functional keys known as mouse (Fig. 9.11). This is also an input device, which is rolled over a pad. This makes the input easier and faster. Floppy disk and compact disk are also input devices. These will be discussed later. Scanner is another

Fig. 9.11 : Mouse

important input device through which pictures and documents can be fed to the computer in their original form. This has facilitated much in the field of publishing. Laser pen is also used to enter data in the computer.

Input devices feed data to central part of the computer called CPU where data is processed.

ii. Central Processing Unit

The brain of computer is the central processing unit abbreviated as a CPU (Fig. 9.12). It controls different parts of computer that includes control unit, memory unit and arithmetic and logic unit (ALU).

Fig. 9.12: CPU

Control unit is the central part of CPU. It interprets instructions and directs other parts how to operate? A major function of this unit is to manage the sequence and operations under instructions (programme). The CPU sends data to input memory and then to ALU where addition, subtraction and other operations are done. From there, data is brought back to memory and finally sent to output unit. The CPU supervises all the operations carried on by the computer.

The memory unit consists of RAM and ROM, which are abbreviations of "Random Access Memory" and {Read only Memory" respectively. This unit is also known as temporary memory. Data from input device or hard disk is first carried to RAM before processing it. Some informations are already fed permanently to the ROM. When computer is turned on, ROM initiates the operating system.

Arithmetic and logic unit (ALU) does mathematical operations such as addition, subtractions, multiplication, division etc. and also it performs logical operations such as comparison between two things.

For your information

Travellers can use track ball where there is no room to place a roll pad.

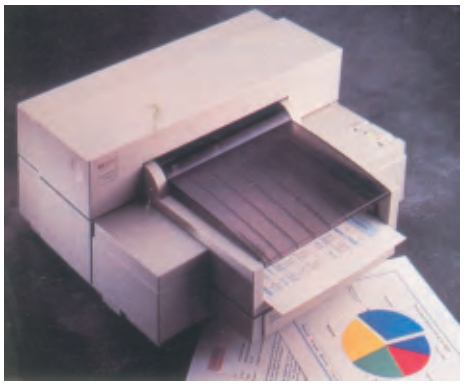
In the modern computers, control unit and arithmetic and logic units are included in the same microprocessor. Microprocessor is such an integrated circuit that consists of small silicon chip. Thousands of electronic components are installed on it. This chip possesses the entire problem solving capability of a computer.

iii. Output Devices

An output device receives informations from CPU and displays the operation carried out by computer. A common example of output is the monitor. A monitor is such an output device on which all the computer operations can be watched on the screen like television.

Monitor

Printer is another output device which prints the results of processing on paper. Printers are of many types that include dot matrix, laser, inkjet and bubble jet etc. Speaker converts signals into sound, so this is also an output device. A robot acts on the advice of computer, therefore it is included in output devices.


Printer

Output of computer can also be recorded on the cassette, floppy disk or C.D. Beside sound, video films and computer data is stored on C.D. That can be thereafter watched on computer or T.V. screen.

iv. Information Storage Devices

Not more than a few years before it was assumed that the only device to store and get informations are the books. But with the advancement in information technology, other information storing devices such as audio, video cassettes, compact disks, floppy disks, hard disks etc. have become very popular. Offices, banks, universities and other institutions are transferring their records on these devices rather than to keep it on papers. These devices can store too much information in a little space. Moreover, it is easier to use them when required.

(a) Audio and Video Cassettes

Audio cassettes are used in a tape recorder and the video cassettes in a VCR. Both of them consist of plastic tapes, which is coated with a magnetic materials. Sound or picture is converted into electrical signals and sent to audio or video heads. Signals produce varying magnetic field in the heads. When tape runs over the head, the magnetic field changes the pattern of magnetic material on the tape.


Audio - Video cassettes

In this way audio or video signals are recorded on the tape. To reproduce sound or picture, the reverse process is done. This time, head converts magnetic recording into audio and video signals again. The speaker changes the audio signals into sound and the picture tube of T.V. changes video signal into picture.

(b) Compact Disk

Compact Disk

This is an aluminium or plastic disk with shining surface. It is made for digital recording. In this recording millions of tiny pits are engraved on the disk. Its pattern corresponds to audio and video signals. The shining spaces between the pits are called "flats". For the replay, a laser beam scans the disk. This is known as reading of C.D. The flats reflects beam, which is equivalent to "I" in digital language. The pits do not reflect beam, which is 0. All 1's and 0's form digital signal. A circuit in the C.D. player converts digital recording to analogue electric signal. This signal is amplified and sent to the speaker or picture tube. The quality of sound produced by digital recording of C.D. is much better as compared to that of cassette tape. Moreover, a head or needle does not touch the C.D. as in case of cassette tape, but instead, only the laser beam touches it. That is why no scratches are formed on the C.D. and it works for a long time with the same performance.

(c) Floppy Disk

Floppy disk is a soft plastic disk over which a layer of magnetic material such as feric oxide is coated. Informations are stored on it in the form of magnetic pattern. It is kept in a plastic cassette for protection. When it is inserted in the computer, the floppy driver rotates it fast. A head reads or writes data on the disk.

Floppy Disk

(d) Hard Disk

A hard disk consists of two or more plates made of hard metallic material. Plates are mounted on a spindle that rotates fast. Plates are kept in a case. Each plate is coated with magnetic material on which data is recorded in magnetic pattern. To read recorded data or to write, each plate is provided with a specific head. Much more information can be stored on the hard disk as compared to floppy disk. A hard disk is the permanent part of a computer, and is installed inside the computer.

Hard Disk

2. Software

It is not possible for a computer to solve any problem unless it is provided instructions in such a language that is understandable for computer. Different instructions are needed for different tasks. These instructions are fed through magnetic tape, C.D. And floppy disk etc.

The instructions given to the computer for some task by electronic method are called software.

It includes operating system, computer language and programmes.

Programme

Programme is a list of instructions for a particular task. Under these instructions, the computer processes data and converts it into information. Preparing such a list of instructions is called programming or software engineering. A person writing a programme is known as programmer. Not everyone does write a programme, but pre written programmes are available in the market. Most of the people use them.

A few of the tasks done by different programmers are given below:

(i) Word Processing

The use of computer for writing matter, editing, storing and printing is known as word processing. In word processing, major task is to type matter by keyboard. Writing words in different styles and colours is possible in it. Word processing has too much importance in printing and publishing books. In such programmes there is also provision for correcting spelling and grammatical mistakes.

(Ii) Graphics

There are certain programmes which provide facility to draw straight and curved lines. These programmes are used to draw diagrams and pictures. Colours and shades can also be filled in pictures. Drawing lines, making pictures and designs by computer is called graphics.

(iii) Data Management

To store data in different files and rearrange them to get requisite results when needed is known as data management. Educational institutes, banks, libraries, hospitals, offices and big commercial organizations store informations, make amendments in them, keep different records and run their systems with the data managements.

9.5 Analogue / Digital Converters

Before discussing analogue / digital converters, let us know what are the analogue / digital signals?

We are familiar with different quantities. Such quantities, which increase or decrease continuously, are known as analogue quantities. Distance, time, velocity and temperature are good examples of analogue quantities. When we note time from a watch with arms , it could be any time from zero to twelve hours. As the arms rotates continuously on the dial, the time advances continuously. This time is an analogue quantity and the watch with arms would be called analogue watch.

Analogue Watch

In comparison to that digital quantities are not continuous. For example, the time on a digital watch does not advance continuously but the display changes once in one second. Let us now take up analogue and digital signals. You have studied alternating current. Its graph of voltage versus time is shown in Fig. 9.13. The graph shows that the voltage varies continuously between maximum and minimum values. Hence voltage is an analogue quantity.

Digital Watch

When a person speaks into microphone, it produces alternating current in the circuit corresponding to sound. This is called the electric signal of sound. Since the voltage varies continuously according to sound, therefore, this signal is analogue signal. If this signal is fed to the amplifier, which is an analogue circuit, it amplifies the signal without changing its shape. The speaker thereafter converts this signal into loud sound.

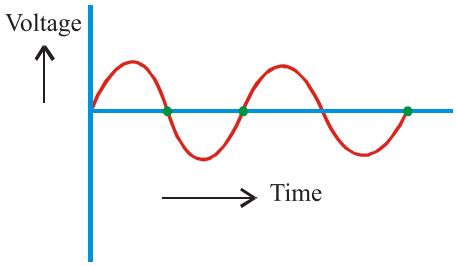


Fig 9.13.

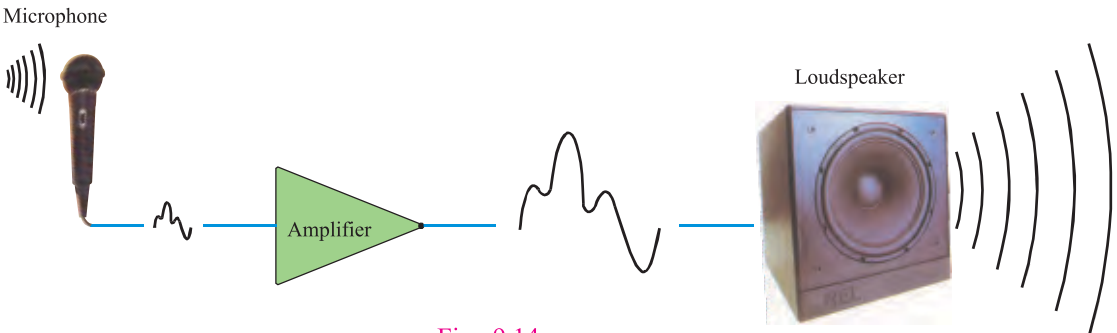


Fig. 9.14

Analogue signals represent continuously varying voltage

During last few decades, scientists and engineers have devised such circuits, which convert informations into digital signals. Digital signals are not continuous. These consist of two types of electrical pulses; one is the high voltage pulse and the other low voltage pulse. High voltage pulse is also called as on or "1" while the low voltage pulse as off or "0".

Digital signal consists of discrete on / off electrical pulses.

Digital signals are based on binary number system in which the base of counting is 2. You have learnt to write figures on the base of 2 in junior classes. As the figure 5637 on the base of 10 (in decimal system) is actually:

$5637 = 5\times10^3+6\times10^2+3\times10^1+7\times10^0$

or $5637 = 5000+600+30+7$

Likewise, the figure 361 on the base 2 in binary system has the meaning

$361 = 1\times2^8+0\times2^7+1\times2^6+1\times2^5+0\times2^4+1\times2^3+0\times2^2\times0\times2^1\times1\times2^0$

or $361 = 256+0+64+32+0+8+0+0+1$

In the binary system, we will write the figure 361 as

$361 = 101101001$

2	361		
2	180	—	1
2	90	—	0
2	45	—	0
2	22	—	1
2	11	—	0
2	5	—	1
2	2	—	1
2	1	—	0
	0	—	1

A simple method to write figure 361 in the binary system is that goes on dividing 361 by 2. Write down all the remainders in sequence starting from left side. This will be the required figure. The division of 361 by 2 is shown. If we write down the remainders in sequence then the figure becomes 101101001. This is the required figure.

Letters are also changed into binary coding like figures and then converted into voltage pulses. In this way all messages can be converted into digital signals.

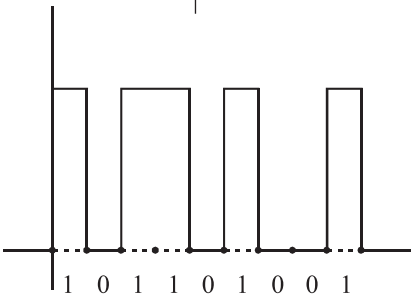


Fig. 9.15 Digital signal of figure 361

There are a few problems in interconnecting computers at far off places. It is because most of the communications are made through telephone wires, which are basically laid down for transmission of sound. The signal of sound is analogue that can easily pass through wires but the signal of computer is digital that cannot pass through wires. Therefore, computer is connected to telephone wires through a device, which converts digital signal into analogue signal. On the other end the same device converts analogue signal coming from wires into digital signal before it is allowed to enter the computer. This device is called modem, which is abbreviated from

modulator / demodulator. If you want to interconnect computers in the same room or same building, it does not require modem.

9.6 Information Technology

We are living in the age of information. Various kinds of inventions have made it possible to get too much information in very short time. Information can be exchanged. These can be made available for use. Games, music and other entertainment programmes being held on the other side of the globe can be watched now.

The scientific method of storing information, processing and using them properly and their communication is called information technology.

Telecommunication

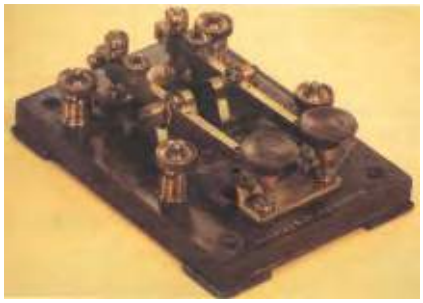
Communication to far off places in a more affective way has always been a challenge for scientists. In 1901, telegraph signal was transmitted and received through electromagnetic waves for the first time without using wires. Its inventor was Marconi. In 1906, first human voice was transmitted. Now-a-days, besides telephone, fax machine, computer and Internet etc. are the main sources of contact. By these devices informations are transmitted from one place to another in the form of words, sound, pictures and computer data.

The methods used for instant communication of information to far off places are called telecommunication.

In all communication methods, informations are transmitted after converting them into electric signals. Electric signals are sent through wires, radio signals through air and light signals through optical fibres. Radio and television are the main sources of telecommunication. Some other sources are given below.

(i) Telegraphy

In this, messages are transmitted in the form of Morris codes. Informations are changed into electric pulses and then transmitted to other places. On the other end these are again converted into audible signals. In this method experts are required to send codes to decode the message received form the other side. This method is very slow.



Morris key used in telegraphy

(ii) Telephone

This is an advanced form of telegraphy. Direct conversation is made through telephone instead of using codes. One part of telephone handset is the microphone and the other part is a receiver. Carbon granules are filled in microphone over which a metallic diaphragm is fixed. When some one speaks into microphone, the diaphragm vibrates that causes variation in pressure on the

carbon granules. Change of resistance occurs due to variation in pressure and the current in the circuit varies. Thus microphone changes sound into electric signals, which are transmitted through wire to the receiver at the other end of line.

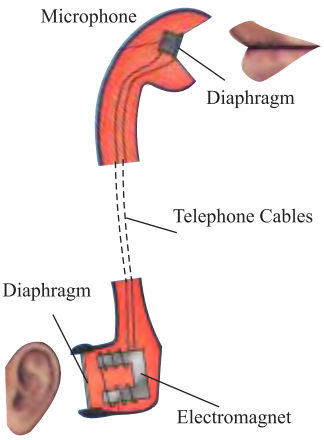


Fig. 9.16

There is also an iron diaphragm in the receiver under which an electromagnet is placed. The variation in the current passing through the coil of magnet causes variation in the force of magnet, due to which diaphragm moves back and forth in accord with the signal. The vibrating diaphragm produces sound (Fig. 9.16).

Electric signals of telephone pass through metallic wires. In the modern system, electric signals are first converted into light signals and then transmitted through optical fibres. In every country, there is a network of telephone exchanges that provide a contact between two telephones. For international contacts, microwave transmissions or satellites are used (Fig. 9.17).

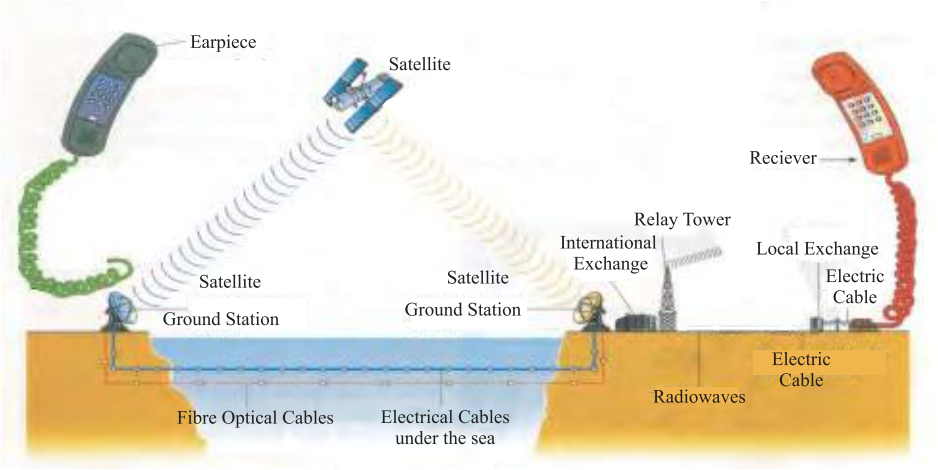


Fig. 9.17

(iii) Mobile Telephone

Now-a-days the use of mobile telephone is very common. A mobile phone sends and receives messages through radio waves. It carries a radio transmitter and a receiver inside it. The transmitter converts sound into radio waves which are received by a nearby station linked with the telephone network, it transmits the radio signals onward.


Mobile Phone

The area of each station of the network is called a cell. When a call reaches from one cell to another , it is connected to the required

station by an automatic system. Mobile phone is also called as cellular telephone by virtue of cell system. The receiver of mobile phone again changes the radio signals into sound.

(iv) Telex Machine

This consists of a teleprinter and an exchange machine. Message is sent from one place to another by this machine. Message is typed on the telex machine. Exchange machine changes it into electric signals that reach the other telex machine through telephone line. The teleprinter prints the message on paper. Since the whole message has to be typed on this machine, therefore, too much time is wasted. This machine has been now replaced by fax machine.

(v) Fax Machine

This machine is used to send and receive documents and pictures from one place to another. The word "Fax" is the short name of "Facsimile" that means to reproduce a document or picture in exactly the same form. Fax machine first makes the image of document, changes it into electric signal and then transmits it through telephone line. The fax machine, that receives the signal on the other side, reproduces it in the form of image print on the paper.

Fax Machine

Communication systems

The electronic transfer of information from one place to another is known as communication. The electromagnetic devices used for this and method to transfer information is known communication system.

The data to be transferred may consist of sound, text, video and graphics etc. The devices involved in the transfer of information could be telegraph, telephone, radio, television or computer. The distance could be as short as the next room and could be as long as the information may be sent to the other end of the solar system.

When we talk with reference to computer, communication means the contact of one computer with the other due to which they exchange information with each other. The communication between the computers takes place only when data reaches from one computer to the other in the form of electronic signal. Three basic components of communication system are:

1. The sending device
2. A communication link or medium
3. The receiving device

The information sending device in most of the cases is a computer, which gives information in the form of digital signals. These are converted into electric signals by a modem so that these can be transmitted. For the transmission of electric signals, a medium or link is

required. On the receiving end signals are again changed into digital ones before allowing them to enter into the computer (Fig. 9.18).

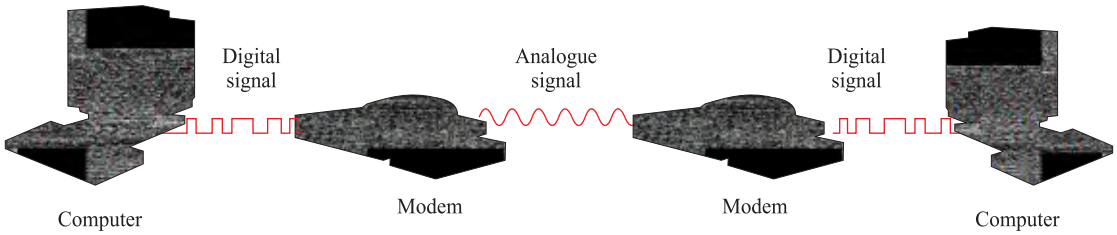


Fig. 9.18: Communication Link

Commonly used links are of three kinds. The first one is the telephone wire, which are also called boosted pairs. The second one is the fibre optic technology. The transmission of data through optical fibres is much faster, and thousands of signals can pass through a fibre at a time. Moreover, signals do not suffer loss of energy in the way. The third link is the microwave transmission. You have learnt about it in the section of satellite T.V. Signals are transmitted to the satellite through microwaves by a ground station. The satellite retransmits them to the required ground station after amplifying them. From there signals are transmitted onwards through other media.

Internet

Internet is the name of interconnection of millions of computers. Not only you can exchange information through Internet but also you can get information of every type. The individuals and organizations from all over the world have stored information on the Internet in the form of websites. Websites are huge collection of information. You can make use of it when needed. Companies can also provide details of their products on websites and can advertise them. Professionals such as doctors and engineers etc. can exchange latest information about their problems. You make contact with Internet service provider ISP through your computer and it provides you the international contact.

The computers linked with an Internet use uniform communication process called the protocol. The protocol used in Pakistan is the "Transmission Control Protocol/Internet Protocol" which is abbreviated as TCP/IP.

E-mail

A major use of Internet is the quick mailing called electronic mail or simply E-mail. Through this, you can send your message immediately to any person all over the world. If the concerned person is not present, he can read the message later as well. First of all you connect your computer to Internet and type your E-mail address and password. This opens your mailbox. Here you can read your mail as well as you can send E-mail to others. To send E-mail to

someone you type the E-mail address of that person and the message and then press send button. The message goes to the mailbox of the required person.

Now-a-days voice-mail has become possible in which your voice reaches the receiving end in original. You can also make two-way conversation. In a video conference, television, video and sound technology is linked with computer through which persons at different places can see, listen and conversant with one another.

IMPORTANT POINTS

- Electronics is the knowledge of behaviour and control of electric current.
- Semi-conductor is such a substance whose ability to conduct current lies in between conductors and insulators.
- If the silicon crystal is doped in such a way that its one part becomes N-type and the other P-type then it is called a P-N junction diode.
- That device which is used to convert A.C. voltage to D.C. voltage is called rectifier.
- Radio waves are a type of electromagnetic waves. These are also called carrier waves.
- Computer is an electronic machine that receives raw data and processes it into useful information under the given instructions.
- The components of computer that can be physically touched are called the hardware.
- The instruction given to the computer for some task by electronic method is called software.
- Programme is a list of instructions for a particular task. Under these instructions, the computer processes data and converts it into information.
- The use of computer for writing matter, editing, storing and printing is known as word processing.
- Drawing lines, making pictures and designing through computer is called graphic.
- To store data in different files and rearrange them to get requisite results when needed is known as data management.
- Such quantities, which increase or decrease continuously, are known as analogue quantities.
- Analogue signals represent continuously varying voltage.
- Digital signals consist of discrete on/off electrical pulses.
- The scientific method of storing information, processing and using them properly and their communication is called information technology.

- The methods used for instant communication of informations to far off places are called telecommunication.
- The electronic transfer of information from one place to another is known as communication.
- The electromagnetic devices used for transfer of information and method to transfer information is known as communication system.

GLOSSARY

Electronics: Knowledge of behaviour and control of electric current.

Semi-conductor: Material with conductivity in between conductors and insulators.

N-type Semi-conductor: That has more free electron.

P-type Semi-conductor: That has more holes.

Rectifier: Device to change A.C. into D.C.

Computer: Machine that changes raw data into useful information.

Hardware: Components of computer, which can be physically touched.

Input Devices: Devices to enter data in the computer.

Central Processing Unit: Part of computer that controls all operations in the computer.

Output Devices: Devices, which display computer operations.

Information Storage Devices: On which information can be stored.

Audio and Video Cassettes: Magnetic tapes to record audio and video signals.

Compact Disk: Disk for digital recording in the form of pits and flats.

Floppy Disk: Soft plastic disk for digital recording.

Hard disk: Disk consisting of metal plates for digital recording.

Software: Instructions to computer for any task.

Programme: List of instructions for computer to do a particular task.

Word Processing: Writing, editing and printing through computer.

Graphics: Drawing pictures and designs on computer.

Data Managing: Storing data in files, its rearrangement and obtaining

	required results.
Analogue/Digital Converter:	Device changing analogue signal into digital and vise-versa.
Telecommunication:	Transmission of information to far off places
Fax Machine:	Machine to send and receive documents and pictures through electronic signals.
Communication System:	Electronic method to transmit information from one place to another.
Internet:	Contact of computers.
E-mail:	Mail sent through electric method.

QUESTIONS

Q. 1. Four answers are given for each sentence, select the correct answer

(i) In p-type semi-conductor, most of the current is due to

(a) free electrons (b) holes

(c) positive ions (d) heat

(ii) Diodes are used to:

(a) convert A.C. into D.C. (b) convert D.C. into A.C.

(c) store charge (d) change voltage

(iii) Electric signal is converted into digital signal by

(a) keyboard (b) monitor

(c) scanner (d) modem

(iv) In binary system, 37 is written as

(a) 101101 (b) 100101

(c) 110011 (d) 101011

(v) Analogue signal is recorded on

(a) magnetic tape (b) floppy disk

(c) hard disk (d) C.D.

Q. 2. Fill in the blanks.

(i) Electronics is the knowledge of behaviour and control of _____.

(ii) A _____ beam scans C.D. for replay.

(iii) Programme is a list of _____.

(iv) The orbit of a hovering satellite is known as _____ orbit.

(v) In the picture tube, an electron gun throws a beam of _____ on the screen.

Q. 3. Mark '✓' against true and '✗' against false statement in the following sentences.

(i) The quality of sound from digital recording of C.D. is much better as compared to that of cassette tape.

(ii) Analogue signal consists of distinct on/off electrical pulses.

(iii) In cable T.V. electrical signals are converted into radio waves.

(iv) Fax machine is used to send and receive documents and pictures from one place to another.

(v) At least four hovering satellites are required to send transmissions all over the world.

Q. 4. What are n-type and p-type semi-conductors? Where are they used for?

Q. 5. How is a diode forward biased and reverse biased? Describe different kinds of diodes and write few uses of them.

Q. 6. What are radiowaves? How radio transmissions reach us?

Q. 7. How does television work? Explain briefly the satellite T.V.

Q. 8. Write an explanatory note on television.

Q. 9. What are the main parts of a computer and what do they work?

Q. 10. Write a note on communication system.