

UNIT-II-Computer Peripherals

- 1) Input Devices :-Keyboard, Mouse, trackball, Joystick, electronic pen, Touch Screen, Image Scanner, OCR, OMR, MICR, Bar code reader, Digitizer, speech recognition devices.
- 2) Output Devices :-Monitors, Dot-matrix printer, Ink-jet printer, Laser Printer, Plotter
- 3) Modem and Projector
- 4) Bio-metric devices

Question

- A) What is Input? Explain Types of input device?
- B) What is Output? Explain Types of Output Device?
- C) Write a short notes on
 - 1) Scanner
 - 2) Bar Code reader
 - 3) Modem & Projector
 - 4) Bio matrices

Input Devices

“Input device is an electromechanical device that accepts data from outside world and translates them into a form a computer can interpret”

“An input device is a hardware or peripheral device used to send data to a computer. An input device allows users to communicate and feed instructions and data to computers for processing, display, storage and/or transmission.”

Following are the types of input device

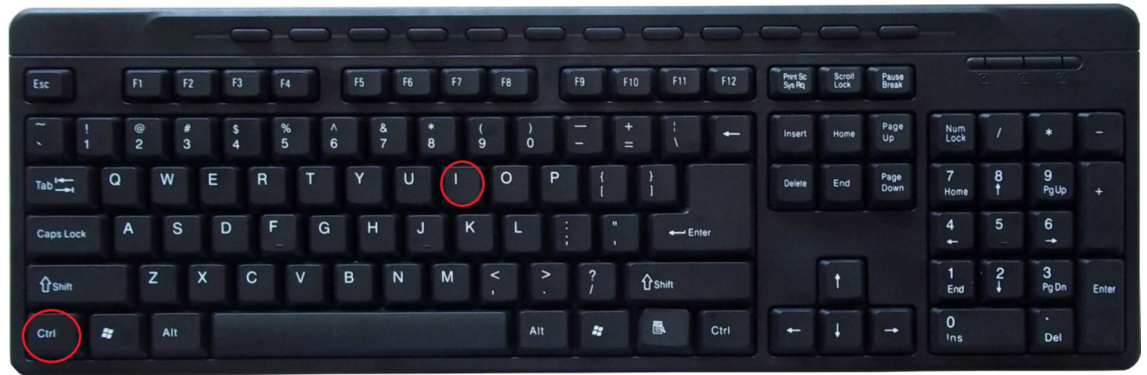
Keyboard, Mouse, trackball, Joystick, electronic pen, Touch Screen, Image Scanner, OCR, OMR, MICR, Bar code reader, Digitizer, speech recognition devices.

1) Keyboard

Keyboard is the most common and very popular input device which helps to input data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions.

Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

The following fig shows a keyboard.



The keys on the keyboard are as follows –

➤ **Typing Keys**

These keys include the letter keys (A-Z) and digit keys (0-9) which generally give the same layout as that of typewriters.

➤ **Numeric Keypad**

It is used to enter the numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.

➤ **Function Keys**

The twelve function keys are present on the keyboard which is arranged in a row at the top of the keyboard. Each function key has a unique meaning and is used for some specific purpose.

➤ **Control keys**

These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).

➤ **Special Purpose Keys**

Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

2) Mouse

Mouse is the most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base, which senses the movement of the mouse and sends

corresponding signals to the CPU when the mouse buttons are pressed.

Generally, it has two buttons called the left and the right button and a wheel is present between the buttons. A mouse can be used to control the position of the cursor on the screen, but it cannot be used to enter text into the computer.



Types of Mouse

1. mechanical mouse

It uses a system of a ball and several rollers to track its movement. This type of mouse is typically of the corded variety and is not as popular as their optical cousins. A high quality mechanical mouse can provide great performance.

2. Optical Mouse

It has no mechanical parts like the ball and wheels. An optical mouse utilises optical electronics to track the mouse's position and movement. They are preferred over standard mechanical mice as they tend to be more reliable and require less maintenance

3. Cordless/Wireless Mouse

A cordless or wireless mouse, as the name suggests, has no cable and uses wireless technology such as IrDA (infrared) or radio (Bluetooth or Wi-

Fi) to communicate with the computer. They are ideal for use "on the road" or where cables are either not suitable or simply not wanted.

4. Bus mouse

A bus mouse requires a special electronic card, which provides a special port just for connecting the mouse to a computer. The special electronics card fits into one of the expansion slots of the computer.

5. Serial Mouse

A serial mouse plugs into a serial port. It does not require a special electronic card for connecting the mouse to a computer.

6. One, two and three buttons mouse

A mouse can have one, two, or three buttons. A one button mouse is good enough for a program designed to use only a single button. Some programs operate a two or three buttons mouse.

3) Trackball

TrackBall is a pointing device similar to a mechanical mouse. A trackball is a computer cursor control device used in many notebook and laptop computers. The trackball is usually located in front of the keyboard toward the user.

This is a ball which is half inserted and by moving fingers on the ball, the pointer can be moved.

Since the whole device is not moved, a track ball requires less space than a mouse. A track ball comes in various shapes like a ball, a button, or a square.



The user rolls the ball with the thumb, fingers or the palm of the hand to move a cursor

Advantages of Trackball

- Precision and Control
- Space and Positioning
- Control Limitations
- Physical Limitations
- Cost and Availability

4) Joystick

Joystick is also a pointing device, which is used to move the cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions

A joystick is an input device that allows the user to control a character or machine in a computer program, such as a plane in a flight simulator. They look similar to the control device you would find on an arcade game, but nearly always include extra buttons for additional functionality.

Advantages of Joysticks

- It is useful for playing computer and video games.
- It is very easy to use by beginners.
- It is very fast interface.
- It is easier to navigate
- The control is in 3D (three dimensions).
- They provide fast interactions as required in most games and hence
- Used in games such as racing or flying styles etc.

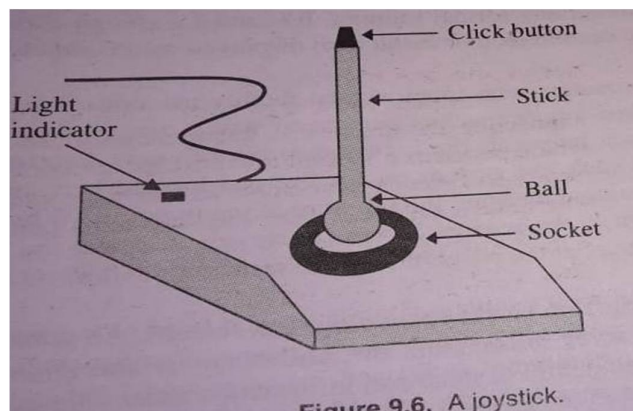


Figure 9.6. A joystick.

5) Electronic pen

An electronic pen is a based point and draw device.threre are two types of electronic pen

1) Light Pen

A light pen is a light-sensitive pointing device commonly used to select or otherwise modify text or data on a screen.

Light pen is a pointing device similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube.

When the tip of a light pen is moved over the monitor screen and the pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU

It use photoelectric (light sensitive) cell and an optical lens mounted in a pen-shaped case.

A light pen is a light-sensitive computer input device, basically a stylus that is used to select text, draw pictures and interact with user interface elements on a computer screen or monitor.

The term light pen may also refer to a pointing input device utilizing a light that is commonly used during a presentation. The light pen can be a very much focused flashlight-type of device or a laser pointer, allowing a user to direct viewers' attention to a specific area, like a picture or text, in the presentation.

A light pen may also be used to describe the pen (stylus) used with a graphics tablet.

A computer aided design (CAD) application also use light pens frequently.



2) Writing pen with Pad

These types of electronics pen come with a special type of writing pad. A user writes on the pad with electronic pen whatever data he/she wants to input to the computer.

A modern PDA often provides this feature. Signature and message stored and transferred as graphics images are input with the use of this device.

Output Devices:-Monitors, Dot-matrix printer, Ink-jet printer, Laser Printer, Plotter

An output device is an electromechanical device that accepts data from a computer and translates them into a form suitable for use by outside world (user).

Output device generate computer output that are broadly of following two types.

1. Soft-copy Output

A soft-copy output is temporary in nature because it does not appear on a paper or some material that a user can carry for showing to other or filling and use later when he/she is not using a computer.

For Exa-content displayed on a terminal screen, or words spoken out by a voice response system are soft copy outputs.

2. Hard-copy Output

A hard-copy output is permanent in nature because it appears on a paper or some material that a user can carry for showing to other or filling and use later when he/she is not using a computer.

For Exa-, output produced on paper by printer or plotters are hard-copy output.

Following are the some examples of output devices

1. Monitors
2. Dot-matrix printer

3. Ink-jet printer

4. Laser Printer

5. Plotter

1. Monitors

The monitor is an output device.it is most popular soft-copy output device used today.

Monitor display an output on a television like screen. A monitor is associated usually with a keyboard and together they form a Video display terminals.

A VDT is both an input and output device. A user uses a keyboard to input data to computer and monitor to view the output from computer.

The name terminal comes from the fact that a terminal is at the terminus or end of a communication path.it is a most popular I/O device use today.

Following are the type's monitors.

1. The CRT monitor. These are big and heavy and use a lot of desk space and electricity. It is the oldest technology used by monitors and is based on the cathode ray tube technology that was developed for television. Monitors are made with better parts which give a higher display resolution and picture sharpness than a television. This type of monitor is no longer popular.



Advantages of Monitors

1. Resolution and Aspect Ratio

They operate at any resolution, geometry and aspect ratio without the need for rescaling the image.

2. Highest Resolutions

CRTs run at the highest pixel resolutions generally available.

3. Black-Level and Contrast

Produce a very dark black and the highest contrast levels normally available. Suitable for use even in dimly lit or dark environments.

4. Colour and Grey-Scale Accuracy

CRTs produce the very best colour and grey-scale and are the reference standard for all professional calibrations.

5. Cost

CRTs are less expensive than comparable displays using other display technologies.

2. LCD Flat panel. Much thinner and lighter than monitors with a cathode ray tube.

The LCD monitor, the most common kind of flat panel display. It is a newer technology than CRT. LCD monitors use much less desk space, are lightweight and use less electricity than CRT. They have been used for many years in the screens of laptop and notebook computers. They also work as touch screens in tablet computers, mobile phones, and other handheld technologies.



3. An LED Monitor (short for Light Emitting Diode) or LED display is an LCD Monitor that uses light emitting diodes for back lighting. The first LCD Monitors used cold cathode fluorescent lamps instead of LEDs to illuminate the screen.



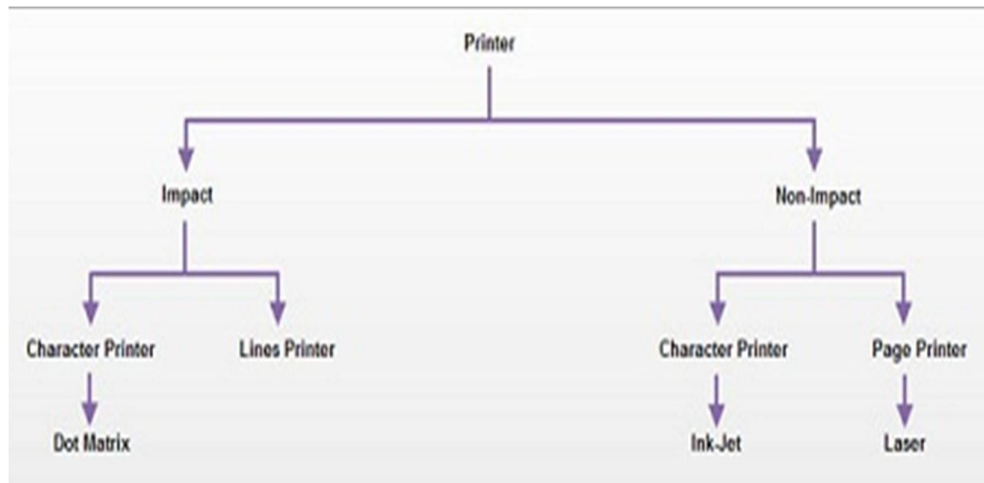
2. Printer

Printers are the most popular hard –copy output device used today.

A printer is a device that accepts text and graphic output from a computer and transfers the information to paper, usually to standard size sheets of paper.

A printer is an external hardware output device that takes the electronic data stored on a computer or other device and generates a hard copy of it

Following are the some types of printers



1. Dot Matrix Printer
2. Ink-Jet Printer
3. Laser Printer

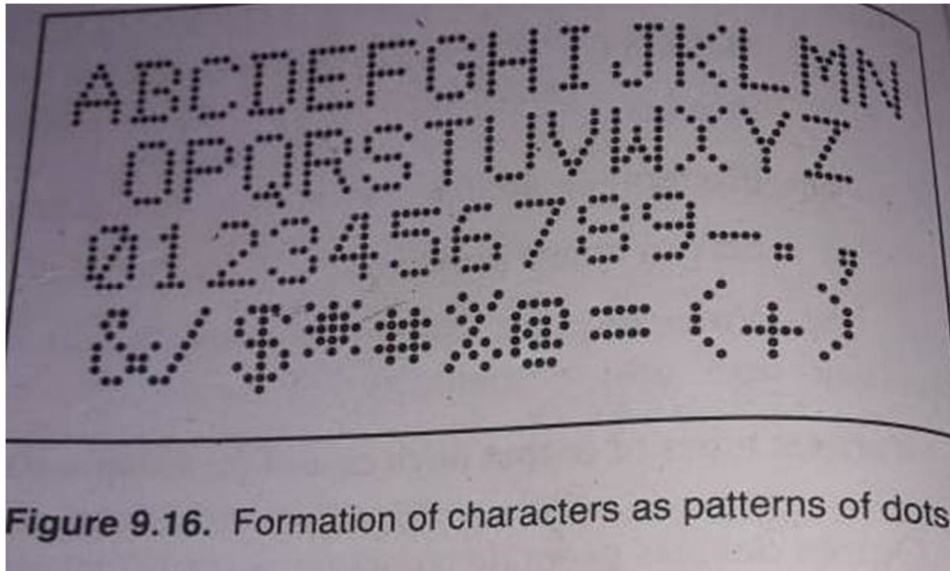
1. Dot Matrix Printer

The Dot Matrix printer is character printer that prints one character at a time. They from character and all kinds of image as pattern of dots.

It prints characters as combination of dots. Dot matrix printers are the most popular among serial printers. These have a matrix of pins on the print head of the printer which form the character. The computer memory sends one character at a time to be printed by the printer. There is a carbon between the pins & the paper. The words get printed on the paper when the pin strikes the carbon. There are generally 24 pins.

The dot-matrix printer uses print heads containing from 9 to 24 pins. These pins produce patterns of dots on the paper to form the individual characters. The 24 pin dot-matrix printer produces more dots that a 9 pin dot-matrix printer, which results in much better quality and clearer characters.

Following fig shows a printing mechanism of dot matrix printer .



It has a print head that moves horizontally across the paper. The print heads contains an array of pins.

Advantages

1. The Dot matrix printers are cheap and easily available in the market.
2. They can make carbon copies of the print out unlike non-impact printers.
3. The printing costs are the lowest as compared to other printers.
4. The printout fades gradually rather than coming to a halt suddenly. You therefore get plenty of time to change the ribbon before crisis emerges.
5. They use paper continuously unlike other printers that require frequent change of paper.
6. The maintenance cost is low as compared to other printers.
7. They tolerate dirty and hot conditions as are found in industrial environments.

2. Ink-Jet Printer

Inkjet printers are character printer that forms character and images by spraying small drops of ink on a paper. The print head of an inkjet printer contains up to 64 tiny nozzles.

The ink comes out of the nozzle in a form of vapours. After passing through a reflecting plate, it forms the desired letter/shape at the desired place.

When the resistor heats up, the ink near it vaporizes and ejects through the nozzle making a dot on the paper placed in front of the print head.

Inkjet printer produces higher quality output than dot matrix printers do because they form character by very tiny ink dots.

In the inkjet printing mechanism, the print head has several tiny nozzles, also called jets. As the paper moves past the print head, the nozzles spray ink onto it, forming the characters and images

A high resolution inkjet printer has many as 64 nozzles within a height of 7mm providing print resolution of around 360 dots per inch.

The ink-jet printer is non-impact printer because they print by spraying ink on the paper.

Inkjet printer comes monochrome and colours, a monochrome printer use single cartridge with black ink, where as a colour inkjet use two ink cartridge

Advantage of Ink-Jet Printer

1. Inkjet printers use a small footprint and are easy to move around, which makes them reasonably portable in a small business or home office environment.
2. Image quality-This makes for extremely high-quality photos and graphics with lifelike results.
3. Image colour-With better quality comes better colour. Again, the use of ink and the technology behind the inkjet printer means they can reproduce extremely bright and vivid colours with exceptional tone and shading
4. Low initial cost-Even if image quality isn't at the top of your printer buying list, price probably is. Whether it's at home or the office, everyone likes to keep an eye on their wallet when shopping for a printer.

Following fig shows ink-jet printer



3. Laser Printer

A laser printer is a popular type of personal computer printer that uses a non-impact, photocopier technology.

Laser printer is page printers that print one page at a time. Main components of laser printer are a laser beam source, a multi-sided mirror, a photoconductive drum and toner.

The laser printer produce high quality output because they form character by tiny particles, the most common laser printer have a resolution of 600 dpi (dots per inch) some are 1200 dpi. Due to their resolution, these printer give excellent graphics art quality.

Laser printer is non-impact printer. Hence, they are quite in operation, but we cannot use them for producing multiple copies of a document in a single printing.

Laser printer is fastest in printing speed than other printer, low speed printer can print 4 to 12 pages per minute, high speed laser printer are also available. owing to their better print quality and printing speed, laser printer are more expensive than other types of printer.

Following are the advantages of Laser Printer.

1. It is not noisy and is faster than impact printer.
2. It can be both single and multi-coloured.
3. Its operating cost is low.
4. It can print both text and images.
5. Its printing quality is better than impact printer
6. Superior Quality – Laser printers are known for their superior quality printing
7. Faster Printing

Projector

Projector

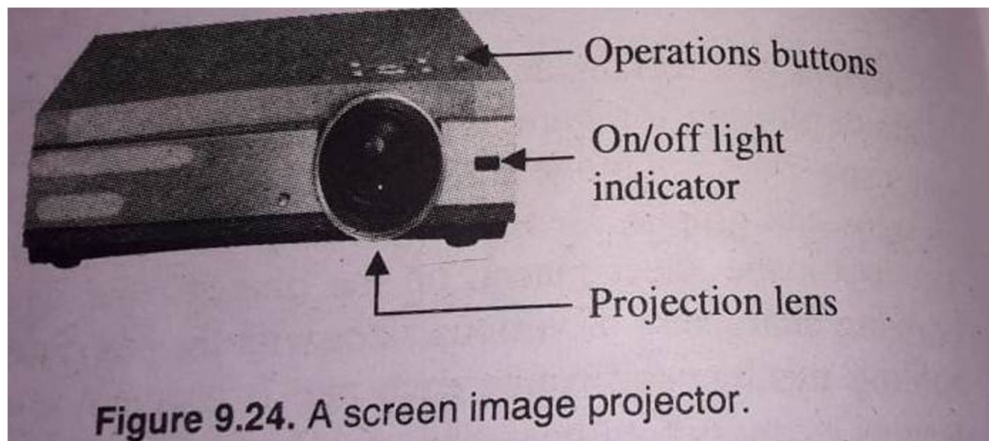
A projector is an output device that can take images generated by a computer or Blu-ray player and reproduce them onto a screen, wall, or other surface.

A projector is a device that uses light and lenses to take an image and project a magnified image onto a larger screen or wall.

Screen Image Projector

Screen Image Projector is an output device, which is used to project information from a computer on a large screen so that a group of people can view it stimulatingly. It is very useful for making presentation to group of people with direct use of a computer.

Following fig shows Screen Image Projector



A screen image projector, we can plug it to a computer directly. A presenter makes a presentation to a group of people by projecting the presentation material page by page on a large screen with help of computer keyboard and mouse.

The presenter can also directly point to, mark or edit certain portion of the content of the displayed materials during the presentation to make the presentation more understandable.

A presenter can prepare full-multimedia presentation with audio, video, image & animation and make a lively & interesting presentation by using this device.

A screen image projector has common presentation equipment today,

Advantages of projector

- 1) Largest possible picture
- 2) Smaller images a great option also. Perhaps you don't want a huge image, or maybe you don't have space for one.
- 3) Low cost.
- 4) Space saving.
- 5) Easy to install

Bio-metric devices

A biometric device is a security identification and authentication device. Such devices use automated methods of verifying or recognising the identity of a living person based on a physiological or behavioural characteristic. These characteristics include fingerprints, facial images, and iris and voice recognition

Biometrics is the measurement and statistical analysis of people's unique physical and behavioural characteristics.

Components of biometric devices include:

1. A reader or scanning device to record the biometric factor being authenticated
2. Software to convert the scanned biometric data into a standardized digital format and to compare match points of the observed data with stored data
3. A database to securely store biometric data for comparison

Following fig shows a biometrics device



Biometrics is any use of biological data in technology. Biometric systems focusing exclusively on the identification of humans have become the major kind of biometric system in today's IT world.

Governments, businesses and organizations can use biometric systems to get more information about individuals or about a populace as a whole. Many biometric systems are developed for security applications.

Advantages of Biometrics device

- 1) Physiological-Fingerprints, face, Hands, Eyes
- 2) Behavioural-Voice, Signature, Keystroke Dynamic
- 3) Biometric technology is very useful for ID verification
- 4) Biometric technology is high individual identification accuracy
- 5) Biometric technology is less exposed to damage and sudden changes
- 6) Biometric technology is that it is less time consuming, dependable & user friendly
- 7) Biometric technology can be effectively employed in forensics.
- 8) Fingerprints won't be lost and can't be attained and copied by someone aiming to illegally gain access.

Computer Memory: - RAM, ROM, Cache Memory

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one.

1. RAM

RAM (Random Access Memory) is the internal memory of the CPU for storing data, program, and program result. It is a read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.

Access time in RAM is independent of the address, that is, each storage location inside the memory is as easy to reach as other locations and takes the same amount of time. Data in the RAM can be accessed randomly but it is very expensive.

RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. Hence, a backup Uninterruptible Power System (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold.



Fig-RAM

Types of RAM

1. Static RAM (SRAM)
2. Dynamic RAM (DRAM)

Static RAM (SRAM)

The word static indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not be refreshed on a regular basis.

There is extra space in the matrix, hence SRAM uses more chips than DRAM for the same amount of storage space, making the manufacturing costs higher. SRAM is thus used as cache memory and has very fast access.

Characteristic of Static RAM

1. Long life
2. No need to refresh
3. Faster
4. Used as cache memory
5. Large size
6. Expensive
7. High power consumption

Dynamic RAM (DRAM)

DRAM, unlike SRAM, must be continually refreshed in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory as it is cheap and small. All DRAMs are made up of memory cells, which are composed of one capacitor and one transistor.

Characteristics of Dynamic RAM

1. Short data lifetime
2. Needs to be refreshed continuously
3. Slower as compared to SRAM
4. Used as RAM
5. Smaller in size
6. Less expensive
7. Less power consumption

2. ROM

ROM stands for **Read Only Memory**. The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture. A ROM stores such instructions that are required to start a computer. This operation is referred to as **bootstrap**. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven.

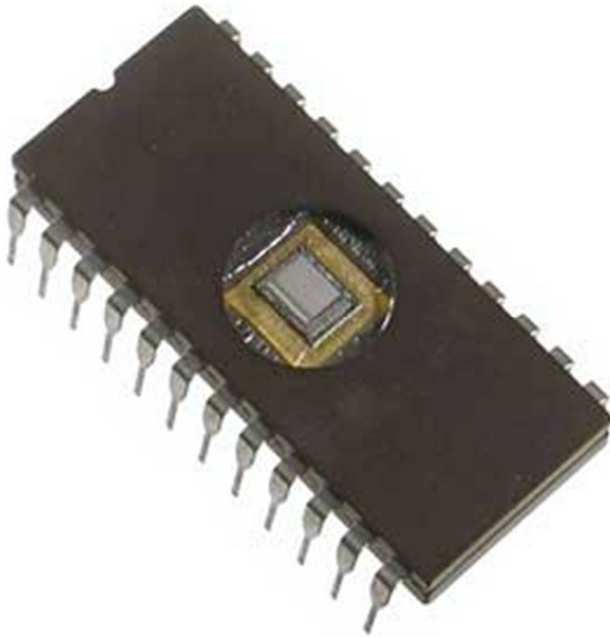


Fig-ROM

Types of ROM

1. MROM (Masked ROM)

The very first ROMs were hard-wired devices that contained a pre-programmed set of data or instructions. These kind of ROMs are known as masked ROMs, which are inexpensive.

2. PROM (Programmable Read Only Memory)

PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. Inside the PROM chip, there are small fuses which are burnt open during programming. It can be programmed only once and is not erasable.

3. EPROM (Erasable and Programmable Read Only Memory)

EPROM can be erased by exposing it to ultra-violet light for a duration of up to 40 minutes. Usually, an EPROM eraser achieves this function. During programming, an electrical charge is trapped in an insulated gate region. The charge is retained for more than 10 years because the charge has no leakage path. For erasing this charge, ultra-violet light is passed through a quartz crystal window (lid). This exposure to ultra-violet light dissipates the charge. During normal use, the quartz lid is sealed with a sticker.

4. EEPROM (Electrically Erasable and Programmable Read Only Memory)

EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 ms (millisecond). In EEPROM, any location can be selectively erased and programmed. EEPROMs can be erased one byte at a time, rather than erasing the entire chip. Hence, the process of reprogramming is flexible but slow.

Advantages of ROM

The advantages of ROM are as follows –

1. Non-volatile in nature
2. Cannot be accidentally changed
3. Cheaper than RAMs
4. Easy to test
5. More reliable than RAMs
6. Static and do not require refreshing
7. Contents are always known and can be verified

Cache Memory

Cache memory is a very high speed semiconductor memory which can speed up the CPU. It acts as a buffer between the CPU and the main memory. It is used to hold those parts of data and program which are most frequently used by the CPU. The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.

Cache memory is the fastest memory on the system, required to keep up with the CPU as it fetches and executes instructions. The data most frequently used by the CPU is stored in cache memory. The fastest portion of the CPU cache is the *register* file, which contains multiple registers. Registers are small storage locations used by the CPU to store instructions and data.

Cache memory, also called CPU memory, is high-speed static random access memory (SRAM) that a computer microprocessor can access more quickly than it can access regular random access memory (RAM). This memory is typically integrated directly into the CPU chip or placed on a separate chip that has a separate bus interconnect with the CPU.

Advantages

The advantages of cache memory are as follows –

1. Cache memory is faster than main memory.
2. It consumes less access time as compared to main memory.
3. It stores the program that can be executed within a short period of time.
4. It stores data for temporary use.

Disadvantages

The disadvantages of cache memory are as follows –

1. Cache memory has limited capacity.
2. It is very expensive