INSIDE THE SYSTEM UNIT

The inside of a system unit consists of several devices and chains of coloured electronic wires running from one end to another. If you look inside the system unit, you will find green boards with mysterious circuit paths and soldering joints. These boards play essential role in running the computer.

Motherboard: A motherboard is the physical arrangement in a computer that contains the computer's basic circuitry and components. On a typical motherboard, the circuitry is imprinted or affixed to a firm planar surface and usually manufactured in a single step. The motherboard is also called Printed Circuit Board (PCB).

The motherboard contains connectors for attaching additional boards. Typically, the motherboard contains controllers for all standard devices such as the display screen, keyboard, and disk drive. It also contains controllers for port and mass storage devices. Collectively all chips that reside on the motherboard are known as the motherboard chipset.

The most common motherboard design used in desktop computers today the AT, based on the IBM AT motherboard. A more recent motherboard specification, ATX, improves on the AT design.

Central Processing Unit: Central Processing Unit (CPU) is the most important port of computer where actual processing, i.e. the mathematical and logical processing takes place. It is the brain behind all computer operations. Within a CPU, instructions are written in the form of computer programs, which are carried out by the CPU sequentially. The power of a CPU lies in ability of its processor to carry out these instructions rapidly and flawlessly. A computer's processing capability is measured in terms of data processed by the CPU processor in one operation. The processor speed is measured in megahertz (MHz) and Gigahertz (GHz). A computer

has a central clock that keeps all its component in tune with one another. Quicker the clock ticks, faster the computer runs. Over the years, there has been a gradual improvement in the processor speed. Intel is a major producer of computer processors. Among popular Intel processors is the Pentium IV series, whose speed ranges from 1.3 Gigahertz to 2.6 Gigahertz or more. Apart from Pentium, there are other processors like Intel Celeron, AMD Athlon, and AMD Duron, etc.

Two typical components of a CPU are:

- The Arithmetic Logic Unit (ALU), which performs arithmetic and logical operations.
- The Control Unit, which extracts instructions from the memory and decodes, and executes them. It also calls on the ALU when necessary.

Switch Mode Power Supply: in personal computer, the power supply unit is a metal box usually found in a corner of the System Unit. This box known as SMPS (Switch Mode Power Supply) box. Visible from the back of the system unit, the power supply box contains the power cord receptacle and cooling fan. Power supply, often referred to as "switching power supply," uses switcher technology to convert the AC current to DC current. Once the current is converted to DC, the power supply unit sends the required wattage to different components of the computer like monitor, hard disk, CD-ROM, floppy disk drive, etc.

The power consumption values (in watts) for common devices in a personal computer are:

Accelerated Graphics port (AGP) card	20 – 30W
Peripheral Component Interconnect (PCI) card	5W
Small Computer System Interface (SCSI) PCI card	20 – 25W
Floppy Disk Drive	5W
Network interface	4W
50x CD-ROM drive	10-25W
RAM	10W per 128MB
5200 RPM HDD	5 – 11W

7200 RPM IDE hard disk drive	5 – 15W
Motherboard (without CPU or RAM)	20 – 30W
550 MHz Pentium III	30W
733 MHz Pentium III	23W
300 MHz Celeron	18W
600 MHz Athlon	45W

Basic Input Output Software: The Basic Input Output Software (BIOS) is a built in software, which keeps track of all devices attached to the computer and acts as an intercommunication channel between these devices. The devices include keyboard, monitor, disk drives, and other miscellaneous devices. Older computers contained read-only BIOS that could not be altered. This means that new component could not be added to the computer because the BIOS would not know how to communicate with them. This limited the user's ability to upgrade their computers. So Flash BIOS was introduced. Now when a new component is installed in the computer, the Flash BIOS can be electronically upgraded so that it can recognize and communicate with the new device.

The BIOS is typically placed in a ROM chip that comes with the computer (it is often called a ROM BIOS). This ensures that the BIOS will always be available and will not be damaged by disk failures. It also makes it possible for a computer to boot itself. As ROM is slower than RAM, therefore many computer manufacturers design system for copying the BIOS from ROM to RAM each time the computer is booted. This is known as *shadowing*.

RAM/ROM-Primary Memory of the Computer: A computer stores data in units called *bits* and *bytes*. Bits are grouped together in sets of eight. Each set of eight bit is called a byte. Different "on and off" combinations for a byte can be developed to stand for letters, numbers, spaces, and symbols. For practical purposes, think of a byte as one

character. When your computer refers to its memory or storage, it refers to the following terms of measurement:

- 8 Bits = 1 byte
- 1024 Bytes = 1 Kilobyte (KB)
- 1024 Kilobytes = 1 megabyte (MB)
- 1024 Megabytes = 1 gigabyte (GB)
- 1024 Gigabytes = 1 terabyte (TB)

The term *memory* stands for data storage that comes in the form of chips, and the term *storage* is used for memory that exists on tapes or disks. Memory is usually used as a short reference for physical memory, related with actual chips. The word 'main' added to the computer's memory distinguishes it from external mass storage devices like floppy disks, CDs and memory sticks.

Besides the main memory, your computer also has a physical temporary internal storage place. That place is known as RAM or Random Access Memory.

RAM is the place in a computer where the operating system, application programs, and data in current use are kept so that they can be quickly accessed by the computer's processor. RAM is much faster to read from and write to than other kinds of storage in the computer, like hard disk, floppy disk, and CD-ROM. However, data stays in RAM only as long as your computer is running. When you turn the computer off, RAM loses its data. When you turn on your computer again, the operating system and other files are once again loaded into RAM, usually from the hard disk. In other words, we can say that RAM is volatile memory (memory that loses the data when the computer is tuned off). Information of any kind can be stored permanently only when it is stored in the hard disk. RAM chips come in memory size of 64MB, 128MB, 256MB, and so on.

There are types of RAM, Static RAM (SRAM) and Dynamic RAM (DRAM). The second type is used more commonly. The two types differ in the technology they use to hold data.

Dynamic RAM needs to be refreshed thousands of times per second. Static RAM does not need to be refreshed, which makes it faster, but it is also more expensive than dynamic RAM.

Extended Data Out RAM (EDO RAM) is an improved version of DRAM. EDO RAM can perform more than one task at a time. When some data is sent to the processor, another chunk of data is retrieved from the RAM module. It means, while some data processing is on in your computer, EDO RAM is looking for the next piece of data for the processor. This process enables the chip's data to be accessed at very high speed. EDO RAM works only on computer with compatible processor and motherboard.

Read Only Memory. Read Only Memory or ROM is a built in computer memory containing data that normally can only be written to. ROM contains the programming that allows your computer to 'boot up' or regenerate each time you turn it on. The ROM is sustained by a small long-life battery in your computer. Unlike a computer's Random Access Memory (RAM), the data is ROM is not lost when the computer's power is turned off. If you configure the hardware of your computer you will be writing to ROM.

Besides computers, ROMs are used extensively in calculators and peripheral devices such as laser printers, whose fonts are often stored in ROMs. A variation of ROM is PROM (Programmable Read Only Memory).

- **PROM:** The Programmable Read-Only Memory (PROM) is a memory chip on which data can be written only once. A program written on a PROM remains there forever. Unlike RAM, PROMs retain their contents when the computer is turned off. The difference between PROM and ROM is that PROM is manufactured as blank memory, whereas ROM is programmed during the manufacturing process. To write data onto a PROM chip, you need a special device called PROM programmer or

burner. The process of programming a PROM is sometimes called burning the PROM.

- **EPROM:** This Erasable Programmable Read Only Memory (EPROM) can be erased and reused. Erasure is caused by an intense ultraviolet light through a window that is designed into the EPROM chip. Normal light in a room does not contain enough ultraviolet light to cause EPROM erasure. Only bright sunlight can cause erasure.

Hard Disk Drive: Hard disk is a device which stores all programs and data in the computer. Hence, the hard disk is referred to as the memory bank of the computer. The hard disk memory is permanent. Programs and computer is turned off. Earlier, the memory capacity of computers was limited to megabytes (MB). But, today computers having hard disks of capacities like 10GB, 20GB, and above are very popular. Larger the hard disk capacity, more the amount of software programs and information that can be stored on it. The Hard Disk Assembly is a sealed metal unit, which contains the following components:

- **Platters:** the platters are actual disks inside the drive that store the data. Most drives at least have two platters. The larger the storage capacity of the drive, more platters it would have. A platter can store data on its both sides, so a drive with 2 platters has 4 sides to store data.
- **Spindle and Spindle Motor:** the platters in a drive are separated by disk spacers and are clamped to a rotating spindle that turns all the platters in unison. The spindle motor is built right into the spindle or mounted directly below it. The motor spins the platters at a constant set rate ranging from 7,200 to 12,000 RPM (Rotation per Minute).
- **Read/Write Heads:** the read/write heads reads and writes data to the platters. There is typically one head per platter side. Each head is attached to a single actuator shaft so that all the heads moves in unison. When one head is over a track, i.e. working, all the other heads

remain statutory over their respective surfaces. Typically, only one of the heads is active at a time, i.e. reading or writing data. The space between the platter and the head is so minute that even one dust particle or a fingerprint could disable the spin.

- **Head Actuator:** all the heads are attached to a single head actuator shaft or actuator arm that moves the heads around the platters.

The platters, spindle, spindle motor, head actuator and the read/write heads are all contained in the Hard Disk Assembly (HDA). Outside the HDA is the logic board that controls the movements of the internal parts. It also controls the movement of data into and out of the drive.

Cards: cards are printed circuit boards that you can insert into an expansion slot of your computer to give it added capabilities. Expansion slots are long and narrow connectors. Cards are also called expansion boards, adaptors, add-ins, and add-ons.

- **Disk Drive Control Card:** this card controls the disk motors of your computer. It transfer data to the control circuitry and directs the read/write heads to access data on the disk. Earlier computers carried a slot in which the card could be inserted. Nowadays, computers do not contain a separate slot for the disk drive control card. Instead it is permanently inserted in the motherboard.
- **Display/Video/Graphic Card:** Display card is used to display the data to the user. It is indirectly linked with the computer's memory and is built in the motherboard. Two type of display cards are available. These are the PCI graphics card and the AGP card.
- **Printer Adaptor Card:** to make use of the information stored in the computer memory, you need to either see it on the monitor or print it. The display/printer adaptor card is the link between the computer's memory, the monitor and the printer. It displays the information on the monitor as well as allows it to be printed.

- **Sound Card:** this card allows you to play sound and music. The sound card converts the digital information into electrical signals that speakers use. When the speaker is connected to the sound card, the sound can be heard on the speaker.
- **Network Interface Card (NIC):** NIC is another type of expansion board that you can insert into your computer to connect to a network. Most NICs are designed for a particular type of network although some can serve multiple networks.