Hardware and Networking

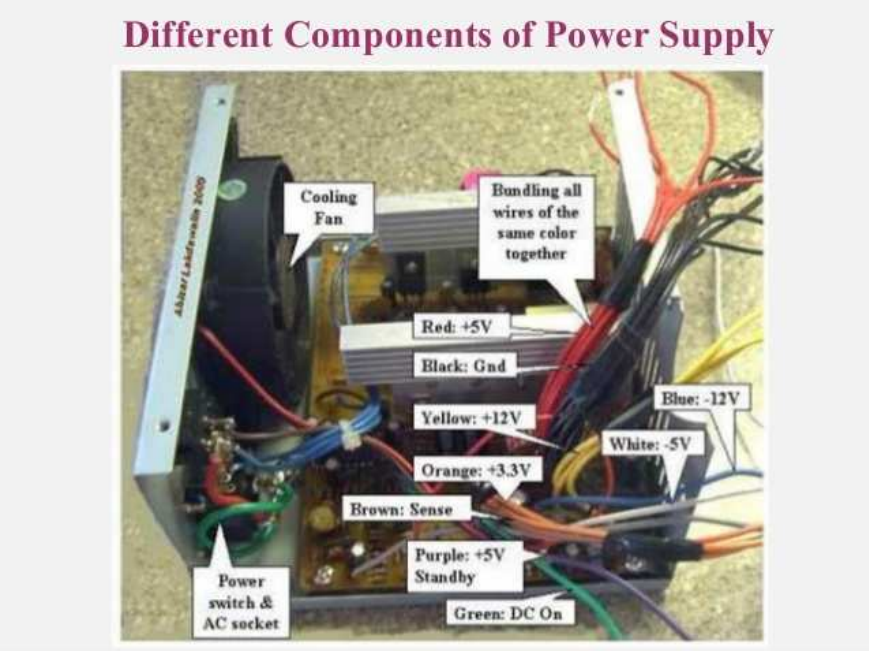
Expt No:- 1 Disassembling and assembling of a Personal Computer (PC),

Aim:- Identification of Components of a PC such as power supply, motherboard, processor, hard disk, memory (RAM, ROM), CMOS battery, CD drive, monitor, keyboard, mouse, printer, scanner, pen drives, disk drives etc. Assembling of PC,

Theory:-

Identification of Components of a PC

1. Power supply :



A **power supply unit** (or **PSU**) converts mains AC to low-voltage regulated DC power for the internal components of a computer. Modern personal computers universally use switched-mode power supplies(SMPS). Some power supplies have a manual switch for selecting input voltage, while others automatically adapt to the mains voltage.

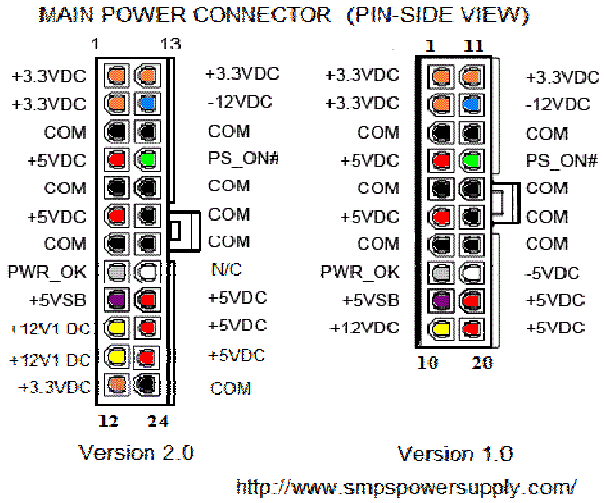
Most modern desktop personal computer power supplies conform to the ATX specification, (Advanced Technology EXtended motherboard) The PC motherboard that superseded the Baby AT design. The **ATX** layout rotated the CPU and memory 90 degrees, allowing **full**-length expansions to be plugged into all sockets. The **power supply** blows air over the CPU rather than pulling air through the chassis. An ATX power supply is connected to the mains supply, it always provides a 5 Volt standby (5VSB) voltage so that the standby functions on the computer and certain peripherals are powered. ATX power supplies are turned on and off by a signal from the motherboard. They also provide a signal to the motherboard to indicate when the DC voltages are in spec, so that the computer is able to safely power up and boot.

There are 3 types of power supply in common use:

- **AT Power Supply** - used in very old PCs.
- **ATX Power Supply** - still used in some PCs.
- **ATX-2 Power Supply** - commonly in use today.

The voltages produced by AT/ATX/ATX-2 power supplies are:

- **+3.3 Volts DC** (ATX/ATX-2)
- **+5 Volts DC** (AT/ATX/ATX-2)
- **-5 Volts DC** (AT/ATX/ATX-2)
- **+5 Volts DC Standby** (ATX/ATX-2)
- **+12 Volts DC** (AT/ATX/ATX-2)
- **-12 Volts DC** (AT/ATX/ATX-2)



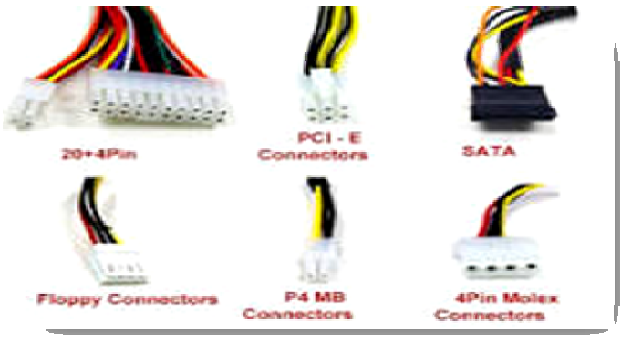
4 Pin Berg Connector
Used to connect the PSU to small form factor devices, such as 3.5" floppy drives.
available in: **AT, ATX & ATX-2**

4 Pin Molex Connector
This is used to power various components, including hard drives and optical drives.
available in: **AT, ATX & ATX-2**

20 Pin Molex ATX Power Connector
This is used to power the motherboard in ATX systems.
available in: **ATX**(ATX-2 have four extra pins)

4 Pin Molex P4 12V Power Connector
Used specifically for Pentium 4 Processor Motherboards.
available in: **ATX** (integrated into the power connector in ATX-2)

6 Pin AUX Connector
Provides +5V DC, and two connections of +3.3V.
available in: **ATX/ATX-2**



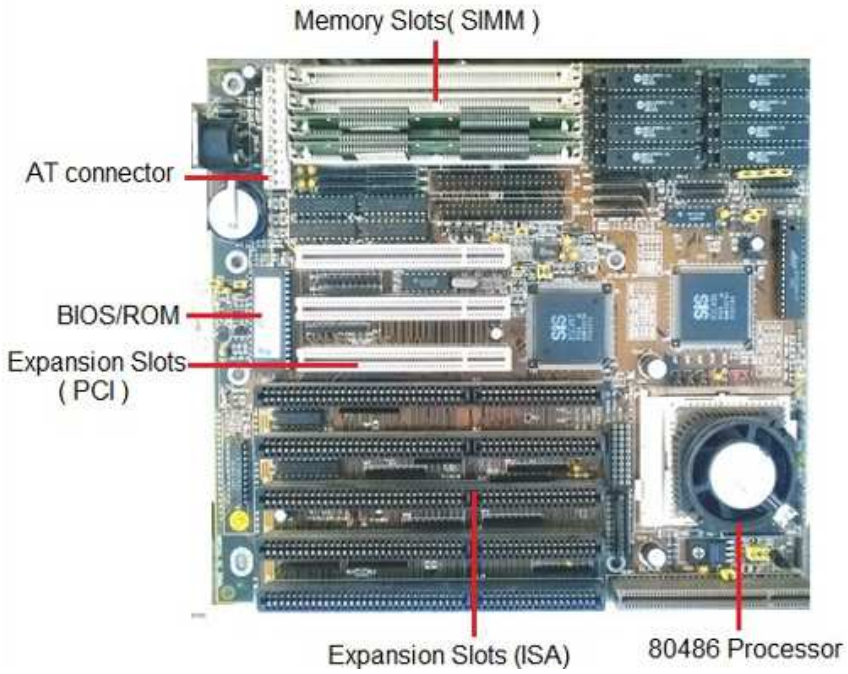
2. **Motherboard:**

The motherboard is the main component of any branded or assembled PC, laptop, tablet or a mobile phone. Now you must be curious, why it is called the motherboard? The motherboard is a Printed Circuit Board which acts as the main platform for communication between all other components of a system. All the other computer parts are either directly installed or connected to various **motherboard components** and all the data is transferred between them through the motherboard.

Different types of motherboards:

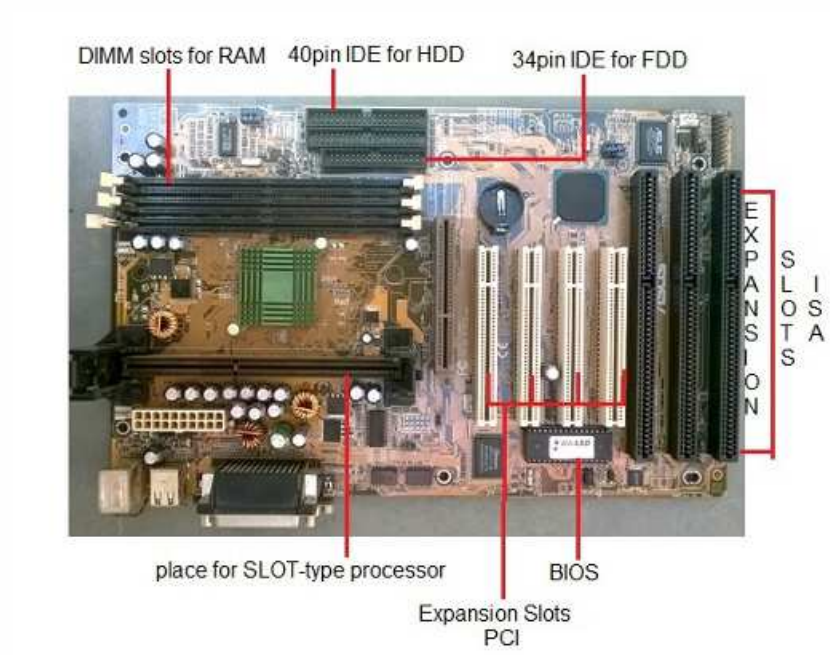
AT Motherboards

The oldest of the main boards, these motherboards were used in earlier 286/386 or 486 computers. The AT means the board consists of advanced technology (AT) power connectors. There are two power connectors of 6 pin each mounted on the AT motherboards. The AT motherboards were available in the early 80's.



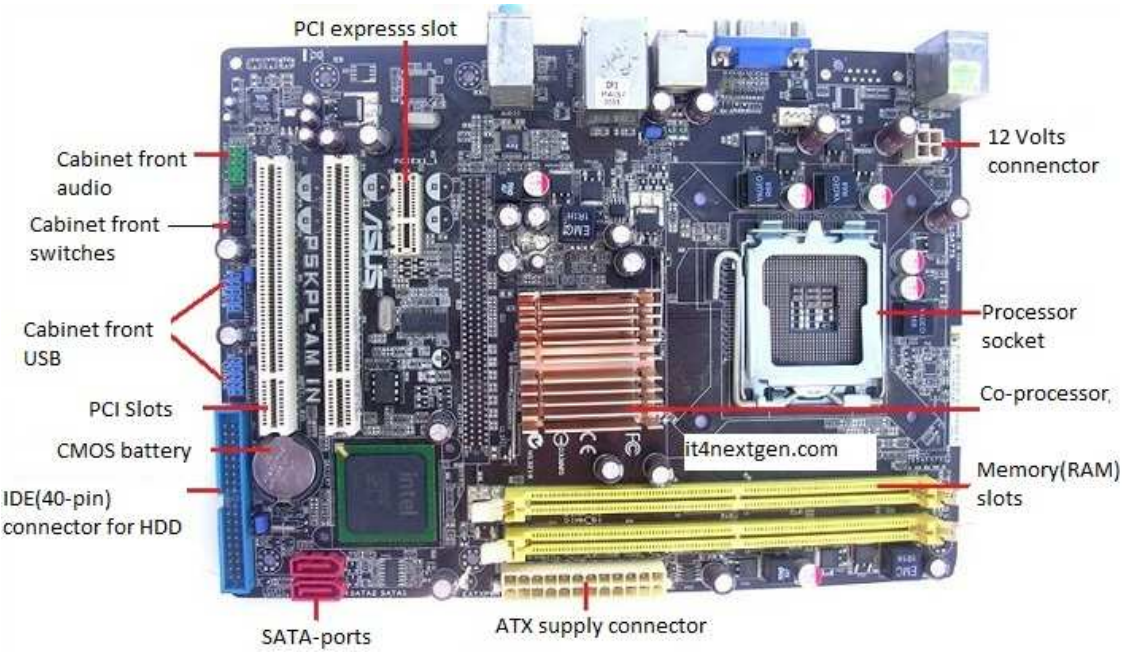
ATX Motherboards

The ATX motherboards started in 90's and are still available. The ATX connector on the motherboard consists of a single connector. These boards are used for P2/P3 or P/4 processors.



DIMM (dual in-line memory module), PCI (Peripheral Component Interconnect), Peripheral component interconnect-extended (**PCI-X**) is a computer architecture standard used for 32-bit **PCI** bus expansion **slots**

Pentium 4 motherboard



Motherboard Components

The motherboard consists of various components which have their own role to play in the functioning of a computer. Let us discuss various motherboard components and know their definition and role.

ISA slots. These were the oldest expansion slots in the history of motherboards. They were found in AT boards and are identified by black color. Conventional display cards or sound cards were installed in these slots. The full form of ISA is **Industry Standard Architecture** and is a 16- bit bus.

PCI Slots. The full form of PCI is Peripheral Component Interconnect. The PCI slot is one of the important motherboard components today and is vastly used to install add-on cards on the motherboard**.** The PCI supports 64-bit high-speed bus.

PCI express. Also known as PCIe, these are the latest and the fastest component of the motherboard to support add-on cards. It supports full duplex serial bus.

AGP slot. Accelerated graphics port(AGP) is specifically used to install a latest graphics card. AGP runs on a 32-bit bus and both PCIe and AGP can be used to install high-end gaming display cards.

RAM(memory) slots

SIMM slots. The full form is a single in-line memory module. These slots were found in older motherboards, up to 486-boards. The SIMM supports 32-bit bus.

DIMM slots. The full form of DIMM is a Double inline memory module. These are the latest RAM slots which run on a faster 64-bit bus. The DIMM used on Laptop boards are called SO-DIMM.

PU Socket

Another vital motherboard component is the CPU socket which is used to install the processor on the motherboard. Some important sockets are explained below.

Socket7. It is a 321 pin socket that supported older processors like Intel Pentium 1/2/MMX, AMD k5/K6, and Cyrix M2.

Socket370. It is a 370 pin socket that supports Celeron processors and Pentium-3 processors.

Socket 775. It is a 775-pin socket that supports Inter dual core, C2D, P-4 and Xeon processors.

Socket 1156. Found on latest types of motherboards, it is an 1156-pin socket that supports latest Intel i-3, i-5 and i-7 processors.

Socket 1366. The socket is of 1366 pins and supports latest i-7 900 processors.

BIOS

The full form of BIOS is Basic Input Output System. It is a motherboard component in the form of a Integrated chip. This chip contains all the information and settings of the motherboard which you can modify by entering the BIOS mode from your computer.

CMOS Battery

The battery or a cell is a 3.0 Volts lithium type cell. The cell is responsible for storing the information in BIOS and the full form is Complementary Metal Oxide Semi-Conductor.

Power Connectors

In order to receive power from SMPS, there are connectors mounted on the motherboards.

AT connector. It consists of 2 number of 6 pin male connectors and is found on old types of motherboards.

ATX connector. The latest in the series of power connectors, they are either 20 or 24 pin female connectors. Found in all the latest types of motherboards.

IDE connector

The Integrated Drive Electronics (IDE) connectors are used to interface disk drives. The 40-pin male connector is used to connect IDE hard disk drives and the 34-pin male connector connects to Floppy Disk Drive.

SATA connector

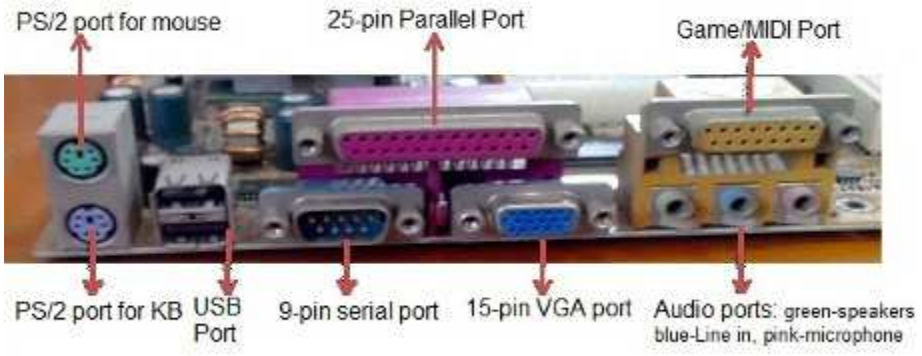
Latest in the series, the connectors, Serial Advance Technology Attachment (SATA) are 7-pin connectors to interface latest SATA hard disks or optical drives. They are much faster than IDE interface.

Co-Processor

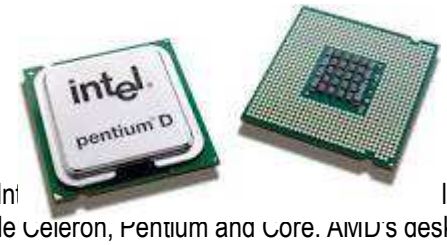
The co-processor is one of the important motherboard components and helps the main processor in mathematical calculations and computer graphics.

Cabinet connections

The cabinet in which the motherboard is installed has many buttons that connect to the motherboard. Some of the common connectors are Power Switch, Reset Switch, Front USB, Front Audio, Power indicator(LED) and HDD LED.



3. Processor:



Its basic job is to receive input and provide the appropriate output. While this may seem like a simple task, modern **processors** can handle trillions of calculations per second. The central **processor** of a **computer** is also known as the CPU, or "central processing unit

There are two primary manufacturers of computer microprocessors. Int lead the market in terms of speed and quality. Intel's desktop CPUs include Celeron, Pentium and Core. AMD's desktop processors include Sempron, Athlon and Phenom. Intel makes Celeron M, Pentium M and Core mobile processors for notebooks. AMD makes mobile versions of its Sempron and Athlon, as well as the Turion mobile processor which comes in Ultra and Dual-Core versions. Both companies make both single-core and multi-core processors.
Each processor has a clock speed which is measured in gigahertz (GHz). Also, a processor has a front side bus which connects it with the system's random access memory (RAM.) CPUs also typically have two or three levels of cache. Cache is a type of fast memory which serves as a buffer between RAM and the processor. The processor's socket type determines the motherboard type where it can be installed.

Major processor models released by Intel.

1. Pentium 1, 2, 3, 4
2. Celeron
3. Pentium M and Celeron M for mobile devices
4. Pentium Dual Core
5. Core Solo
6. Core Duo
7. Core 2 Duo
8. Core 2 Quad
9. Core i3, i5, i7

4. Hard Disk :

Currently, we can group hard drives into four types:

1. Parallel Advanced Technology Attachment (PATA)

2. Serial ATA (SATA):
    a) SATA drives can transfer data faster than PATA types by using serial signaling technology.
    b) SATA cables are thinner and more flexible than PATA cables.
    c) They have a 7-pin data connection, with cable limit of 1 meter.
    d) Disks do not share bandwidth because there is only one disk drive allowed per SATA controller chip on the computer motherboard.
    e) They consume less power. They only require 250 mV as opposed to 5V for PATA.

3. Small Computer System Interface (SCSI)

These are quite similar to IDE hard drives but they make use of the Small Computer System Interface to connect to the computer. SCSI drives can be connected internally or externally. Devices that are connected in a SCSI have to be terminated at the end. Here are some of their advantages.

- They are faster.
- They are very reliable.
- Good for 24/7 operations.
- Have a better scalability and flexibility in arrays.
- Well-adapted for storing and moving large amounts of data.

4. Solid State Drives (SSD):

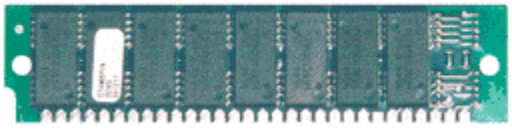
These are the latest in drive technology that we have in the computer industry. They are totally different from the other drives in that they do not consist of moving parts. They also do not store data using magnetism. Instead, they make use of flash memory technology. They make use of integrated circuits or semiconductor devices to store data permanently, at least until they are erased. Here are some of their advantages.

- Faster data access.
- Less susceptible to shock.
- Lower access times and latency.
- Durability.
- Less power usage.

5. RAM Memory :

With the PC hardware market's explosive growth over the last 10 years, the variety of RAM modules has expanded tremendously.
Today's support tech must contend with SIMMs, DIMMs, and RIMMs
SIMM chips
Single in-line memory modules (SIMMs) come in 30-pin and 72-pin variants. The best way to identify a SIMM chip is by a notch next to the contacts on one side. The 72-pin SIMM has a notch among the contacts in the middle.

Used extensively on older computers, shows a 30-pin, 3.5-inch SIMM chip (note the tin contacts).

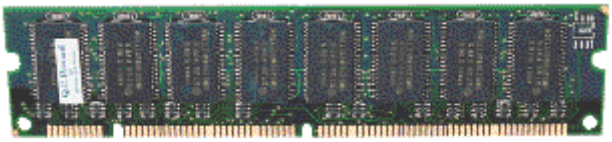


The newer 72-pin, 4.25-inch SIMM chip is shown in

DIMM chips
Dual in-line memory modules (DIMMs) have 168 pins and transfer data 64 bits at a time. DIMMs can easily be identified because they:

- Have no bottom-corner notch (like SIMMs have).
- Have semicircular holes on both sides.
- Have two notches among the contacts.
- Are installed perpendicular to the memory socket, unlike 72-pin SIMMs that are installed at a slight angle

Figure shows a 168-pin, 5.25-inch DIMM chip.



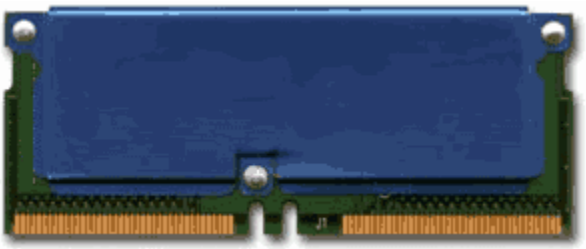
SO-DIMM chips

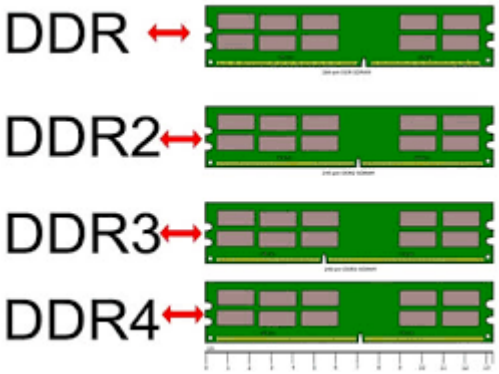
Small outline dual in-line memory modules (SO-DIMMs) are commonly used in notebook computers. SO-DIMM chips are smaller than standard DIMMs and come in 72-pin and 144-pin varieties.

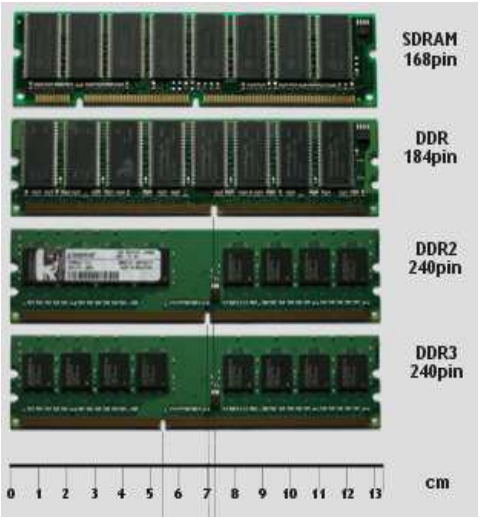
SDRAM and DRAM chips shows a 168-pin SDRAM chip

184-pin RIMM chip RIMMs are faster than DIMMs but generate more heat

160-pin SO-RIMM chip



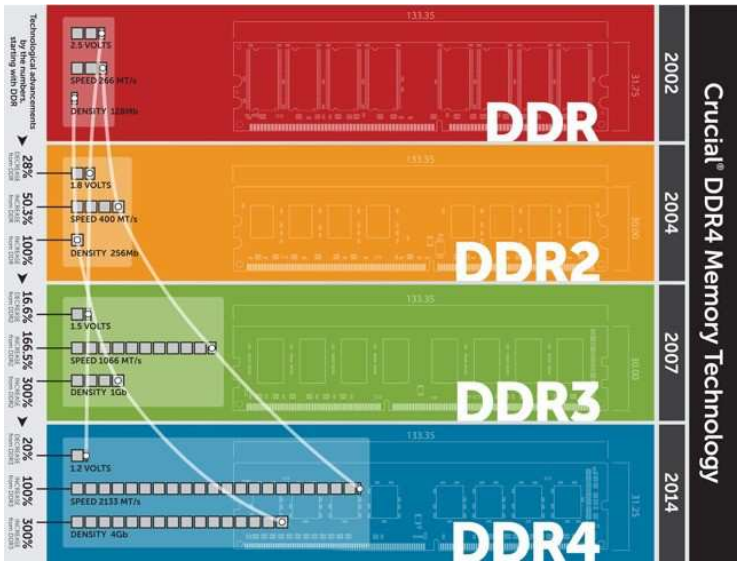


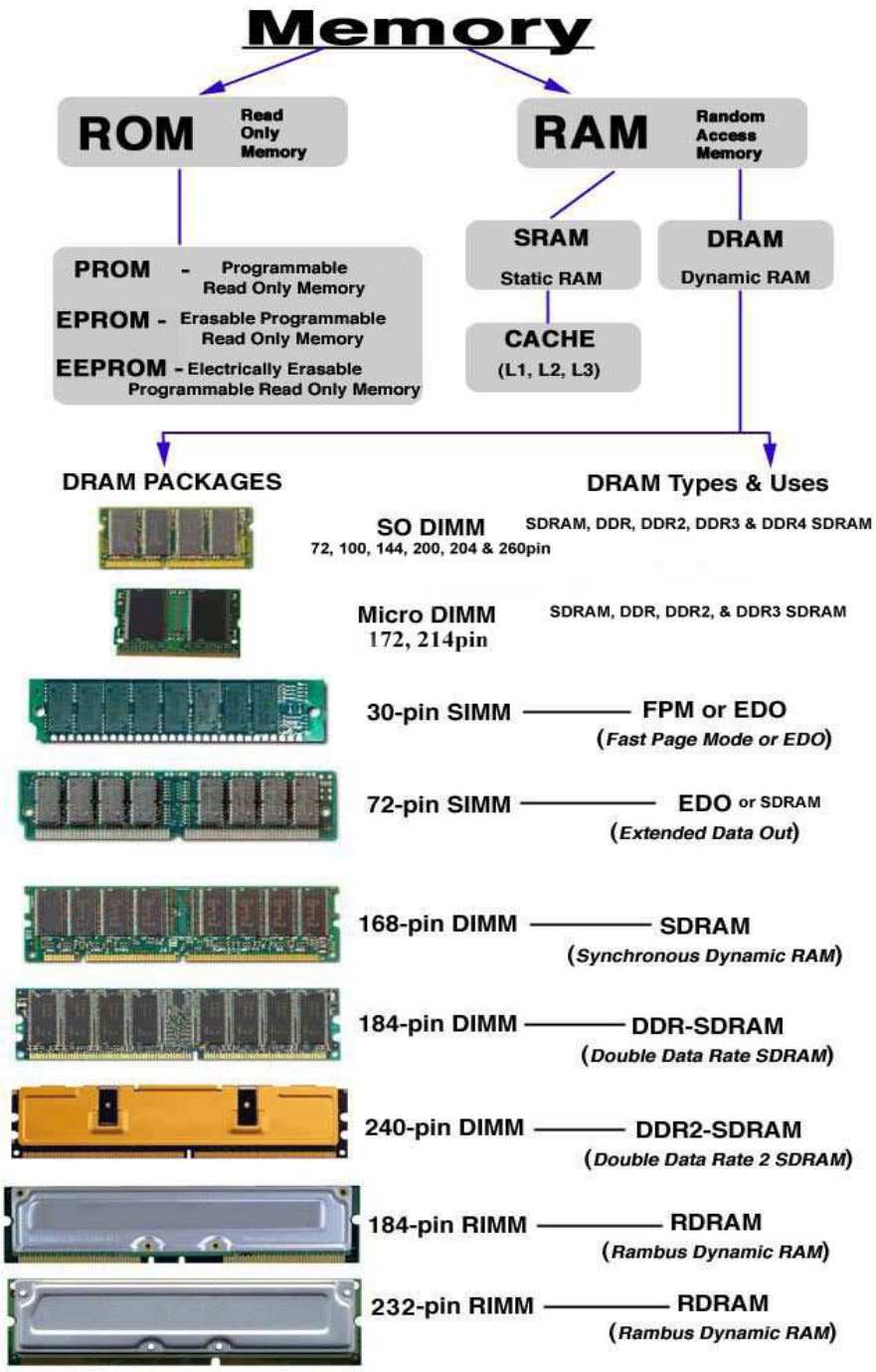


DDR modules have the notch 73.28mm from one end (the long side from the notch). DDR 1 total pin are 184.

DDR2 modules have the notch 70.68 mm from one end (the long side from the notch). DDR 2 total pin are 240.

DDR3 modules have the notch 54.68 mm from one end (the short side from the notch). DDR 3 total pin are 240.



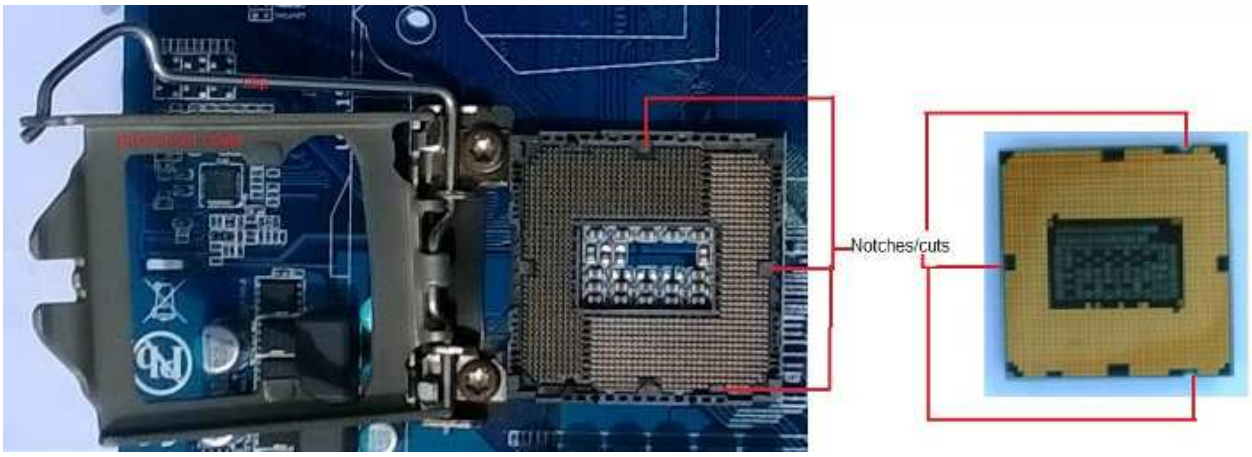


CMOS battery: Alternatively referred to as a Real-Time Clock (RTC), **Non-Volatile RAM** (NVRAM) or CMOS RAM, CMOS is short for **Complementary Metal-Oxide Semiconductor**. CMOS is an on-board, battery powered **semiconductor chip** inside computers that stores information.

Step by Step instructions to Build a PC

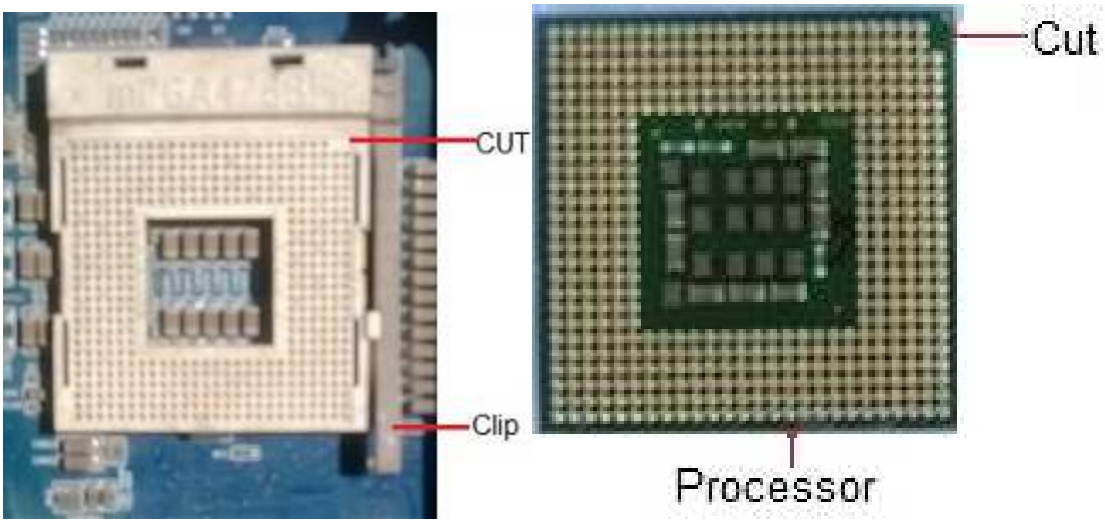
Installing a (CPU) processor

After unpacking the processor carefully, the first and the foremost step is to locate the notch on the side of the processor. The CPU socket on the motherboard also has a same type of cut, you just need to match the notch on CPU and motherboard socket while installation. After successfully fixing the processor on the socket you need to pull the socket lever down.

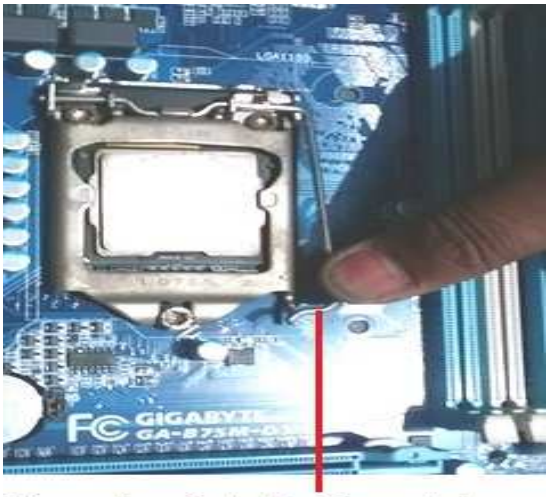


Cuts/notches as on PIN-less processor types

Cuts/notches as on PIN-less processor types



Processor inserted into socket



Press the clip to fix it in metal cap

Fixing CPU fan

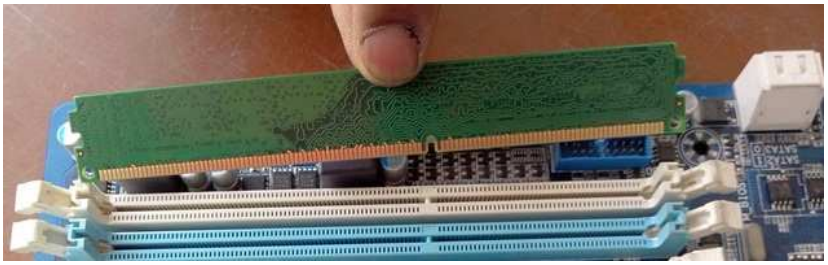
CPU is the most heated component of a PC. A fan is needed to cool down the temperature of a processor. Before installing the fan, you need to apply heat sink compound on the upper surface of the processor.

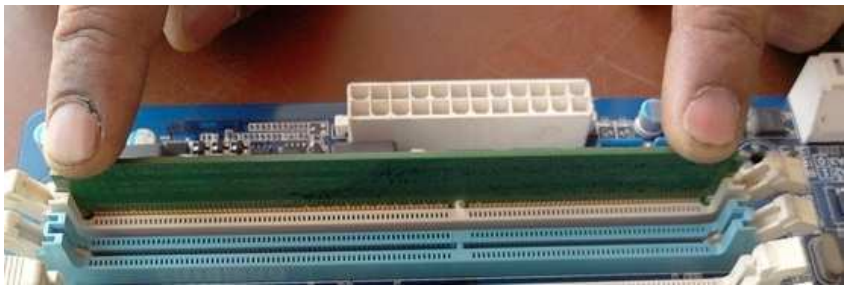
Depending on the processor type, you need to use different types of cooling fans.

Fixing Motherboar d in PC-Cabinet.

Fixing RAM module

The RAM modules are fixed in RAM slots on the motherboard. As you can see in the picture, you need to pull the plastic locks on both the ends of the slot to insert the RAM module.Once it rests on the slot, just press it, the plastic locks will automatically get tightened.





Installing SMPS

The SMPS is installed on the top area on the side of cabinet. After inserting the SMPS from inside the cabinet you need to fix four screws back to get it fixed.

place SMPS from inside the cabinet and move in the direction mentioned.

Installation and connection of Hard Disk Drive.

Hard disk needs to slide into the 3.5 inches' bay area inside the cabinet. It is important to fix all the screws on the hard disk to prevent any vibrations in the storage media.

1. Slide the HDD into the bay. 2 . Install the screws on both sides

2. Install one side of SATA cable to HDD and the other end on the motherboard

3. Now install SATA power connector

4. Difference between SATA power connector and IDE power connector

Fixing DVD Writer/CD-ROM in the cabinet.

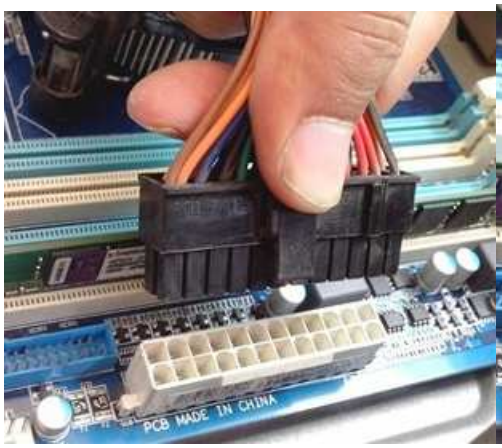
On the top section of the cabinet, 5.25 inches of space is reserved for installing DVD/CD writer. You need to gently push the DVD writer from the front side and fix the screws.

Connections of (IDE) FDD and DVD/CD-ROM

SMPS connections on the motherboard.

Installing SMPS 12 pin connector. In older motherboards (up to P-3 main boards), you need to install two number of 6-pin connectors as shown in the picture. You just need to remember that all the black wires are on the inner-side for correct connections.

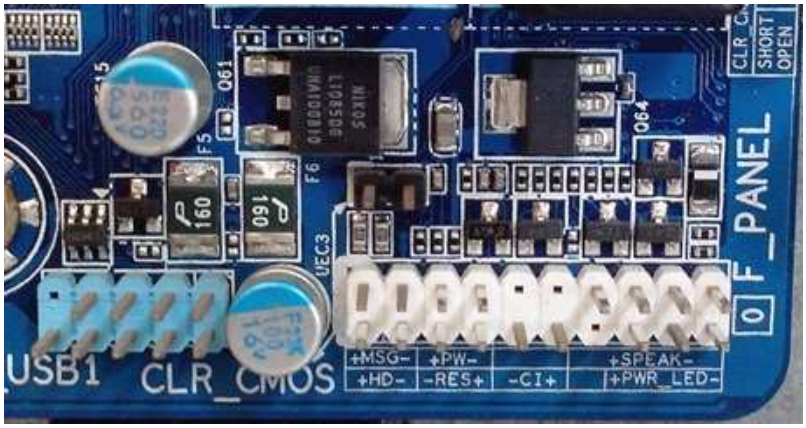
Installing ATX (24pin) SMPS-connector.

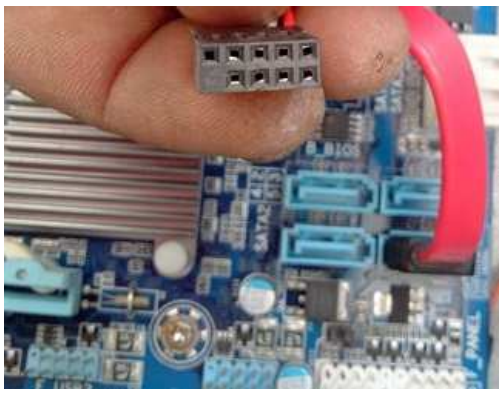


Installing ATX (4-pin) connector

Installing Cabinet connectors:

The cabinet has its own set of switches like power and reset buttons, HDD and power indicators, audio and USB ports. These front buttons need to be connected on the motherboard according to the legend printing.





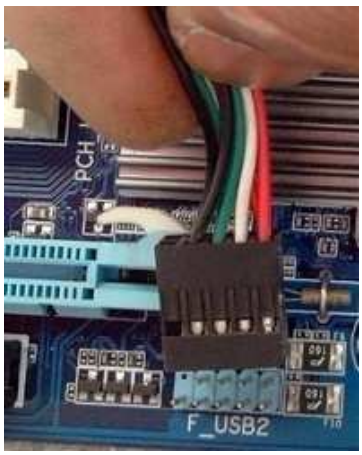
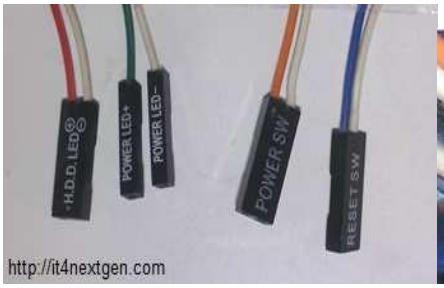


Figure: Installation of Front-USB connector —see the hole blocked on the connector and correspondingly see no pin on the motherboard.

Other Front-Panel connectors.



The last step after connecting all the internal components of a desktop PC is to close the side cover of the cabinet.

Expt No :-2 : Installation of Operating System (Any one)

Aim:- Installation of Operating System and Device drivers, Boot-up sequence. Installation of application software .(at least one),Basic troubleshooting and maintenance and Device drivers, Boot-up sequence. Installation of application software .(at least one),Basic troubleshooting and maintenance

Installing Using a Windows installation DVD

Clean Install

A clean install is intended for users who want to freshly install Windows on their computer (by deleting all of the data on the hard disk and then installing Windows) or computers that do not have an operating system yet.

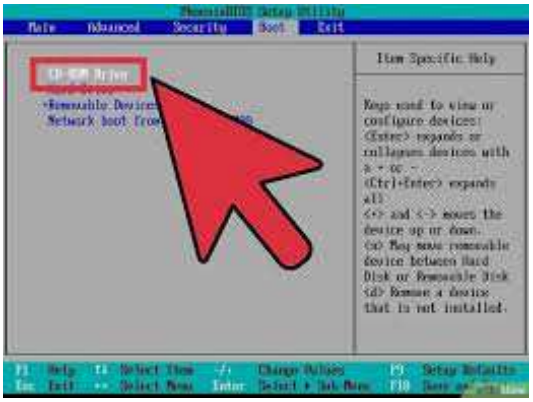
Enter your computer's BIOS. Turn off the computer that you want to install Windows on then turn it back on. When the BIOS screen appears or you are prompted to do so, press Del, Esc, F2, F10, or F9 (depending on your computer's motherboard) to enter the system BIOS. The key to enter the BIOS is usually shown on the screen.

Find your BIOS's boot options menu. The boot options menu of your BIOS may vary in location or name from the illustration, but you may eventually find it if you search around.

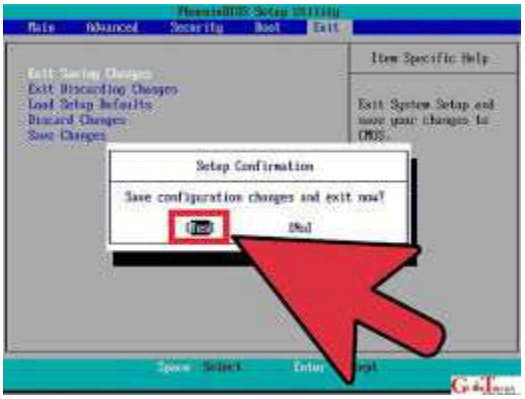
If you can't find the boot options menu, search the name of your BIOS (most likely located in the BIOS menu) online for help.

3 Select the CD-ROM drive as the first boot device of your computer.

Although this method may vary among computers, the boot options menu is typically a menu of movable device names where you should set your CD-ROM drive as the first boot device. It can also be a list of devices that you can set the order of their boot on. Consult a manual or the internet for help ifyou is stuck.



4 Save the changes of the settings. Press the button indicated on the screen or select the save option from the BIOS menu to save your configuration.

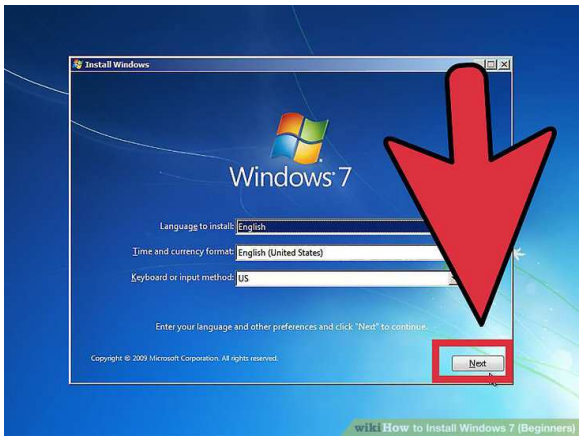


5 Shut off your computer. Either turn off the computer by choosing the shut-down option in your current operating system, or hold the power button until the computer powers off.

6 Power on the PC and the insert the Windows 7 disc into your CD/DVD drive.

7 **Start your computer from the disc.** After you have placed the disc into the disc drive, start your computer. When the computer starts, press a key if you are asked if you would like to boot from the disc by pressing any key. After you choose to start from the disc, Windows Setup will begin loading.

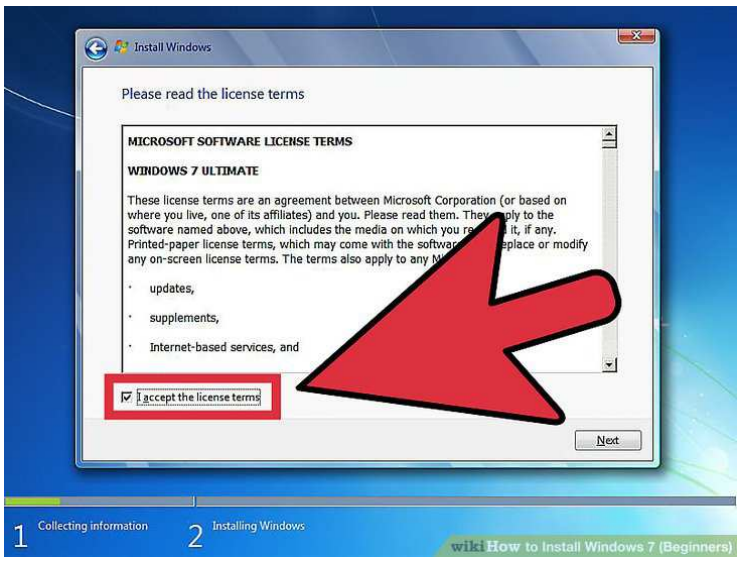
- If you are not asked to boot from the disc, you may have done something wrong. Retry the previous steps to solve the problem.



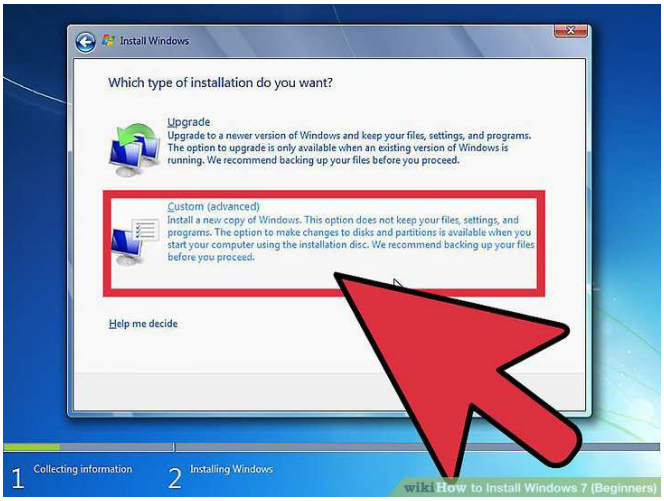
8 **Choose your Windows Setup options.** Once Windows Setup loads, you'll be presented with a window. Select your preferred language, keyboard type, and time/currency format, and then click *Next*.

9

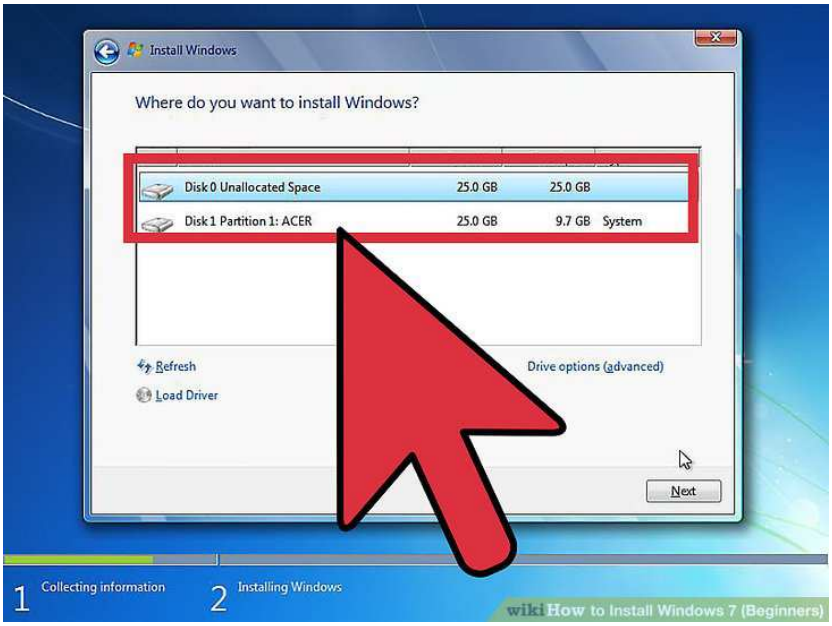
Click the *Install Now* button.



10 **Accept the License Terms.** Read over the Microsoft Software License Terms, check *I accept the license terms*, and click *Next*.



11 **Select the *Custom* installation.**



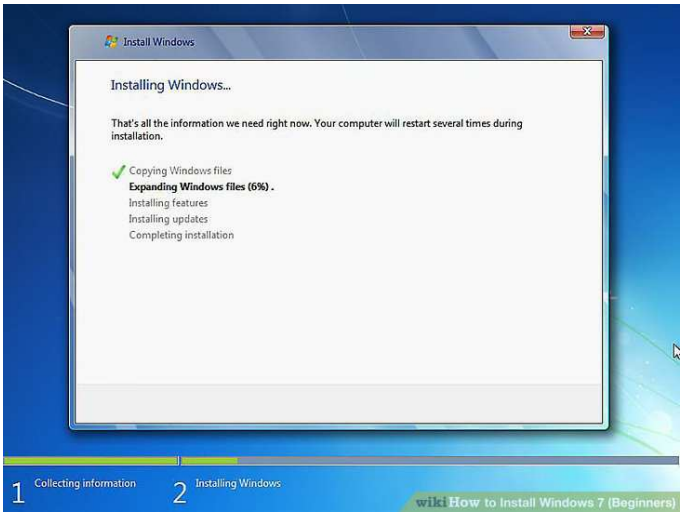
12 **Decide on which hard drive and partition you want to install Windows on.** A hard drive is a physical part of your computer that stores data, and partitions "divide" hard drives into separate parts.

- If the hard drive has data on it, delete the data off of it, or **format** it.
  - Select the hard drive from the list of hard drives.
  - Click *Drive options (advanced)*.
  - Click *Format* from Drive options.
- If your computer doesn't have any partitions yet, create one to install Windows on it.

- Select the hard drive from the list of hard drives.
- Click *Drive options (advanced)*.
- Select *New* from Drive options.
- Select the size, and click *OK*.

13

Install Windows on your preferred hard drive and partition. Once you've decided on where to install Windows, select it and click *Next*. Windows will begin installing.



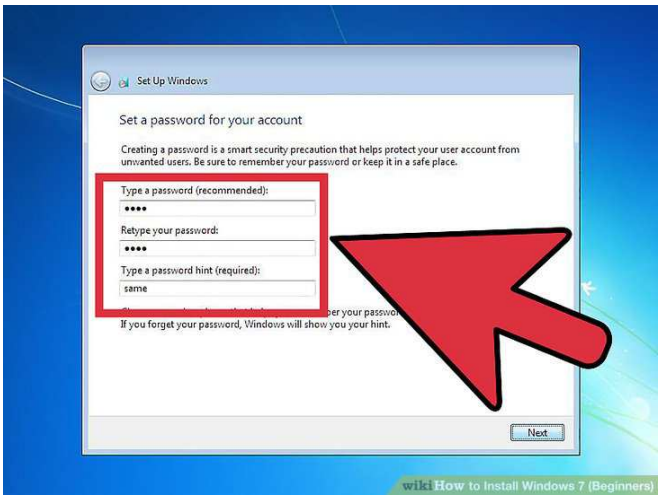
Post-Installation Procedure:

These steps carry off after you have finished installing Windows and your computer has started in Windows 7.

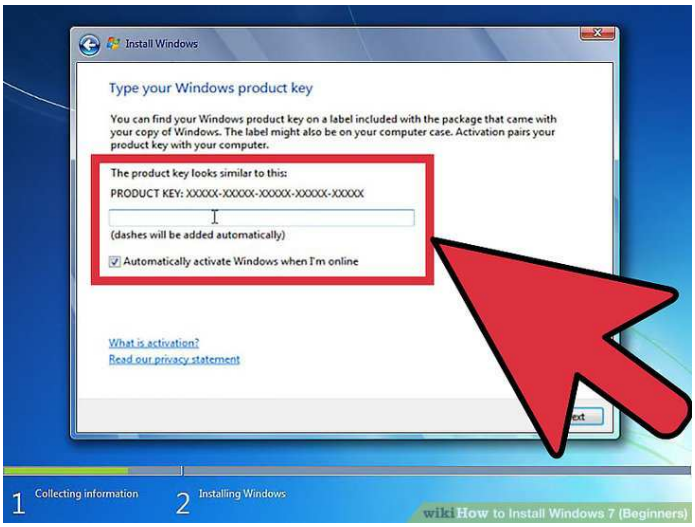
1. 

Type your username and computer's name and click *Next*.

2 **Type your password and click *Next*.** If you don't want a password, leave the text boxes blank and then click *Next*.



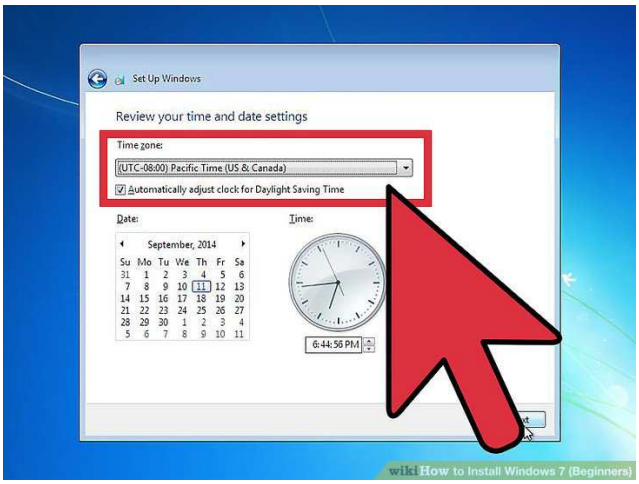
3 . **Enter your product key then click *Next*.** Your product key is located on the case of your Windows 7 disc if you purchased the disc. To skip entering your product key, just click *Next*, but Windows will run on a 30-day trial, and you'll have to enter a key once the 30 day trial time is up.

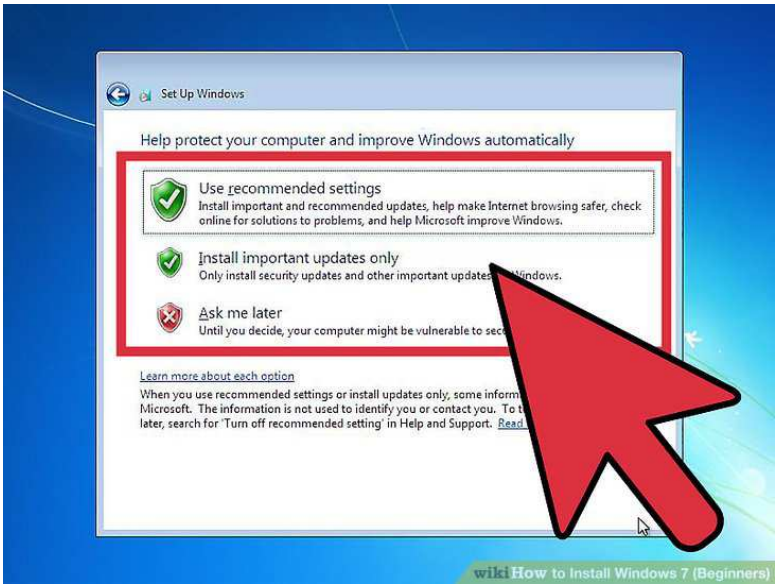


4 **Choose your Windows Update settings.**

- *Use recommended settings* automatically sets update and security settings recommended by Microsoft.
- *Install important updates only* configures your computer only to install necessary updates.
- *Ask me later* disables your security until you have made a decision.

Set your time and time zone

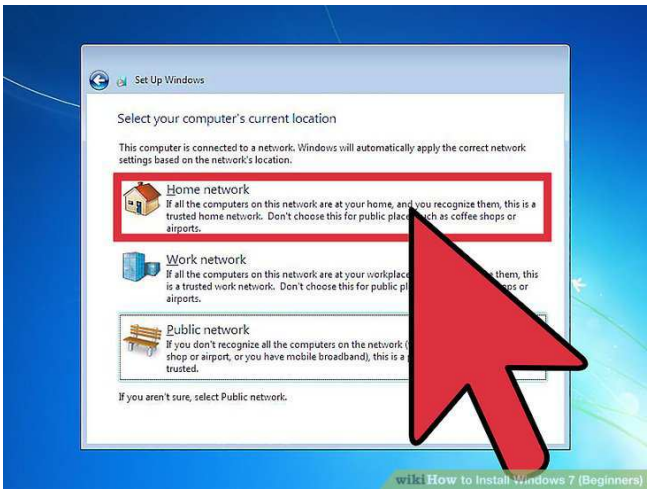




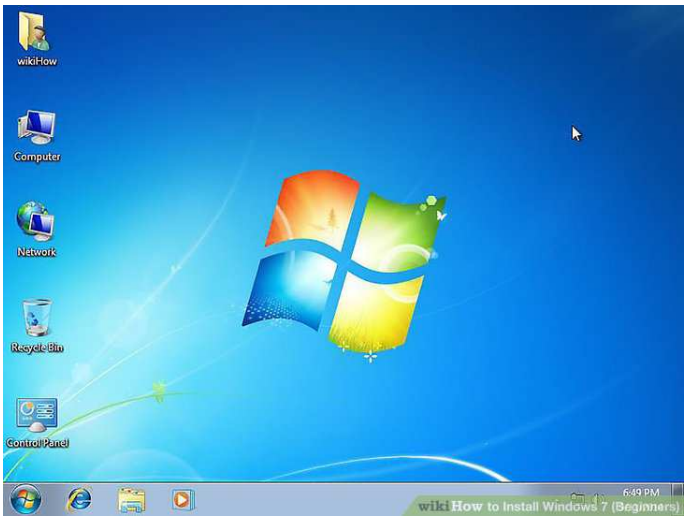
5 **Set your network type.**

- If the computer is connected to your own personal network, choose *Home network*.
- If you are connected to the network at your workplace, choose *Work network*.

- If you're connected to a public network from places such as restaurants and shops, choose *Public network*.



6. Your computer is now set up!



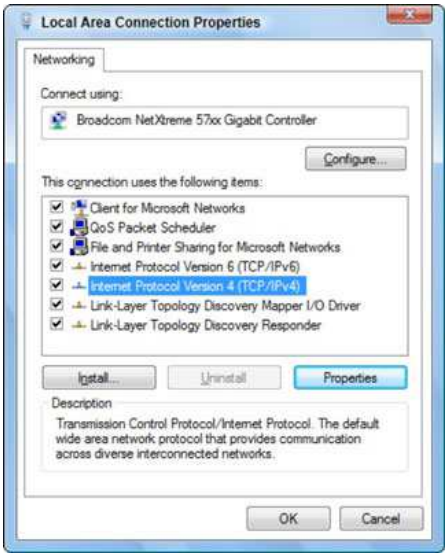
8. Install other application software like Adobe Reader, Microsoft Office, Antivirous software, Winrar, etc.

How to set IP Address in windows 7

Most computers that are attached to an Ethernet network will have their IP addresses assigned automatically by DHCP. You can configure your PC to use its own IP address, effectively disabling DHCP. Here's how to do that in Windows 7:

1. Open the Network and Sharing Center window.
2. On the right side of the window, choose the link Local Area Connection.
3. In the Status dialog box, click the Properties button.

   A Properties dialog box for the connection appears. It lists the various protocols and services being used by the connection



4. Select the service titled Internet Protocol Version 4 (TCP/IPv4).
5. Click the Properties button.

   The dialog box labeled Internet Protocol Version 4 (TCP/IPv4) Properties appears.

6. Choose the option Use the Following IP Address.
7. Type the IP address.At this point, you must know what you're doing. Seriously. Typing an improper IP address, or one that's out of range, means that your computer cannot use the network.
8. Type a subnet mask.For a local-area network, the value is usually 255.255.255.0, but it could be something else depending on the specifics of your network.
9. Type the default gateway address.The default gateway address is the IP address for the network's router. Because DHCP also obtains the address for the DNS server, which helps your computer find addresses on the Internet, you need to manually list those addresses as well.

10. Type the address of the preferred DNS server.This value is obtained from your ISP.
11. Type the address for the alternative DNS server.The alternate DNS server's IP address is also something that your ISP must provide.
12. Click OK to close the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
13. Close the other open dialog boxes and windows.

Basic troubleshooting and maintenance:

PC Maintenance

This section includes information about tasks you can perform to help ensure the trouble-free operation of your PC, and to ease the recovery of important information on your PC should problems arise in the future.

Creating Data Backup Discs

You can use the CD or DVD burning software included on your PC to create backup discs of important information including personal files, e-mail messages, and Web site bookmarks.

When writing data to a backup disc, you should use software that includes *write verification* functionality. This verification feature compares the data on your hard disk drive with the data copied to the disc to ensure it is an exact copy. Depending on your disc burning software, you may need to manually enable this feature.

Creating System Recovery Discs

This is a one-time step that you should perform while your PC is working properly. If you later encounter problems with your PC, you can restore it to its original configuration using the System Recovery discs that you create.

Before creating recovery discs, read “System Recovery Overview“ on page 17, and then create the discs as described in “Creating System Recovery Discs“ on page 18.

Removing Unused Programs

1 Click **Start**, and then click **Control Panel**.

2 Double-click **Add or Remove Programs**. The Add or Remove Programs window opens.

3 Select the program you want to remove, and click the **Change/Remove** button.

4 Follow the onscreen instructions.

NOTE: Some programs have their own uninstall features. If you cannot uninstall a program from the Control Panel, try using the program to uninstall.

Running the Disk Cleanup Program

The Disk Cleanup program frees up space on your hard disk drive by removing temporary and unused files (including Temporary Internet Files and files in the Recycle Bin). You can run Disk Cleanup manually, or you can set it up to run automatically.

Running Disk Cleanup manually

1 Click **Start**, **All Programs**, **Accessories**, **System Tools**, and then click **Disk Cleanup**.

Disc Cleanup searches for files to delete and calculates how much disk space can be saved.

2 Choose the files to delete by placing a check mark in the check box next to the file types listed.

3 Click **OK**, and then click **Yes** to finish deleting the selected files.

Scheduling Disk Cleanup to run automatically

1 Click **Start**, and then **Run**, and type the following into the open field (note there is a space between the *r* and the */*): *cleanmgr /sageset:100*

2 Select the types of files that you want removed (for example, temporary files, Temporary Internet Files, and the files in the Recycle Bin).

3 Click **OK** to save the settings.

4 Click **Start**, **All Programs**, **Accessories**, **System Tools**, and then click **Scheduled Tasks**.

5 Double-click **Add Scheduled Task** and then click **Next**.

6 Select **Disk Cleanup** from the application list and then click **Next**.

7 Accept the default task name or type a name for the task, select when the task is performed, and click **Next**.

8 Select the time and reoccurrence (if available), and click **Next**. Disk cleanup may take a long time, so select a time when the PC is on but not in use.

9 Enter your login name and password and click **Next**.

If you do not have a password, leave the Password field blank and click **Next**.

Select **Open advanced properties for this task when I click Finish** and click **Finish**

11 In the Run field of the Disk Cleanup window add */sagerun:100* at the end of the path. For example: *C:\WINDOWS\system32\cleanmgr.exe /sagerun:100*

12 Click **OK** and, if prompted, verify your password.

Disk Cleanup runs at the time you have set.

Running the Disk Defragmenter Program

When Windows stores files on your hard disk drive, it often divides them into multiple pieces (or *fragments*) so they fit into available space on the drive. When you attempt to open a fragmented file, it must be retrieved from more than one place, so the process takes more time.

The Disk Defragmenter program groups the fragmented files together on your hard disk drive to improve PC performance. This does not affect the location of files and folders on your PC.

NOTE: The Disk Defragmenter program may take a long time to complete. You can run it unattended overnight.

---

1 Open the Windows Task Manager by pressing the Ctrl key, the Alt key, and the Delete key at the same time.

2. On the Applications tab, select all the programs that are listed, and then click **End Task**. Close the Task Manager.
3. Click **Start**, choose **All Programs**, **Accessories**, **System Tools**, and then click **Disk Defragmenter**.
4. In the Volume column, select the hard disk drive you want to defragment (typically **C:**), and then click **Defragment**.

If Disk Defragmenter repeatedly starts, a hidden background program is still accessing the hard disk drive. Restart the PC in Safe Mode and run the Disk Defragmenter program again:

1. Click **Start**, **Turn Off Computer**, and then **Restart**.
2. Press the F8 key as soon as the first logo screen appears.
3. On the Windows Advanced Options menu, use the arrow keys to select **Safe Mode** and press the Enter key.
4. Press the Enter key again to select the operating system.
5. Log on to Windows. When the Desktop message appears, click **Yes** to continue in Safe Mode.
6. After Windows starts, use the previous procedure to run the Disk Defragmenter program.

Checking for Hard Disk Drive Errors

Perform the following procedure to check the integrity of the hard disk drive in Windows XP. Close all open programs before beginning the disk check.

1. Click **Start**, and then click **My Computer**.
2. In the window that opens, right-click the hard disk drive that you want to check, and click **Properties**.
3. In the Properties window, click the **Tools** tab.
4. Under **Error-checking**, click **Check Now**.
5. If desired, click the check box next to **Automatically fix file system errors** and **Scan for and attempt recovery of bad sectors**.
6. Click **Start**. If prompted to restart, click **Yes** to restart the PC.

Understanding Hard Disk Drive Space

HP PCs with the Windows XP operating system preinstalled *may* appear to have a hard disk drive smaller than what is stated in the product specifications, in the documentation, or on the box. Hard disk drives are described and advertised by manufacturers in terms of decimal (base 10) capacity. Windows and other programs, such as FDISK, use the binary (base 2) numbering system.

In decimal notation, one megabyte (MB) is equal to 1,000,000 bytes, and one gigabyte (GB) is equal to 1,000,000,000 bytes. In the binary numbering system, one megabyte is equal to 1,048,576 bytes, and one gigabyte is equal to 1,073,741,824 bytes. Because of the different measuring systems, you may see a difference between the size reported by Windows and the size advertised. The storage capacity of the hard disk drive is as advertised.

Recommended Maintenance Schedule

Daily	Weekly	Monthly	Quarterly (seasonally)
Manage e-mail • Delete e-mail from unknown sources. • Do not open untrusted attachments. • File e-mail.	**Protect against viruses, adware, and spyware** • Update definition files or schedule a weekly automatic update. • Run a full virus, adware, and spyware scan or schedule a weekly automatic scan.	**Use Windows Update** • Check for updates or schedule a monthly automatic update. (See the *Getting Started Guide* for details.)	**Set new passwords** (See the *Getting Started Guide* for details.)
	Optimize performance • Run Disk Cleanup. (See "Running the Disk Cleanup Program" on page 1.) • Check for disk errors. (See "Checking for Hard Disk Drive Errors" on page 2.) • Run Disk Defragmenter. (See "Running the Disk Defragmenter Program" page 2.)	**Review the Start menu** • Set to launch only needed applications.	**Clean the PC, monitor, keyboard, and mouse** • For detailed cleaning instructions, go to **http://www.hp.com/support** select your country/region and language, search on your PC model number, and then search on the keyword *cleaning*.
	Optimize your browser • Delete cookies. • Delete cache. • Delete history files.	**Clean up the desktop** • Delete or uninstall unneeded icons and applications. (See "Removing Unused Programs" on page 1.)	
	Empty the Recycle Bin • This, and other cleanup tasks, can be performed with the Disk Cleanup program. (See "Running the Disk Cleanup Program" on page 1.)	**Maintain overall condition** • Check cleanliness. • Make sure ventilation is unobstructed. • Secure all connections and cabling.	
	Back up important files to CD or DVD (See "Creating Data Backup Discs" on page 1.)	**Create a Restore Point** (See "Microsoft System Restore" on page 16.)	

Troubleshooting PC Problems

Audio

Symptom	Possible solution
No sound is produced.	Press the Mute button on the keyboard to see if the Mute feature is turned on. *Or* **1** Click **Start**, and then click **Control Panel**. **2** Click **Sounds, Speech, and Audio Devices**, and then **Sounds and Audio Devices**. **3** Click the **Mute** check box to remove the check mark from the box.
	Click the task bar **Volume** icon ( ), or use the keyboard controls to increase the volume.
	Ensure powered (active) speakers are turned on.
	Turn off your PC, and reconnect the speakers.
	Press the Standby button (select models only), or press the Esc key on the keyboard to resume from standby mode.
	Replace the passive speaker system with an active speaker system (sold separately). Active speakers have a power cord and On button and connect to the Audio Out (green) connector on the PC.
	Unplug headphones if they are connected to your PC.
Codec error messages appear when certain audio files are played.	Open the file in Windows Media Player. Ensure Windows Media Player is configured to automatically download codecs. • If the correct codec is available, the file will play. Note that you must be connected to the Internet to download the codec file. • If the correct codec is not available, check to see if there is an update available for Windows Media Player. • For more information, open Windows Media Player Help, and then search the online Help for *codec*.

Video

Symptom	Possible solution
Some video files do not play.	Your file may be corrupt or in an unsupported format. Open the video file in a video editor such as WinDVD Creator, and then resave the file in a supported format.
Codec error messages appear when I play certain video files.	Open the file in Windows Media Player. Ensure Windows Media Player is configured to automatically download codecs. • If the correct codec is available, the file will play. Note that you must be connected to the Internet to download the codec file. • If the correct codec is not available, check to see if there is an update available for Windows Media Player. For more information, open Windows Media Player Help, and then search the online Help for *codec*.
Files Needed To Display Video Are Missing or Corrupt error message appears.	**1** Click **Start**, right-click **My Computer**, and then select **Properties**. **2** Click the **Hardware** tab, and then click **Device Manager**. **3** Click the plus sign (**+**) next to **Sound, video and game controllers**. **4** Double-click **TV tuner** (select models only). **5** Click the **Driver** tab, and then click **Update Driver**. **6** Select **Install** from a list or a specific location, and then click **Next**. **7** Remove the check mark from **Search removable media**. **8** Click **Include this location in this search**, and then click the **Browse** button. **9** Click the plus sign (**+**) in order, next to each of the following directories: • My Computer

	• C:\ • Drivers 10 Click **OK**, **Next**, and then click **Finish** after the drivers are updated. 11 Restart the PC.

CD and DVD Drives

Symptom	Possible solution
The CD or DVD drive cannot read a disc or takes too long to start.	Ensure the disc is inserted with the label facing up and centered in the tray.
	Wait at least 30 seconds to let the DVD drive determine the type of media.
	Clean the disc with a CD cleaning kit, available from most PC stores.
	The driver may be corrupted or outdated. Refer to "Updating Drivers" on page 16 for detailed information about restoring and updating drivers.
I cannot remove a CD or DVD.	Turn on your PC, and press the Eject button nearest the drive to open the tray. If you suspect a problem with the actual Eject button: 1 Click **Start** and then **My Computer**. 2 Right-click the CD or DVD drive you want to open. 3 Select **Eject** from the menu.
I cannot create (burn) a disc.	Ensure the disc is inserted with the label facing up and centered in the tray.
	Verify that you are using the correct disc type (media) for the drive. Try a different brand of disc.
	Make sure the disc is clean and undamaged. If recording stopped during a recording session, the disc may be damaged; use a different disc.
	Use the correct type of disc for the type of files you are recording.
	When using a CD-R disc, make sure that it is blank when recording music and is blank or appendable (with space to add more data files) when recording data.
	Verify that you are using the correct disc type when making a copy of a disc. Some recording programs can record only to the same disc type as the source. For example, you can record a DVD only to a DVD+R/–R or a DVD+RW/–RW disc, and you can record a CD only to a CD-R or a CD-RW disc.
	Make sure the disc is in the correct drive and you specify the same drive in the CD or DVD recording software.
	Select a slower write speed for the recording drive, if it is available.
	The recording software may not let you add a track if it exceeds the available space on your disc. You can make space available by removing one or more tracks from the list before recording the files to disc.
	Close all software programs and windows before recording.
	Make sure you have enough space available on your hard disk drive to store a temporary copy of the content.
	If you are on a network, copy the files from a network drive to your hard disk drive first, and then record them to disc.
	Close all programs and windows and then restart your PC.
I cannot add data to a DVD.	Make sure you set the correct recording option (append or add data files) in your DVD

	burning software.
I cannot play a music CD on a home stereo.	Use a CD-R disc, not a CD-RW disc.
	Try a different brand of disc, or check to see if the brand of disc works with your stereo. Refer to the documentation that came with your stereo or CD player, and check the manufacturer's Web site.
	Use a CD instead of a DVD. Audio files on a DVD can be played on your PC, but you cannot create a music DVD to be played in a home CD player.
	Convert .mp3 or .wma audio files to .wav or .cda music files before burning them to a disc.
Titles of music tracks are not displayed for the CD.	The PC must be connected to the Internet for the artist, title, and track information to appear when playing music CDs. This information is not recorded on the disc. Track information may not be available for every CD.
An error message appears when capturing video.	You may need to select the capture device if your PC has both an analog and a digital video capture device. Refer to the Help menu in the video capture program to find out how to change the video device selection.
I cannot play a DVD movie on a DVD player.	Your DVD player cannot play video files recorded onto the DVD as data files. To play a movie properly, use a video recording program such as WinDVD. Some video files may be viewed on a PC, but not on a home DVD video player.

Display (Monitor)

In addition to the information listed here, also refer to the documentation that came with your monitor.

Symptom	**Possible solution**
PC seems to be locked up and not responding.	Use the Windows Task Manager to close any programs not responding or to restart the PC: **1** Press the Ctrl key, the Alt key, and the Delete key on the keyboard at the same time **2** Select the program that is not responding, and click **End Task**. Or Click **Shut Down**, and then click **Restart** If this does not work, press and hold the On button for 5 or more seconds to turn off the PC. Then, press the On button.
Hard disk drive error message displays	Press the Help **?** button on the keyboard to open the Help and Support Center, or refer to the *Warranty and Support Guide* to contact Support for replacement details.

Hardware Installation

Symptom	**Possible solution**
A new device is not recognized as part of the system.	Install the device driver from the CD provided with the device, or download and install the driver from the device manufacturer's Web site. You may need an updated driver for Windows XP. Contact the device vendor directly for an update. For HP peripherals, visit the HP Web site. Refer to the *Warranty and Support Guide*

	for details.
	Ensure that the device is properly and securely connected and that the pins in the connector are not bent down.
	Ensure that all cables are properly and securely connected and that the pins in the cable or connector are not bent.
	Turn off the PC, turn on the external device, and then turn on the PC to integrate the device with the PC.
	Restart the PC, and follow the instructions for accepting the changes.
	Deselect the automatic settings in the operating system for the card, and choose a basic configuration that doesn't cause a resource conflict. You can also reconfigure or disable devices to resolve the resource conflict.
New device does not work.	You must be logged in as the computer administrator to install or uninstall a device driver. To switch users, click **Start**, click **Log Off**, and then click **Switch User**; choose the computer administrator user. (The computer administrator is usually the user *Owner*.)
New or existing device does not work after installing a new device.	To resolve a device conflict, you may need to disable one of the devices or uninstall an old device driver: **1** Click **Start**, and click **Control Panel**. **2** Click **Performance and Maintenance**. **3** Click the **System** icon, and select the **Hardware** tab. **4** Click **Device Manager**. **5** Click the plus sign (**+**) next to the problem device and check for exclamation points in a yellow circle near the device icon. The exclamation point means there is a device conflict or problem with the device. Exclamation points do not always appear when a device is not working properly. **6** If there is an old or unnecessary device driver listed in the Device Manager, this may be causing the device conflict. To uninstall the old driver for the new device driver to work properly, do the following: Right-click the device, click **Uninstall**, and then click **OK**. **7** Right-click the device, and select **Properties**. **8** If available, click the **Resources** tab to verify that there is a device conflict. **9** Click the **General** tab to see if your device is enabled and working properly. If it is available, click the **Troubleshoot** button, and follow the onscreen instructions in the device troubleshooter wizard. **10** Restart the PC. Click **Start**, click **Turn Off Computer**, and then click **Restart**.

Internet Access

Symptom	Possible solution
I cannot connect to the Internet.	Verify Internet settings, or contact your Internet Service Provider (ISP) for assistance.
	Reconnect the modem, verifying connections. Note that your PC may also have an Ethernet network interface (also called a network interface card, or (NIC) that connects to a local area network (LAN). Although it looks similar to the modem connector. The RJ 45 Ethernet network connector is not the same. Verify that you are using the modem connector. Do not connect the telephone cable to NIC. Do not plug a network cable to a telephone service line. Doing so may damage the NIC.
	Verify that the Web browser is installed and set up to work with your ISP.
	Try to connect again later, or contact your ISP for assistance.
I cannot automatically start Internet programs.	Log in to your ISP, and start the desired program.
Web pages load slowly.	Verify that the correct modem speed and COM port are selected: **1** Click **Start**, and then click **Control Panel**. **2** Click **Printers and Other Hardware**, if it is present. **3** Double-click **Phone and Modem Options**. **4** Select the **Modems** tab, and then click the **Properties** button. **5** In the *Device status* area, verify the modem is working properly. **6** In the *Device usage* area, verify the modem is enabled. **7** If there are further problems, click the **Troubleshoot** button, and follow the onscreen instructions. Note that Web pages do not always load as quickly as files stored on your PC. Web pages may also load slowly if there is a high demand for the Web site at that time.
The AOL program comes up even when it is not being used.	You may want to remove the AOL program. To uninstall AOL: **1** Click **Start** on the taskbar. **2** Click **Control Panel**. **3** Double-click **Add or Remove Programs**. **4** Select **America Online**, click **Change/Remove**, and then follow the onscreen instructions. **NOTE:** Removing the AOL program will not cancel your account with AOL.
My Internet browser home page changed to something I did not want.	You may have *spyware* on your PC. Spyware is software that usually runs silently in the background on your PC. collecting and sending information about you and your use of the PC to another person or system on the Internet . You can find and remove spyware from your PC by using any one of a number of software programs available for this purpose. Many of the popular virus protection programs have some tools that scan for and remove spyware from your PC To avoid getting spyware on your PC: Do not install programs if you are not sure they come from reputable companies. Check the company's Web site very carefully for information about what is included with the program. a program on your PC. Read the message in the window and make sure it is a software program that you really want.
Unwanted pop-up advertisements display on my PC when connected to the Internet.	This is typically caused by *adware* or advertising-supported software. You can configure your Web browser to block pop-ups (available by clicking **Tools** and then **Pop-up Blocker**).

	To remove adware from your PC, use the antispyware/adware program included on your PC (select models only) or any number of available software programs that remove adware programs. Note that many of the popular antivirus programs have tools that scan for and remove adware from your PC.

Keyboard and Mouse

Symptom	Possible solution
Keyboard commands and typing are not recognized by the PC.	Turn off the PC by using the mouse, reconnect the keyboard to the back of your PC, and then turn on your PC.
	Press the Help **?** button on the keyboard to open the Help and Support Center, or refer to the *Warranty and Support Guide* to contact Support for replacement details.
Keyboard Print button does not work.	Use the **Print** menu item in the program (typically located on the File menu).
Wireless keyboard does not work after installation or is not detected.	• Ensure the keyboard is within the range of the receiver. • Replace the batteries in the wireless keyboard. • Refer to the documentation that came with the keyboard.
Wireless mouse does not work after installation or is not detected.	• Ensure the mouse is within the range of the receiver. • Replace the batteries in the wireless mouse. • Refer to the documentation that came with the mouse.
Cursor does not respond to mouse movement.	Restart your PC using the keyboard: **1** Press the Alt and Tab keys on the keyboard at the same time to navigate to an open application. **2** Press the Ctrl and S keys on the keyboard at the same time to save your changes in the selected application (Ctrl+S is the keyboard command for Save on most — *not all* — applications). **3** After saving changes in all open applications, press the Ctrl and Esc keys on the keyboard at the same time to display the Start menu. **4** Use the up arrow key to select **Turn Off Computer**, and then press the Enter key on the keyboard. **5** Use the left and right arrow keys to select **Turn Off**, and then press the Enter key. **6** After the shutdown is complete, disconnect and reconnect the mouse connector into the back of your PC, and then turn on your PC.
Cursor responds slowly to mouse movement.	Use a mouse pad or other rough surface under the mouse.
Cursor does not move using the arrow keys on the keypad.	Press the Num Lock key. The Num Lock light should not be on if you want to use the arrow keys in the number keys group.
Cursor moves only vertically or horizontally (or does not move smoothly on the screen).	Remove the rollerball cover from bottom of mouse (rotate it counter-clockwise), remove the ball, and clean it with a damp, lint-free cloth (not paper). Also clean the rollers on which the ball moves.
Mouse does not work after installation or is not detected.	Unplug and reconnect the mouse cable to your PC.
Optical mouse does not track cursor well.	Place the mouse on a mouse pad or white sheet of paper, or gently wipe the light sensor lens on the bottom of the mouse with a lint-free cloth (not paper).
Cursor moves too fast or	Adjust the cursor speed:

too slow.	1 Click **Start**, **Control Panel**, **Printers and Other Hardware**, and then **Mouse**. 2 Click the **Pointer Options** tab. 3 Adjust the **Motion** slider toward **Slow** or **Fast** to decrease or increase the speed at which the pointer (cursor) responds to mouse movement. 4 Click **OK**.

Power

Symptom	Possible solution
PC will not turn on or start.	Ensure that cables connecting the PC to the external power source are plugged in properly.
	When the cables connecting the PC to the external power source are plugged in properly and the wall outlet is functioning, the green power supply light should be on; if the light is not on, refer to the *Warranty and Support Guide* to contact Support.
	Connect the monitor to the PC, plug it in, and turn it on.
	Set the line voltage selection switch to the correct setting for your country/region, or refer to the *Warranty and Support Guide* to contact Support.
	Test the outlet by connecting a different electrical device to the outlet.
	Reinstall the old memory to return your PC to its original state. Refer to the *Upgrading and Servicing Guide* for instructions.
	Press the Help **?** button on the keyboard to open the Help and Support Center, or refer to the *Warranty and Support Guide* to contact Support for replacement details.
	Reseat drive power, data, and power supply cables. See the *Upgrading and Servicing Guide* for instructions.
Invalid system disk or *Non-System disk or disk error* message displays.	When drive activity stops, remove the disk and press the spacebar. The PC should start up.
PC does not respond or turn off when the On button is pressed.	Press and hold the On button until the PC turns off.
PC shut down automatically.	The PC is in an exceedingly hot environment. Let it cool down. Ensure PC air vents are not blocked and internal fan is running. Note that your PC may not have an internal fan.
	Refer to the *Warranty and Support Guide* to contact Support for replacement details. Note that your PC may not have an internal fan.
PC date and time display is incorrect.	The real-time clock (RTC) battery may need to be replaced. Battery life is approximately seven years. Before replacing the battery, try resetting the date and time in your operating system by using the Control Panel. If the problem persists, replace the battery. See the *Upgrading and Servicing Guide* for replacement instructions.

Repairing Software Problems

Your PC uses the operating system and installed software programs during normal operation. If your PC works improperly or stops because of the software, you may be able to repair it.

Some software repairs are as simple as restarting your PC, and others require performing a System Recovery from files on your hard disk drive.

Your hard disk drive contains a System Recovery image that includes all the software files that were originally installed on your PC at the factory. In the unlikely event that you need to recover your system, it is easy to do so using this recovery image.

Because all the necessary information is contained in the System Recovery image on your hard disk drive, recovery discs are not included in the accessory box.

As a backup, you can:

- Make your own System Recovery discs from the recovery image as described in "Creating System Recovery Discs" on page 18.
- Contact HP Support to purchase a set of System Recovery discs.

You should also make the HP PC Recovery Tools CD. This CD contains utilities that allow you to make changes to your hard disk drive. See "Creating a Recovery Tools CD" on page 18.

NOTE: It is important that you perform the PC repair methods in the order described in this document.

Software Repair Overview

This section lists the available methods to fix your PC if you are experiencing software problems. Detailed instructions about each method are in the sections that follow. You must perform the procedures in the order listed here.

- Restarting your PC
- Turning off your PC
- Updating drivers
- Microsoft System Restore
- Application Recovery and Driver Recovery
- System Recovery

NOTE: If you are replacing a hard disk drive, you only have to run the System Recovery.

Additionally, your PC may include a Software Repair Wizard (select models only). You can use this wizard to access many of the repair methods described in this chapter, including:

- Creating System Recovery discs
- Microsoft System Restore
- Application Recovery and Driver Recovery
- System Recovery

You can start the Software Repair Wizard by clicking **Start**, **All Programs**, **PC Help & Tools**, and then **Software Repair Wizard**.

Restarting Your PC

Restarting is the simplest repair method for your PC. When you restart, the PC reloads the operating system and software into its memory.

To restart your PC:

1. Close all open programs and windows.
2. Click **Start**.
3. Choose **Turn Off Computer**.
4. Click **Restart**.

Turning Off Your PC

When you turn off your PC and then turn it on again, you force the PC to reload the operating system into its memory, which clears some tracking information. This may eliminate some problems that can remain after performing a restart.

To turn off your PC:

1. Close all open programs and windows.
2. Click **Start**.
3. Choose **Turn Off Computer**.
4. Click **Turn Off**.
5. Start your PC by pressing the On button.

Updating Drivers

A *driver* is a software program that allows your PC to communicate with an attached device, such as a printer, a hard disk drive, a mouse, or a keyboard.

Complete the following procedure to update a driver, or to revert to an earlier version of the driver if the new one does not solve your problem:

1 Click **Start**, right-click on **My Computer**, and then click **Properties**. The System Properties window displays.
2 Click the **Hardware** tab, and then **Device Manager**. The Device Manager displays.
3 Click the plus sign (**+**) to expand the device whose driver you want to update or rollback, (for example, **DVD/CD-ROM drives**).
4 Double-click the specific item (for example, **HP DVD Writer 640b**), and then click the **Driver** tab.
5 Click **Update Driver** or **Rollback Driver**, and follow the onscreen instructions.

Microsoft System Restore

Microsoft® Windows® XP includes a feature that allows you to restore your PC configuration to that of a previous time when a current software problem did not exist. The feature does this by creating a "restore point" where it records the PC settings at that time and date.

When you add programs by clicking **Add New Programs** in the Add or Remove Programs window (accessed by clicking **Start**, **Control Panel**, and then **Add or Remove Programs**), the operating system automatically creates a restore point before it adds the new software. You can also set them manually.

If you experience a problem that you think may be due to software on your computer, use System Restore to return the PC to a previous restore point.

WARNING: Always use this System Restore procedure before using the System Recovery program.

NOTE: Do not use the Application Recovery program to reinstall software programs that came on CDs or DVDs included in the PC box. Reinstall these programs directly from the CDs or DVDs.

To start an Application Recovery or Driver Recovery:

1 Close all applications and folders (skip to step 3 if you are recovering a driver).
2 Uninstall the damaged application:
  a Click **Start**, **Control Panel**, and then **Add or Remove Programs**.
  b Select the program you want to remove, and then click **Change/Remove**.
3 Click **Start**.
4 Choose **All Programs**.
5 Choose **PC Help & Tools**.
6 Click **HP Application Recovery**.
7 Click **Application Installation** or **Driver Installation**, and then click **Next**.
8 Select the driver or application program to install, and then click **Install**.
9 Repeat steps 7 and 8 to install other drivers or applications.
10 When you have finished recovering applications or drivers, close the Application Recovery program. Then click **Start**, **Turn Off Computer**, and then **Restart** to restart the PC.

WARNING: Do not skip this last step. You must restart the PC when you are finished recovering applications or drivers.

System Recovery Overview

After you have tried the previously mentioned methods of repairing your system software, you can run the System Recovery program as a last resort to reinstall the operating system and the application software.

System Recovery provides two recovery options:

- **Standard Recovery —** This option recovers factory shipped programs, drivers, and the operating system without affecting any data files that you may have created since purchasing this PC. Some data files may be difficult to find after the System Recovery, so it is best to back up all hard disk drive files before performing a System Recovery.
- **Full System Recovery —** This option completely erases and reformats the hard disk drive — this includes deleting all data files you have created. The Full System Recovery reinstalls the operating system, programs, and drivers from the recovery image or discs. However, you must reinstall any software that was not installed on the PC at the factory. This includes software that came on CDs included in the PC accessory box, and software programs you installed since your purchase.

NOTE: If your PC has a blank or corrupted hard disk drive, you will see only the Full System Recovery option.

NOTE: If your PC includes an HP Personal Media Drive (select models only), you must remove it before starting the System Recovery program.

Additionally, you have to choose from the following methods for performing a System Recovery:

- **Recovery Image —** Run the recovery from a recovery image stored on your hard disk drive. The recovery image is a file that contains a copy of the original software. To perform a system recovery from the recovery image on your hard disk drive, see "Running System Recovery from the Hard Disk Drive" on page 19.

  NOTE: The recovery image uses a portion of the hard disk drive that cannot be used for data storage.

- **Recovery Discs —** Run the recovery from a set of recovery discs (CDs or DVDs) that you create from files stored on your hard disk drive. To create recovery discs, perform the procedure in the next section.

To start a System Restore:

1. Close all open programs.
2. Click **Start**.-
3. Choose **All Programs**.
4. Choose **Accessories**.
5. Choose **System Tools**.
6. Click **System Restore**.
7. Click **Next**.
8. Follow the onscreen instructions.

To manually add restore points:

1. Close all open programs.
2. Click **Start**.
3. Choose **All Programs**.
4. Choose **Accessories**.
5. Choose **System Tools**.
6. Click **Create a Restore Point**.
7. Click **Next**.
8. Follow the onscreen instructions.

For more information about software restore points:

1. Click **Start**.
2. Click **Help and Support**. The Help and Support Center displays.
3. Type *system restore* into the Search box, and then click **Search**.

Expt: 3 : Study of Network Cabling and Crimping

Aim: Identification of network components: LAN card, wireless card, switch, hub, router, different types of network cables (straight cables, crossover cables, rollover cables) Basic networking and crimping.

Theory**:- Networking Basics**

Computer networking has become an integral part of business today. Individuals, professionals and academics have also learned to rely on computer networks for capabilities such as electronic mail and access to remote databases for research and communication purposes. Networking has thus become an increasingly pervasive, worldwide reality because it is fast, efficient, reliable and effective. Just how all this information is transmitted, stored, categorized and accessed remains a mystery to the average computer user.

This tutorial will explain the basics of some of the most popular technologies used in networking, and will include the following:

Types of Networks – including LANs, WANs and WLANs

- The Internet and Beyond – The Internet and its contributions to intranets and extranets
- Types of LAN Technology – including Ethernet, Fast Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet, ATM, PoE and Token Ring
- Networking and Ethernet Basics – including standard code, media, topographies, collisions and CSMA/CD
- Ethernet Products – including transceivers, network interface cards, hubs and repeaters

Types of Networks

In describing the basics of networking technology, it will be helpful to explain the different types of networks in use.

Local Area Networks (LANs)

A network is any collection of independent computers that exchange information with each other over a shared communication medium. Local Area Networks or LANs are usually confined to a limited geographic area, such as a single building or a college campus. LANs can be small, linking as few as three computers, but can often link hundreds of computers used by thousands of people. The development of standard networking protocols and media has resulted in worldwide proliferation of LANs throughout business and educational organizations.

Wide Area Networks (WANs)

Often elements of a network are widely separated physically. Wide area networking combines multiple LANs that are geographically separate. This is accomplished by connecting the several LANs with dedicated leased lines such as a T1 or a T3, by dial-up phone lines (both synchronous and asynchronous), by satellite links and by data packet carrier services. WANs can be as simple as a modem and a remote access server for employees to dial into, or it can be as complex as hundreds of branch offices globally linked. Special routing protocols and filters minimize the expense of sending data over vast distances.

Wireless Local Area Networks (WLANs)

Wireless LANs, or WLANs, use radio frequency (RF) technology to transmit and receive data over the air. This minimizes the need for wired connections. WLANs give users mobility as they allow connection to a local area network without having to be physically connected by a cable. This freedom means users can access shared

resources without looking for a place to plug in cables, provided that their terminals are mobile and within the designated network coverage area. With mobility, WLANs give flexibility and increased productivity, appealing to both entrepreneurs and to home users. WLANs may also enable network administrators to connect devices that may be physically difficult to reach with a cable.

Computer network:-

A computer network, or simply a network, is a collection of computers and other hardware components interconnected by communication channels that allow sharing of resources and information. Networking is practice of linking of two or more computing devices such as PCs printers etc. with each other connections between two devices is through physical media or logical media to share the information data and resources. Network is made with hardware and software.

IP Address:-

Internet protocol is the set of techniques used by is the set of techniques used by many hosts for transmitting data over the Internet. An IP address is like a mailing address that is used to deliver data that is files, to a computer. IP addresses are stored in binary numbers they are usually displayed in human-readable notations, such as 192.168.100.1 (for IPV4)

Address Class:-

A **classful network** is a network-addressing architecture used in the Internet from 1981 until the introduction of Classless Inter-Domain Routing in 1993. The method divides the address space for Internet Protocol Version 4 (IPv4) into five address classes. Each class, coded in the first four bits of the address, defines either a different network size, i.e. number of hosts for unicast addresses (classes A, B, C), or a multicast network (class D). The fifth class (E) address range is reserved for future or experimental purposes.

Subnet Mask:-

Subnetting an IP Network can be done for a variety of reasons, including organization, use of different physical media (such as Ethernet, FDDI, WAN etc.), preservation of address space, and security.

Gateway:-

In a communications network, a network node equipped for interfacing with another network that uses different protocols. A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires the establishment of mutually acceptable administrative procedures between both networks. A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions. Loosely, a computer or computer program configured to perform the tasks of a gateway. For a specific case, see default gateway.

DNS:-

The Domain Name System (DNS) is a hierarchical distributed naming system for computers, services, or any resource connected to the Internet or a private network. It associates a various information with domain names assigned to each of the participating entities. A Domain Name Service resolves queries for these names into IP addresses for the purpose of locating computer services and devices worldwide. By providing a worldwide, distributed keyword-based redirection service, the Domain Name System is an essential component of the functionality of the Internet.

Structured Cabling

Comprises of cables and associated hardware parts
Provides an organized way of low voltage wiring
Transmits data that is built in structured form

Need of structured cabling:

Consistency – Standard cabling systems for Data, voice and video Cost Reduction – Reduces the cost by reducing the number of cables
Troubleshooting – Isolates and fixes the problem
Mobility – Network resources are portable
Supports upgrading – Supports future applications

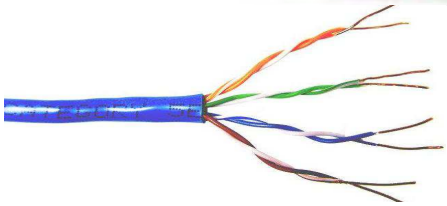
Different types of cables:

Twisted pair cable
Coaxial cable
Optical fiber cable
Shielded and Unshielded cable

Common network cable types:-

Coaxial cable

Unshielded twisted pair

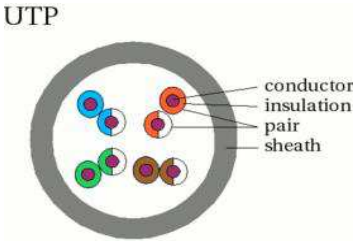


Fiber optic

UTP characteristics

Unshielded

Twisted (why?) pairs of insulated conductors
Covered by insulating sheath



UTP categories

Category 1	Voice only (Telephone)
Category 2	Data to 4 Mbps (Localtalk)
Category 3	Data to 10Mbps (Ethernet)
Category 4	Data to 20Mbps (Token ring)
Category 5	Data to 100Mbps (Fast Ethernet)
Category 5e	Data to 100Mbps (Fast Ethernet)
Category 6	Data to 2500Mbps (Gigabit Ethernet)

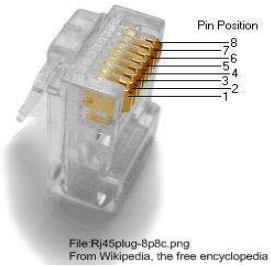
Cat5e cable

1000Mbps data capacity For runs of up to 90 meters

Solid core cable ideal for structural installations (PVC or Plenum)
Stranded cable ideal for patch cables

Terminated with RJ-45 connectors

RJ45 connector



Tools Required

Cat5e cable

RJ45 connectors
Wire Cutters

Cable Tester
Cable stripper
Crimping tool

Ethernet Cable Pin outs:

A straight through cable

used to connect to a hub or switch, and

A cross over cable

used to operate in a peer-to-peer fashion without a hub/switch.

Standard, Straight-Through Wiring (both ends are the same):

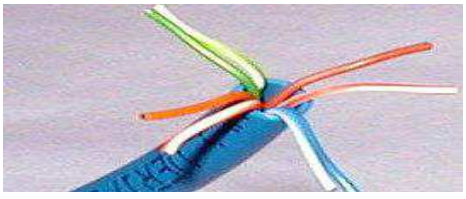
RJ45 Pin #	Wire Color	Wire Diagram	10Base-T Signal 100Base-TX Signal	1000Base-T Signal
1	White/Green		Transmit+	BI_DA+
2	Green		Transmit-	BI_DA-
3	White/Orange		Receive+	BI_DB+
4	Blue		Unused	BI_DC+
5	White/Blue		Unused	BI_DC-
6	Orange		Receive-	BI_DB-
7	White/Brown		Unused	BI_DD+
8	Brown		Unused	BI_DD-

Cross Over Cable

RJ45 Pin #(End 1)	Wire Color	Wire Diagram	RJ45 Pin# (End 2)	Wire Color	Wire Diagram
1	White/Orange		1	White/Green	
2	Orange		2	Green	
3	White/Green		3	White/Orange	
4	Blue		4	White/Brown	
5	White/Blue		5	Brown	
6	Green		6	Orange	
7	White/Brown		7	Blue	
8	Brown		8	White/Blue	

Step 1 – Strip cable end

Strip 1 – 1½" of insulating sheath
Avoid cutting into conductor insulation



Step 2 – Untwist wire ends

Sort wires by insulation colors

Step 3 – Arrange wires

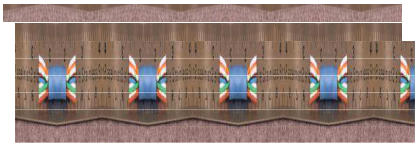
TIA/EIA 568A: GW-G OW-Bl BlW-O BrW-Br

TIA/EIA 568B: OW-O GW-Bl BlW-G BrW-Br

Step 4 – Trim wires to size

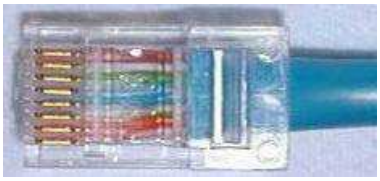
Trim all wires evenly

Leave about ½" of wires exposed



Step 5 – Attach connector

Maintain wire order, left-to-right, with RJ45 tab facing downward



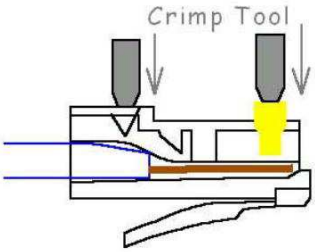
Step 6 - Check

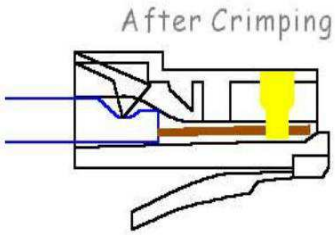
Do all wires extend to end?

Is sheath well inside connector?

Step 7 - Crimp

Squeeze firmly to crimp connecter onto cable end (8P)





Step 8 – Test

Does the cable work?

Procedure for Making Wire Ethernet Cables:

1. Strip off about 2 inches of the cable sheath.
2. Untwist the pairs - don't untwist them beyond what you have exposed
3. Align the colored wires according to the diagrams above.
4. Trim all the wires to the same length, about 1/2" to 3/4" left exposed from the sheath.
5. Insert the wires into the RJ45 end - make sure each wire is fully inserted to the front of the RJ45 end and in the correct order.
6. Verify the wires ended up the right order and that the wires extend to the front of the RJ45 end and make good contact with the metal contacts in the RJ45 end.
7. Crimp the RJ45 end with the crimper tool
8. Cut the cable to length - make sure it is more than long enough for your needs
9. Repeat the above steps for the second RJ45 end.
10. Use a cable tester to verify the proper connectivity of the cable.

****