

CHAPTER 4: PERFORM COMPUTER REPAIR AND MAINTENANCE

Unit of learning code: ICT/CU/IT/CR/3/5/A

Related Unit of Competency in Occupational Standard: **Perform Computer Repair and Maintenance**

4.1 Introduction to the unit of learning

This unit specifies competencies required to perform computer repair and Maintenance. It includes performing troubleshooting, disassembling faulty components, repair/replace and reassembling components, testing computer, component functionality and upgrading computer software/hardware.

4.2 Summary of Learning Outcomes

1. Perform troubleshooting.
2. Disassemble faulty components.
3. Repair/Replace and reassemble components.
4. Test computer/component functionality
5. Upgrade computer software/hardware

4.2.1 Learning Outcome 1: Perform troubleshooting

4.2.1.1 Introduction to the learning outcome

This unit covers competencies required to perform troubleshooting. It includes Identification of Computer parts, Hardware Software, assembling of computer maintenance tools, Theory of probable cause, Assembling and disassembling process, Test of theory of probable cause, Problem identification and appropriate solutions.

4.2.1.2 Performance Standard

- 4.2.1.2.1 Identification of computer parts is done.
- 4.2.1.2.2 Assembling of appropriate computer maintenance tools and maintenance techniques is done.
- 4.2.1.2.3 Theory of probable cause is established.
- 4.2.1.2.4 Testing of the theory to determine cause is done.
- 4.2.1.2.5 Identification of the problem is established.
- 4.2.1.2.6 Appropriate solution to the problem is performed.

4.1.1.3 Information Sheet

Computer Terminologies

CPU (Central Processing Unit) is the brains of the computer

Application - a program in which you do your work.

Bit - the smallest piece of information used by the computer. In computer language, it is either a one (1) or a zero (0).

Backup - a copy of a file or disk you make for archiving purposes.

Hard Drive - a large capacity storage device made of multiple disks housed in a rigid case.

HDD: Hard Disk Drive

CD: Compact Disk

Icon - a graphic symbol for an application, file or folder.

Kilobyte (K) - 1024 bytes.

Launch - start an application.

Megabyte (MB) - 1024 kilobytes.

Software is a set of electronic instructions that tell a computer what to do.

Memory - the temporary holding area where data is stored while it is being used or changed; the amount of RAM a computer has installed.

Menu - a list of program commands listed by topic.

Menu Bar - the horizontal bar across the top of the screen that lists the menus.

Software - files on disks that contain instructions for a computer.

Upload - to send a file from one computer to another through a network.

Identification of Computer Parts

Hardware and Software

Hardware is any part of a computer system you can see or touch. A peripheral is any piece of hardware attached to a computer, such as a printer. You cannot see or touch software, but you can see and touch the packaging the software comes in. Application Software Application software lets you accomplish specific tasks. Popular application software includes Microsoft

Word, Excel, Access, WordPerfect, Acrobat Reader, Internet Explorer, etc. Operating System Software Operating system software controls the overall activity of a computer. Some examples of operating systems are Windows, Unix Linux, DOS etc

Component Functions

CPU: All information goes through the CPU to be processed. The latest CPUs execute many millions of instructions per second.

MEMORY: Memory is where the information is stored. a. **RAM:** Random Access Memory stores programs and data as it is used. The information in RAM is lost when the power is turned off. b. **ROM:** Read Only Memory stores start up and basic operating information.

DISKS: Disks are where large amounts of information are stored, even when the power is off.

a. **Floppy Disks** - Information can be written to and read from floppy disks. The advantage of floppy disks is that they can be removed from the computer and the data taken to another machine. b. **Hard disks** - Hard disks are not removable like floppy disks, but hold more information. c. **CD ROMs** - Compact Disk Read Only Memory. They are useful for storing large amounts of data. A CD ROM holds about 650 MB of data and is removable.

Input/output Components: Allow a computer to communicate with the outside world. Following are some examples of input/output devices.

a. **Keyboard** is used to enter information from the user to the computer.

b. **Monitors** are used to display information.

c. **Video controller** is a board in the computer that controls the monitor. It translates the data in the video memory into symbols on the monitor.

d. **Parallel/Serial ports** allow the computer to send data to and receive data from printers, modems, etc.

e. **Mouse and Joystick** are used to input positional information to the computer. f. **Network Interface Card** – A NIC connects the computer to a network. Networks are a high-speed method of transferring data from one computer to another.

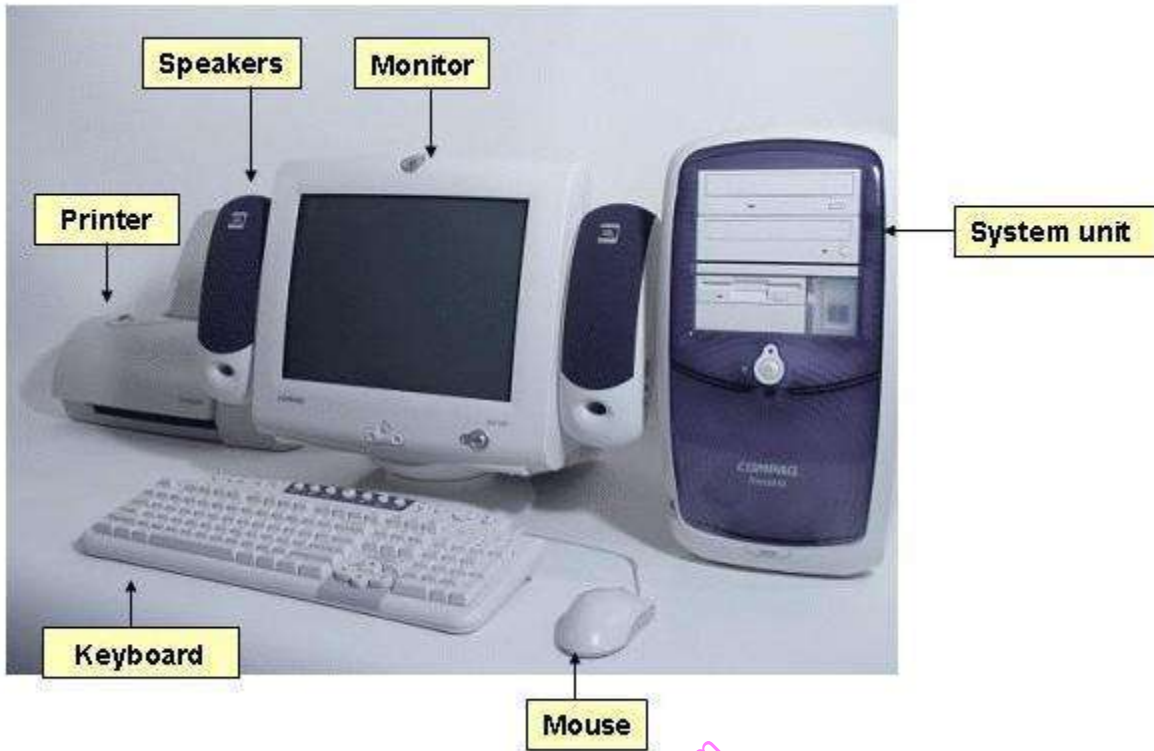


Figure 86 Hardware components of a Computer Desktop

(<https://www.example.com/computer-hardware/>)

How Computers Work

A computer collects processes, stores, and outputs information.

Input Devices

An input device lets you communicate with a computer. You can use input devices to enter information and issue commands. A keyboard, mouse and joystick are input devices.

Processing

The Central Processing Unit (CPU) also known as the system unit is the main chip in a computer. The CPU processes instructions performs calculations and manages the flow of information through a computer system. The CPU communicates with input, output, and storage devices to perform tasks.

Storage Devices

A storage device holds information . The computer uses information stored on these devices to perform tasks. The hard drive, the tape drive, the floppy disk, and the CD -ROM drive are storage devices .

Output Devices

An output device lets a computer communicate with you . These devices display information on a screen, create printed copies or generate sound. Monitor, printers, and speakers are output devices

Computer maintenance tools

Once you have gathered sufficient information to identify the problem, the next step in the Computer troubleshooting methodology is to “Establish a Theory of Probable Cause”. Here, you use your experience and knowledge to determine what you believe to be the underlying issue. Ask yourself, “What do I think caused the problem?”. Sometimes the first answer that comes to mind is indeed the cause. Other times that answer is not forthcoming. You may need to work through a series of tests to help you arrive at that theory.

There are six steps in the series of tests, and they include the following:

1. Identify the problem.
2. Establish a theory of probable cause.
3. Test the theory to determine cause.
4. Establish a plan of action to resolve the problem and implement the solution.
5. Verify full system functionality and if applicable implement preventative measures.
6. Document findings, actions, and outcomes.

Computers are a necessity everywhere; from homes to offices, schools, colleges, hospitals, banks, railway stations, etc., computers have become an indispensable part of all spheres of our lives. There is a plethora of hand tools available in the market and online today. Hand tools enable you to perform manual jobs quickly and efficiently. Choosing the right set of hand tools for your computer repair kit is crucial to getting you through a large number of hardware malfunctions very easily and swiftly.

The following are the seven must-haves from a diverse number of hand tools available online for your computer hardware kit.

1 Flat-Tip Screwdrivers



Web source: <https://www.amazon.com/flat-head-screwdriver/s?k=flat+head+screwdriver>

Flat-tip screwdrivers are flat-headed and used to turn slotted screws.

4. Philips-Head Screwdrivers



Web source: <https://www.amazon.com/Phillips-head-screwdriver/s?k=Phillips+head+screwdriver>

Phillips-head screwdrivers are used to tighten or loosen screws that are cross-headed.

3 Nut Drivers



Web source: <https://www.amazon.com/Nut-Drivers/b?ie=UTF8&node=553340>

Nut drivers are similar in appearance to a screwdriver, are an essential part of the computer repair toolkit. They are used to fasten bolts and nuts of varied dimensions. They possess a hollow shaft that empowers them with a stronghold of the threaded nut.

5. Wire Cutters



easyvet.com

Web source: <https://www.amazon.com/wire-cutters/b?node=553186>

Wire cutters are helpful in stripping and cutting wires as per one's need.

6. Needle-Nose Pliers



Web source: <https://www.amazon.com/Needle-Nose-Pliers/b?ie=UTF8&node=553318>

Needle-nose pliers provide cutting and holding functionalities to the user. They are useful especially in hardware and electronics repair; because of their pointed needle-like tip, they come in handy if a nut or an element has become stuck in an otherwise unreachable cranny of the motherboard.

7. Wire Strippers



Web source: <https://www.amazon.com/DOWELL-Stripper-Multi-Function-Tool%EF%BC%8CProfessional-Craftsmanship/dp/B06X9875Z7>

Wire Strippers are pliers that help in stripping the wire off its insulation. A wire is generally coated with a covering of insulating material. If the situation demands, the wire has to be stripped-off of all its insulating covering to use it, say as a connector or a cable. A wire stripper consists of a pair of blades that function as a pair of scissors does.

8. Crimpers



Web source: https://www.google.com/search?q=crimpers&safe=active&sxsrf=ALeKk02B1i-jB5hgs6hTDJqxL4Q_jO5bEA:1608198692067&source=lnms&tbn=isch&sa=X&ved=2ahUKEwiF_JL-3tTtAhWO2BQKHca-DCIQ_AUoAXoECCYQAw&biw=1600&bih=700#imgrc=iGV740EZQJzzAM

Crimping tools or crimpers are used to connect wires in such a manner that they are able to transmit data. Two wires are joined together with the help of a crimping tool by deforming either one or both of the wires. Every single one of the wires need to be conjoined is first placed in the connector jack and then squeezed and held together to form a uniformly conducting wire.



Figure 87 Computer maintenance tools

The learning point here is about the tools required to assemble a kit that can perform basic, board-level service on PC systems. One of the best ways to start such a set of tools is to purchase a small kit sold especially for servicing PCs.

Because they work better than conventional screwdrivers, the use nut drivers to remove the hexagonal-headed screws that secure the computer system-unit covers, adapter boards, disk drives, and power supplies in most systems. There is, however, still need standard screwdrivers for systems that have substituted Phillips-head screws for the more standard hexagonal-head screws. If slotted screws are used, they should be removed and replaced with Phillips-head screws that capture the driver tool and prevent it from slipping off the head of the screw and potentially damaging the system.

Assembling and Disassembling Process

What is assembling a Personal Computer (PC)?

This part is all about CPU assembling. Specifically, you have to be very careful with this process.

Following are the steps to assemble CPU:

1. Take Inventory
2. Make space and time.
3. Prepare your CPU case.
4. Install motherboard.
5. Install the processor.
6. Install the processor heat sink.
7. Install the RAM.
8. Install the HDD.
9. Install CD/DVD drive
10. Connect Expansion cards
11. Install SYS/Rear cooling fan.
12. Bus cable connection
13. Power Cable connection
14. Front Panel connector connection

1. Take Inventory:

Before you start, take inventory of your parts. Make sure you have the following components and tools with you.

1. Case/ Tower/Cabinet
2. Motherboard

3. Processor
4. Heatsink and CPU Fan
5. SMPS
6. Hard disk drive
7. CD/ DVD drive
8. RAM
9. CMOS Battery
10. A good screwdriver sets.

2. Make Space, Make Time:

Building a PC takes space. You can use your dining room table to build your PC. So, make sure you have plenty of working space and a few hours to proceed with minimal interruption. You must work on a flat, stable tabletop surface or bare floor, where you have room to lay out all of the items, to begin with, assemble.

3. Prepare your CPU cabinet:

Now it is time to prepare the case. Remove the case cover from the CPU cabinet.

You need to check Screw brass standoffs are perfectly placed or not. If it is not in a proper position, in that case, you need to position them accurately. (always check the manual and follow their instructions)

4. Install The Motherboard:

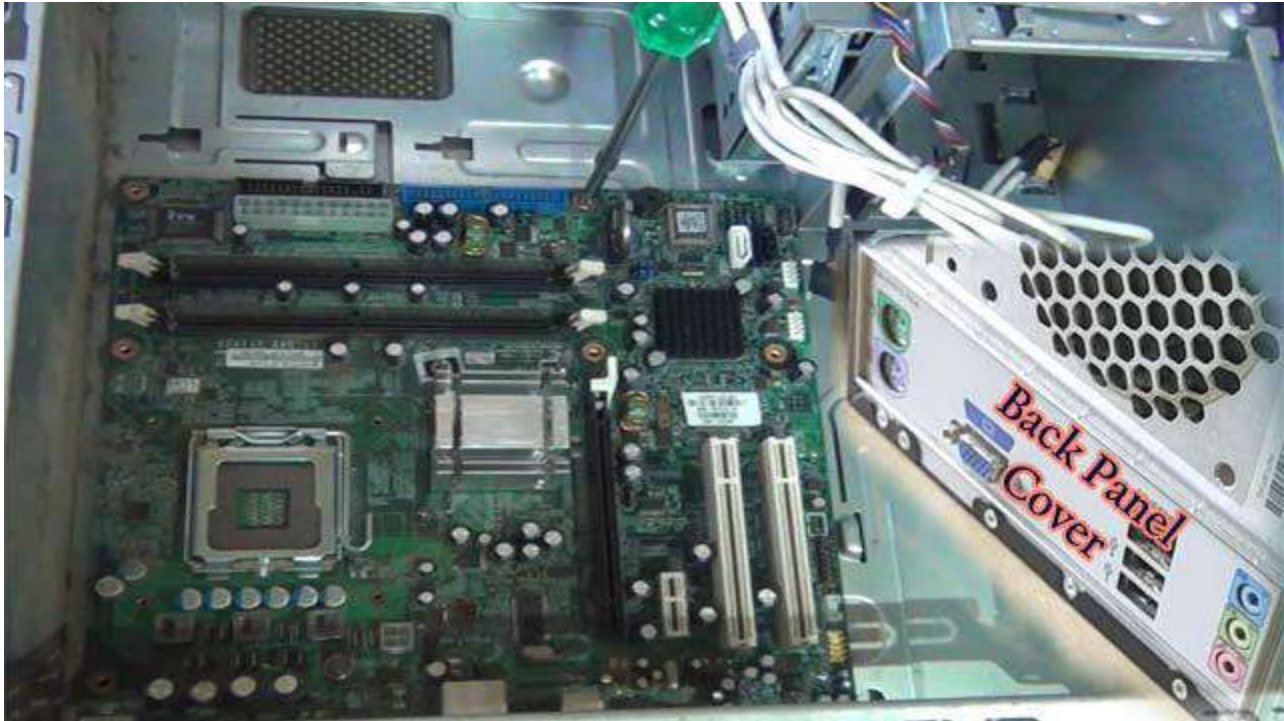


Figure 88 motherboard and Back panel cover

(<https://www.tutorialsworld.com/computers/pc-motherboard.htm>)

You must take great care, especially when installing the motherboard. First, remove the motherboard of its packaging and put it on top of the antistatic bag it came in. Remember, you always want to safeguard your components from potentially hazardous static electricity.

1. You need to secure the motherboard onto the PC case/chassis and inspect carefully for any visible defects.
2. Next, review the motherboard handbook, to make sure you are familiar with the motherboard layout and understand which socket is which. Manuals are immensely helpful, usually easy to read, and include illustrations instructions.
3. Check the layout of the sockets on the motherboard. And confirm that the ports on your motherboard's back panel match the holes on the case's Input/output (I/O) shield installed in your case. If it is necessary, then remove the old I/O shield by tapping it firmly a few times with the thicker end of a screwdriver. And then replace it with the shield that came with the new motherboard.

4. There is need for carefully positioning the motherboard on top of the brass standoffs. After that line up all the holes, use the screws that accompanied the case to fasten down the motherboard.

5. Install the processor (CPU):

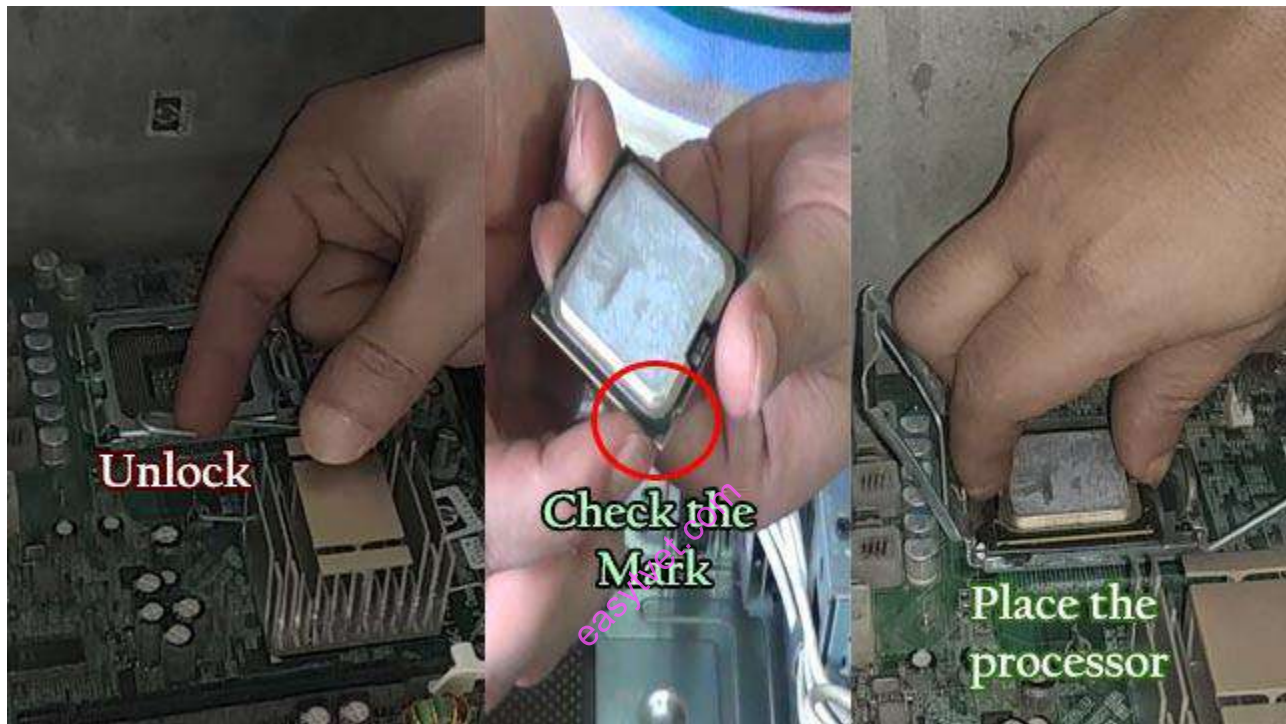


Figure 89 CPU (Central Processing Unit) placement)

<https://homepage.cs.uri.edu/faculty/wolfe/book/Readings/Reading04.htm>

1. Use the unlocking mechanism to open the CPU socket which is, usually a lever.
2. Carefully line up the pins and place the chip in its socket; it will fit only when oriented correctly. An arrow or a missing pin on one corner of the chip will show you how to line things up.
3. Align with the triangular symbol with the processor and socket key marks, as shown in the Figure.
4. Lower the lever to lock the CPU into place.
6. Install The CPU Heat Sink:

Following the manufacturer instructions to install the heat sink and the cooling fan. If buying a CPU and a separate heat sink, then there is need to spread a thin layer of the thermal grease over the chip. The thermal grease ensures proper transfer of heat.

There are some heat sinks that come with this grease already applied. In that case, there is no need to use thermal grease over the chip.

1. Attach the clip that holds the heat sink in place, keeping in mind that it may require a fair amount of force. Again, follow the instructions that came with the heat sink. They will show you how to fit it correctly. If you are in doubt, you can visit the manufacturer's website for more information.

2. Plug the CPU fan's power connector into the proper connector on the motherboard.

7. INSTALL RAM MEMORY:

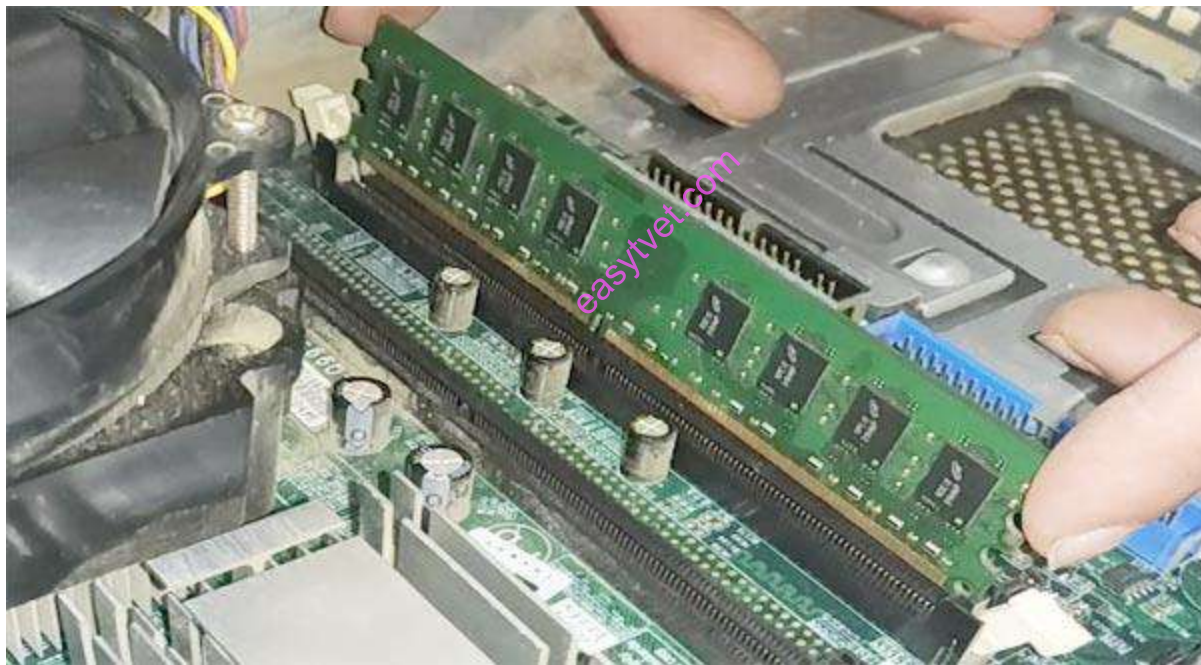


Figure 90 Installing RAM (Random Access Memory)

https://www.google.com/search?q=installing+ram&safe=active&sxsrf=ALeKk00W1se9FJhW0XJS2d0j9f1pkQ6xhQ:1608546343154&tbm=isch&source=iu&ictx=1&fir=dZQL_jAYPZFy4M%252CWkNWvJ-ZkygBTM%252C_&vet=1&usg=AI4_-kQ01bll5FQKixC2YMPJvwLisFyHZw&sa=X&ved=2ahUKEwitqo2L7t7tAhUM8hoKHQsNCTgQ_h16BAgTEAE#imgsrc=dZQL_jAYPZFy4M

1. Unlock the two tabs from both ends of the RAM slot.
 2. To install the RAM, insert them into the proper sockets and push down firmly but evenly until the clips on both sides of the socket pop into place. If your motherboard supports dual-channel memory, consult the user manual to determine which pairs of RAM sockets you should use.
8. Install the Power Supply Unit (SMPS):



Figure 91 Installing SMPS (Power supply unit)

<https://medium.com/@kekreaditya/how-to-install-smps-in-your-computer-6a19736813c2>

1. Place the SMPS inside the CPU cabinet in the proper position. If you are not able to find the correct location, then check the manual.
 2. Final steps, to install SMPS, you need to tighten the screw to secure the SMPS to the case.
9. To install HDD:

You can see a 3.5 inch bay inside the CPU cabinet. If you are unable to find it, then check the manual of the case to identify the bay location.

Place the HDD inside the bay properly and tighten the screw.



Figure 92 Installing drives

<https://medium.com/@kekreaditya/how-to-install-smtps-in-your-computer-6a19736813c2>

10. To install CD/DVD:

You can see a 5.25 inch bay inside the CPU cabinet. If you are unable to find it, check the manual of the case to identify the bay location.

Place the CD/DVD inside the CPU cabinet to align with the 5.25-inch bay. And, finally, you need to tighten all the screws to hold firmly.

11. Install Expansion cards:

Expansion cards help to increase the functionality of your computer. You can place Expansion cards on the motherboard.

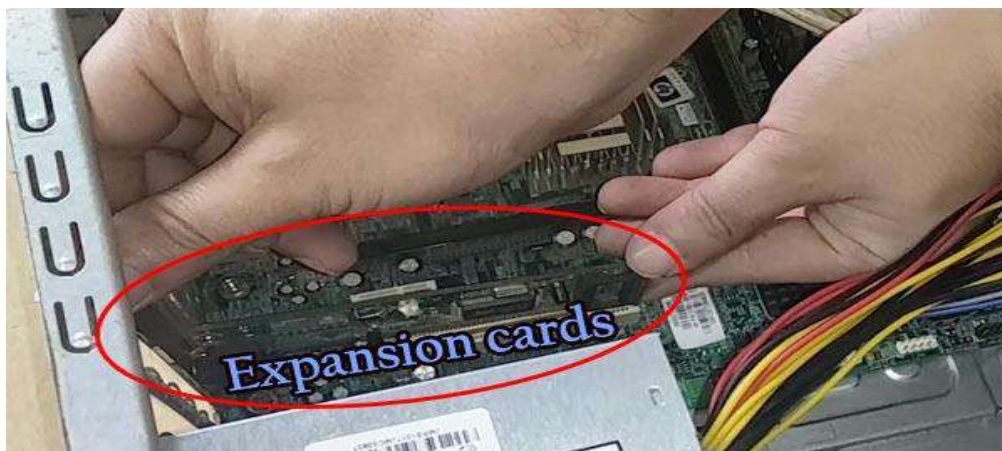


Figure 93 Installing Expansion Cards

https://www.google.com/search?q=Installing+Expansion+Cards&safe=active&sxsrf=ALeKk01Dy_dux99FURhQjg6JnNBXj_zqGA:1608546492677&source=lnms&tbm=isch&sa=X&ved=2ahUKEwiwuLPS7t7tAhX2UhUIHQj1BqkQ_AUoAXoECCIQAw&biw=1600&bih=700#imgrc=hLdDTSdoQRqgiM

PCI compatible expansion cards can place on the PCI slots of the motherboard.

PCI-e compatible expansion cards can place on the PCI-e slots of the motherboard.

Video cards or graphics cards can place on the AGP slot of the motherboard.

You must know about various parts of a motherboard such that, you can effortlessly identify the different connectors.

12. Install Sys/Rear cooling fan:



Figure 94 Cooling Fans

<https://www.amazon.com/Internal-Fans-Cooling-Components/b?ie=UTF8&node=3012290011>

Find the location where you can place the Sys/Rear cooling Fan. Generally, SYS/Rear cooling can place below the SMPS.

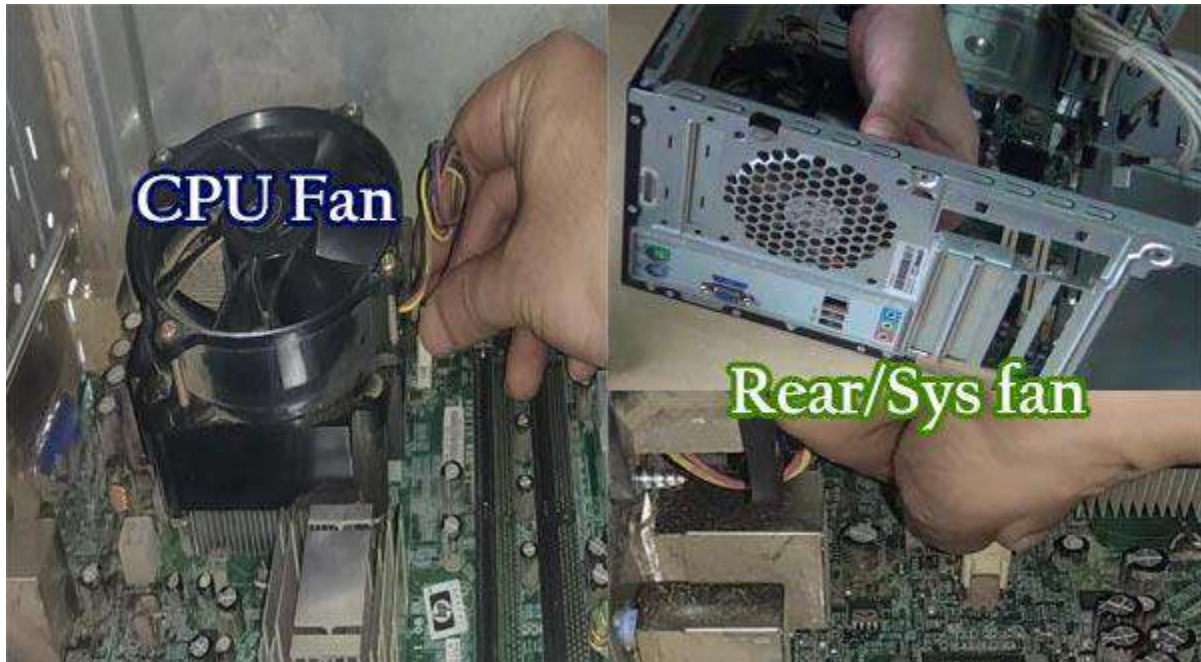


Figure 95 Cooling fans

<https://www.amazon.com/Internal-Fans-Cooling-Components/b?ie=UTF8&node=3012290011>

13. Bus cable connection:

Amazingly, bus cable or data cable connections are prime connections. Bus cable helps to share information or data between the storage device and motherboard.

14. Power Cable connection:



Figure 96 Cable connection

<https://www.educba.com/types-of-computer-cables/>

15. Front Panel connector connection:

Use your motherboard user manual and find the description of front-panel connectors.

First, attach each of the tiny leads from the power and reset switches. After that, the hard-disk activity lights, the PC speaker, and any front-panel USB to the corresponding pin on your motherboard.

Part2: How to assemble PC.

This one is the final part of assembling a computer system.

1. Check your keyboard connector port. If it is a USB connector, then connect your keyboard into the proper USB port. And if it is a PS/2 connector, then connect to the correct, PS/2 port.
2. Same steps you need to follow to connect your mouse into the proper port.
3. You require a VGA (Video Graphic Array) cable to connect the monitor and CPU. Find the 15 pins male connector on the backside of the CPU cabinet and your monitor. Use the VGA cable to connect the CPU cabinet and the monitor. Finally, you need to tighten the lock screws.

4. If you have a speaker, you can connect the speaker on the backside of your CPU cabinet. To get sound from the speaker, you need to plug the speaker's cable with the Aux port.
5. And if you have a printer, you can connect the printer on the backside of your CPU cabinet. These days, you can connect your speaker BUS cable on the USB port.

Finally, connects power to the various parts of your computer. You have to connect the power cable with the CPU case, monitor, speaker, and printer.

Check your PC Set-Up:

It is time to turn on your system and check your PC set up. Make sure the keyboard, mouse, and monitor are all plugged into the appropriate ports on the back of the PC. Plug the power cord back in, and turn the machine on.

Most Common Computer Problems Needing Troubleshooting

Although most complex computer issues at work can often be solved by the business IT support team, there are many other small, but common, issues that occur on a regular basis on a personal computer. The good news is that many problems with computers have simple solutions, and learning to recognize a problem and fix it yourself will save you a lot of time and money. The following are the top 10(ten) common computer problems that you shouldn't panic over.

1. The Computer Won't Start

A computer that suddenly shuts off or has difficulty starting up could have a failing power supply. Check that the computer is plugged into the power point properly and, if that doesn't work, test the power point with another working device to confirm whether or not there is adequate power.

2. The Screen is Blank

If the computer is on but the screen is blank, there may be an issue with the connection between the computer and the screen. First, check to see if the monitor is plugged into a power point and that the connection between the monitor and computer hard drive is secure. If the problem is on a laptop, then you may need to get a professional to fix it as some of the internal wires may be worn.

3. Abnormally Functioning Operating System or Software

If the operating system or other software is either unresponsive or is acting up, then try restarting

your computer and run a virus scan. To avoid having this happen, install reliable anti-virus software.

4. Windows Will not Boot

If you are having troubles booting Windows, then you may have to reinstall it with the Windows recovery disk.

5. The Screen is Frozen

When your computer freezes, you may have no other option than to reboot and risk losing any unsaved work. Freezes can be a *sign of insufficient ram, registry conflicts, corrupt or missing files, or spyware*. Press and hold the power button until the computer turns off, then restart it and get to work cleaning up the system so that it doesn't freeze again.

6. Computer is Slow

If your computer is slower than normal, you can often fix the problem simply by cleaning the hard disk of unwanted files. You can also *install a firewall, anti-virus and anti-spyware tools, and schedule regular registry scans*. External hard drives are great storage solutions for overtaxed CPU's and will help your computer run faster.

7. Strange Noises

A lot of noise coming from your computer is generally a sign of either hardware malfunction or a noisy fan. Hard drives often make noise just before they fail, so you may want to back up information just in case, and fans are very easy to replace.

8. Slow Internet

To improve your Internet browser performance, you need to clear cookies and Internet temporary files frequently. In the Windows search bar, type '%temp%' and hit enter to open the temporary files folder.

9. Overheating

If a computer case lacks a sufficient cooling system, then the computer's components may start to generate excess heat during operation. To avoid your computer burning itself out, turn it off and let it rest if it is getting hot. Additionally, you can check the fan to make sure it's working properly.

10. Dropped Internet Connections

Dropped Internet connections can be very frustrating. Often the problem is simple and may be

caused by a bad cable or phone line, which is easy to fix. More serious problems include viruses, a bad network card or modem, or a problem with the driver.

Trouble Shooting Process

Performing trouble shooting process involve a six-step troubleshooting methodology. The first step in their methodology is to identify the problem. Step two is to establish a theory of probable cause. The third step is to test that theory of probable cause. Step four is to develop an action plan and implement that plan. The fifth step is to verify complete system functionality. And step six is to document the process. In the section below, each of these steps is covered in more detail. The six steps of troubleshooting.

1. Identify the problem.

The first thing that you need to be aware of when troubleshooting a problem is that the symptoms are not the problem. When troubleshooting, it is critical that you actually identify the underlying problem—what’s actually causing the symptoms to manifest themselves. To do that, you should question the user. Ask detailed questions about when the symptoms occurred and why they may have occurred. If the user can re-create the issue for you, this can be extremely helpful. Determine what, if anything, has changed, which may have caused the problem. Importantly, before you take any action, make a backup copy of the system, so that you can preserve everything as it is.

Highlights:

- Question the user.
- Remember that the symptoms are not the underlying problem.
- Determine what has changed.
- Make a backup of the system before moving on.

2. Establish a theory of probable cause.

Once you have identified the base problem that is causing the symptoms, you will establish a list of probable causes. Once you have a list of all of the probable causes, use your technical knowledge to prioritize that list. Your list should have the probable causes listed from most likely to least likely. Incidentally, be sure to question the obvious. For instance, if the symptom is a power situation at the workstation, is the power cord plugged in and, if it is plugged in, is the

outlet actually getting power? Additionally, if no probable cause can be determined, you will need to escalate the problem to a higher level.

Highlights:

- Make a list of probable causes.
- Using your knowledge, prioritize the list.
- Question the obvious (i.e., if the symptom is a power issue at the workstation, first check to make sure that the power cord is plugged in).
- Escalate to a higher level if a probable cause cannot be determined.

3. Test probable cause theory to determine actual cause.

Once you have established your theory of probable cause, you should take a moment to consider whether or not you can troubleshoot the issue on your own, or if escalating it to a higher authority is called for. If it falls within your capabilities, you will need to test your theory to determine if it is, indeed, the actual cause. Your theory was created from the most likely probable cause, so you need to determine how best to test it. If your theory is confirmed, you will move on to the next step. If the theory is disproved, you will need to go back to step two or step one, as needed, and work your way through the troubleshooting methodology.

Highlights:

- Create your theory from the most likely probable cause.
- If the theory is confirmed, move on to the next step.
- If the theory is not confirmed, go back to step two or step one (if needed).

4. Establish an action plan and execute the plan.

Once you have determined the actual cause by testing your probable cause, you will need to establish an action plan and then execute that plan. Simple problems will probably only need simple plans. However, if it is a complex problem, you may need to write out the plan so that you can be sure to execute it correctly. This is another opportunity to escalate the problem to a more senior level if necessary.

Highlights:

- Simple problems probably just need simple plans.
- Complex problems may need written out action plans.
- Escalate to a higher level if required.

5. Verify full system functionality.

After you have executed your plan, you will need to verify that the system is fully functional. If everything works—that's great. Based on your findings and the issue, you may find that you have the opportunity to implement preventative measures so that the problem does not occur again. If full system functionality has not occurred, you will need to go back to step one and continue to work through the troubleshooting methodology.

Highlights:

- If everything works, great! If applicable, use your findings to implement preventative measures.
- If not everything works, go back to step one.

6. Document the process.

Once everything is fully functional, documenting the process becomes important. This is where you document findings, actions, and outcomes. When the problem occurs again, there will be information available to walk someone through the means of troubleshooting and resolving the issue.

This documentation also captures a history of equipment and users so that perpetual issues become known and recorded. An important aspect of this is that both positive and negative outcomes should be documented. This can save time during future troubleshooting and prevent others from taking the same missteps you may have taken.

Highlights:

- Capture your findings, actions, and outcomes.
- Issues that need to be troubleshot may occur again.
- Documentation provides a history of equipment and users so that problem issues are known.

The importance of having a methodology.

A methodology gives a systematic approach to solving IT problems. It reduces wasted time and frustration for both the technician and the end user.

Six-step troubleshooting methodology.

Identify the problem; establish theory of probable cause; test the theory; establish a plan of action and implement it; verify system functionality; and document everything.

3.2.1.4 Learning Activities

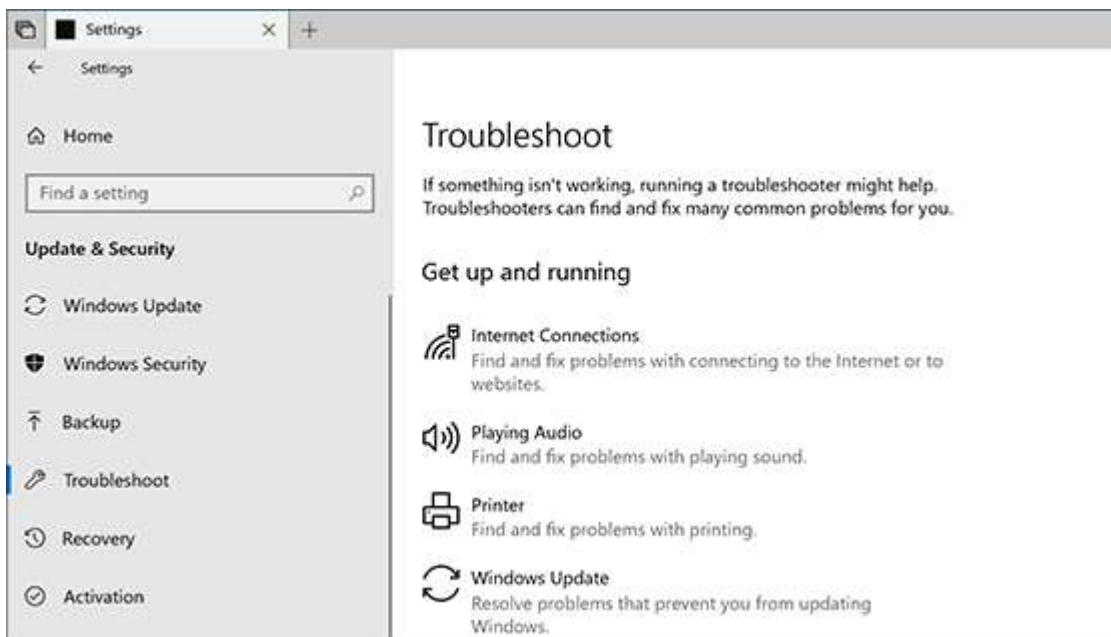
Practical Activity

The learner needs to undertake both assemble and disassemble of a computer. Therefore, below is a list of activities to help you to assemble and disassemble a computer system.

- Unplugged the AC power supply to the PC from the wall socket.
- Remove the Cover or chassis or case.
- Remove Adapter Cards if any.
- Now Remove the processor and the heatsink and fan.
- Remove hard disk and CD/ DVD drives
- Next, remove the Memory Modules.
- Remove the Power Supply (SMPS)
- Finally, Remove the Motherboard

The learner needs to run a troubleshooter of a Computer Windows. As such, a list of activities to help solve problems with a Computer is as follows:

1. Select **Start > Settings > Update & Security > Troubleshoot** or select the **Find troubleshooters** shortcut at the end of this topic.



<https://edu.gcfglobal.org/en/windowsbasics/troubleshooting-basic-problems/1/>

2. Select the type of troubleshooting you want to do, then select *Run the troubleshooter*.
3. Allow the troubleshooter to run and then answer any questions on the screen. If you see a message that no changes or updates were necessary, you can try recovery options, or find out more about Outlook error codes and upgrade and installation error codes.

3.2.1.5 Self-Assessment

1. What are the three (3) components of a computer system?
2. Why magnetic screwdrivers are not preferred in troubleshooting and repair maintenances of PC systems?
3. What does tweezers used for?
4. Which is the proper procedure of removing the hard drive of a computer system?
5. What are the steps to properly assemble the front panel cables of the CPU?

3.2.1.6 Tools, Equipment, Supplies and Materials

Screwdrivers

Nut drivers

Chemicals (such as contact cleaners), component freeze sprays, and compressed air for cleaning the system

Foam swabs, or lint-free cotton swabs if foam isn't available

Small nylon wire ties for “dressing” or organizing wires.

3.2.1.7 References

Christenson, P. (2018). *PCI Definition*. <https://techterms.com>

Computer Basics: Basic Parts of a Computer. (2020).

<https://edu.gcfglobal.org/en/computerbasics/basic-parts-of-a-computer/1/>

<https://www.youtube.com/watch?v=MGqJa20Lqwc>

<https://www.youtube.com/watch?v=ctAVC2JwEwI>

3.2.1.8 Model answers to self-assessment

1. While hardware and software components co-exist to make up the actual computer, the humanware component adds in the human face to bring the complete computer into a

functional and productive existence. When installed separately, each may be useful to an extent but incapable of achieving complete computing potential. Hardware and software need the human factor in order to make input and connectivity possible.

2. Magnet's not strong enough to do much real damage, but if you want to be safe, keep the magnetic bits away from exposed circuitry as they may harm your hard drives.
3. Tweezers are small tools used for picking up objects too small to be easily handled with the human fingers. The tool is most likely derived from tongs, pincers, or scissors-like pliers used to grab or hold hot objects.

4.

Step 1: Take Out the Battery. ...

Step 2: Remove the Screws of the Main Access Panel. ...

Step 3: Remove the Drive Mount. ...

Step 4: Pull Out the Drive from the Connectors. ...

Step 5: Take it out from the Bracket.

Desktop web link: <https://www.youtube.com/watch?v=9xofddy0jQE>

easyjet.com

3.2.2 Learning Outcome 2: Disassemble faulty components.

3.2.2.1 Introduction to the learning outcome

This unit covers competencies required to perform disassembling faulty components. It include Tools for disassembling, Procedures and techniques for disassembling and Repair or replace and reassemble components

3.2.2.2.1 Performance Standard

3.2.2.2.1 Tools for disassembling are assembled.

3.2.2.2.2 Faulty components are disassembled.

3.2.2.2.3 Disassembling is performed according to provide instruction manuals.

3.2.2.2.2 Information sheet

Diagnostic tools: They are tools used to test and diagnose components.

Flat-head screwdriver: Used to tighten or loosen slotted screws.

Phillips-head screwdriver: Used to tighten or loosen cross-headed screws.

Torx screwdriver: Used to tighten or loosen screws that have a star-like depression on the top, a feature that is mainly found on laptops.

Hex driver: Used to tighten or loosen nuts in the same way that a screwdriver tightens or loosens screws (sometimes called a nut driver).

Needle-nose pliers: Used to hold small parts.

Wire cutters: Used to strip and cut wires.

Tweezers: Used to manipulate small parts.

Part retriever: Used to retrieve parts from locations that are too small for your hand to fit.

Flashlight: Used to light up areas that you cannot see well.

Wire stripper: A wire stripper is used to remove the insulation from wire so that it can be twisted to other wires or crimped to connectors to make a cable.

Crimper: Used to attach connectors to wires.

Punch-down tool: Used to terminate wire into termination blocks. Some cable connectors must be connected to cables using a punch down tool.

Significance of Disassembling a Computer System

When disassembling a computer the following consideration is useful:

Do not remove the motherboard battery or the configuration information in CMOS will be lost.

Use proper grounding procedures to prevent ESD damage.

Keep paper and pen nearby for note taking and diagramming. Even if you have taken computers apart for years, you might find something unique or different inside.

Have ample work space.

When removing adapters, do not stack the adapters on top of one another.

If possible, place removed adapters inside a special ESD protective bag.

Handle each adapter or motherboard on the side edges. Avoid touching the gold contacts on the bottom of adapters. Sweat, oil, and dirt cause problems.

Hard disk drives require careful handling. A very small jolt can cause damage to stored data.

You can remove a power supply, but do not disassemble a CRT-style monitor or power supply

Using tools properly helps prevent accidents and damage to equipment and people. This section describes and covers the proper use of a variety of hardware, software, and organizational tools specific to working with computers and peripherals.

Hardware Tools

For every job there is the right tool. Make sure that you are familiar with the correct use of each tool and that the correct tool is used for the current task. Skilled use of tools and software makes the job less difficult and ensures that tasks are performed properly and safely.

A toolkit should contain all the tools necessary to complete hardware repairs. As you gain experience, you learn which tools to have available for different types of jobs. Hardware tools are grouped into four categories:

- ESD tools
- Hand tools
- Cleaning tools
- Diagnostic tools

The figure below shows some common tools used in computer repair.



Figure 97 Computer Tools

<https://www.electronicshub.org/electronics-repair-tool-kit-beginners/>

ESD Tools

There are two ESD tools: the antistatic wrist strap and the *antistatic mat*. The antistatic wrist strap protects computer equipment when grounded to a computer chassis. The antistatic mat protects computer equipment by preventing static electricity from accumulating on the hardware or on the technician.

Hand Tools

Most tools used in the computer assembly process are small *hand tools*. They are available individually or as part of a computer repair toolkit. Toolkits range widely in size, quality, and price.

Cleaning Tools

Having the appropriate *cleaning tools* is essential when maintaining and repairing computers. Using the appropriate cleaning tools helps ensure that computer components are not damaged during cleaning. Cleaning tools include the following:

- **Soft cloth:** Used to clean different computer components without scratching or leaving debris.
- **Compressed air:** Used to blow away dust and debris from different computer parts without touching the components.
- **Cable ties:** Used to bundle cables neatly inside and outside of a computer.
- **Parts organizer:** Used to hold screws, jumpers, fasteners, and other small parts and prevents them from getting mixed together.

Diagnostic Tools

Diagnostic tools include the following:

- A *digital multimeter*, as shown below, is a device that can take many types of measurements. It tests the integrity of circuits and the quality of electricity in computer components. A digital multimeter displays the information on an LCD or LED.



Figure 98 Multimeter

A *loopback adapter*, also called a loopback plug, tests the basic functionality of computer ports. The adapter is specific to the port that you want to test.

- The *toner probe*, is a two-part tool. The toner part is connected to a cable at one end using specific adapters, such as an RJ-45, coaxial, or metal clips. The toner generates a tone that travels the length of the cable. The probe part traces the cable. When the probe is in near proximity to the cable to which the toner is attached, the tone can be heard through a speaker in the probe.



Figure 99 Toner Probe

Although an *external hard drive enclosure* is not a diagnostic tool, it is often used when diagnosing and repairing computers. The customer hard drive is placed into the external enclosure for inspection, diagnosis, and repair using a known-working computer. Backups can also be recorded to a drive in an external enclosure to prevent data corruption during a computer repair.

Software Tools

Like hardware tools, there are a variety of software tools that can be used to help technicians pinpoint and troubleshoot problems. Many of these tools are free and several come with the Windows operating system.

Disk Management Tools

Software tools help diagnose computer and network problems and determine which computer device is not functioning correctly. A technician must be able to use a range of software tools to diagnose problems, maintain hardware, and protect the data stored on a computer.

You must be able to identify which software to use in different situations. *Disk management tools* help detect and correct disk errors, prepare a disk for data storage, and remove unwanted files.

Personal Reference Tools

They include troubleshooting guides, manufacturer manuals, quick reference guides, and repair journals. A technician keeps a journal of upgrades and repairs. The documentation in the journal includes descriptions of the problem, possible solutions that have been attempted, and the steps taken to repair the problem. Note any configuration changes made to the equipment and any replacement parts used in the repair. This documentation is valuable when you encounter similar situations in the future.

- **Notes:** Make notes as you go through the troubleshooting and repair process. Refer to these notes to avoid repeating previous steps and to determine what steps to take next.
- **Journal:** Document the upgrades and repairs that you perform. Include descriptions of the problem, possible solutions that have been tried to correct the problem, and the steps taken to repair the problem. Note any configuration changes made to the equipment and any replacement parts used in the repair. Your journal, along with your notes, can be valuable when you encounter similar situations in the future.
- **History of repairs:** Make a detailed list of problems and repairs, including the date, replacement parts, and customer information. The history allows a technician to determine what work has been performed on a specific computer in the past.

Faulty Components in a Computer Component

Hard drives have a built in S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) feature. The idea is that the hard drive monitors itself and will notice if it starts to fail, providing you with some advance notice before the drive fails completely. This isn't perfect, so your hard drive may fail even if SMART says everything is okay.

If you see any sort of "SMART error" message, your hard drive is failing. You can use SMART analysis tools to view the SMART health status information your hard drives are reporting

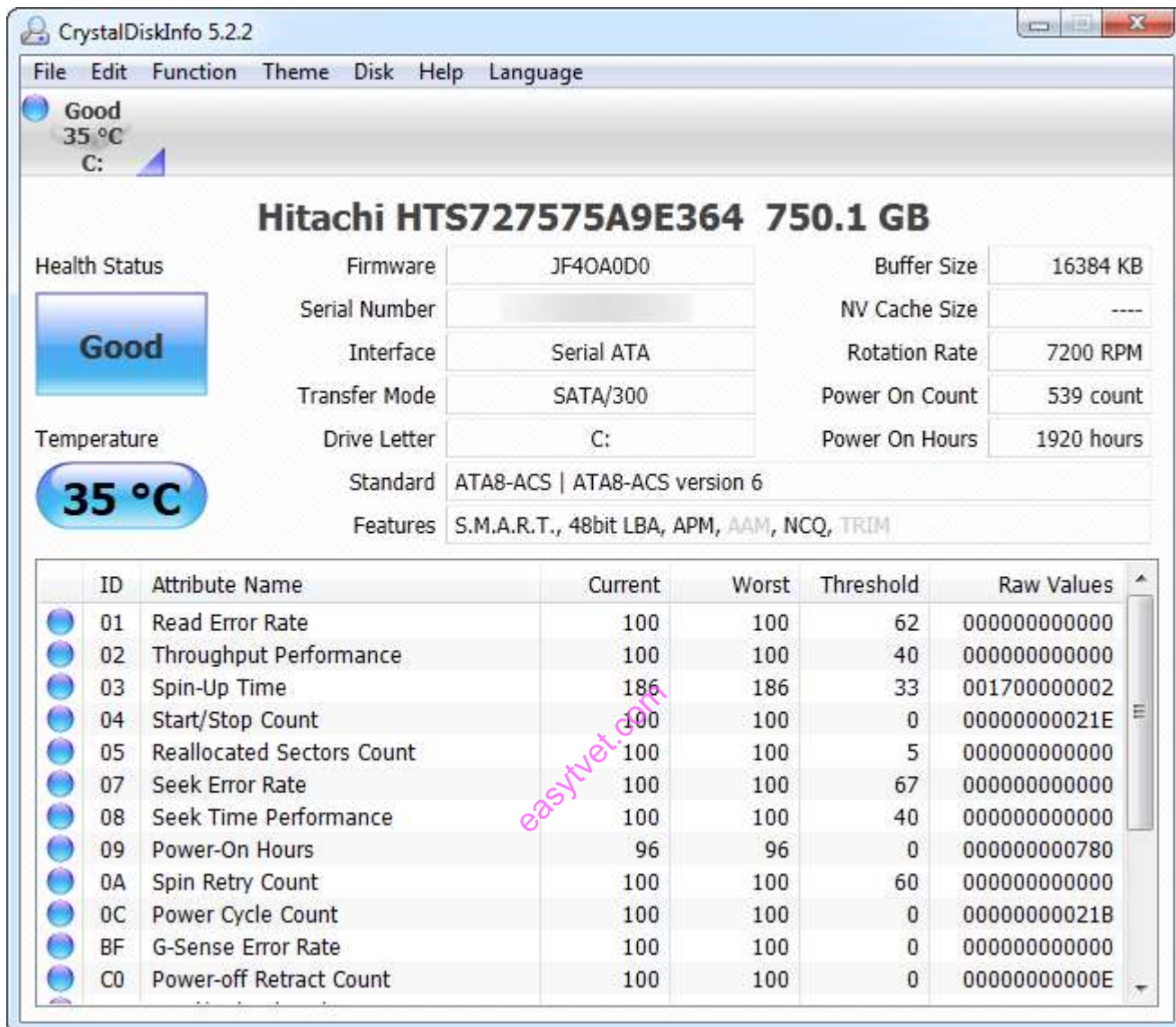


Figure 100

Web source: <https://www.pcmag.com/how-to/how-to-check-your-hard-drives-health>

Test the RAM

RAM failure can result in a variety of problems. If the computer writes data to RAM and the RAM returns different data because it's malfunctioning, you may see application crashes, blue screens, and file system corruption.

To test your memory and see if it's working properly, use Windows' built-in Memory Diagnostic tool. The Memory Diagnostic tool will write data to every sector of your RAM and read it back afterwards, ensuring that all your RAM is working properly.

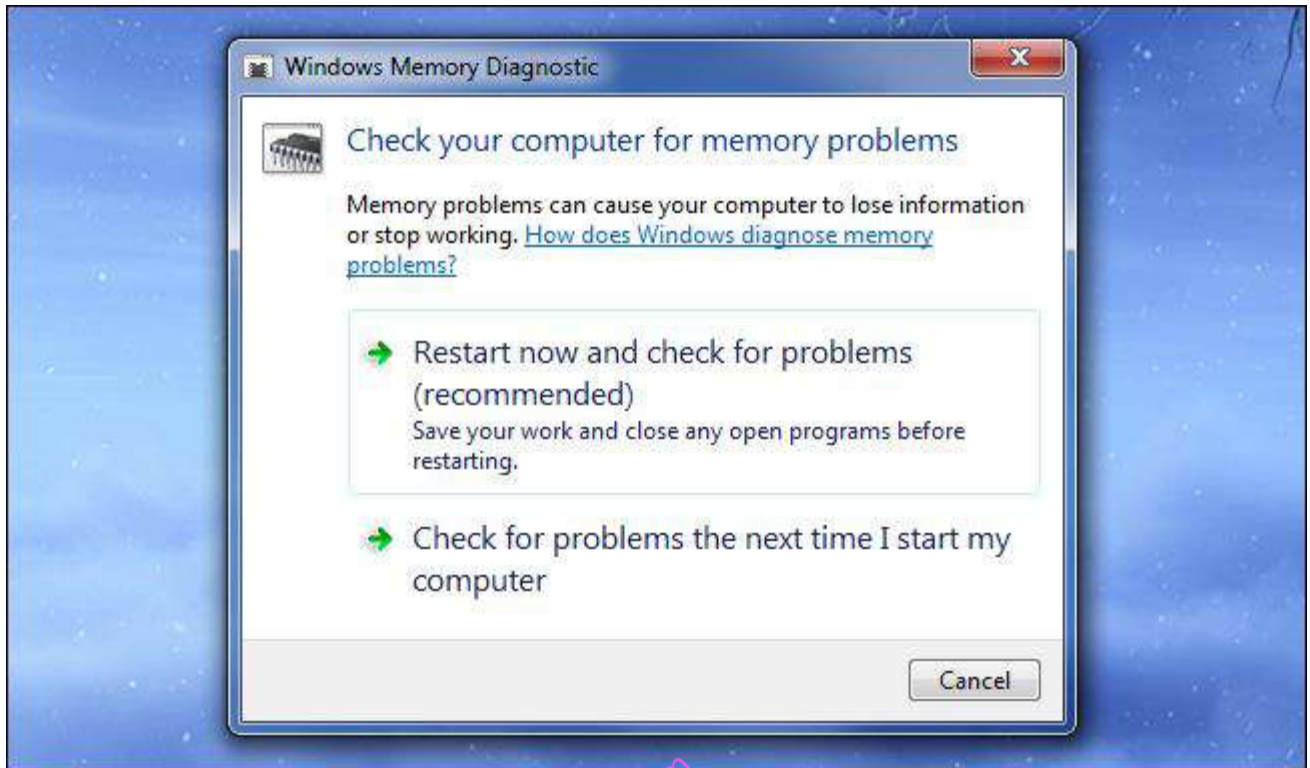


Figure 101

Web source: <https://www.howtogeek.com/260813/how-to-test-your-computers-ram-for-problems/>

Check Heat Levels

How hot is inside your computer? Overheating can result in blue screens, crashes, and abrupt shut downs. Your computer may be overheating because you're in a very hot location, it's ventilated poorly, a fan has stopped inside your computer, or it's full of dust.

Your computer monitors its own internal temperatures and you can access this information. It's generally available in your computer's BIOS, but you can also view it with system information utilities such as SpeedFan or Speccy. Check your computer's recommended temperature level and ensure it's within the appropriate range.

If your computer is overheating, you may see problems only when you're doing something demanding, such as playing a game that stresses your CPU and graphics card. Be sure to keep an eye on how hot your computer gets when it performs these demanding tasks, not only when it's idle.

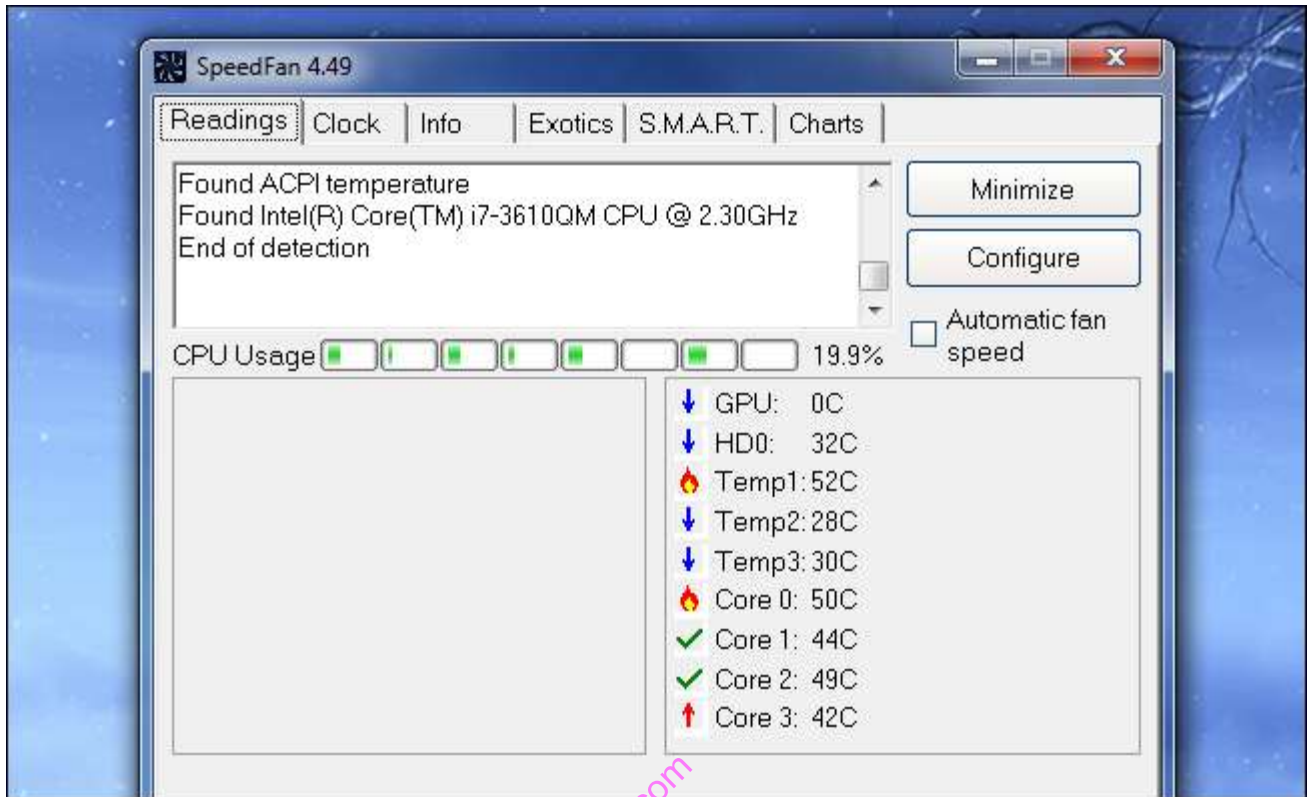


Figure 102

Web source: <https://www.howtogeek.com/260813/how-to-test-your-computers-ram-for-problems/>

Stress Test the CPU

You can use a utility like Prime95 to stress test your CPU. Such a utility will force your computer's CPU to perform calculations without allowing it to rest, working it hard and generating heat. If your CPU is becoming too hot, you'll start to see errors or system crashes. Overclockers use Prime95 to stress test their overclock settings — if Prime95 experiences errors, they throttle back on their overclocks to ensure the CPU runs cooler and more stable. It's a good way to check if your CPU is stable under load.

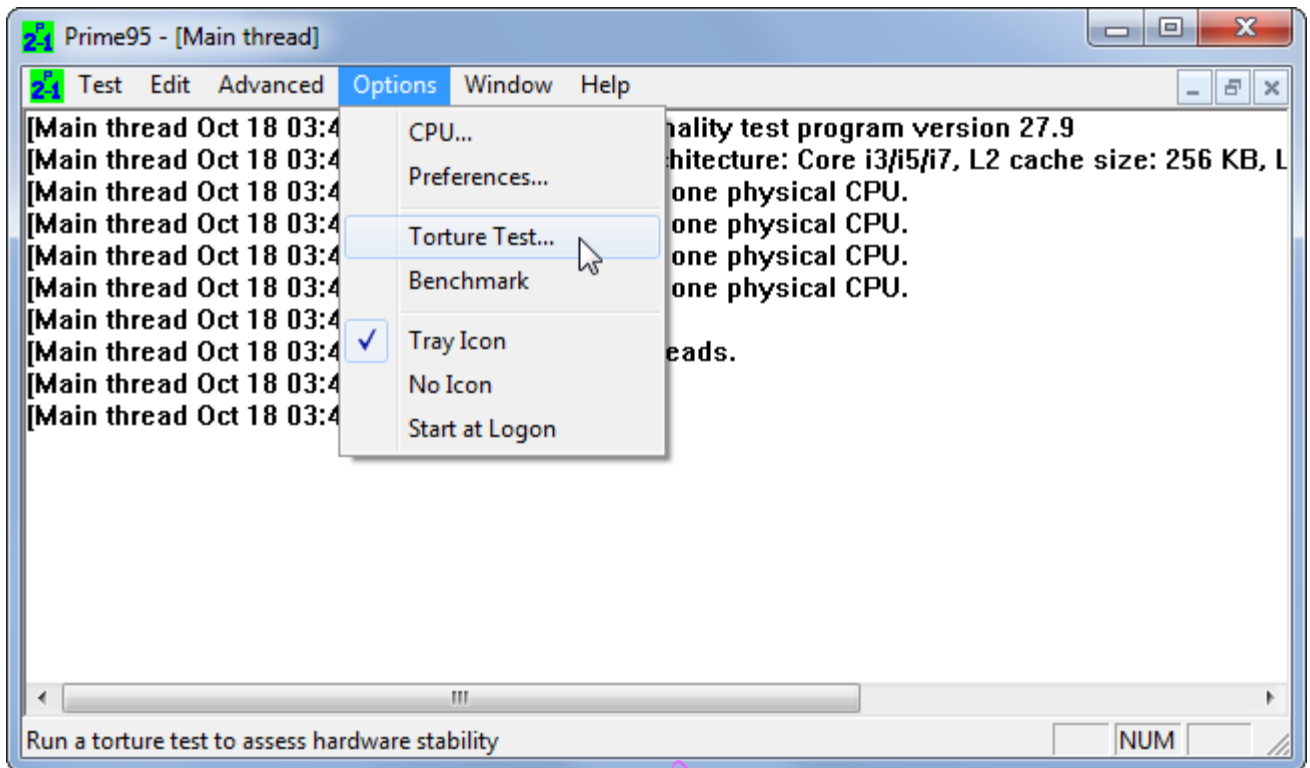


Figure 103

Web source: <https://www.howtogeek.com/260813/how-to-test-your-computers-ram-for-problems/>

Stress Test the Graphics Card

Your graphics card can also be stress tested. For example, if your graphics driver crashes while playing games, the games themselves crash, or you see odd graphical corruption, you can run a graphics benchmark utility like 3DMark. The benchmark will stress your graphics card and, if it's overheating or failing under load, you'll see graphical problems, crashes, or blue screens while running the benchmark.

If the benchmark seems to work fine but you have issues playing a certain game, it may just be a problem with that game.



Figure 104

Web source: <https://www.howtogeek.com/260813/how-to-test-your-computers-ram-for-problems/>

Swap it Out

Not every hardware problem is easy to diagnose. If you have a bad motherboard or power supply, their problems may only manifest through occasional odd issues with other components. It's hard to tell if these components are causing problems unless you replace them completely.

Ultimately, the best way to determine whether a component is faulty is to swap it out. For example, if you think your graphics card may be causing your computer to blue screen, pull the graphics card out of your computer and swap in a new graphics card. If everything is working well, it's likely that your previous graphics card was bad.

This isn't easy for people who don't have boxes of components sitting around, but it's the ideal way to troubleshoot. Troubleshooting is all about trial and error, and swapping components out allows you to pin down which component is actually causing the problem through a process of elimination.

Procedures and Techniques for Disassembling a Repair/Replace a Computer System

The following are techniques and procedural steps for disassembling and repair of a computer system;

Step 1: Unplugging



Figure 105

web source: <https://edu.gcfglobal.org/en/computerbasics/setting-up-a-computer/1/>

The first thing you do, is unplug every cable that's plugged in to your computer. That includes the following cables:

- Power
- USB
- Firewire
- Mouse
- Keyboard

- Internet
 - Ethernet
 - Modem
 - AM\FM Antenna
 - Cable TV
- etc...

So pretty much just unplug every cable from your computer.

Step 2: Outer Shell/Casing



Figure 106

Web source: <https://edu.gcfglobal.org/en/computerbasics/setting-up-a-computer/1/>

Now that your computer is fully unplugged, move your PC to a clean work space, preferably a carpet. The carpet is better than tile, because screws and other small parts will roll around.

If you are working on a carpet, about every five minutes touch something that is grounded (Sink faucet\pipe, wire coming from the ground part of a wall outlet). This is so you don't shock your motherboard or other parts.

First off, unscrew the four screws on the back of the computer. On most computer cases, there will be large knobs that you can unscrew by hand or by screw driver on the back-right side of the computer. The left side has small screws because on that side you can't access much on the inside.

Once the screws are removed, you can remove the side panels. On most computers, they just slide off. Start with the left side panel (the side that once had the knobs), slide it towards the back of the computer. Now you can remove the left panel. Just like the other one, slide it towards the back of the computer

Step 3: Outer Shell/Casing (cont.)



Figure 107

Removing both side of the panels

<https://content.instructables.com/ORIG/FJA/0KCK/FTY4BQAJ/FJA0KCKFTY4BQAJ.jpg?auto=webp&frame=1&width=1024&height=1024&fit=bounds&md=2960401d4ba88227e6782a75e68cde32>

In the last step I removed both side panels. In this step, I will be removing the front and top panels.

Just like the side panels, the top panel slides off. Also like the side panels, the top one slides toward the back of the computer. The front panel clips on to the metal frame with four tabs, so you must push them in and slide the whole panel forward.

Step 4: System Fan



Figure 108

Web source: <https://www.amazon.com/Computer-Case-Fans/b?ie=UTF8&node=11036291>

Figure 16.1: Internal Components

Now that the case is off, I will begin to remove the internal components.

Most computers have two fans: the system fan, the one blowing air into the computer, and the CPU fan, the one blowing air onto the CPU heat sink. I will start by removing the system fan first. It is located at the back side of the computer, the side with all the component plugins.

First, unplug the fan from the motherboard. You can find the plug by following the wire from the fan. It should be labeled "SYS_FAN1". Next, you will have to unscrew the fan from the outside. You should now be able to lift the fan out of the PC.

Step 5: CPU Fan

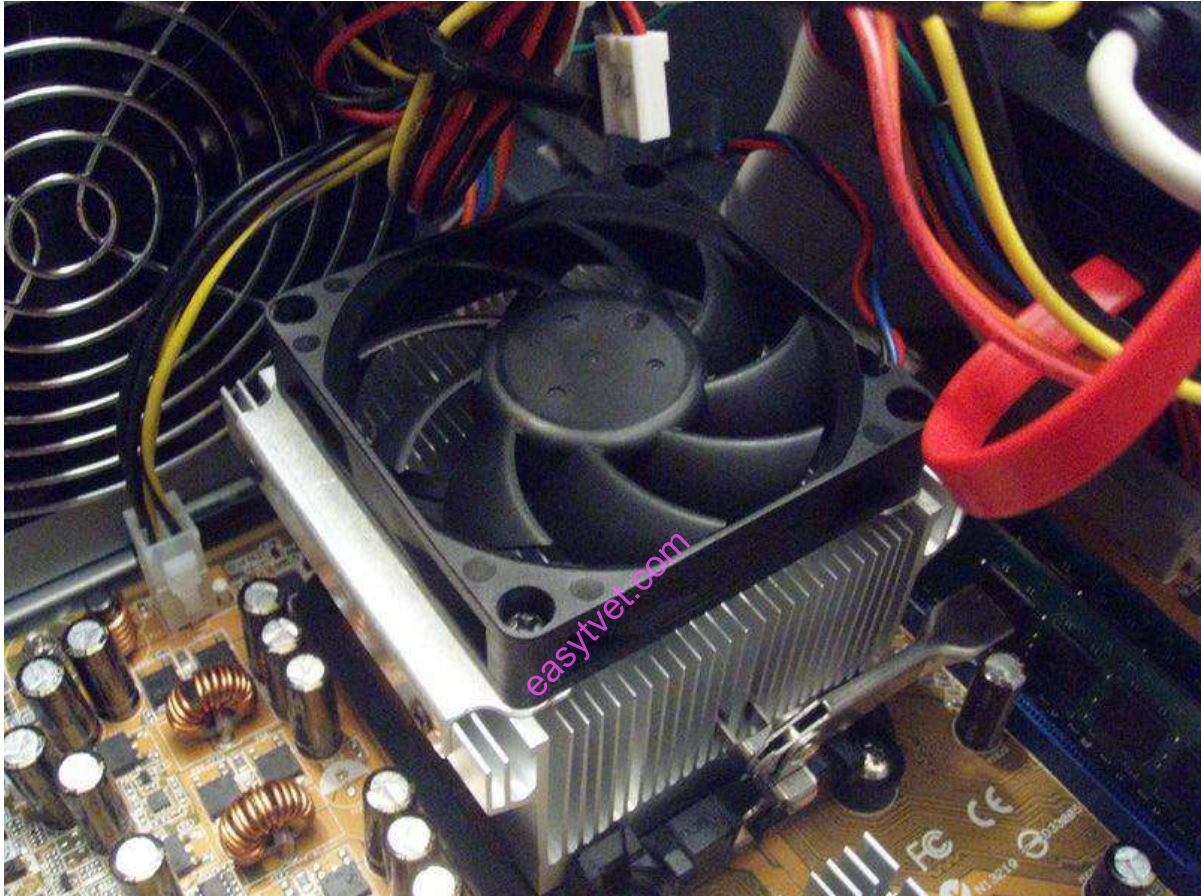


Figure 109

Web source: <https://www.amazon.com/Computer-Case-Fans/b?ie=UTF8&node=11036291>

Figure 17.1 : System fans

Now that the system fan is out, we can remove the CPU fan.

The CPU fan is located right on top of the CPU heat sink, which is a large piece of metal with fins on the top. The CPU fan plugs into the motherboard in an awkward place, that is hard to

access. But just follow the wires and you should easily find it. It is labeled "CPU FAN1". To remove the fan from the heat sink, remove the four screws securing it in place.

Step 6: Power Supply



Figure 110 Internal components

Web source: <https://edu.gcfglobal.org/en/computerbasics/inside-a-computer/1/>

Figure 111 Internal components

The power supply manages all the power for the machine.

The power supply is a large metal box located at the upper-back part of the computer. They sometimes come with an on/off switch that is accessible from the back of the computer. The main power cord also plugs into the back of the power supply.

The power supply supplies power to every component in a computer, therefore it has the most wires out of every other component in the computer. The first thing I will do is unplug every wire coming from the power supply. The list below is everything that I had to disconnect.

- Motherboard (very large connector/plug)

- CD/DVD drive[s] power
- Internal hard drive power
- Portable hard drive slot power

Once everything is unplugged, unscrew the four screws holding the power supply in place, on the back of the computer. Next, push the power supply from the outside, and then lift it out.

7: CD/DVD Drive[s]



Web source: <https://edu.gcfglobal.org/en/computerbasics/inside-a-computer/1/>

Figure 112 CD/DVD Drive[s]

I have one CD/DVD drive, but you might have two. If so, follow this step twice!

The CD/DVD drive is one of the easiest components to remove. First, unplug the ribbon from the back of the drive. Once that is completed, pull on the tab securing the drive in place, and then push it out from the inside.

If nothing as a second drive, there should be a flat piece of metal covering the drive slot. Follow the inscribed instructions to remove it.

Step 8: Card Reader



Figure 113 Card Readers

Web source: https://en.wikipedia.org/wiki/Card_reader

Most new computers have built in card readers, but old computers almost never have them. Just like every other component, unplug the wire first. On my computer, there is just one screw holding the card reader in place. Your computer might have more, so just unscrew them all! After that, the card reader should be removeable.

Most card readers have a protective plastic cover on the part that you can see from the external computer, which can be removed by lifting the tabs on the top and bottom. Refer to the pictures.

Step 9: Hard Drive & Portable Hard Drive Slot

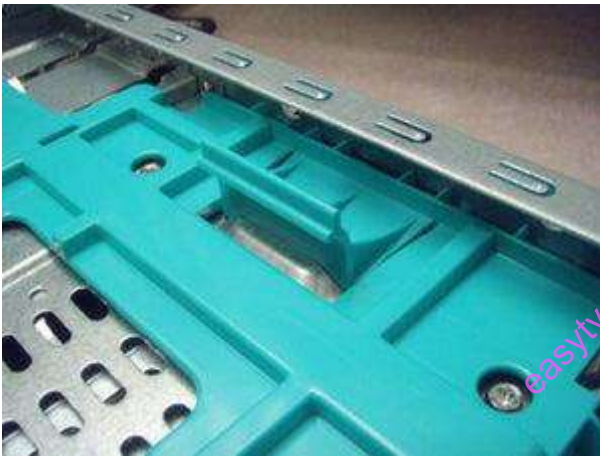


Figure 114 Hard Drive & Portable Hard Drive Slot(s)

Web source: https://en.wikipedia.org/wiki/Card_reader

First off, de-attach the connector at the back of the slot, and unplug the other end from the motherboard. Also unplug the SATA cable from the motherboard and the hard drive. The portable hard drive slot is secured the same way the CD/DVD drive is, with a tab. Pull on the tab, then slide the slot out.

To remove the hard drive from the side of the slot, unscrew the four screws securing it in place. You must be very careful to not drop the hard drive, as it is very delicate!

Step 10: Expansion Cards



Figure 115 Expansion cards

Expansion cards are like small upgrades to your computer.

Expansion cards give computer new capabilities, once installed. Different examples are:

- Bluetooth
- Wireless Internet
- Ethernet
- TV

easyvet.com

Different computers come stock with different cards. My computer came stock with a TV and Ethernet card. If you only have one, remove that one. If you have two, remove the two!

There should be a single screw on top of each expansion card slot, whether it's occupied, or empty. Remove the screws on the occupied card slots. Once the screws are removed, you should be able to remove the cards by pulling them carefully upward. Some expansion cards have cables leading to other parts of the computer, for example, my TV card is connected to the connectivity center on the front of my computer. You will have to unplug any cables attached to an expansion card.

Step 11: Connectivity Center Cables

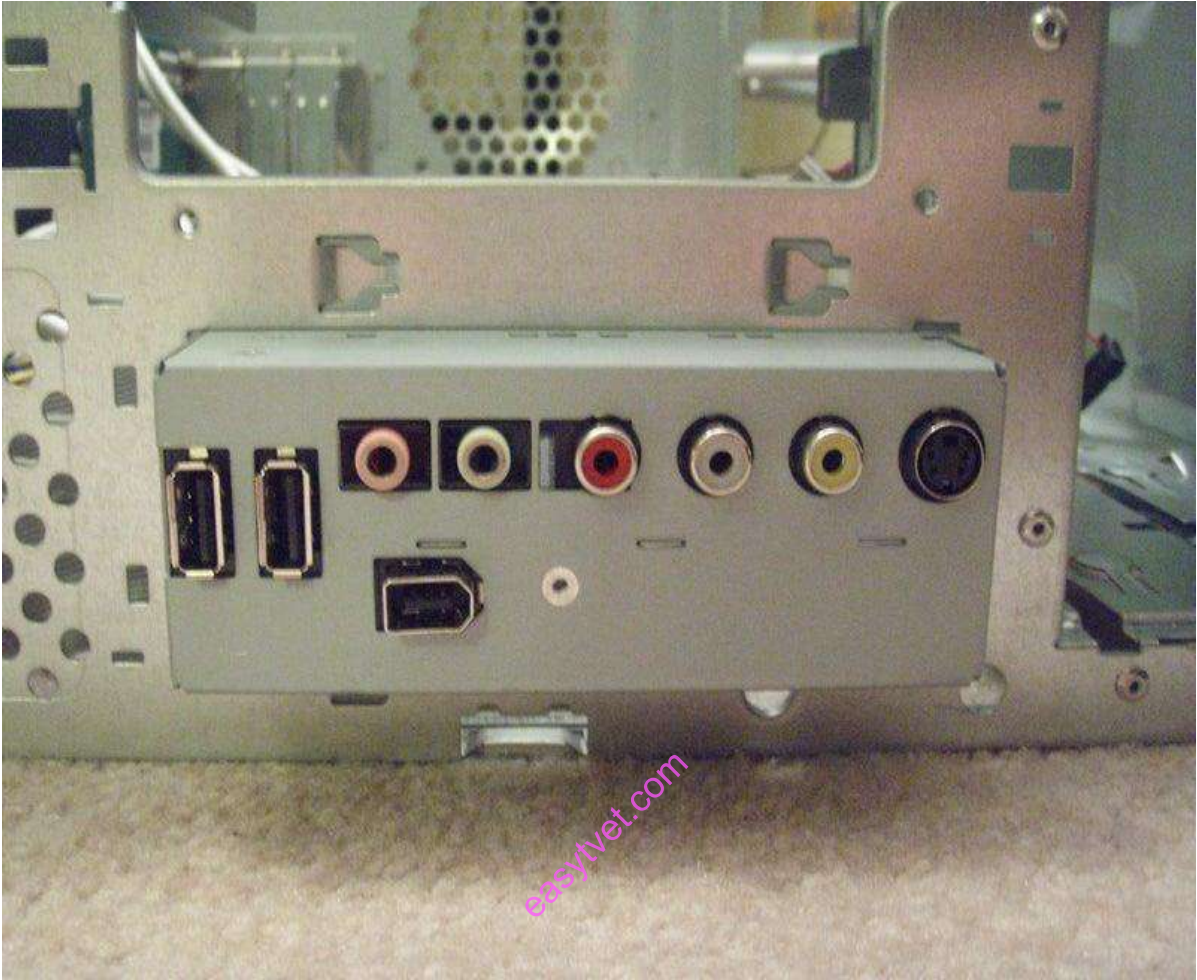


Figure 116 Connectivity Center Cables

Web source: <https://fcit.usf.edu/network/chap4/chap4.htm>

Most new computers have a connectivity center located at the front of the computer.

The connectivity center is the area on the front of the computer where there is many input sections, like usb, firewire, microphone, headphones, video, etc.. I won't remove the whole connectivity center in this step, but I will unplug all the cables coming from it.

Do that (unplug all cables), then unplug the wires leading from the power button, hdd light, and power light.

Step 12: RAM (Random Access Memory)

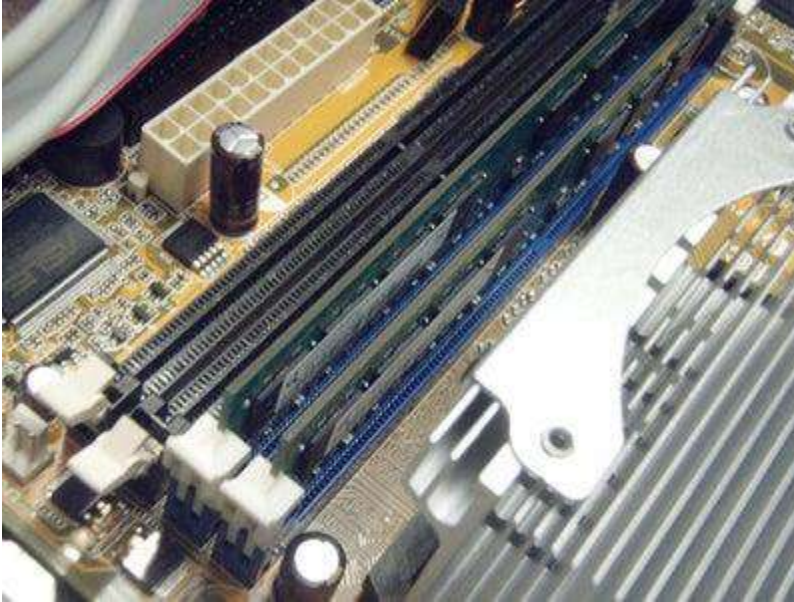


Figure 117 RAM (Random Access Memory)

Web source: <https://www.crucial.com/articles/about-memory/support-what-does-computer-memory-do>

RAM allows for the near instantaneous transfer of information to and from the CPU.

So pretty much, the more RAM you have, the faster your computer runs. Most computers have 4 RAM slots, and two RAM chips. My computer came stock with two, but yours might have more or less. To remove the RAM, push down on both tabs holding the RAM in place, which are located at both ends of the RAM. Please see the pictures.

Step 13: Power Button & Power LED + HDD LED

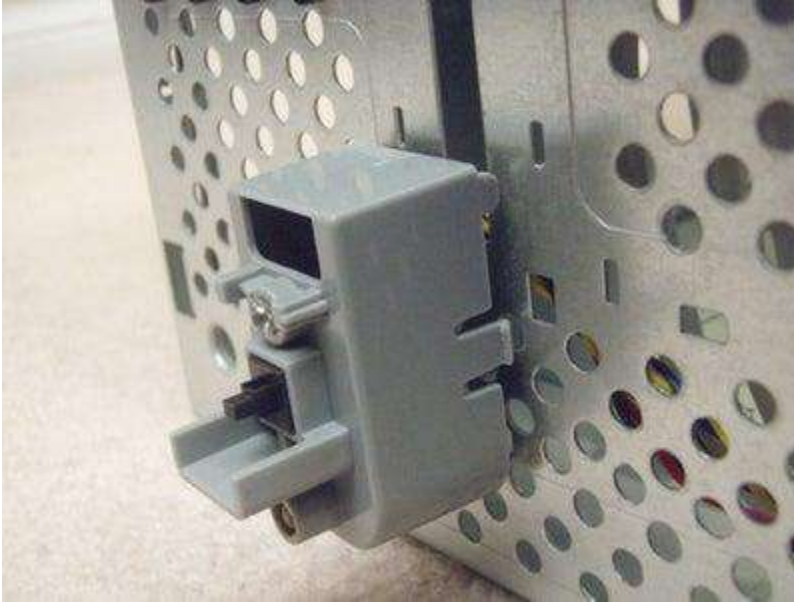


Figure 118 Power Button & Power LED + HDD LED

Web source: <https://www.crucial.com/articles/about-memory/support-what-does-computer-memory-do>

The power button, power LED, and hard drive LED are all within a plastic "chasis".

There is a zip tie holding the wires/cables for the front connectivity center and front power button/LEDs. Cut it.

To remove the chasis, press in on the tabs that are located on the chasis' side. Refer to the pictures to see the tabs. Once the tabs are being pressed in, pull the whole chasis out of the computer.

To remove the LEDs from the "chasis", push them from the front with a screw driver. To remove the button, you will need to push it from the back, the side with the wires. For clarification, see the pictures.

Not all computers may be set up like this, so your computer will probably be different. Just use common sense to find a way!

Step 14: Connectivity Center

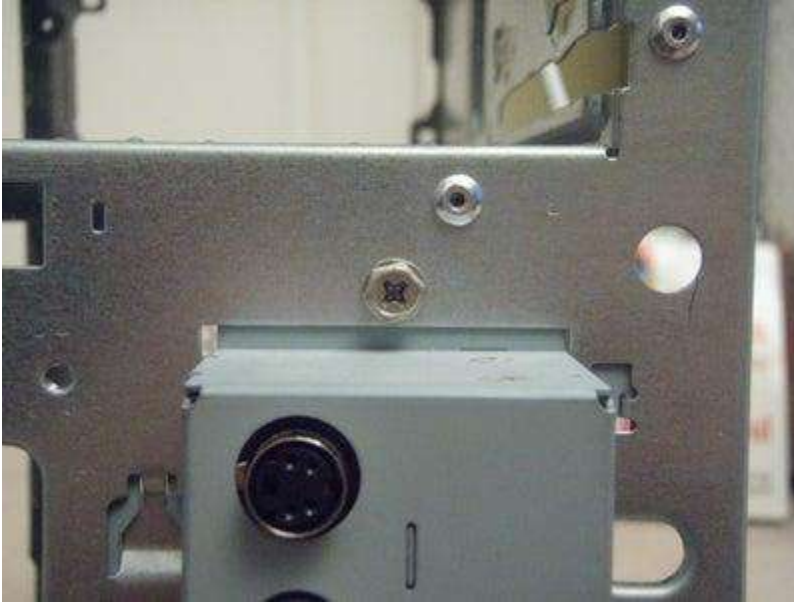


Figure 119 Connectivity Center

Web source: <https://fcit.usf.edu/network/chap4/chap4.htm>

Not every computer has a connectivity center, but most new ones do.

Like I said in step 11, "The connectivity center is the area on the front of the computer where there is many input sections, like usb, firewire, microphone, headphones, video, etc.". But this time, I will remove the whole component, not just unplug the cables\wires!

First thing, unscrew the single screw holding it in place. There might be a different amount of screws, in different locations on your computer, but just unscrew them all! Once the screw[s] are removed, the whole component should slide into the inside of the computer, which can then be removed.

Just like every other step, refer to the pictures if you are confused!

Step 15: Motherboard

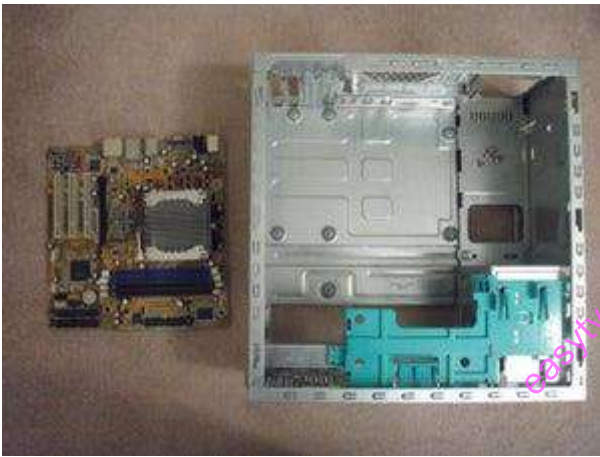
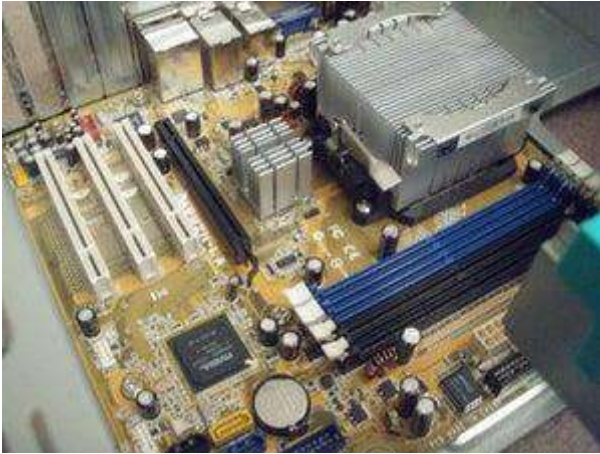


Figure 120 Motherboards

Web source: <https://en.wikipedia.org/wiki/Motherboard>

The motherboard is well, the mother of the computer! It is what links every component in the computer together.

My motherboard is fried, but I will remove it anyway. The motherboard links every component in the computer together. The CPU, RAM, and expansion cards are attached directly to it, and every other part of the computer is in one way or another attached to it.

The motherboard has seven screws holding it to the frame, which are indicated by large white circles around them. Remove those seven, then lift the motherboard out of the frame.

Reassembling Components of a Computer

The reassembling of the computer system is exactly the opposite of disassembling operation. Before starting assembling the computer system, make sure you have the screws and a screwdriver for those.

The first step for assembling the computer system starts with mounting the processor on the processor socket of the motherboard. To mount the process, you don't need to apply any force. The special ZIF (zero insertion force) sockets are usually used to prevent any damage to the processor pins. Once the processor is mounted, the heat sink will be attached on top of the processor. The CPU fan is also attached on top of the heat sink.

Now the motherboard is to be fixed vertically in the tower case and the screws are fixed from behind of the motherboard.

Now line up the power supply at the top back end of the cabinet and screw it. The power connectors for motherboard power supply and CPU fan power supply are to be connected. If the cabinet cooling FAN is required then it is to be screwed at the back end grill of the cabinet and its power connector is to be connected from SMPS.

Install the CD/DVD drives at the top front end of the cabinet and screw it. Install the Hard disk drive and floppy disk drive below CD/DVD drive and screw it. Make sure once screwed there is no vibration in either of the CD/DVD, Hard disk or Floppy disk drives.

Now select the appropriate data cable and connect one end of the cable to its drive socket and another end at its appropriate connector on the motherboard. For SATA hard disk drive or CD/DVD drives use SATA cable and its power cable, else use IDE data cable. Do the proper jumper settings as per the usage requirement.

It is time now to mount the memory modules on the motherboard by aligning the RAM to its socket on the motherboard and press it downward. Make sure the side tab are fixed into the RAM notch. If not, you may still have to press a bit.

Install the internal cards to its socket and attach the cables or power cable to it. The selection of right socket or slot is required as per the type of socket.

Cover the tower by placing it and pressing towards front side and screw it.

Connect the external devices with CPU at its appropriate socket. It includes mouse and keyboard at PS2 or USB connectors. Monitor at the video output socket. Connect the power cable to the back of tower in SMPS. Plug in the power cable to the electric board.

3.2.2.4 Learning activities

Project Work

1. You are provided with the following activities on Disassembling a Computer. In this, you need to explain the practical activities of at least four (4) hardware components listed below.

- 1) CD/DVD Drive
- 2) Motherboard
- 3) Power Supply
- 4) Card Reader
- 5) Expansion Cards
- 6) RAM Chips

Practical Activity

2. You are needed to undertake a physiological computing disassembly and reassembly activities as follows;

- Shut down the computer system before the commencement of the activities. It is hazardous to perform any such activity with the computer system power on and connected with the power supply. Detach the power cable.
- Remove all the interfaces of the devices connected with the cabinet (computer system).
- Perform the task at the dry, non humid area to prevent environmental problem.
- If you are inexperienced, take a picture of the inside assembly of the cabinet, so that you can attach the right thing at the right place at the time of reassembly.
- Keep all the screw properly and fix all of them at the appropriate place

3.2.2.5 Self-assessment

Why should you avoid using a magnetic screwdriver in disassembling a computer system?

1. What are some basic tools to carry with you when servicing a computer?
2. .What is the impact of Moore's Law on the various hardware components?
3. What factors should be considered before disassembly and reassembly of a computer?

3.2.2.6 Tools, Equipment, Supplies and Materials

- ✓ Medium flat-tipped screwdriver
- ✓ Screwdriver
- ✓ 1/4-inch nut driver
- ✓ 3/16-inch nut driver
- ✓ Pair of small diagonal cutters
- ✓ Pair of needle-nose pliers
- 33 Screws
- ✓ Drive Slot Cover

easytvvet.com

✓

3.2.2.7 References

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(2020). from <https://www.tekmoz.com/how-to-disassemble-a-laptop/>

3.2.2.8 Model answers to self-assessment

1. Magnetic screwdriver can cause permanent loss of data on hard drives or floppy disks. Magnetism can also induce currents into components and damage them.
2. **Flat-Tip Screwdrivers:** Flat-tip screwdrivers are flat-headed and used to turn slotted screws. Buy the Taparia Flat Tip Screwdriver or the JK Files Flat Tip Screw Driver.

Philips-Head Screwdrivers: Philips-head screwdrivers are the ones that are used to tighten or loosen screws that are cross-headed.

Torx Screwdrivers and Nut Drivers: Torx Screwdrivers are used to fasten or loosen screws that have star-shaped depression; these screwdriver tips have a firmer grip and do not slip out that easily whilst fastening. Of late, Torx screwdrivers are used to tighten or unscrew almost all laptop fittings.

Nut drivers, which are similar in appearance to a screwdriver, are an essential part of the computer repair toolkit. They are used to fasten bolts and nuts of varied dimensions. They possess a hollow shaft that empowers them with a stronghold of the threaded nut. You could use the Focus Nut Driver or the Wera Werk Nut Driver to fasten or loosen your nuts and bolts quickly. You could also make use of the JE tech Toll Nut Driver which comes with a soft grip to tighten your nuts.

Wire Cutters: Wire cutters are helpful in stripping and cutting wires as per one's need. Grab the Ambika Heavy Duty Wire Rope Cutter to snip your wires.

Needle-Nose Pliers: Needle-nose pliers provide cutting and holding functionalities to the user. They are useful especially in hardware and electronics repair; because of their pointed needle-

like tip, they come in handy if a nut or an element has become stuck in an otherwise unreachable cranny of the motherboard.

Wire Strippers: Wire Strippers are pliers that help in stripping the wire off its insulation. A wire is generally coated with a covering of insulating material. If the situation demands, the wire has to be stripped-off of all its insulating covering to use it, say as a connector or a cable. A wire stripper consists of a pair of blades that function as a pair of scissors does.

Crimpers: Crimping tools or crimpers are used to connect wires in such a manner that they are able to transmit data. Two wires are joined together with the help of a crimping tool by deforming either one or both of the wires. Every single one of the wires to be conjoined is first placed in the connector jack and then squeezed and held together to form a uniformly conducting wire.

3. The trainee should pick one of the components and discuss the impact of the fact that computing doubles in speed every two years. Most devices are getting smaller, faster, cheaper, and this should be indicated in the answer.
4.
 - 1) Shut down the computer system before the commencement of the process. It is hazardous to perform any such activity with the computer system power on and connected with the power supply. Detach the power cable .
 - 2) Remove all the interfaces of the devices connected with the cabinet(computer system).
 - 3) Perform the task at the dry, non humid area to prevent environmental problem.
 - 4) If you are inexperienced, take a picture of the inside assembly of the cabinet, so that you can attach the right thing at the right place at the time of reassembly.
 - 5) Keep all the screw properly and fix all of them at the appropriate place

3.2.3 Learning Outcome 3: Repair/Replace and reassemble components.

3.2.3.1 Introduction to the learning outcome

This unit covers competencies required to perform Determine components to replace or repair, Procedures and Techniques for reassembling, Component testing, and Repair/replace report

3.2.3.2 Performance Standard

3.2.3.2.1 Faulty parts to be repaired or replaced are identified

3.2.3.2.2 Acquisition of new parts is done as per the specifications of the components in the case of replacement and repair is done on faulty components.

3.2.3.2.3 Reassemble the repaired or replaced components.

3.2.3.3 Information Sheet

Operating System - the system software that controls the computer.

S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) feature. The idea is that the hard drive monitors itself and will notice if it starts to fail, providing you with some advance notice before the drive fails completely.

Shut Down - the command from the Special menu that shuts down the computer safely.

Hardware: refers to the physical components that make up a computer and allow it to operate.

Acquisition of New Computer Parts in Case Of Repair And/or Replacement Of Faulty Components

There are three main options for acquisition of computer hardware are buying, leasing, or renting it. There are advantages and disadvantages that ought to be weighed for each of the decisions, as shown in the table illustration below. Some of the more influential factors to consider in deciding which option is best for a particular installation include initial versus long-term costs, whether the business can afford to tie up capital in computer equipment, and whether the business desires full control of and responsibility for the computer equipment.

	Advantages	Disadvantages
Buying	Cheaper than leasing or renting over the long run Ability to change system Provides tax advantages of accelerated depreciation Full control	Initial cost is high Risk of obsolescence Risk of being stuck if choice was wrong Full responsibility
Leasing	No capital is tied up No financing is required Leases are lower than rental payments	Company doesn't own the system when lease expires Usually a heavy penalty for terminating the lease Leases are more expensive than buying
Renting	No capital is tied up No financing is required Easy to change systems Maintenance and insurance are usually included	Company doesn't own the computer Cost is very high because vendor assumes the risk (most expensive option)

Buying implies that the business itself will own the equipment. One of the main determinants of whether to buy is the projected life of the system. If the system will be used longer than four to five years (with all other factors held constant), the decision is usually made to buy. Notice in the example in illustration below that the cost of purchase after three years is lower than that of leasing or renting. As systems become smaller, more powerful, and less expensive, and as distributed systems become more popular, more businesses are deciding to purchase equipment.

Leasing, rather than purchasing, computer hardware is another possibility. **Leasing equipment from the vendor or a third-party leasing company is more practical when the projected life of the system is less than four years. In addition, if significant change in technology is imminent, leasing is a better choice.** Leasing also allows the business to put its money elsewhere, where it can be working for the company rather than be tied up in capital equipment. **Over a long period, however, leasing is not an economical way to acquire computer equipment.**

Renting computer hardware is the third main option for computer acquisition. **One of the main advantages of renting is that none of the company's capital is tied up, and hence no financing is required.** Also, renting computer hardware makes it easier to change system hardware. Finally, maintenance and insurance are usually included in rental agreements. Because of the high costs involved and the fact that the company will not own the rented equipment, however, **renting should be contemplated only as a short-term move to handle nonrecurring or limited computer needs or technologically volatile times.**

Evaluation of Vendor Support for Computer Hardware

Several key areas ought to be evaluated when weighing the support services available to businesses from vendors. **Most vendors offer testing of hardware on delivery and a 90-day warranty covering any factory defects, but you must ascertain what else the vendor has to offer. Vendors of comparable quality frequently distinguish themselves from others by the range of support services they offer.**

A list of key criteria that ought to be checked when evaluating vendor support is provided in the illustration below. Most of the extra vendor support services listed there are negotiated separately from hardware lease or purchase contracts.

Vendor Services	Specifics Vendors Typically Offer
Hardware Support	Full line of hardware Quality products

Vendor Services	Specifics Vendors Typically Offer
	Warranty
Software Support	Complete software needs Custom programming Warranty
Installation and Training	Commitment to schedule In-house training Technical assistance
Maintenance	Routine maintenance procedures Specified response time in emergencies Equipment loan while repair is being done

Support services include routine and preventive maintenance of hardware, specified response time (within six hours, next working day, etc.) **in case of emergency equipment breakdowns, loan of equipment in the event that hardware must be permanently replaced or off-site repair is required, and in-house training or off-site group seminars for users. Peruse the support services documents accompanying the purchase or lease of equipment and remember to involve appropriate legal staff before signing contracts for equipment or services.**

Unfortunately, evaluating computer hardware is not as straightforward as simply comparing costs and choosing the least expensive option. Some other eventualities commonly brought up by users and management include

1. the possibility of adding on to the system if the need comes up later;
2. the possibility of interfacing with equipment from other vendors if the system needs to grow;
3. the benefits of buying more memory than is projected as necessary, with the expectation that business will eventually “grow into it”; and
4. The corporate stability of the vendor.

Competition among vendors has made the idea of producing hardware that is compatible with competitors’ hardware important for vendors’ survival. Before becoming convinced that buying

cheaper compatibles is the way to endow your system with add-on capability, however, do enough research to feel confident that the original vendor is a stable corporate entity.

Reassembling Of the Repaired or Replaced Computer Components

Computers are still largely designed using the Von Neumann architecture, which describes the use of a central processing unit interacting with a memory unit, to facilitate the processing of data from input sources like external mass storage to output devices like the screen.

Computers usually consist of some relatively similar componentry across designs, although several of the components which traditionally were modular in early computer designs have been absorbed into an integrated central motherboard. These components include the CPU, memory unit (RAM), data storage drive (HDD/SDD), graphics card, sound card, network card, and cooling unit, along with peripherals like the keyboard, speakers, mouse, and screen. Other devices may also work in tandem with the computer, and are also considered hardware, such as a printer, scanner, game controller, or webcam.

For repairing or troubleshooting a computer use the following procedure: Gather together your toolkit: e.g. air blowing machine, screw drivers, software, back up disk etc. q Check for power FIRST, before doing anything else. 10 - 15 percent of all computer Issues/Problems emanate from power surge. Check this BEFORE doing anything else. Check to be sure if the computer is plugged in to an AC outlet properly.

Check your external connections to the computer. Specifically, check the mouse, keyboard, monitor, modem and/or printer cables, making sure that all are secure and in the right sockets. Perform the Power On Self-Test (POST) POST is a set of procedures that a computer runs through each (me it is turned on. It ensures that all of the system's hardware is working properly before trying to load the operating system. If the computer does not pass POST, it will not boot.

Note: Make sure the computer turns on. If nothing happens (no lights, no sound, no fans, etc.), the computer has a power related issue.

If the computer is still malfunctioning, go ahead then and open the case. Check to see that all of the cards are fully pressed down into the bus connections, that any socketed chips are fully pressed into their sockets, and that all cable connections are fully attached. Make sure that the drive cables are attached correctly. q Clean any dust or foreign material out of the case while it is

open. Dust can cause overheating problems and electrical shorts. Sometimes, insects will nest inside the case as well. All of this needs to be cleaned out before you close up the case. Take precautions to avoid inhaling excess dust, and consider using protective eyewear if necessary.

The computer is unable to start up – If the computer does not turn on when you press the power button, the following suggestions may help you to determine why the computer will not start up.

q First of all, check if the computer is plugged in to an AC outlet properly. q Plug another electrical device into the outlet to be sure that the outlet is providing adequate power. A surge protector can be used in this case, because voltage surges can be very damaging to computers and other electrical components. Then put on the system to perform a POST. After the POST and it confirms that, the computer is producing all of the usual startup sounds and lights, but the monitor is not displaying any information, perhaps there is a problem with the monitor. Make sure that it is connected to a power source, and also that the VGA cable is connected to the computer.

Basic computer Hardware Repairs

Replacing a Power Supply. The power supply failure is a common problem in our country. This is due to an uneven or “poor” voltage and power surges.

- Replacing a Hard Drive or formatting and installing Fresh OPERATING SYSTEM.

Replacing RAM. RAM can fail or can loose from its housing and need to be reseated. If a computer needs new or additional RAM, it is important to make sure that the RAM used is compatible with the computer system. RAM is very easily damaged by electrostatic charges, so it is very important for the user to be grounded before picking up RAM. Also RAM should only be handled by the edges.

Peripheral Hardware Use and Maintenance

Peripheral hardware will also last longer if it is well maintained. Peripheral hardware such as printers, scanners will last longer if proper care about heat, dust and power surge control is taking to consideration. Troubleshooting and fixing Printer problems

Let’s assume that your printer’s drivers are up-to-date, q and that it has enough paper and ink or toner to print. q Try turning the printer off and on. q Unplug the printer and plug it back in.

Check your printer's print queue by looking for the printer icon in the system tray and double-clicking it.

The print queue shows you the status of each job as well as the general status of your printer. q makes sure that 'Use Printer Offline' isn't selected.

Ensure that 'Use Printer Offline' isn't checked. Sometimes, printing while your printer is turned off can cause Windows to set your printer to work offline, and that can stall jobs sent later.

Maintaining the Battery for your Computer

Most laptop batteries will last at least four hours when fully charged. If not maintained, however, the battery will require charging more frequently. For maximum performance. Use the battery as your power source until the low battery warning emerges. Using your laptop with the AC adapter plugged into an electrical outlet will overcharge the battery. Overcharging decreases the life of the battery. Eventually the battery will be unable to hold a charge and will require a replacement. Condition the battery for maximum performance 1. Discharge the battery – use the battery until the low battery warning emerges. 2. Charge the battery – use the AC adapter until the battery is fully charged. 3. Then immediately disconnect the AC adapter from the notebook. The procedure above insures both maximum performance and long life for the battery

Web link: <https://www.youtube.com/watch?v=AqFY7vJiaac>

3.2.3.4 Learning Activities

Special instructions related to learning activities.

- Practical activities can be performed in the computer lab of the trainee's institution or a personal computer.

Trainees taking this unit are highly recommended to own a working computer.

- The learner is required to perform the following step by step activities in reassembling of repaired components of a Computer System.

STEP 1

Put the motherboard back into the case and reconnect the sound cable.

Put all screws back into the white arrow holes.

Put the case parts back together. Remember to thread the cables including the antennae cable back through. Make sure no cable is snagged or caught up anywhere.

STEP 2

Put the retaining screws back into the bottom half of the computer. Then put the top screws back in.

STEP 3

Put the screen back in place and reconnect the antennae and the data cable.

Replace the display hinge screws.

STEP 4

Replace the keyboard. First of all put the ribbon cable back in. Remember there is a plastic hinge which holds the ribbon in place; remember to lift this up first (gently).

The ribbon has a darker side and a lighter side. It is the lighter side that faces upward, so there is no twist in the ribbon.

Replace the keyboard retaining screws.

STEP 5

Click the Hinge Cover Plate (HCP) back into place. Use even pressure to ensure it fits properly.

STEP 6

Replace the RAM. Remember it is fed into the slots at 30 degree angles and not straight on.

Once it has been fed at a 30 degree angle, click it downwards into place.

Replace the other components such as the wireless card, again remember it has to be inserted at a 30 degree angle. Click it into place and gently replace the gold connector.

Replace the Hard Disk Drive (HDD) by sliding it in the opposite direction to the arrow. Make sure it fits securely and is not loose.

Insert the CD/DVD drive and put the retaining screw back into the underside of the laptop.

STEP 7

Finally, replace the component covers and replace all of the screws

3.2.3.5 Self-Assessment

1. What is the relationship between hardware and software problem in a computer system?
2. Why is proper and regular maintenance significant for any computer system?

3. What are the basic computer maintenance guidelines which assist in improving hardware and software performance?
4. What is the distinction between hardware repair and software repair?
5. When the screen is blank, the computer may not be set to display the image on the computer screen. What are the two (two) 2 basic tips to troubleshoot and fix/ repairs the computer issue?

3.2.3.6 Tools, Equipment, Supplies and Materials

Medium flat-tipped screwdriver

- Small flat-tipped tweaker screwdriver
- Screwdriver
- 1/4-inch nut driver
- 3/16-inch nut driver
- Pair of small diagonal cutters
- Pair of needle-nose pliers

3.2.3.7 References

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3.2.3.8 Model Answers to Self-Assessment

1. Without software, computer hardware is useless. Conversely, computer software cannot be used without supporting hardware. Similarly, computer software has to first be loaded into the computer's hardware and then executed. There are several categories of software, with the two main categories being operating-system software, which makes the hardware usable, and application software, which does something useful. Examples of operating systems

include Microsoft Windows on a personal computer and Google's Android on a mobile phone. An example of application software is Microsoft Excel.

2. Since computers are such an integral part of our lives, it is crucial that we take care of them by having them properly maintained. Here are five great reasons why regular computer maintenance is a good idea.
3. **Early Detection of Issues:** Computers can be temperamental, and we all know that small issues can become huge problems before we know it. But, having regular maintenance check done on your computer can eradicate small issues before they become big problems. Small issues can crop up at any time, even when your computer is new, nipping them in the bud during a regular maintenance session can save you a lot of headaches when the computer starts to age.

Prevention against Viruses and Malware: It seems like no matter how often we sweep our computers or run virus checks on them; our computers are still vulnerable to harmful viruses. There are innumerable viruses and malware already out there just waiting to infect computers, and more are being created every day. Some are meant to be a daily annoyance and slow down the processing time of the computer or make pop-up messages appear, but others can infect entire operating systems. When this occurs either at home or a business, it can be costly to fix and can even cost a company money in other ways such as loss of productivity. But, keeping computers well-maintained can keep both viruses and malware away and keep your computer running in tip-top shape. Regular maintenance can also help you ensure your antivirus software is up-to-date and working properly.

Speed up Your Computer: Nothing can be more frustrating than a computer that processes too slowly. But, as most of us can attest, over time our computers get clogged up with files and everything gets disorganized and fragmented. The result is slow processing times. Computer maintenance techs are experts at running speed and optimization checks that can pinpoint issues and keep your computer running at an optimal speed.

Maximize your Software Efficiency: Another reason your computer may slow down over time is that your software package is getting old. Since this change happens gradually, your computer simply gets used to it and thinks that it is normal. But, having regularly scheduled maintenance on your computer will clean out any issues and have your software running perfectly again.

Prevent Data Loss: Although data loss is uncommon, if it does happen, it can wreak havoc on your life. When your computer starts running slowly or begins having occasional hiccups, it can require a system reboot that can ultimately result in lost data. However, keeping your computer maintained will lessen the likelihood of these instances and keep your data safe and secure for when you need to access it.

3. These essential maintenance tips for a computer system will see many more years of powerful performance and great appeal.

Protect with padding: Everyone has been there; drops, bumps, and slips result in unsightly cosmetic dings that leave your computer looking less-than-loved. If you're like most people who travel with their PC, safeguarding against accidents can feel next to impossible when packing your PC away into a carry-on. An exposed laptop is vulnerable to all of the elements of travel you likely want to protect it from.

Whether you're traveling business-class or to a classroom across campus, shielding your PC against the elements starts with a protective case. There are a few different styles of protection that offer differing levels of armor and functionality. These include:

Skins: Functioning as a full-body laptop sticker, laptop skins are best for protecting the chassis from light damage and scratches.

Hardshell snap-on covers: Polycarbonate, plastic, or rubberized hard shell laptop covers protect your PC while still granting easy access to ports, buttons, lights, and fans.

Sleeves: A simple, soft, envelope-style pouch typically made of gentle materials like nylon, polyester, suede, or microfiber, laptop sleeves are lightweight protection.

Messenger bag: A shoulder bag specifically designed to accommodate your laptop and necessary peripherals, the dedicated laptop messenger bag offers the most padded protection.

Organize cords: The only thing more frustrating than dealing with long, confusing cables is getting them all mixed up and tangled in the process. Keeping your digital world connected is a must, so nixing the cables isn't a feasible option. Taking the time to declutter and organize the

snake-like mass of wires spawning from your power strip and PC ports is a great first step for both desktop and laptop users. Try these wire organization tips:

A rotating power strip: Traditional power strips offer a single line or panel of surge inputs. A rotating power strip gives you the freedom to modify the positioning of your many chargers, monitors, and docks.

Color-coding cables: Computer cables tend to be two colors; black and white. Organizing your mess of wires may be as simple as color coding them with reds, blues, yellows, greens, and or using labels in distinguishable hues.

Cable clips: Wire management is made simple when you attach cable clips to your desk, wall, or floor. These small clips are designed to hold cables of all different sizes.

Organizer panel: Functioning as a panel of cable clips, a wire organizer panel accommodates multiple wires. Stick it in place with an adhesive or keep it desk-side when you use a weighted panel.

Awesome tip: Be sure to keep your wires away from any footpaths. Tripping over wires could result in the toppling of your devices, doing more damage in an instant than years of use could ever do.

Update your operating system: If you're looking for basic computer maintenance, keeping your operating system up to date is one of the easiest solutions. Regardless of whether you're a Windows, Mac, or Linux loyalist, updating your PC when new patches are available ensures your PC stays at the cutting-edge of performance power.

Windows 10 is known for keeping users in-tune with once-a-day update checks. This automated scan occurs in the background and always notifies you if there are any important software or operating system patches that need to be made. The end goal is to optimize your PC performance, so when Windows suggests you update, you should do it.

Awesome tip: Some updates take longer than others. Set aside time before bedtime or during a daytime break to let Windows do its thing without interrupting your workflow.

Unplug to avoid overcharging: With heightened dependence on wireless devices, optimizing battery power is a top priority for many. There are few things more dreadful than a draining

battery when you've got hours of work and play left on your day's schedule. However, it's better to resist the temptation of plugging in the moment your PC falls under 50% battery life.

Unnecessary charging can lead to overcharging, which then leads to regenerative capability deterioration. This often looks like a laptop that can't hold a charge as well as it could in its earlier days.

Being shackled to the weight of a charger defeats the purpose of a laptop's wireless portability. To avoid a bad battery fate, unplug your device after it reaches 100% charge, and don't plug in until power is actually low.

Purge your system of junk files and programs: Computers tend to show their age best in the number of unused files living on their hard drives. Useless programs and old junk files likely take up more space than you realize. From old versions of software to retired versions of your resume, your PC is sure to have its fair share of digital debris festering on your desktop or in your start menu. These programs and files can quickly turn into performance hogs if they continue to accumulate.

Before your computer gets to a point where it's begging for more storage space, use these PC purge tips to relieve your system.

- Uninstall trialware
- Run disk cleanup software
- Empty the recycle bin
- Delete temporary files
- Remove cache of offline web pages

Run regular antivirus scans: Malware attacks can sneak up on you at any given moment, and in the event one does, having a savvy antivirus living on your PC will protect you against the damage viruses bring. Weekly antivirus scans ensure your computer is always clear of malicious software infections. A basic scan will examine your computer for any glaring dangers or outstanding activity.

For those who are frequent web-users and download programs and files regularly, consider running a virus scan twice a week. It's always better to err on the side of safety, especially when your personal data could be at risk.

Malware infections can compromise the performance of your computer and expose your confidential information to third-party cybercriminals. Depending on the type of malware installed on your system, a virus could also:

- Slow web browser speeds
- Disrupt network connections
- Freeze or crash your system
- Alter computer settings
- Allow unauthorized access to system resources

By running regular antivirus scans you can rest assured that nothing slips by. Be sure to choose an antivirus scan service that also scans all of your downloads, too.

Clean the keyboard and case: You'd be surprised to see just how much dust and debris lives underneath your keyboard's keys. From food crumbs and dog hairs to dust and dirt, and everything else that can fit in between the keys, a number of dirty particles can clog your keyboard. This usually results in sticky or difficult-to-press buttons.

Clearing out these hard-to-reach parts of your laptop or desktop setup is most easily done with a compressed air canister, available from office supply stores, computer stores, and hardware stores.

For external keyboards: Unplug the keyboard from the USB port or power it off if it's wireless. Tilt the keyboard upside down and shake any loose debris out first. Spray compressed air at an angle and approximately 1-inch away from the keys. Use a damp microfiber cloth to finish the job, removing any excess dust or grime.

For the laptop user: Power your laptop off and unplug any USB or power supply inputs. Tilt the laptop upside down and gently tap it to encourage any loose debris to come out. Set the laptop down in its natural position and spray between keys from about 1-inch away. Spray in short bursts moving from one side of the keyboard to the other.

If you find certain spots tougher to clean than others, use a cotton ball dipped in isopropyl alcohol as a great alternative. Alcohol evaporates more quickly than water which makes it the perfect solution for hardened debris.

Pro-tip: When cleaning your laptop or desktop, absolutely avoid pouring any type of liquid onto the body. Water and electronic devices do not mix well and could result in extreme damage to your computer.

Update your passwords: Believe it or not, updating your passwords is a task as crucial as backing up your data. Verizon's 2017 Data Breach Investigations Report found that an alarming 81% of hacking-related breaches leveraged either stolen and/or weak passwords [1]. Poor password behavior encompasses everything from using the same password for every account to using simple, guessable passwords like "password" or "123456."

When it comes to basic computer maintenance, protecting your digital world against cybercriminals should always be at the forefront of your task list. No security system is perfect, and more today than ever before, consumers are realizing this on a large scale.

If you're overdue for a password update, consider using these strong password generation tips:

- i. Use at least 10 characters
- ii. Use a combination of uppercase and lowercase letters
- iii. Include both numbers and special symbols
- iv. Add emoticons if possible (:O, :(, :D, :), T.T)

A strong password safeguards all of your data against potential third-party hackers which is precisely why it's such an essential part of computer maintenance.

Organize your data: It's easy to let your computer's data organization run awry when your work and play lifestyle doesn't leave much time for calculated file management. Whether it's old music files from your garage band days or downloaded add-ons for your favorite simulation game, your PC's many folders can grow crowded.

If you can't remember the last time you took a look through your downloads folder, you're likely overdue for a visit. The same applies to the rest of your default folders (documents, photos, etc.).

Dealing with a cluttered desktop or crowded computer folders may be a daunting task, but with these tips and tricks, you'll be well on your way to a functioning system of files and folders.

Create large, main folders: Everyone uses their computers for different primary purposes. A freelance writer will likely have completely different main folder assignments than a business owner. It's important to narrow down your digital world into easy folder divisions to make your first round of organization a breeze, and your future rounds even easier.

Create small sub-folders: Within your larger primary folders, smaller sub-folders make your organization operation even smoother. Being able to categorize files by their functionality or content will help you access them whenever you need them. No search button necessary.

Empty your downloads folder: Your downloads folder should function as a temporary cache for recently downloaded files. Get into the habit of placing recent downloads in their proper folders or deleting them once they've served their purpose.

Clear your desktop: When you power on your computer and saddle up for your day's work or some light social media browsing, you want to be able to do so without the stress of clutter. Clear your desktop of any files, folders, or programs you don't need readily available at every power-on.

Choose thoughtful filenames: If you're frequently saving images, PDFs, and other common files, you know how easy it is to type in gibberish for a successful "Save As" operation. Instead of rushing through, take the time to come up with intentional file names so you always know what's living on your hard drive and where it's located.

Back up your data: Part of owning a modern computer is to prepare for the unexpected. Sudden crashes, untimely glitches, and random hardware failure all have the potential to damage the data living on your PC. Backing up files is one of the most vital computer maintenance procedures PC users can do for themselves. That's why we've ranked it at our final spot. Your computer is replaceable, but without a backup, your information is not.

Full backups are usually done on storage-heavy external hard drives and on the cloud. By making duplicate copies of everything on your PC (actually having your data in 3 places is safest), all of your valuable data lives both on your computer and inside of the external drive or cloud.

4. Computer hardware maintenance involves taking care of the computer's physical components, such as its keyboard, hard drive and internal CD or DVD drives. Cleaning the computer, keeping its fans free from dust, and defragmenting its hard drives regularly are all parts of a computer hardware maintenance program.

5. Tip 1. Make sure the monitor has power and the power light comes on when the power button is pressed. ...

If you have a flat panel LCD monitor, unplug the monitor power cable, wait about 30 seconds, reconnect the cable and then turn on the monitor.

Tip 2. Choose Start→Control Panel and click the System and Security Link. Under Action Center, click the Find and Fix Problems (Troubleshooting) link. You see the Troubleshooting screen. Make sure that the Get the Most Up-to-Date Troubleshooters check box is selected.

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3.2.4 Learning Outcome 4: Test computer functionality

3.2.4.1 Introduction to the learning outcome

This unit covers competencies required to Identify computer testing tools, Testing techniques are identified, perform computer test functionality, and Generate status report.

3.2.4.2 Performance Standard

3.2.4.2.1 Test the computer for POST test

3.2.4.2.2 Perform specific component test.

3.2.4.2.3 Evaluate test results.

3.2.4.2.4 Generate component and system report.

3.2.4.3 Information Sheet

Boot - to start up a computer.

Byte - a piece of computer information made up of eight bits. Card or Expansion Card – a printed circuit board that adds some.

Document - a file you create, as opposed to the application that created it.

Download - to transfer data from one computer to another. (If you are on the receiving end, you are downloading. If you are on the sending end, you are uploading).

Driver - a program on a computer that tells it how to communicate with an add-on piece of equipment (like a printer).

Expansion slot - a connector inside the computer that allows one to plug in a printed circuit board that provides new or enhanced features.

File - the generic word for an application, document, control panel, or other computer data

Switching on the Computer for Power-On Self-Tests (Post) Test

The Power on Self-Test happens each time the turn a computer on. It sounds complicated and that's because it kind of is. A computer does so much when it is turned on and this is just part of that.

The POST is an automated test that is controlled by the Bios. It happens during the boot process. The first step of the POST, which is operated by the Bios, is to verify the Bios code.

After it has completed that, the POST then continues to check all the computer hardware. If there are no errors the POST will proceed very quickly. However, if any errors are found, these will be displayed via an error message, or if the video hasn't been turned on, or if there is some error in it, then the computer will make a number of beeps. These are known as the POST beep codes.

Booting (or **booting up**) is the initialization of a computerized system. The system can be a computer or a computer appliance. The booting process can be “hard”, after electrical power to the CPU is switched from off to on (in order to diagnose particular hardware errors), or “soft”, when those power-on self-tests (POST) can be avoided. Soft booting can be initiated by hardware such as a button press, or by software command. Booting is complete when the normal, operative, runtime environment is attained.

The computer may make one or two beeps on startup anyway, however these are normal. It is only when the beep continues, and the computer does not start up correctly. Then there may have problems.

A **boot loader** is a computer program that loads an operating system or some other system software for the computer after completion of the power-on self-tests; it is the loader for the operating system itself, which has its own loader for loading ordinary user programs and libraries. Within the hard reboot process, it runs after completion of the self-tests, then loads and runs the software. A boot loader is loaded into main memory from persistent memory, such as a hard disk drive or, in some older computers, from a medium such as punched cards, punched tape, or magnetic tape. The boot loader then loads and executes the processes that finalize the boot. Like POST processes, the boot loader code comes from a “hard-wired” and persistent location; if that location is too limited for some reason, that primary boot loader calls a second-stage boot loader or a secondary program loader.

On modern general purpose computers, the boot up process can take tens of seconds, and typically involves performing a power-on self-test, locating and initializing peripheral devices, and then finding, loading and starting an operating system.

The process of hibernating or sleeping does not involve booting. Minimally, some embedded systems do not require a noticeable boot sequence to begin functioning and when turned on may simply run operational programs that are stored in ROM.

All computing systems are state machines, and a reboot may be the only method to return to a designated zero-state from an unintended, locked state.

Performing Specific Component Test

Although hardware failures most certainly may occur in your computer, it is important to check for as many software issues as you can before proceeding. The fact is, most errors are caused by software (such as drivers) related problems, not by a failing hardware device. See basic troubleshooting for a good starting point.

Remove new hardware.

If any new hardware was recently added to the computer, remove that hardware to make sure it is not causing your issue. If a computer works after removing the new hardware, it can mean a few things. Either the new hardware is not compatible with your computer, a system setting needs to be changed, or the new hardware is defective.

Remove any disks or USB devices.

USB cable and port



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Web source:

https://www.google.com/search?q=usb+port&safe=active&sxsrf=ALeKk022_VvALmPzJi9EeR2nzXYrmBg5Mw:1608548383438&tbm=isch&source=iu&ictx=1&fir=XvyTwE0i8aVwuM%252CR6PElcFxpBh-_M%252C_&vet=1&usg=AI4_-kR_EJEaoRXpka-zRhUQ3zZddTqdNg&sa=X&ved=2ahUKEwjTov7X9d7tAhWEsnEKHZ2ICH0Q_h16BAgSEA#imgrc=XvyTwE0i8aVwuM

Remove any disks, CDs, or DVDs that are in the computer. If any USB devices (iPods, drives, phones, etc.) are connected, disconnect all of them as well. Reboot the computer and see if anything changes.

Disconnect external devices

Remove everything from the back of the computer, except the power cable. Turn on the computer and see if it beeps normally. If the computer has never beeped, keep the monitor or display connected to see if any change occurs.

Reconnect and check power cords

If the computer is not getting enough power or the power is getting interrupted, the computer can encounter problems. Disconnect your power cables from any power strip or UPS (uninterruptible power supply) and connect the computer directly to a known good wall outlet.

Identify beep code

If you are receiving a sequence of beeps, see the beep code page for a listing of different beep codes and their explanation. You can also check your motherboard or computer documentation for information on the beep codes. These beep codes are meant to help identify which computer component is failing or bad. If your beep code is not listed, continue troubleshooting.

<https://www.manualsearcher.com/hp/elitedesk-800-g2/manual?p=6>

<https://support.hp.com/us-en/product/hp-elitedesk-800-g2-small-form-factor-pc/7633277/manuals>

Check all fans

Make sure all fans are running on the computer. If a fan has failed (especially the heat sink fan for the CPU), your computer could be overheating or detecting the fan failure, causing the computer not to boot.

Check all cables

Verify all the cables are securely connected to the computer and that there are no loose cables by firmly pressing in each cable.

- All disk drives should have a data cable and power cable connected to them.
- Your power supply should have at least one cable going to the motherboard. Many motherboards may also have additional cables connected to them to supply power to the fans.

Disconnect all expansion cards

If the above recommendations still have not resolved the irregular POST, disconnect the riser board (if applicable) and each of the expansion cards. If this fixes the problem or allows the computer to POST, connect one card at a time until you determine which card is causing the problem.

Disconnect all drives

If you cannot diagnose the problem by the beep code (or you do not hear a beep code), power off the computer. Then, disconnect any IDE, SATA, SCSI, or other data cables from the motherboard. When they are disconnected, try booting the computer again.

If this resolves your irregular POST or generates error messages, reconnect each device until you determine which device or cable is causing the issue. In some situations, it can also be a loose cable connection that causes the issue.

Remove the RAM

If you continue to experience the same problem with all the above hardware removed, remove the RAM from the motherboard and turn on the computer. If the computer has a different beep code or was not beeping but is now, turn off your computer and try the suggestions below. Make sure to turn off the computer before adding and removing the memory and then turning it back on to see if the suggestion resolves the issue.

1. Re-insert the memory into the same slot.
2. If you have more than one stick of memory, remove all but one stick of memory and try rotating through each stick.
3. Try one stick of memory in each slot.

If you can get the computer to boot with one or more of the sticks of memory installed, you are likely dealing with some bad memory. Try to identify which stick of memory is bad and replace it.

If you can get the memory to work in one slot but not another slot, the motherboard is likely defective. You can either work around the issue by running the memory in a different slot that does work or replace the motherboard.

Power cycle the computer

In some situations, a computer may have power related issues often caused by either the power supply or the motherboard. To help determine if this is the issue, try turning the computer on, off, and back on as fast as possible, making sure the computer power light goes on and off. In some situations, you may be able to temporarily get the computer to boot.

3.2.4.4 Learning Activities

The trainee needs to perform the following activities for identification and assembling and disassembling of faulty components of a computer:

- Assemble a working system from components.
- Disassemble a working system and identify the purpose of each component.
- Redesign a working system to make it more ergonomic, more environmentally friendly, or more cost effective.
- Repair a nonworking or faulty system by replacing one or more components.
- Operate a system (or system of systems) to achieve a specified outcome.
- Observe a debate (portrayed by actors or animated figures) about a controversial new technology, choose a point of view, and defend it using information gathered from the Web.

3.2.4.5 Self-Assessment

1. Why is it desirable to switch on the computer system for Power On Self Test (POST) analysis?
2. What does the following POST beep codes mean:

Beeps	Meaning
1 short beep	

2 short beeps	
No beep	
Continuous beep	
Repeating short beeps	
1 long, 1 short beep	
1 long, 2 short beeps	
1 long, 3 short beeps	
3 long beeps	
Beeps	Meaning
1	
2	
3	

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4	
5	
6	
7	
8	
9	
10	
11	
continuous beeping	

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3.2.4.6 Tools, Equipment, Supplies and Materials

- 1/4-inch nut driver
- 3/16-inch nut driver
- Pair of small diagonal cutters
- Pair of needle-nose pliers

3.2.4.7 References

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"Power-On Self-Test Beep Definition - Part 1". *Apple Support. February 18, 2012.*

3.2.4.8 Model Answers for Self-Assessment

1. The power supply unit (PSU) may cause problems if it is not connected properly or does not produce enough power for the system. If the PSU is badly connected, the system will either not run or be very unreliable. A PSU that does not produce enough power (measured in watts) may not be an obvious cause of problems. This is because the system is likely to start up well but may crash a lot when used. Additionally, When a system starts up it carries out a Power On Self-Test (POST) to check all the hardware is working properly before the operating system is loaded. The POST starts by showing how much memory is in the system and the main devices attached and then loads Windows® or whatever operating system the computer uses. POST will beep if anything is badly wrong with the hardware. The beeps give a signal which an ICT technician can look up to find out what's wrong. For example, one beep then three beeps then one beep from a Dell means there is a problem with the RAM,

which is probably not in the socket properly. Beeps are useful as an ICT technician can interpret this information, even if there is no screen display.

2.

Beeps	Meaning
1 short beep	Normal POST – system is OK
2 short beeps	POST error – error code shown on screen
No beep	Power supply, system board problem, disconnected CPU, or disconnected speaker
Continuous beep	Power supply, system board, RAM or keyboard problem
Repeating short beeps	Power supply, system board or keyboard problem
1 long, 1 short beep	System board problem
1 long, 2 short beeps	Display adapter problem (MDA, CGA)
1 long, 3 short beeps	Enhanced Graphics Adapter problem (EGA)
3 long beeps	3270 keyboard card error

Beeps	Meaning
1	Memory refresh timer error
2	Parity error in base memory (first 64 KiB block)
3	Base memory read/write test error
4	Motherboard timer not operational (check all PSU to MB connectors seated)
5	Processor failure
6	8042 Gate A20 test error (cannot switch to protected mode)
7	General exception error (processor exception interrupt error)
8	Display memory error (system video adapter)
9	AMI BIOS ROM checksum fix
10	CMOS shutdown register read/write fix
11	Cache memory test failed

continuous beeping	Motherboard does not detect a RAM module (continuous beeping)
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3.2.5 Learning Outcome 5: Upgrade computer software/hardware

3.2.5.1 Introduction to the learning outcome

This unit covers competencies required to Determine Reasons of upgrading, Identify procedures and techniques for upgrading, and Test functionality of the upgraded software/hardware

3.2.5.2 Performance Standard

3.2.5.2.1 Run diagnostic program.

3.2.5.2.2 Install update if any.

3.2.5.3 Information Sheet

The central processing unit (CPU) is the brain of your computer. It receives information (fetches), processes data (decodes), and performs calculations (executes). You can find your Windows computer's CPU specs by navigating to Settings > System > About. Then, click "Device specifications."

Random access memory (RAM) temporarily stores the data that you're actively using while on your computer. This is why if you tend to open 40 tabs at once, you'll notice a decline in overall performance. RAM allows you to more quickly access data than if it was coming straight from your hard drive To see real-time usage of your CPU, you can open up the Task Manager on your computer and click the "Performance" tab.

Hard drive is where all of the data on your computer is stored. It's different than RAM because it's your computer's long term storage, as opposed to the short term memory RAM delivers. The most common types of hard drives are hard disk drives (HDD) and solid-state drives (SSD).

Solid-state drives (SSD) are a newer type of hard drive without any moving parts. It's a much faster hard drive but a pricier option found in high-end computers.

A graphics processing unit (GPU), or graphics card, receives information from the CPU and then decides how the pixels on the screen should display that information A CPU should last between 10 and 20 years in most cases.

Running Diagnostic Programs of a Computer

Symptoms of an over-stressed and failing CPU include an operating system not loading despite the fans running. Also, if the computer turns on but nothing loads or powers on and then it shuts off suddenly, it may have CPU issues.

Check your CPU usage record if you suspect the CPU is at the heart of a computer issues. If a CPU is maxing out on all cores, it may want to upgrade it.

Note: If an upgrade a CPU, you may also need to upgrade a motherboard and RAM along with it.

There are two common types of RAM, Dynamic RAM (DRAM) and Static RAM (SRAM). Dynamic RAM (DRAM) is more common than SRAM. It consists of transistors and capacitors and refreshes at a rate of thousands of times per second.

Static RAM (SRAM) has more transistors per memory cell than DRAM and doesn't need to refresh. Due to its more advanced features, it's significantly faster - but also more expensive - than DRAM.

How long does RAM last on average?

Typically, it will not need to replace your RAM completely. Rather, you may find that a need to upgrade it depending on the use of a computer for and what types of applications it run.

The amount of RAM it need depends on what the computer is used for. 4GB is sufficient for general internet browsing and/or running non-memory-intensive applications. 8GB to 12GB is better for gaming, video streaming, and/or running memory-intensive applications.

16GB and beyond is necessary for running applications related to high-resolution photo editing, video editing, animation, and illustrations.

What are signs my RAM is failing?

If experiencing performance issues like lagging or freezing with everyday tasks, it may need to upgrade your RAM.

Note: In some laptop models, the RAM is soldered to the motherboard, meaning that it can't upgrade the RAM yourself. Check the computer's service/hardware manual to determine if the RAM is soldered.

An HDD features a traditional spinning hard drive. While it's cheaper than SSD, it's also slower, louder, and can run hot.

How long does a hard drive last on average?

A typical hard drive will last between 3 and 5 years.

What are signs that the hard drive is failing?

Signs of the hard drive dying can range from overall slower performance to corrupted data.

Note: It's important to back up the hard drive as soon as it provide notice signs that the hard drive is close to failure. Common backup solutions include external hard drives and remote cloud storage.

Two common types of graphics cards include video graphics array (VGA) which renders 256 colors. Quantum Extended Graphics Array (QXGA), on the other hand, is more high performance and is capable of rendering millions of colors.

How long does a graphics card last on average?

Typically, expect the graphics card to last more than 5 years. With that said, the lifespan may depend on if it is a single GPU or dual GPU configuration. A single GPU is more cost-effective and better for casual users. A dual GPU, in contrast, is more expensive but users who need great graphics will enjoy the increased graphics performance.

What are signs GPU is failing?

When random lines or dots appear, or incorrect colors appear on your screen, known as artifacting, it might be time to upgrade the graphics card.

Note: Artifacting can also be a sign that your graphics card is overheating, so check the cooling system before upgrading. Prevent overheating by regularly cleaning vents and fans to remove dust buildup.

The best way to ensure you can depend on your laptop or desktop PC is by investing in quality technology from the beginning. The lure of cheap deals is strong but while a cheap PC might be lower cost at the outset, you will likely have to replace it faster than you would if you had spent more money in the first place. HP Store holds a variety of quality, capable computers that can suit a variety of purposes.

Infographic transcription:

If a computer is acting up or performance is slowing, it may be time to upgrade one or more components on the PC.

When it comes to making upgrades, there are 4 components that, when upgraded, tend to solve most common problems plaguing a computer:

- CPU
- RAM
- Hard Drive
- GPU

Find out what these components do, how long they should last, and signs that it's time to upgrade.

1) CPU

The central processing unit (CPU) is the brain of the computer. It receives information (fetches), processes data (decodes), and performs calculations (executes).

CPU Functions:

- Fetch
- Decode
- Execute

How long does a CPU last on average?

10-20 years

Installation of Updates and Computer Upgrades

Check your CPU usage record - if the CPU is maxing out on all cores, you may want to upgrade.

Note: If upgrading a CPU, there is need to upgrade the motherboard and RAM along with it.

2) RAM

Random access memory (RAM) temporarily stores the data that is actively in use while on a computer. RAM allows for more quickly access data than if it was coming straight from the hard drive.

Two most common types of RAM:

Dynamic **RAM (DRAM)**

- More common than SRAM
- Consists of transistors and capacitors.
- Refreshes thousands of times per second

Static **RAM (SRAM)**

- Consists of more transistors per memory cell than DRAM.
- Does not need to refresh.
- Faster and more expensive than DRAM

How long does RAM last on average?

Typically, it needs to replace the RAM completely. Rather, may find the need to upgrade it depending on what use of a computer for and what types of applications it runs.

Amount of RAM you may need based on your computing needs:

- General internet browsing and/or running non-memory-intensive applications (4GB)
- Gaming, video streaming, and/or running memory-intensive applications (8GB to 12GB)
- Running applications related to high-resolution photo/video editing/animation/illustration (16GB to 64GB)

Signs for upgrade

If experiencing performance issues like lagging or freezing with everyday tasks, you may need to upgrade your RAM.

Note: In some laptop models, the RAM is soldered to the motherboard, meaning that they can't be RAM upgraded. Check the computer's service/hardware manual to determine if the RAM is soldered.

3) Hard Drive

A hard drive is where all of the data on a computer is stored.

Common types of hard drives:

Hard disk drive (HDD)

- Traditional spinning hard drive
- Cheaper than SSD, but slower as well
- Can be louder and get hotter than solid state drives.

Solid state drive (SSD)

- Newer technology
- Does not have any moving parts.
- Smaller than hard disk drives

How long does a hard drive last on average?

3-5 years

Signs you should upgrade.

Signs can range from slower performance to corrupted data - these issues may suggest your hard drive is close to failing.

Note: It is important to back up your hard drive as soon as you notice signs that your hard drive is close to failure. Common backup solutions include external hard drives and remote cloud storage.

4) GPU

A graphics processing unit (GPU), or graphics card, receives information from the CPU and then decides how the pixels on the screen should display that information.

Types of graphics cards:

1. Video Graphics Array (VGA)

- Minimum standard
- Allows 256 colors.

2. Quantum Extended Graphics Array (QXGA)

- High performance
- Allows millions of colors.

How long does a graphics card last on average?

5+ years

This may depend on if you have a single GPU or dual GPU configuration:

1. Single GPU

- More cost effective
- Better for standard users

2. Dual GPU

- More expensive
- Increased graphics performance, making it better for gamers.

Learn more about how to upgrade your laptop or PC to get the most out of an existing computer, and how to customize for highest performance when buying a new laptop.

1. Test components. Check that the components work using the tests you selected in preparation for the hardware upgrade. The selected tests should ensure that everything is checked – if any tests are missed, it is possible that a component will give problems later.

2. System testing. Make sure the computer works with all the peripherals and the network.

1. Restoring data. This will be needed if the hard disk has been replaced or formatted. If the data is not restored it will not be on the disk, so the user will not be able to access their work.

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2. Software installation. This is often needed for hardware upgrades, such as a new scanner. The software will allow the user to control the hardware properly, e.g. changing the scan resolution, and to edit the scanned images.

3. Software configuration. This may be needed to set the defaults for a new printer driver, so that the printer uses a quick and economical print quality setting (unless the user chooses otherwise)

Related web links:

- HP Laptop Buying Guide
- How to Choose the Best HP Laptop

1.5.5.4 Learning Activities

Practical Activity

Special instructions related to learning activities.

- Practical activities can be performed in the computer lab of the trainee's institution or a personal computer.

Trainees taking this unit are highly recommended to own a working computer.

Case 1.

The learner needs to do the following activities on software upgrading to check of the computer's performance improves:

- Uninstall any unnecessary software you are not using.
- Remove viruses, spyware, and other malware.
- Defragment the hard drive (primarily an issue for Windows computers).

Case 2.

Ask yourself whether a component upgrade is worth it to weigh the time and cost of making the upgrade against the time and productivity you may be losing by not making it.

3.2.5.5 Self-Assessment

1. What are the potential risks to consider when installing hardware components?

2. Why is it desirable to install or upgrade hardware components safely, configuring associated software?
3. Why is it necessary to test the computer system for functionality?
4. What are the reasons for and implications of registering installed product components?
5. Why is it important to produce updated documentation for the modifications?

3.2.5.6 Tools, Equipment, Supplies and Materials

- 1/4-inch nut driver
- 3/16-inch nut driver
- Pair of small diagonal cutters
- Pair of needle-nose pliers

3.2.5.7 References

Williams, Gregg (January 1982). "A Closer Look at the Personal Computer". BYTE. Retrieved 19 October 2019.

"Power On Self-Test Beep Definition - Part 2". Apple Support. January 10, 2012. Archived from the original on December 3, 2019.

3.2.5.8 Model Answers to Self-Assessment

1. As an ICT technician, there needs a good understanding of the health and safety regulations from early on in the career, so that one understands the good practices demanded by law. In particular, you need to:
 - report any accidents
 - take reasonable care of your own health and safety when moving heavy components
 - not cause any electrical hazards
 - make sure that workstations meet safety requirements.

A need to adhere to health and safety regulations as they will help to protect and others and will avoid any unnecessary legal action for reckless and unsafe working practices. If one identifies any health and safety problems, you should tell the line manager or the health and safety representative immediately.

2. One can use diagnostic software to thoroughly test hardware in a computer system and give a report on any problems found. An example of diagnostic software is BurnInTest Standard, which can test your computer components, such as the processor, hard drive, optical drive, sound and graphics cards, RAM, network connections and ports. This software will even report on the temperature of your processor. The results from tests can be saved to disk or printed.
3. When a system starts up it carries out a Power on Self-Test (POST) to check all the hardware is working properly before the operating system is loaded. The POST starts by showing how much memory is in the system and the main devices attached and then loads Windows® or whatever operating system the computer uses. At the beginning of POST, you can enter the computer set-up by pressing the correct key. (There may be a message displayed on-screen to inform you which is the correct key, perhaps the F2 or Del key, or you may need to look this up in the manual.) Once in set-up you can change how the computer uses hardware, such as whether to start from the hard disk or to use an optical disk to start the computer. The computer will usually be set to start from the hard disk, but if you want to re-install the operating system you will need to change this so the computer starts from an optical drive, which will be the operating system installation CD. POST will beep if anything is badly wrong with the hardware. The beeps give a signal which an ICT technician can look up to find out what is wrong. For example, one beep then three beeps then one beep from a Dell means there is a problem with the RAM, which is probably not in the socket properly. Beeps are useful as an ICT technician can interpret this information, even if there is no screen display.
4. Product registration is when you inform the manufacturer of your details when you install the product. Product registration is often good practice as it helps get faster technical support and advice from manufacturers about components. This is because the manufacturer then has a record of when the warranty started and who is covered by the warranty. Another reason why registration can be useful is that the manufacturer may send out technical advice or useful information to purchasers if any problems are found with the product.

5. Documentation needs to be kept up to date, recording any new hardware installations or upgrades. This ensures that:

- The organization knows which components are in which systems
- Users know how to get the best from their hardware
- Warranties can be implemented for faulty kit.

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