



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

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: SECP1513-04

Assignment : Step by step PC Assembly

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PART A

TOOLS

1.0 SCREWDRIVER



The function of screwdriver is to unscrew the screws and open computer parts. The importance of it is to avoid stripping the head of the screws.

2.0 FLASHLIGHT



Flashlight is for giving light source. The importance of it is that it eases us to assemble parts of PC because PC cases are dark and full of shadow. Thus, to assemble PC parts, we need a good light source so we don't have to force our eyes to see.

3.0 TWIST TIES



Twist ties are used to tie the cable. It is important to use twist ties to tie the cable and keep the cables in place. This will make the PC look more neat and tidied up.

4.0 PLIER



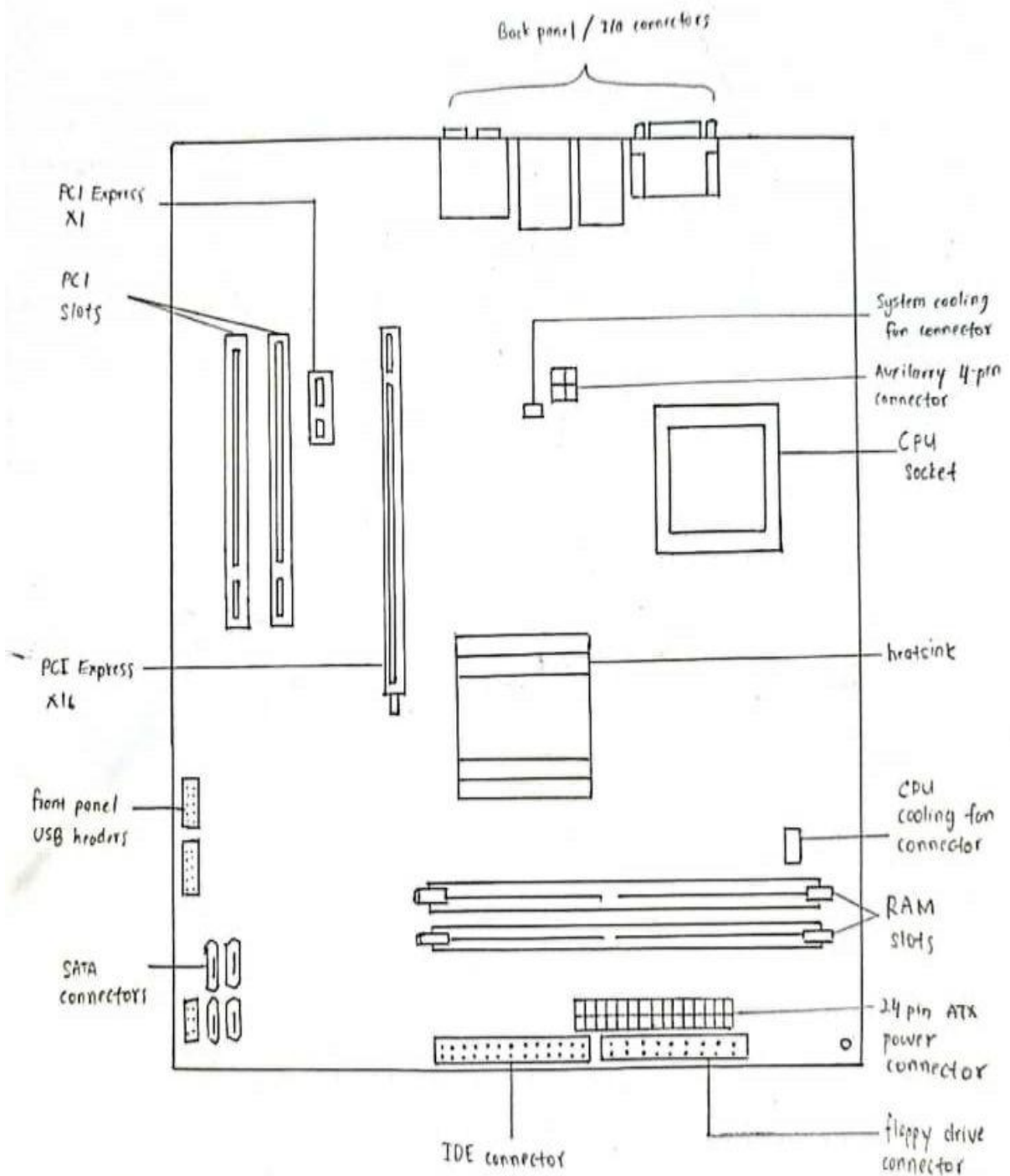
Plier is functioning as tool that can cut wire or snip the excess off the cable ties. Plier is an important tool as user would be going to use it to remove a stripped screw.

5.0 HEAT SINK COMPOUND



Heat sink compound is used to fill in the gap between CPU or other heat generating components and the mechanical heat sink. It is important because this compound can avoid the reduction in heat dissipation that can generate an overheating and failing device.

PART B-1.0



PART B-2.0

CPU/Processor

- Computer processor also known as microprocessor or central processing unit is a component of a computer system that functions as a brain of a program and carry out computer operations.
- It is logically a circuitry that receives and processes the basic instruction given to a computer by the user



Intel Xeon processor



Inter Core i7



AMD Ryzen 9 5900X

Graphic Card

- Graphics card creates and outputs images to the computer monitor
- Graphic card slots into the motherboard and communicates with other computer components via the BUS Network
- Graphic card include cooling fans to draw away heat and ports to connect to computer monitors and TV's



Nvidia GeForce RTX 2080 Super



AMD Radeon RX 5700



AORUS GeForce RTX 3080

Heat Sink

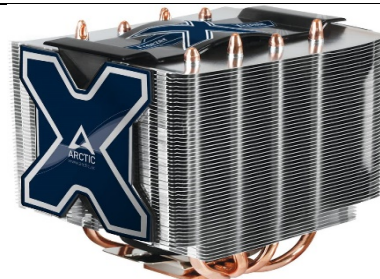
- A component designed to lower the temperature of an electronic device by dissipating heat into the surrounding air
- A heat sink without a fan is called a passive heat sink and a heat sink with a fan is called an active heat sink and they are generally made of an aluminum alloy and have fins



DEEPCOOL GAMMAXX 400



Cooler Master Hyper 212



ARCTIC Freezer Xtreme

CD Rom Drive

- CD Rom drive is a device that uses photo diodes to detect reflecting lights on optic discs and uses a laser to read or write data



ASUS ZenDrive U9M DVD Writer



LG Slim 8X External DVD Writer



Tinytech External DVD Writer

CD Rom

- CD Rom or Compact Disc-Read Only Memory is a type of CD disc that can only be read, but not recorded
- It is used to store programs and data files

CD-RW 4-12X



ARITA Blank CD



MYECO Blank CD



EMTEC Blank CD

USB Cable

- USB or Universal Serial Bus provide connection from computers to peripheral such as keyboards, printers, portable, portable media players, network adaptors and pointing devices
- They are also used to provide electrical power to portable devices via a wall adaptor or computer



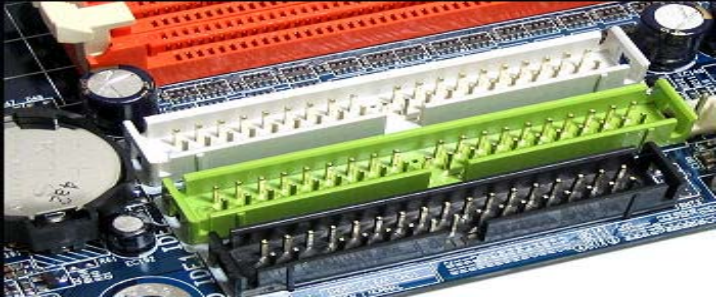
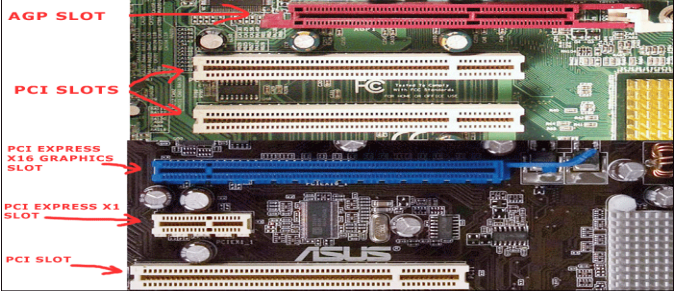
AUKEY USB Type C to Type A



UGREEN USB 3.0 Type A to Type A



RS pro USB A to Male USB B cable

IDE Slots	PCI Slots
<ul style="list-style-type: none"> Integrated Electronics (IDE) slots is a standard interface for connecting a motherboard to storage devices such as hard drives and CD Rom drives 	<ul style="list-style-type: none"> Peripheral Component Interconnect (PCI) slots are the slots for older expansion cards such as sound cards, network cards and connector cards
 <p>MSI & ASUS</p>	 <p>MSI & ASUS</p>




RAM

- RAM or Random-access memory also known as “temporary memory”
- RAM consists of electronic circuits on the motherboard that temporarily hold data while computer is on and when the computer is off, RAM is empty
- Each circuit has an address that is used by the microprocessor to transmit and store data

 <p>CORSAIR VENGEANCE LED</p>	 <p>CRUCIAL BALLISTIX SPORT</p>	 <p>G.SKILL MAC RAM</p>
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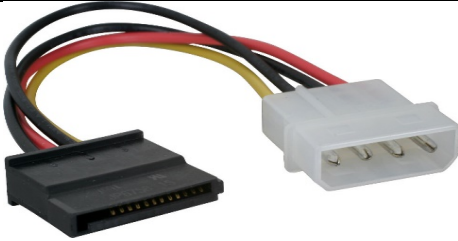
SATA Cable

- SATA or Serial Advanced Technology Attachment are used to connect devices in computer assemblies such as a motherboard to storage devices such as hard drives, optical drives and solid-state memory drives
- SATA Cable are known for transferring data at high rates

 <p>BENFEI SATA cable</p>	 <p>INATECK st1003 SATA cable</p>	 <p>NEEYER SATA cable III</p>
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IDE Cable

- IDE Cable connects to older hard drive disks and optical drives for data transfer



MOLEX IDE cable



MULTICOMP IDE cable



roline IDE cable

Power Supply

- Power supply is an electronic device that supplies electric energy to an electric load
- Power supply converts one form of electrical energy to another and, as a result, power supplies are sometimes referred to as electric power converters



CORSAIR RM580x



Cooler Master MasterWatt 750W



FSP Dagger 500W

Hard Disk

- Hard Disk Drive (HDD) is an electro-mechanical data storage device that stores and retrieves digital data using magnetic storage and one or more rigid rapidly rotating platters coated with magnetic material
- The pins on the back of the hard drive that nothing connected to are called jumpers and they are not used so much with modern hard drives
- The jumpers consist of two types, master and slave



SEAGATE BARRACUDA



TOSHIBA X300



WESTERN DIGITAL Velociraptor

PART C

Part C – “Step by Step PC Assembly”

As a step of caution before you start assembling your PC, you have to discharge all static build ups from electrostatic charges by touching any metal objects that are safe to discharge statics. You could also get an anti-static wrist strap. This is because touching any PC parts with statics will cause electrical charges and can cause harm to other PC parts.

Step 1: Installing the Processor

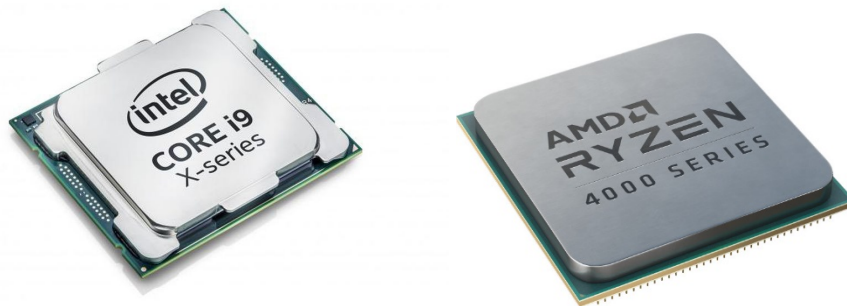


Fig 1. Example of processors from Intel and AMD



Fig 2. Example of how to properly hold a processor

The most important part of a computer is the processor. Processors are basically the brain of a computer. Without it, a computer simply cannot run. To install a processor, you have to make sure that the processor is compatible with the socket type of the motherboard. After you have opened your computer case's side panels, open the socket near the CPU slot and carefully insert the processor into the slot and close the socket gently after that. You must handle the processor with caution, as shown in Figure 2, and never touch the pins of the processor as it can cause damage to it.

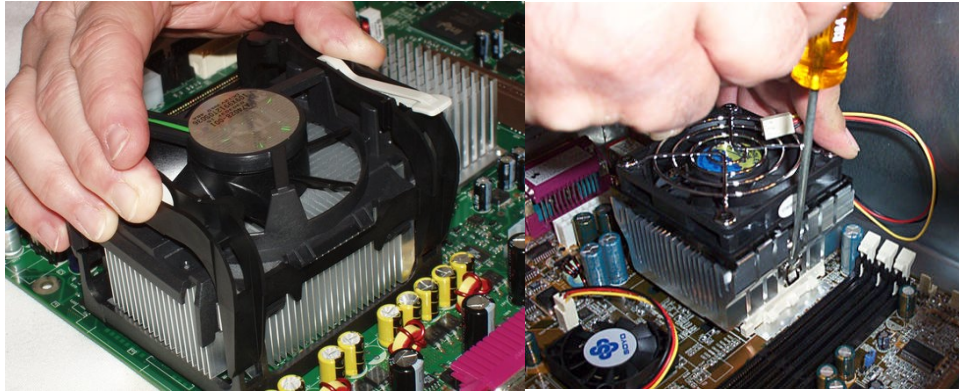


Fig 3. Example of CPU cooler fans with heat sinks installed under them

Next, you would want to install a CPU cooler. Take out the metal strap that is covering the fan slots by unfastening the screws using a Phillips screwdriver. Depending on the model, you can mount the fan on the CPU by either pushing the corners until it clips in or by screwing it in. Locate where the cable for the cooler should go in the motherboard. There should be a port called “CPU_FAN” in your motherboard. Once you have found it, connect the cooler fan to the port using related cables. Heat sinks can also be used to increase heat conductivity and heat flow out of your PC.

Step 2: Installing RAM

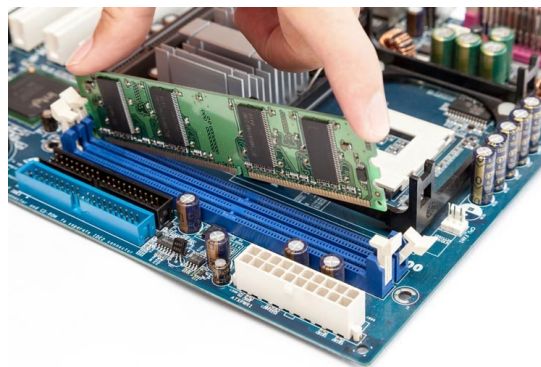


Fig 4. Example of how to properly install RAM

After you have finished installing the motherboard, now is the time you install the RAM into it. You can do that by opening the memory holder and align the pins on the RAM into the memory slot before putting it in. You must apply only a little pressure when inserting the RAM until a “snap” or “click” sound is heard. When it snaps, it means that the RAM is properly installed. As careful as you are with the processors, you must also avoid touching the pins of the RAM for the same reasons of not to cause damage to the pins.

Step 3: Installing the Motherboard



Fig 5. Example of an IO shield



Fig 6. An IO shield next to the ports

You have to install an IO shield before you can insert your motherboard inside of your PC. Thankfully, most motherboards come with a matching IO shield. We use an IO shield to help protect the motherboard so you could safely connect peripherals such as USB devices, audio devices, and etc. To insert the IO shield into the PC, apply pressure towards the corners of the panel until it snaps into your PC case.

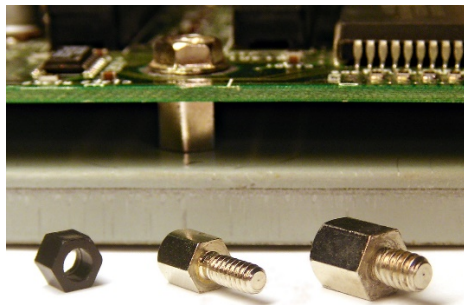


Fig 7. The screwed standoff (in the back) helps give space between motherboard & case

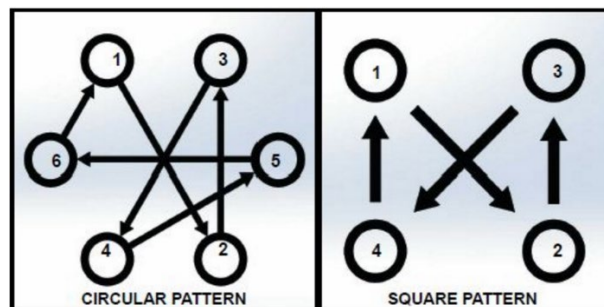


Fig 8. An example of cross pattern technique

To further help protect your motherboard, you must use standoffs which provides a margin of space between the motherboard and the case to keep the multiple solder points below from grounding and short-circuiting. First of all, locate the standoffs of the PC in relation to your motherboard. If however your PC has less standoffs when the motherboard has more holes in it, then just install the other 3 standoffs by screwing them in place. Place and screw the motherboard by using a Phillips screwdriver into the allocated standoffs in the PC by using cross pattern technique (Figure 8) to apply an even pressure to the motherboard. You must remember not to overly tighten the screws.

Step 4: Mounting the Power Supply



Fig 9. A modular and a non-modular power supply unit. Notice that the modular power supply has extra ports while the non-modular one has more wires running through it.

You have to know that there are 2 types of power supply that are available. One is a non-modular power supply which includes wires and the other is a modular power supply which has ejectable wire ports. If you are using the latter, you have to buy the extra cables separately. Insert the power supply in the allocated location for it (usually at the corner) and mount it by screwing the corner of the power supply slots by screw. After that, you have to find the power supply's IDE cables so we can connect it to the motherboard.

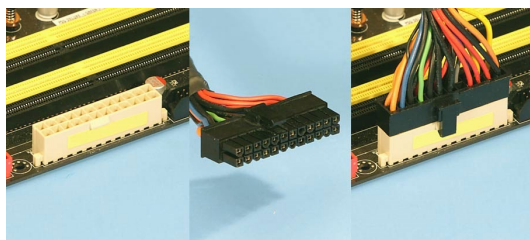


Fig 10. Example of how to connect the 24-pin IDE cable into the motherboard.

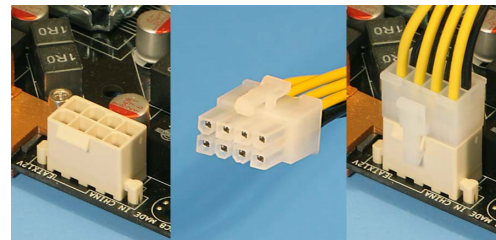


Fig 11. Example of how to connect the 8-pin IDE cable into the motherboard.

Attach the 24-pin and 8-pin (or 4-pin, depending on the model of power supply) IDE cable to the motherboard via the correct ports (as shown in Figure 10 & Figure 11). Once that is done, connect the power supply to a socket via a 3-pin power plug. Doing this will provide power to the PC and thus allow it to turn on.

Step 5: Connect the cables

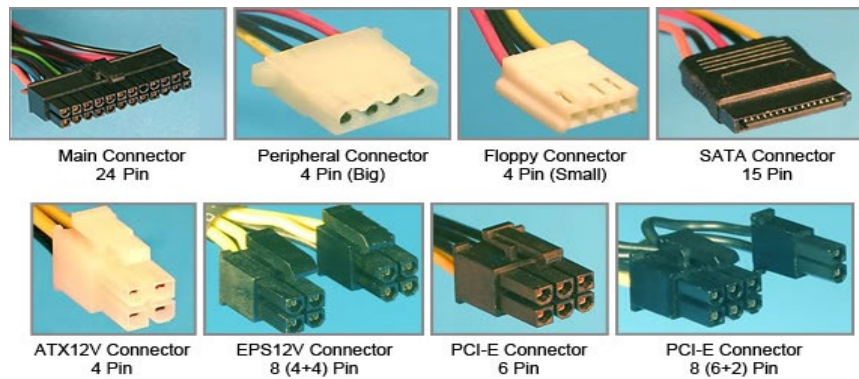


Fig 12. Example of various types of connecting cables. Note that they might have different number of pins depending on the model used.

Some of the cables that need to be connected are the cables from the power supply such as the main 24-pin & 8-pin CPU connectors, peripheral connectors, floppy connectors, SATA connectors and PCI-E connectors.

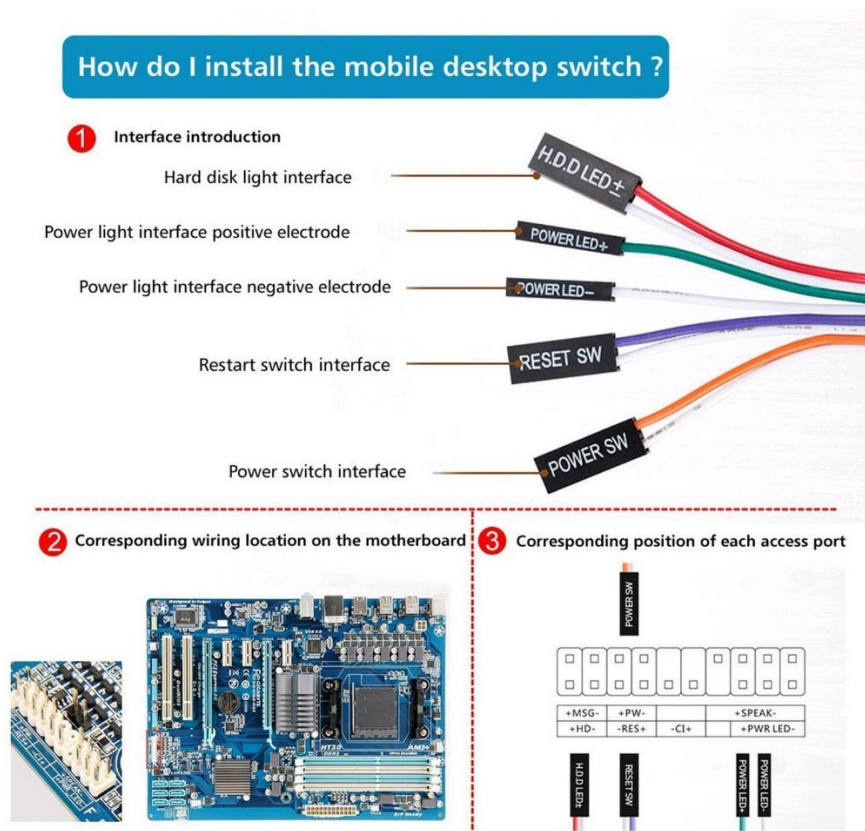


Fig 13. Example of front panel connectors and how to wire it

There are also front panel connectors from the PC case such as HDD LED±, Power LED (positive and negative), Reset Switch, Power Switch, HD Audio & USB. Some of these cables must be inserted properly into the motherboard by referring to Figure 13.



Fig 14. Example of USB 3.0 Port

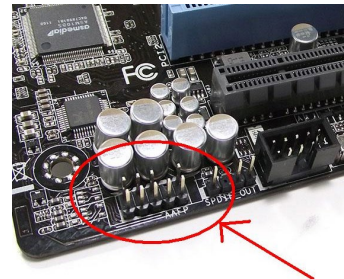


Fig 15. Example of HD Audio Port

Next, plug in the 3.0 USB cable adapter and HD Audio cable into the correct ports inside the motherboard.



Fig 16. Example of USB Headers

Connect the USB ports from the PC case into the motherboard via the USB headers.

Step 6: Installing an Optical Disc Drive



Fig 17. An optical disc drive can allow use of discs such as DVDs, CDs and Blu-ray.



Fig 18. Example of how to install an optical drive.

This is an optional step because recently created PCs do not include the location for an optical drive. To install an optical disc drive, slide the optical drive into the location provided for it in the PC (Figure 13). After that, line up the holes in the PC with the holes in the optical drive and screw in the optical drive.

Step 7: Installing a Storage Device



Fig 19. Example of how to install a disk drive

Usually, a PC case has an internal hard disk already mounted in a drive bay. To install a storage device, you must align the HDD or SSD holes to your PC case's holes and screw it. Connect the SATA/IDE power cable from the power supply to the storage drives and the motherboard using separated cables. For Hard Disk Drive(HDD), make sure that the direction is either vertical or horizontal, not at an angle, since it will cause a slow down for the data flow in the HDD. For Solid State Drive(SSD), it is safe to install it anywhere on your PC because it is vibration-resistant.



Fig 20. The different types of interfaces of a hard drive



Fig 21. The connector ports on a motherboard

HDD ports on the motherboard(Figure 21) consists of SATA data ports and SATA power ports. It also have IDE (or PATA) power port. These are used to connect to the different types of hard drive.



Figure 22. A jumper setting diagram for a hard drive

Do note that depending on the type of the HDD, the jumper settings that can be plugged by IDE cable in the HDD ports may vary.

Step 8: Installing a Graphics Card



Figure 23. Example of a graphics card

Some of the computer processors in Step 1 have their graphics card already integrated. As an example, Intel processors usually have Intel HD graphics as their integrated graphics card. If this is the case, then this step can be skipped. However, if the motherboard has 2 or more graphics card slots, then the user can decide to install another one.



Figure 24. Example of a graphics card's pin cover

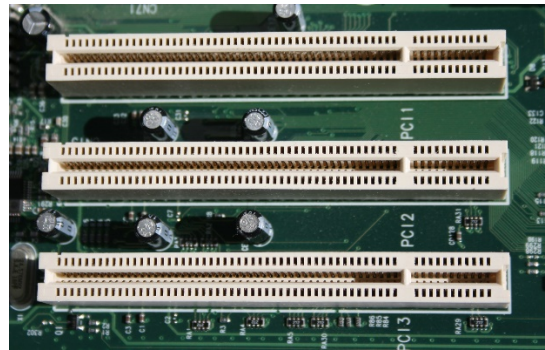


Figure 25. Example of PCI slots on a motherboard

In order to install the graphics card, you must open the pin cover under the graphics card in order to install the golden pins to the motherboard. Next, you should apply light pressure to insert it after you align the pins from the graphics card to the PCI slot correctly. If a "snap" or "click" sound is heard, then the graphics card is properly installed. You can then screw the side panels by using a Phillips screwdriver. Connect the 8-pin PCI-E cable from the power supply to that specific graphics card port. When the power supply is turned on, check to see what colour the light indicator shows. If the colour is white, then the graphics card is working properly. However, if the colour is red, then you have to repeat this step again and make sure if the graphics card is properly connected to the PCI slot.

Step 9: Closing the PC Case and Connecting the Peripherals

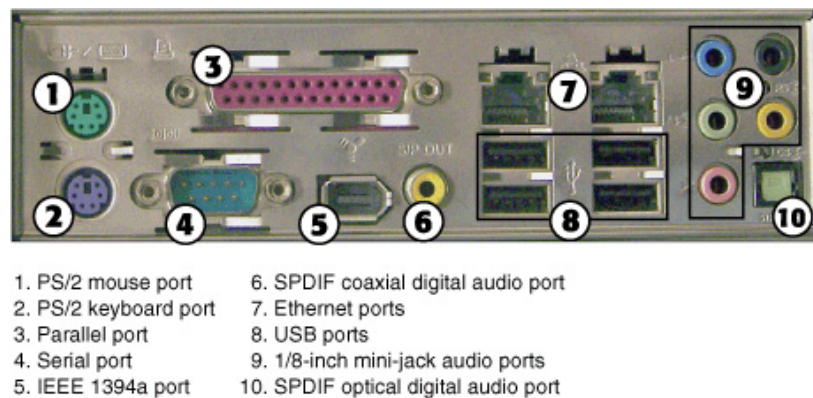


Figure 26. A labelled diagram of I/O (input/output) port that is used to connect peripherals

Peripherals are various parts of hardware that completes a computer setup. These parts consist of mouse, monitor, speaker, printer, router, headphones and etc. Nowadays, HDMI ports on a PC can be connected into HDMI port of monitors which is better in terms of resolution, data flow and so on compared to those using VGA ports(labelled as (4) in Figure 26).



Figure 27. Examples of commonly used peripherals

To connect peripherals to a PC, you don't need the PC case cover to be open. Thus, you can close the case up and screw it up. Then, you just have to plug in the cables of the peripheral into its' correct port. For instance (refer to Figure 26), you can connect a mouse and keyboard to the USB port (8), connect speakers to an audio port (9), connect a monitor to the serial port (4) and so on. If you prefer using Wi-Fi over Ethernet, you can use a Wi-Fi USB adapter that can be bought separately. Just insert the USB adapter into the USB ports (8) and then the PC is now able to connect to the Internet via Wi-Fi.

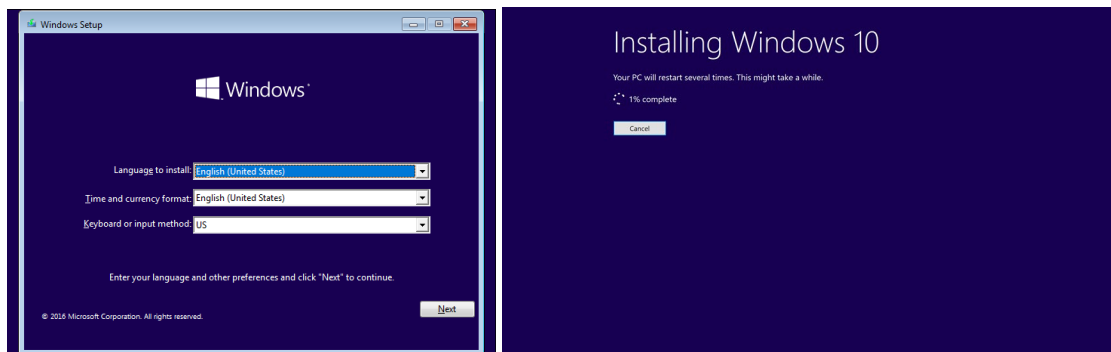


Figure 28. Examples of the installation process for the Windows Operating System

After you have connected all the peripherals that you wanted, you must now install an Operating Software (OS). For this instance, we'll be using Windows Operating Software. Download the installer from their official website and use the license key that you have purchased.

In conclusion, assembling a PC can take around a couple of minutes by someone who is a professional but it may take a few hours for those who just started to try and do it themselves. All in all, assembling a PC can really give someone a unique experience and the freedom to personalise their own PC to their own liking.

REFERENCES

PART A

1. How Heat Sink Compound Keeps Electronics Cool. (n.d.). Retrieved December 13, 2020, from <https://www.techspray.com/how-heat-sink-compound-keeps-electronics-cool>
2. 5 Tools Needed When Building or Working on Your Pc. (n.d.). Retrieved December 13, 2020, from https://www.streetdirectory.com/travel_guide/116220/hardware/5_tools_needed_when_building_or_working_on_your_pc.html
3. Tools You'll Need to Build Your Own Computer. (n.d.). Retrieved December 13, 2020, from <https://www.kitchentablecomputers.com/tools.php>

PART B – 1.0 & 2.0

1. Motherboard Components and Connectors. (n.d.). Retrieved December 9, 2020, from <https://www.tutorialsworld.com/computers/pc-motherboard-2.htm#one>
2. What is a graphic card?. (n.d.). Retrieved December 9, 2020, from <https://www.ebuyer.com/blog/2015/04/what-is-a-graphics-card/#:~:text=A%20Graphics%20Card%20is%20a,signal%20your%20monitor%20can%20understand.>
3. Heat sink. (n.d.). Retrieved December 9, 2020, from https://en.wikipedia.org/wiki/Heat_sink
4. CD-ROM. (n.d.). Retrieved December 9, 2020, from <https://en.wikipedia.org/wiki/CD-ROM>
5. 10 Parts of a Motherboard and Their Function. (n.d.). Retrieved December 9, 2020, from <https://turbofuture.com/computers/the-motherboard-components>

PART C

1. How To Build a Computer – Step By Step Infographic. (n.d.). Retrieved December 13, 2020, from <https://www.pcbuildadvisor.com/how-to-build-a-computer-step-by-step-infographic/>
2. All about the various PC power supply cables and connectors. (n.d.). Retrieved December 13, 2020, from <http://www.playtool.com/pages/psuconnectors/connectors.html>
3. Basics 10: Setting Up a Computer. (n.d.). Retrieved December 13, 2020, from <https://canvas.instructure.com/courses/955530/assignments/3758440>