Semester I 2020/2021

Subject   : Technology and Information System (SECP1513)
Section   : 10
Assignment   : Step by Step PC Assembly

TEAM 5 (ANONYMOUS)

NO.	PHOTOS	DETAILS
1		Name : TAY WEI JIAN Matric No. : A20EC0159 Phoner No. : 01110958928 E-mail : tayjian@graduate.utm.my
2		Name : MUHAMMAD FAIQ HAIDAR Matric No. : A20EC0318 Phoner No. : 085886688868 E-mail : muhammad.haidar@graduate.utm.my
3		Name : TEE JUN HONG Matric No. : A20EC0160 Phoner No. : 0177937223 E-mail : teehong@graduate.utm.my
4		Name : MOHAMED YASSER ELREFAEY Matric No. : A20EC9106 Phoner No. : 01164409459 E-mail : mohamedyassert26@graduate.utm.my

LECTURER   **:** DR. NOR AZIZAH BINTI SA'ADON

**SUBMITTION DATE**   **:** 30th NOVEMBER 2020

PART A
Tools Needed for PC Assembly

1.0 SCREWDRIVER

Usually hand-operated, for turning screws with slotted heads. For screws with one straight diametral slot cut across the head, standard screwdrivers with flat blade tips and in a variety of sizes are used. Special screws with cross-shaped slots in their heads require a special screwdriver with a blade tip that fits the slots. The most common special screw is the Phillips head (Phillips Screw).

The number-one most important tool for PC building is a Phillips-head screwdriver with a big bit, helpful to avoid stripping the head; a long shaft also aids in keeping the handle out of the way when working in tight spaces—it's a good idea to keep a short screwdriver around as well, for the same reason.
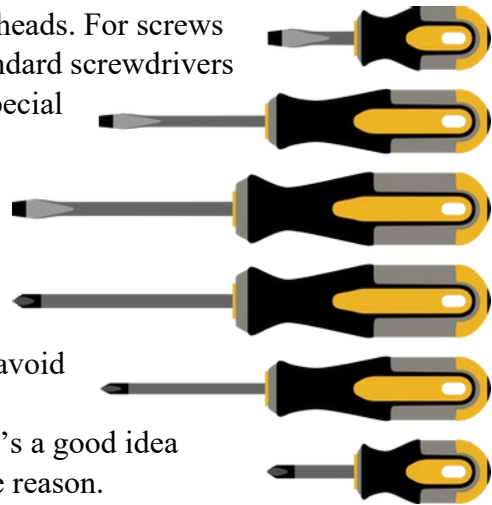
2.0 ANTI-STATIC EQUIPMENT

Anti-static equipment should be used for any serious PC assembly. Touching a grounded case or another grounded, metal object occasionally will eliminate most risk of electrostatic discharge, but better safe than sorry.

There are several products that can eliminate electro-static discharge (ESD)—an anti-static mat can be placed on the floor of the workspace, allowing unrestricted movement, but they can also be awfully expensive for a hobbyist builder. The most cost-effective method is to purchase an ESD wrist strap and either clip it to a grounded object or plug it into the ground socket of any wall outlet.

3.0 LIGHT SOURCE

PC cases are full of shadows, and screws love to roll into the darkest corners. A bright desk lamp with a long, pose-able neck is handy, but nothing beats a cheap headlamp for direct illumination. It may look silly, but a headlamp will always point in the right direction, and it doesn't require an extra hand to hold it. A flashlight will work in a pinch, but it will also make multitasking much harder.

4.0 ZIP TIES

Cable management is essential to keep dust accumulation low and airflow high—
and even more importantly, it makes things look nice. Zip ties are the best
way to keep cables in place, but they're also only good for a single use.
Cables that might be moved around in the future can be tidied-up
with black twist ties, which are practically invisible, nearly as
secure, and far easier to remove.

5.0 PLIERS

Sometimes the heads of cheap screws get stripped. When this happens, sometimes the
only option is to use a pair of pliers carefully. Needle nose pliers have a wide
variety of uses, and they often include a wire cutter, which can be used to snip
the excess off of cable ties.
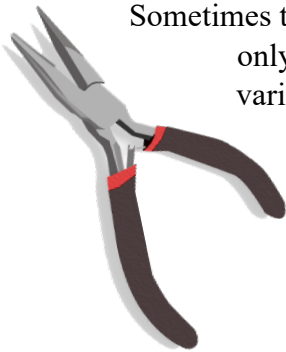
PART B
Sketch of a Motherboard Layout

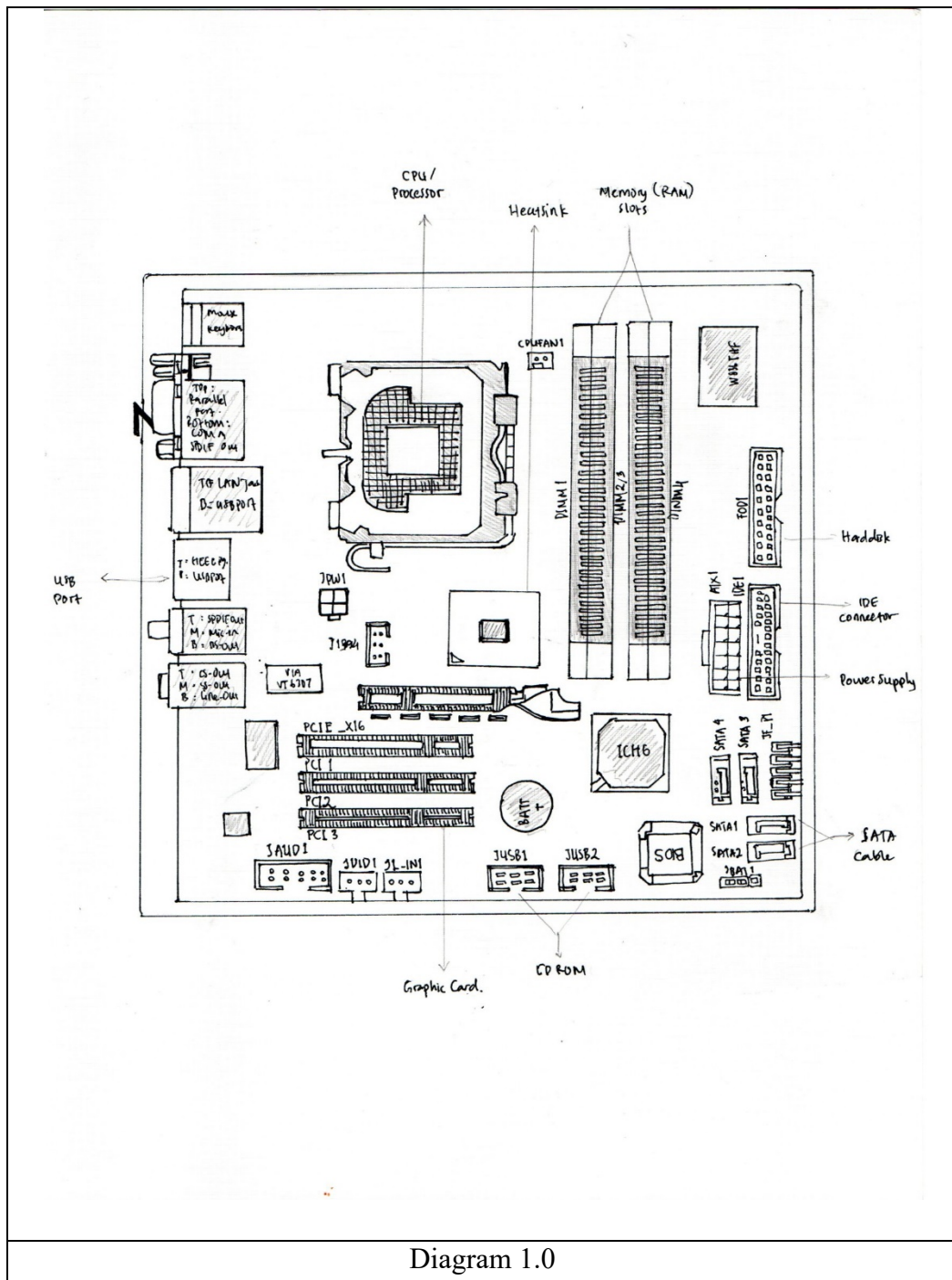### 1.0 Manually sketched motherboard layout

Diagram 1.0

Diagram 1.0 above showed the manually sketched diagram of a motherboard.

2.0 Explanation of keywords

Graphic Card

Graphics card is also called as video card or display card. It enable computers to easily create graphics and images. It is a circuit board designed for displaying high-quality graphics at a high speed on a device with specialized hardware. It is include in most modern computers and often associated with video gamers trying to get the most fun out of their games, it is also helpful for technical applications such as editing photos or editing business videos with Adobe Photoshop or Adobe Premiere Pro. Some example models includes GeForce GTX 1080 Ti, GeForce RTX 3080 and AMD Radeon RX 580X.

Diagram of graphic card.

USB Cable

USB stands for universal serial bus, it is a plug and play interface that enables a computer to connect with peripheral devices and other devices. There is a wide variety of USB-connected devices, from keyboards and mice, to music players and flash drives. USB can also be used to transmit power to some devices, such as the power and battery charging of smartphones and tablets. Some example models includes USB-A, USB-B and Mini-USB.

Diagram of USB cable.

IDE cable

IDE stands for Integrated Drive Electronics, it is a common type of link for storage devices in a computer. IDE typically refers to the cable types and ports that are used to connect various hard drives and optical drives to each other and to the motherboard. ATA and Parallel ATA, which can also be abbreviated as PATA, are also sometimes referred to as IDE. Actually, within the CPU, the IDE is a cable that has a flat shape and a fairly wide connector. The two most common types of IDE cables are the 34-pin cable used for floppy drives and the 40-pin cable for hard drives and optical drives.

Diagram of IDE cable.

CPU / Processor

CPU stands for Central Processing Unit, it is considered as the brain of the computer and consist of several functions. Firstly, CPU performs all types of data processing operations. It can also stores data, intermediate result, and a program instruction. CPU also controls the operation of all parts of the computer. CPU has three main components which is memory or storage unit, control unit and Arithmetic Logic Unit (ALU). All the instructions and data are stored in the memory unit. If required, this unit provides data to other units of the machine. The control unit tracks all processes of computation but does not perform real processing of data. ALU is the most important part that does all the calculations and makes the decisions. Some example models of CPU includes Intel Core i9-9900K, Intel Corei7-9700K and AMD Ryzen 9 3900X.
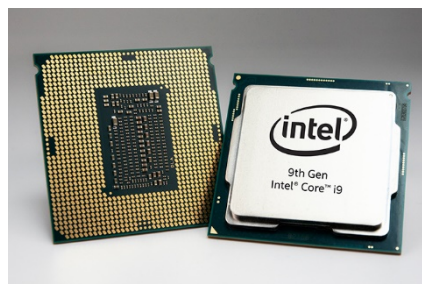

Diagram of CPU.

Slots

On a motherboard, the slots are either configured for a particular feature, such as memory or storage, or for general expansion. A slot for extension devices is the Peripheral Part Interconnect (PCI) slot. Several PCI expansion slots come with most desktop computers. For a range of products, PCI slots are used for modems, network cards, TV tuners, radio tuners, video cards and sound cards, among others. Today, most computers already have some of these cards built in. For expansion cards, the PCI Express slot, like the PCI slot, is used. For graphics cards, PCI Express allows faster transfer speeds than PCI and is thus favored. As the main slot for graphics cards, the PCI Express has replaced the Accelerated Graphics Port (AGP) on most computers. Some example models includes PCI Express RA assy 5.8mm slot 2.3mm pc, PCI EXP 3.1L 64 POS BLK 30u" and PCI Express RA assy 5.8mm slot 3.1mm pc.
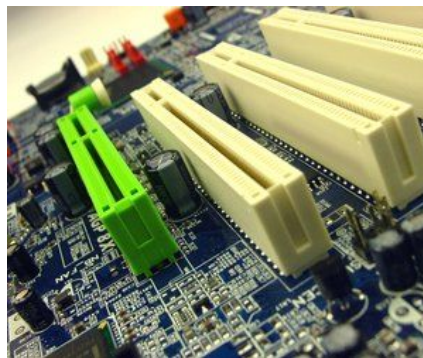

Diagram of slots on a motherboard.

Power supply

For the many parts within the computer case, the power supply unit is the piece of hardware that transforms the power supplied from the outlet into usable power. It turns the alternating current from your wall outlet into a continuous source of power that the computer components need, called direct current. It also controls overheating by regulating the voltage, which, depending on the power supply, can adjust automatically or manually. Some example models of power supply unit includes Corsair CX450, Seasonic Focus Plus Platinum 650W and Corsair SF750.

Diagram of power supply.

Heat sink

Heat sink is a componen in a computer to help keep the CPU cool and prevent it from overheating. The heat sink has a thermal conductor that carries heat away from the CPU through fins that dissipate the heat in the rest of the device to a wide surface area, thereby cooling both the heat sink and the processor. A heat sink needs airflow and therefore it has built-in fans. Some example models of heat sink includes XFP. MSA HEATSINK 10mm TALL, SFP HEATSINK 13.5MM TALL and HEAT SINK SFP DWDM 6.5mm TALL.
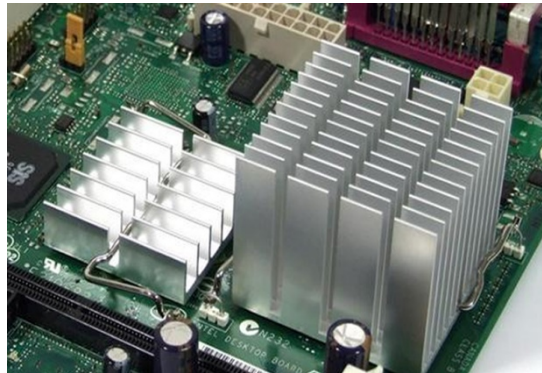
Diagram of heat sink.

RAM

Random-access memory or RAM is a form of data storage for computers that stores program instructions that are commonly used to increase a computer's general speed. Regardless of the physical location of the data inside the memory, a RAM unit enables data items to be written or read at the same time. It makes it possible to access data from its physical location in randomized order, which makes it easy enough to immediately find some unique data information. RAM is used as a computer's primary memory. It is considered to be the volatile memory as the information stored in the RAM may lose when there is no power. When the machine is running, RAM is used by the system's CPU to store and quickly access information. It doesn't permanently store any information. Some example models of RAM includes Corsair Vengeance LED, Kingston HyperX Predator and G.Skill TridentZ Royal.

Diagram of RAM.

Hard disk

Hard disks are flat, aluminum or glass circular plates that are covered with a magnetic material. Hard disk uses spindle of magnetic disks, called platters to record and store information. Up to many gigabytes (billions of bytes) of information can be stored on hard disks for personal computers. The hard drive of a computer is a system consisting of several hard disks, read/write heads, a drive motor to spin the disks, and a small amount of circuitry, all sealed to defend the disks from dust in a metal case. The term hard disk is often used to refer to the entire hard drive, in addition to referring to the disks themselves. Some example models of hard drive includes Seagate BarraCuda, Toshiba X300 and WD VelociRaptor.

Diagram of hard disk.

CD ROM

A CD-ROM which stands for Compact Disc Read-Only Memory is an optical disk containing audio or software data whose memory is read-only. The device used to read them is a CD-ROM drive or an optical drive. A small drive engine, a tracking mechanism and a laser/lens assembly are the key components of a CD/DVD ROM drive, all of which attach through a 40-pin ribbon cable to the computer's motherboard. Example models of CD ROM drives are 9.5mm Sata 3 Notebook Cd-rom Drive and Dell PowerEdge 2850 IDE CD-ROM Drive Tray U8611 M4989.

Diagram of CD ROM

SATA cable

SATA, short for Serial Advanced Technology Attachment (Serial ATA), is an IDE standard first released in 2001 to connect devices to the motherboard, such as optical drives and hard drives. Serial ATA can replace Parallel ATA as the IDE standard of choice for connecting storage devices inside of a computer. Much more faster than an equivalent PATA unit, SATA storage devices can transfer data to and from the rest of the machine. Example models of SATA cable includes LSATA8 SATA Cable, SATA-PWR cable and SATA24 Serial ATA cable.

Diagram of SATA cable.

PART C
Step by Step PC Assembly

STEP 1 – INSTALLING PROCESSOR AND HEAT SINK ON MOTHERBOARD
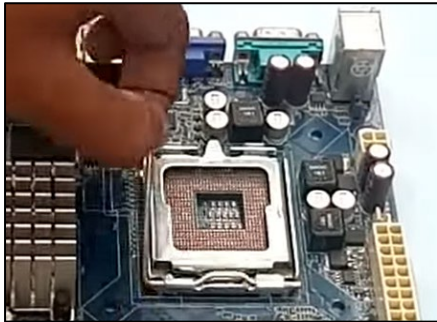
Ground yourself first by placing your hand on an unpainted metal piece of the computer case, using anti-static wristband, or connecting yourself to a grounded metal object with wire to avoid damaging electronic components. Bend the pin of the processor socket and pull it out before installing the processor.
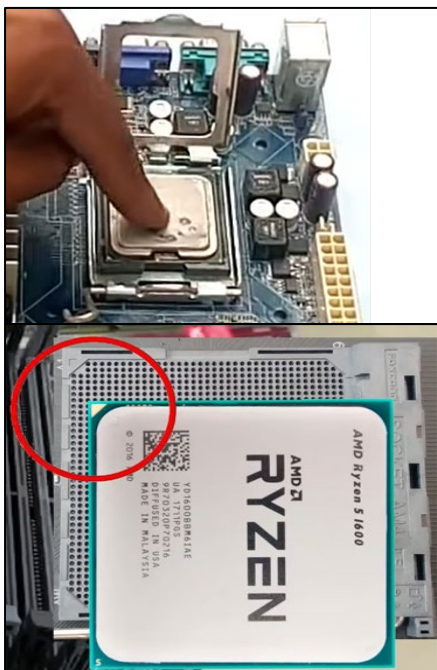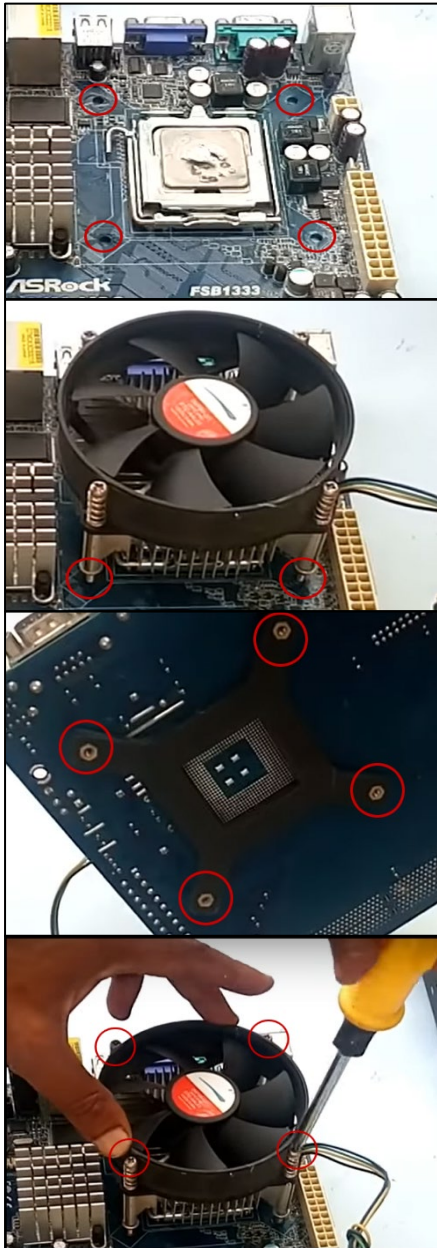

Open the lit of the processor socket. Install the processor into the socket. Make sure the rotation of the processor is correct to install the processor the right way. There is a triangular mark in the corner on both the processor and the socket. Make sure these two triangular marks are coincided when placing the processor onto the socket. After placing the processor into the socket, check again the processor to make sure the processor is fit into the socket.
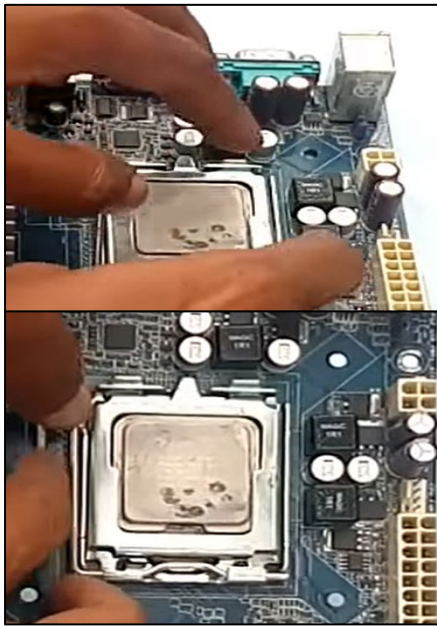
Close the lit of the processor socket after placing the processor into the socket. Push and lock the pin of the processor socket before applying thermal paste.

Apply thermal paste on the processor. Make sure the amount of thermal paste applied is not too much or too less, the thermal paste should be enough to cover almost all the surface of the processor to achieve best efficiency in heat sink. Spread the thermal paste and try to cover all the surface of the processor.

After applying the thermal paste, install the processor cooling fan for heat sink. Place the cooling fan on top of the processor and fit the screws of the cooling fans into the holes around the processor socket. After that, place the plate used to fix the position of cooling fan on the back of the cooling fan. Make sure the position of the plate is aligned to the cooling fan. Tighten the screws of the cooling fan to fix its position.

## STEP 2 – INSTALLING POWER SUPPLY

Place the power supply on the hole at the top of the case. Use the screws in the packet to fix the position of the power supply.

STEP 3 – INSTALLING MOTHERBOARD
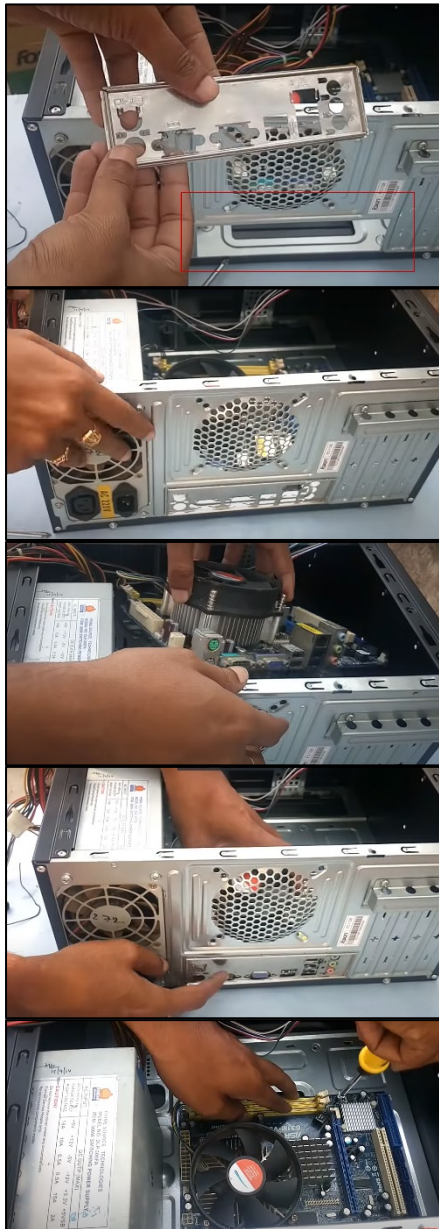
Fix the I/O plate to its place in the hole highlighted. After fixing the plate, make sure the motherboard ports are facing to the slots. Fit the motherboard ports into the slots and do not force the ports to avoid motherboard being damaged. Use the screws in the packet to fix the motherboard to the case.

## STEP 4 – INSTALLING GRAPHIC CARD
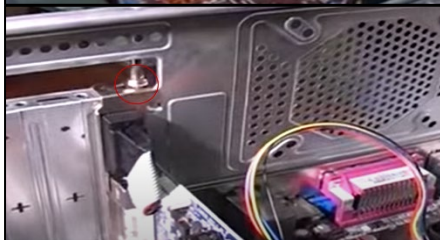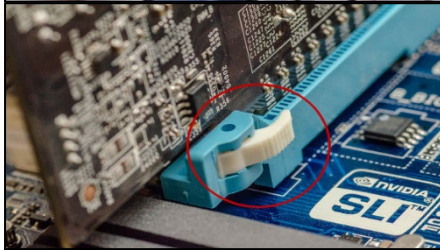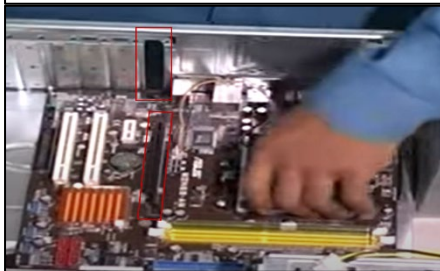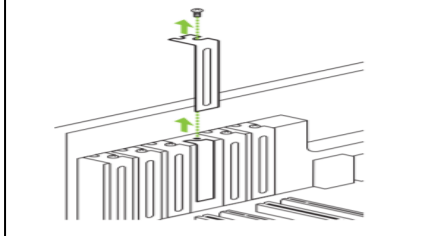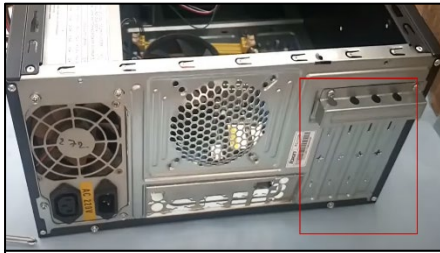
Before installing graphic card, remove one of the slot covers to prepare a slot for graphic card. Before inserting graphic card into PCI-E slot labelled x16 of motherboard highlighted, make sure to unlock the latch at the end of the slot. Make sure the PCI-E x16 connectors of the graphic card is facing towards the PCI-E slot and fit the graphic card into the slot. After inserting the graphic card, remember to lock the latch of the slot. After that, fit the position of the graphic card by using screw at the end of the graphic card with display port.

STEP 5 – INSTALLING HARD DISK
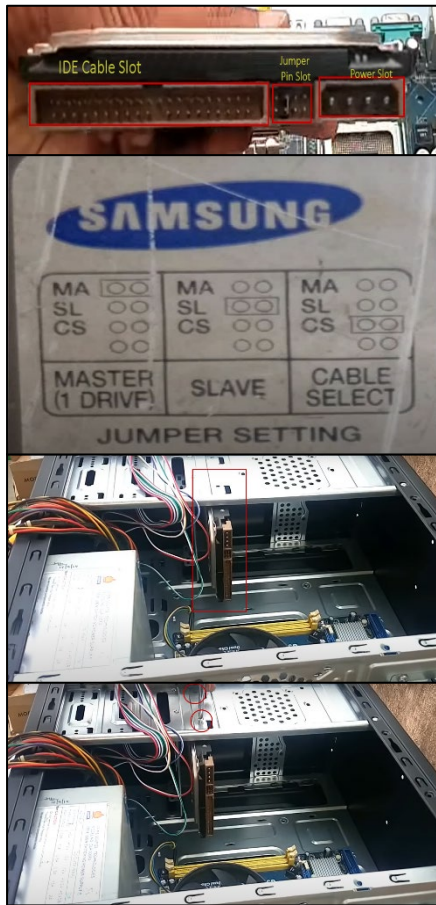
Refer the instruction on the hard disk about jumper setting before setting it. Placing jumper shunt to the corresponding pins will set the jumper setting of the hard disk to 'master', 'slave', or 'cable select'. Place the hard disk into the position highlighted. After that, fix the position of the hard disk by tightening the screws.

STEP 6 – INSTALLING RAM
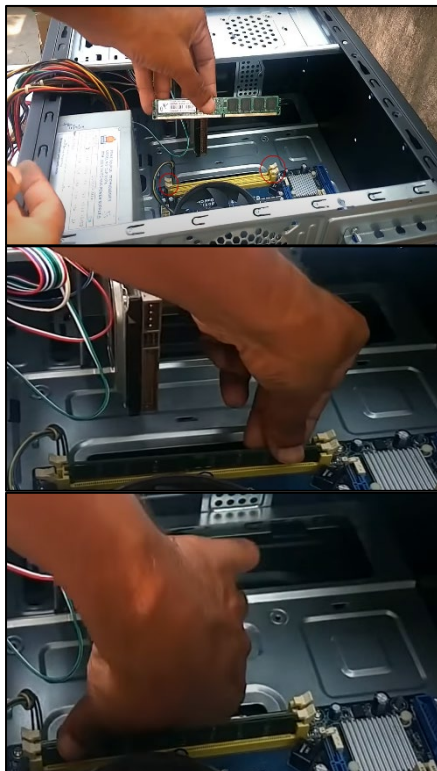
Open the secure locks at both side of the memory slot before inserting RAM. After inserting the RAM into the slot, apply little pressure to one side of the RAM to make the RAM fit into the slot and the secure lock auto-lock the RAM. Then, same procedure for another side of the RAM. If the RAM cannot be fit into the memory slot after applying pressure, try to flip the RAM and insert again. Do not try to force the RAM fit into the slot if it does not fit.

# STEP 7 – INSTALLING CD ROM

Ply the drive bay below the audio ports to prepare a slot to place CD ROM. Insert CD ROM into the slot prepared and push it until it fit the slot. Try not to hit it to fit it into the slot, this might result the CD ROM damaged. After the CD ROM is fit into the slot, use the screws to fix its position to avoid it falls in the future.

# STEP 8 – CONNECTING POWER, IDE, SATA, ETC. CABLES
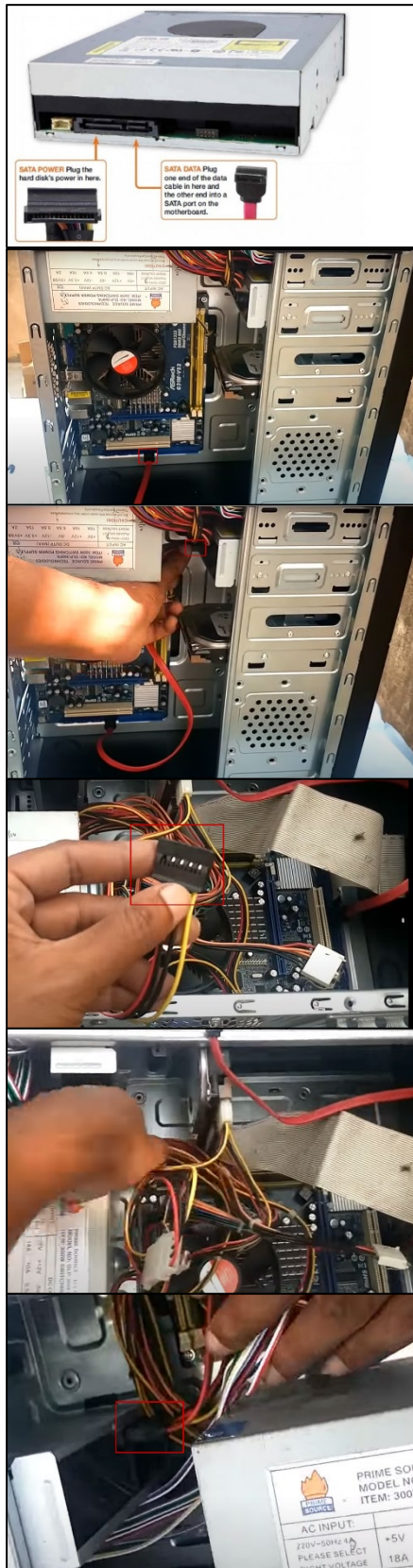
Connecting the CD ROM and motherboard by using a SATA cable. One of the ends of SATA cable is inserted into the SATA cable port on motherboard while the other end of SATA cable is connected to the SATA cable port on CD ROM. Next, connect the power supply to CD ROM. Most of the CD ROM are powered by SATA power supply cable. Plug in the SATA power supply that connected to the power supply to the SATA power supply slot of CD ROM. Make sure the connection is firm.
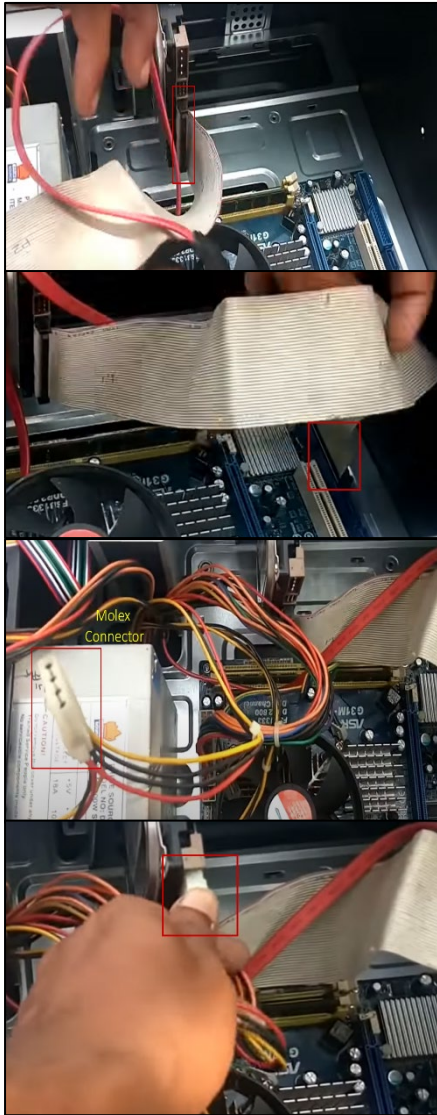
Connecting the hard disk and motherboard by using IDE cable. One of the ends of IDE cable is connected to the IDE cable slot of hard disk and the other end of IDE cable is connected to the IDE cable port on the motherboard. Some of the hard disk drive are powered by SATA power supply cable while some of the hard disk drive are powered by Molex connector. For this example, the power supply cable used is Molex connector. Plug in the power supply cable to the power slot of the hard disk drive and make sure the connection is firm.
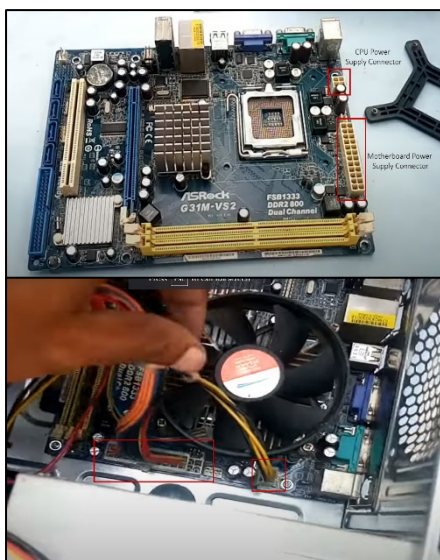

To power both the motherboard and processor, a 24 pin or 20 pin power cable and an 8 pin or a 4 pin CPU power cable from the power supply unit are required. The CPU power cable usually will be labelled 'CPU'. Plug in the power cable into motherboard power supply connector. A firm push in is needed to make sure the cable is inserted into the connector to avoid it loose in future. After that, plug in the CPU power cable into the CPU power supply connector with a little push to make sure the cable is firmly fit into the connector. Most of the 8 pin CPU power cable is divisible to 4+4. The 8 pin CPU power cable can be detached to two 4 pin CPU power cable and use either one of them to power the CPU if the CPU power supply connector is for 4-pin.
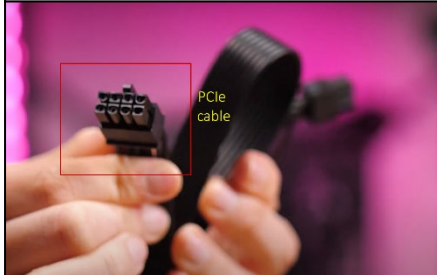
There are some graphic cards required direct power connection. If the graphic card does need a direct power connection, use the PCIe power connector cables that connected to the power supply unit. The number of cables required are based on the graphic card, some graphic card required 1 connection while some required 2 connections. The number of pins of the connector required also depends on the graphic card. Most of the PCIe cables can be split to 6+2. Plug in the PCIe cable into the power slot of the graphic card based on the number of connection and number of pins required. Insert the cables firmly to make sure the connection is in good condition.
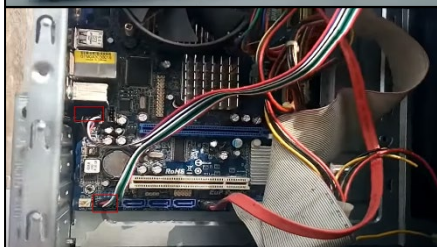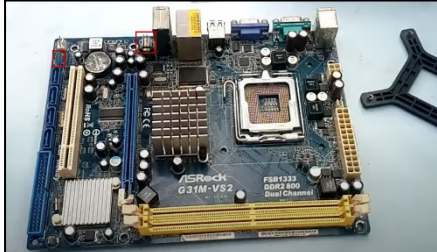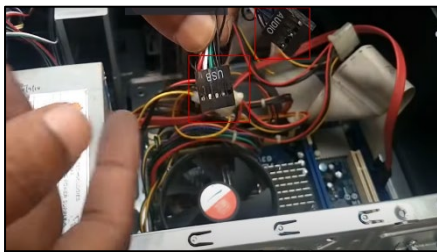
Connecting the front panel USB and audio port by using the USB cable and Audio cable to the USB port on motherboard. Make sure the connections are firm.
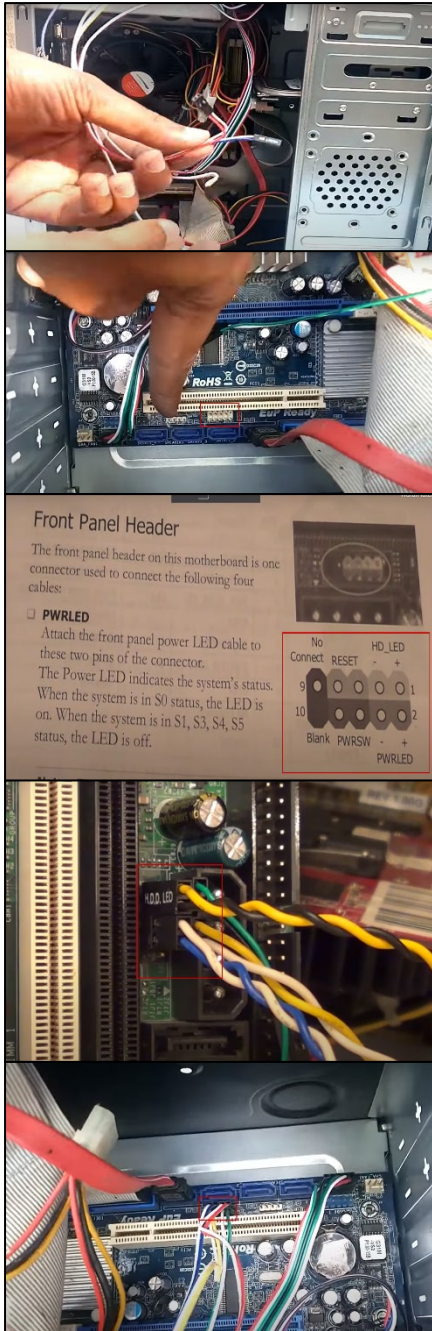
Connecting the front panel power and reset buttons through their respective cables to the motherboard. This process should refer to the motherboard manual to make sure the connections are correct. Connect the cables to their respective pins based on their name labelled such as 'POWER LED', 'H.D.D. LED', 'POWER SW' and 'RESET SW'. Make sure the connections are correct.

STEP 9 – CLOSING THE CASE AND CONNECTING THE PERIPHERALS

Place the side cover back on and secure the side panel with case screws.

Connect peripheral devices which include keyboard, mouse, wireless network dongle, printer, and webcams with your CPU by plugging into USB port. Many cables are only fit a specific way, do not force it if the cable does not fit. Try to change the alignment of the cable and connect it again.

Then, connect speakers and microphone into 2.5mm sockets. The pink socket is for microphone while green socket is for speaker.

Display Ports

Finally connect the CPU with monitor by plugging into display ports. Plugging into the HDMI port, VGA port or DVI port based on your monitor required port type. If VGA cable is used, make sure to tighten the screws on the cable to secure it.