SCHOOL OF COMPUTING
Faculty of Engineering

(Technology and Information System)
Assignment 3 - Basic PC Assembly
Group III
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PART A

1.Screwdriver

The Screwdriver function is because computers are held together with screws and to tied it up we need the screwdriver

2.Anti-static mat

Anti-static mat 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.

3.Light source

PC cases are full of shadows, and screws love to roll into the darkest corners. Headlamp will be the best choices 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.

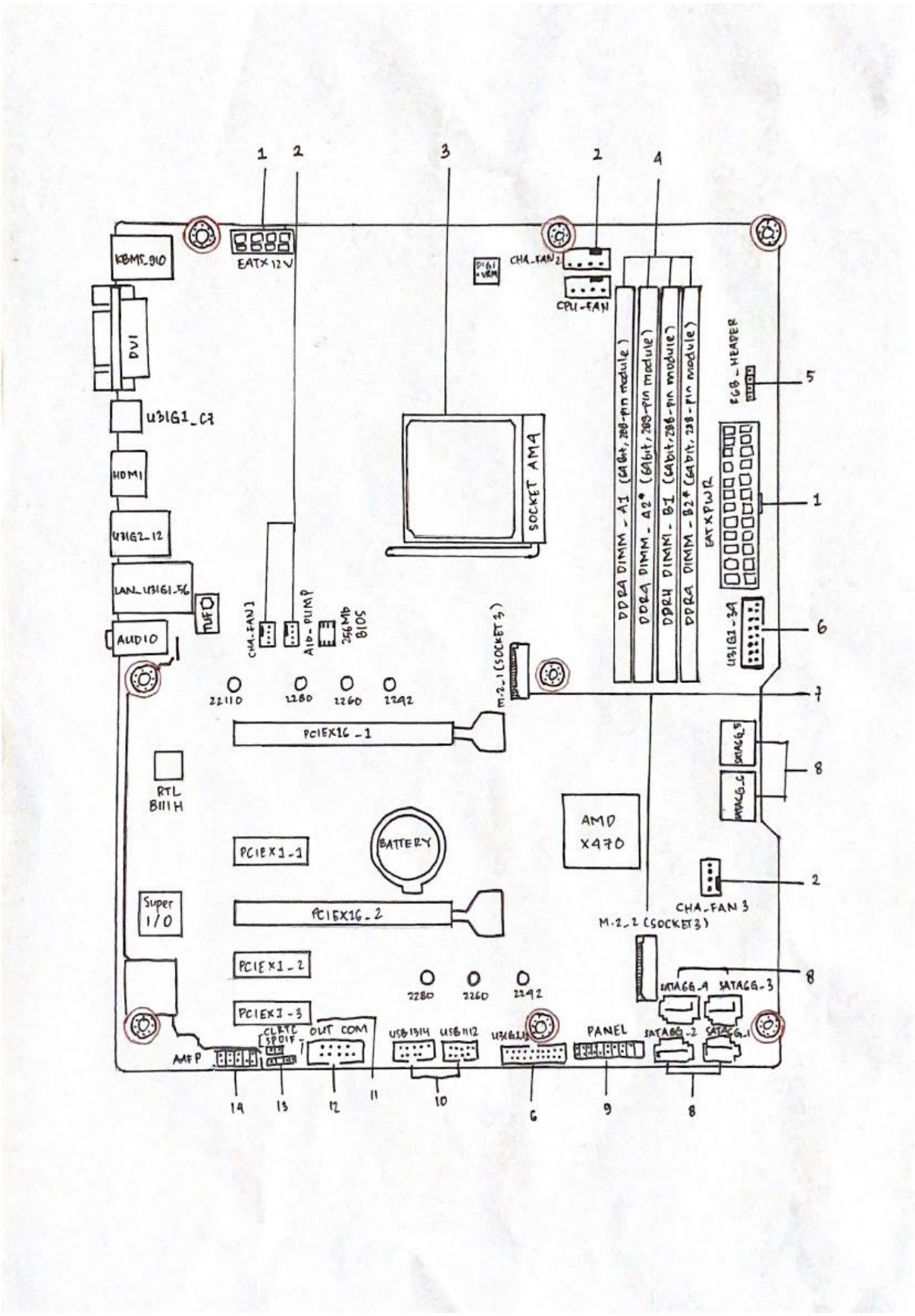
4.Twist ties

Cable management is essential to keep dust accumulation low and airflow high—and even more importantly, it makes things look nice. Twist ties are the best way to keep cables in place, but they're also only good for a single use.

5.Pliers

In some case, unfortunately, sometimes the heads of cheap screws get stripped. When this happens, the best option is to use a pliers.

PART B



1.ATX power connectors (24-pin EATXPWR; 8-pin EATX12V_1; 4-pin EATX12V_2) (ATX power connectors are designed to connect a computer's power supply to an ATX motherboard.)

2.CPU, CPU optional, AIO pump, water pump, extension, M.2, and chassis fan connectors (4-pin CPU_FAN, 4-pin CPU_OPT, 4-pin AIO_PUMP, 4-pin W_PUMP+, 4-pin M.2, 5-pin EXT_FAN, 4-pin CHA_FAN1-2) (The CPU_FAN connector supports the CPU fan.)
3.CPU socket (CPU socket or CPU slot contains one or more mechanical components providing mechanical and electrical connections between a microprocessor and a printed circuit board (PCB).)
4.DDR4 DIMM slots (Slot for RAM)
5.RGB header (4-pin RGB_HEADER1-2)(RGB or ARGB headers are used to connect RGB LED strips and other RGB accessories to your PC.)
6.USB 3.1 Gen 1 connectors (20-1 pin U31G1_12, U31G1_34) (USB 3.1 slot)
7.M.2 Sockets (M.2_1 (Socket 3); M.2_2 (Socket 3))
(M. 2 is a slot that can interface with SATA 3.0)
8.Intel® Serial ATA 6 Gb/s connectors (7-pin SATA6G_6, SATA 6G_5)(Serial ATa connectors.)
9.System panel connector (20-8 pin PANEL)(system panel header controls a computer power button, reset button, and LED's.)
10.USB Slot (For USB slot)
11.VROC_HW_KEY connector (4-pin VROC_KEY)(VROC hardware key is the mechanism to obtain a license to the Intel VROC software.)
12.Serial port connector (10-1 pin COM)(Serial port connector.)
13.Clear RTC RAM jumper (2-pin CLRTC)(This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS.)
14.Front panel audio connector (10-1 pin AAFP)(For audio slot connector.)

PART C

Assembling a PC can be a daunting experience, but with this guide, it will be a breeze. In order to build a PC, you will need a couple of components including but not limited to:

1. Processor (CPU)
2. Computer Case
3. Memory (RAM)
4. Power Supply
5. SATA Cables
6. Motherboard (SATA Capable)
7. Processor Fan
8. Hard Drive (SATA Capable)

Most if not all are purchasable in any computer shop, or as the norm, you can also use an online e-commerce website. After getting your components, it is also important to have proper tools to assemble it; this is a list of some of the tools needed :

1. Screwdriver (for slotted and Phillips head screws)
2. Small container to hold screws

All of these tools are the bare minimum to build a PC; you can also prepare a set of cable management sleeves to clean and organise the cables inside your computer. And above all, all components are different, so it is always a good practice to read the user manual before doing any significant steps.

Step 1 - Prepare the computer case for assembly

Open the case screws with your screwdriver, most cases will have its screws in the position marked in the picture, but your case may differ. After removing the screws, remove the backside panel by pushing it to the side.

Warning: Case may have sharp edges, handle with care.

Step 2 -Install Power Supply

Now is an excellent time to install your power supply to the case. If you do this in the final part of the process, you will have a hard time installing it. Your case may have the PSU (Power Supply Unit) slot on the top part of the case or the bottom. Whichever it is, the process will be the same.

Insert your PSU into the appropriate slot and keeping in mind the location of the screws, the orientation is also essential. Because every case differs, you will need to refer to the instruction manual to make sure that your PSU is in a good position. Most cases nowadays

will have its slot on the bottom part of the case and connected like this.

Warning: Make sure that it is firmly attached, and no movement is felt.

Step 3 - Prepare Motherboard for Out-of-Case Installation

Now from here, you can go with two different approaches to building your PC you can either:

- **Build PC Outside Case:** This involves installing some of your components (CPU, cooler, RAM, M.2 SSD) onto the motherboard first before installing the motherboard into the case.
- **Build PC Inside Case:** With this method, you fit the motherboard into the case first and then install your components onto it.

Each approach can work, but it is easier to use the first approach as you will have more room to fit your other component and avoid unwanted obstruction. and for the sake of this guide, we will use the first method. After preparing your case, take out your motherboard and put it

on top of the cardboard box it came with.

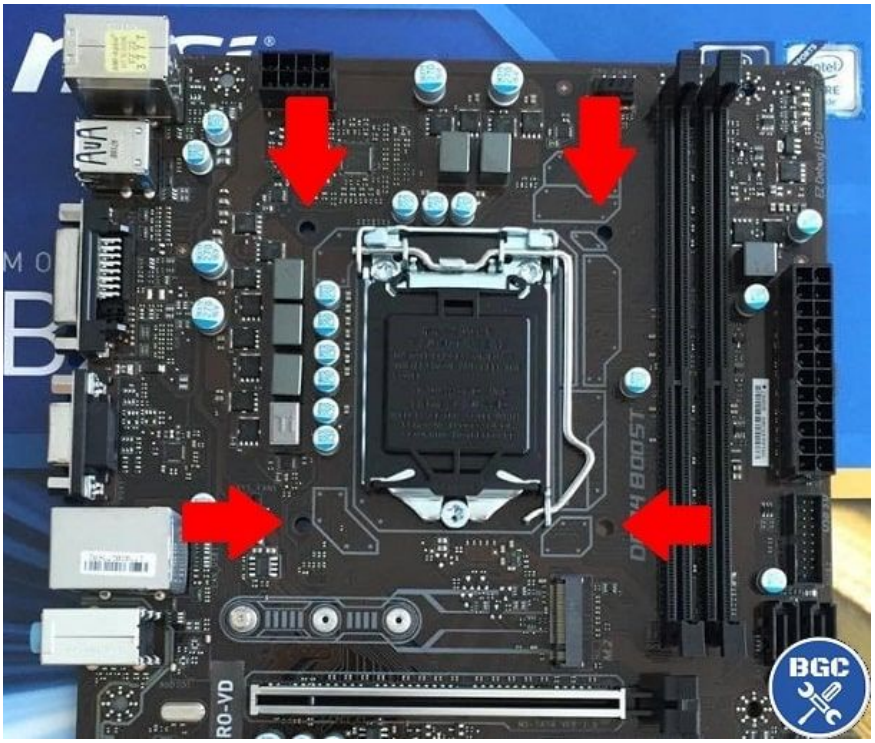
Step 4 - Installing CPU

This part arguably is the most dangerous part of the whole process if not taken with caution, All CPUs are different from one another, for example, an Intel CPU and AMD will have different socket and installation approaches. You will have to read the user manual of your CPU before putting it into the motherboard. A rule of thumb is to align all the marked areas on both your CPU and motherboard and put it in the slot, don’t worry about damaging your motherboard, the motherboard is designed to be quite sturdy. But don’t put excessive force on installing any components.

Step 5 - Mount Heatsink and Fan on Motherboard

Congratulations! from here onwards it's smooth sailing if you have successfully installed your CPU all the other steps are precisely like putting legos. Now we will install the heatsink for our CPU, inside your CPU box there will be a Heatsink with a cooler attached, take it out and **DO NOT** touch the bottom part that has the heatsink compound. For this guide we will use the included heatsink that came with the CPU, you can also use a custom heatsink for your CPU by buying a compatible one according to the type of CPU and motherboard you have. But most of the time the heatsink included will suffice.

Locate the fan socket in advanced before installing your cooler as this will make your life easier after that refer to your motherboard manual as for the exact location of your socket



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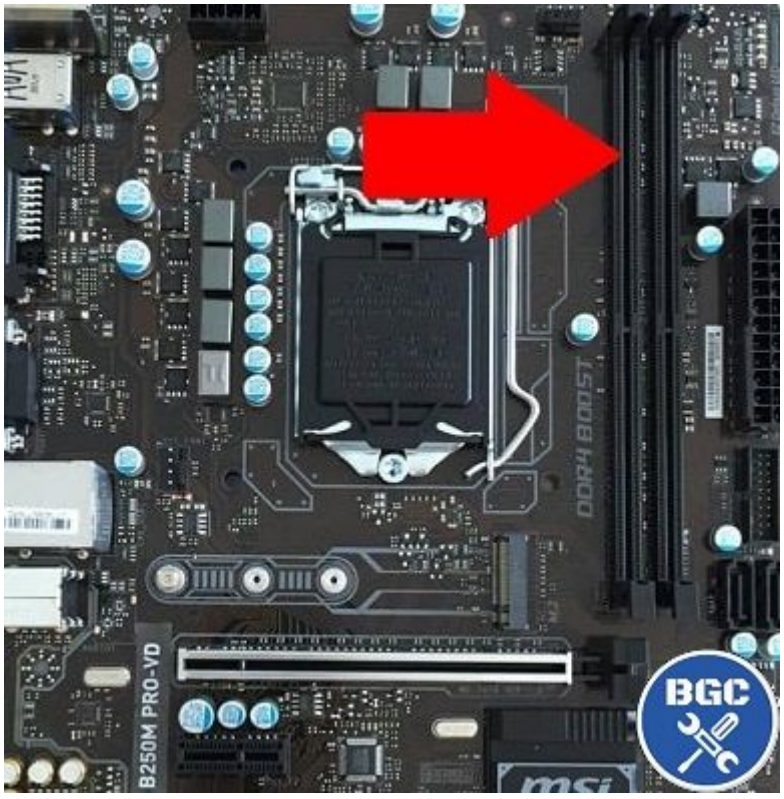
This will be your general guide to where the location of the sockets is. Align each corner of the CPU cooler with the four holes that surround the CPU socket

Lock your cooler in place by pushing down on each of the four corners until you hear a clicking sound for each. To check if the Intel stock cooler is properly locked in, carefully lift the motherboard (holding the CPU fan to do this is fine) and check to see whether the four corners of the cooler have all come through on the back of the motherboard. Remember to only touch your motherboard by its edges. Also, try to gently lift the cooler out of its place to see if it's nice and firmly locked in.

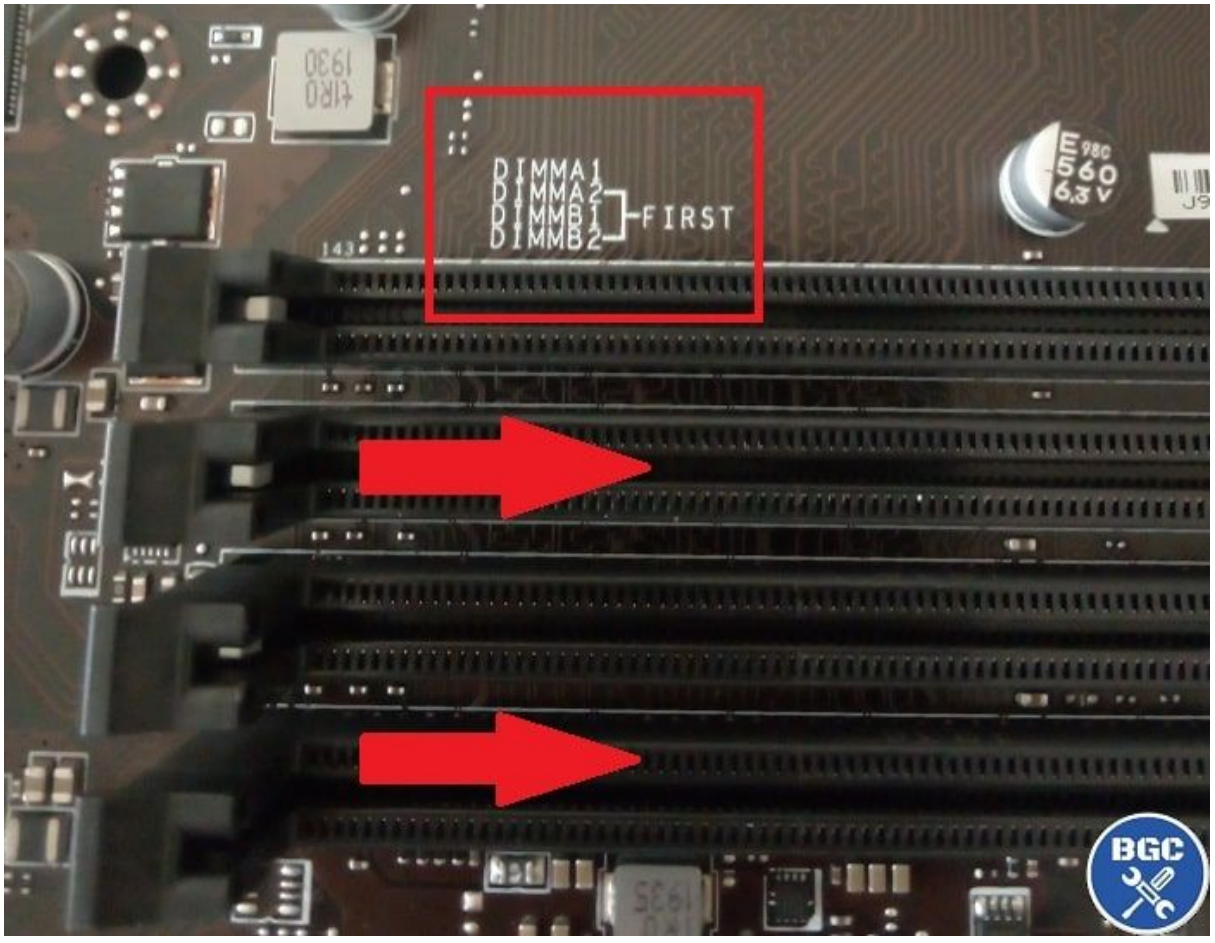
It should be tight, and if one of the push pins isn't locked in place properly, you won't have an evenly balanced cooler which may lead to undesirable temperatures down the road because the cooler base isn't entirely touching the processor.

Step 6 - Installing RAM

If you are installing a single RAM you will only need to search for the DIMM slot on your motherboard, it will always go in the first slot from the left but putting it in either slot is acceptable. But if you are using dual-channel RAM, you will need to pay attention to which slot you install it in. Putting it in the wrong slot will result in the RAM not working optimally or not even working at all, don’t worry failing to put your RAM on the correct spot will not damage anything, and you can always go back to change it later.

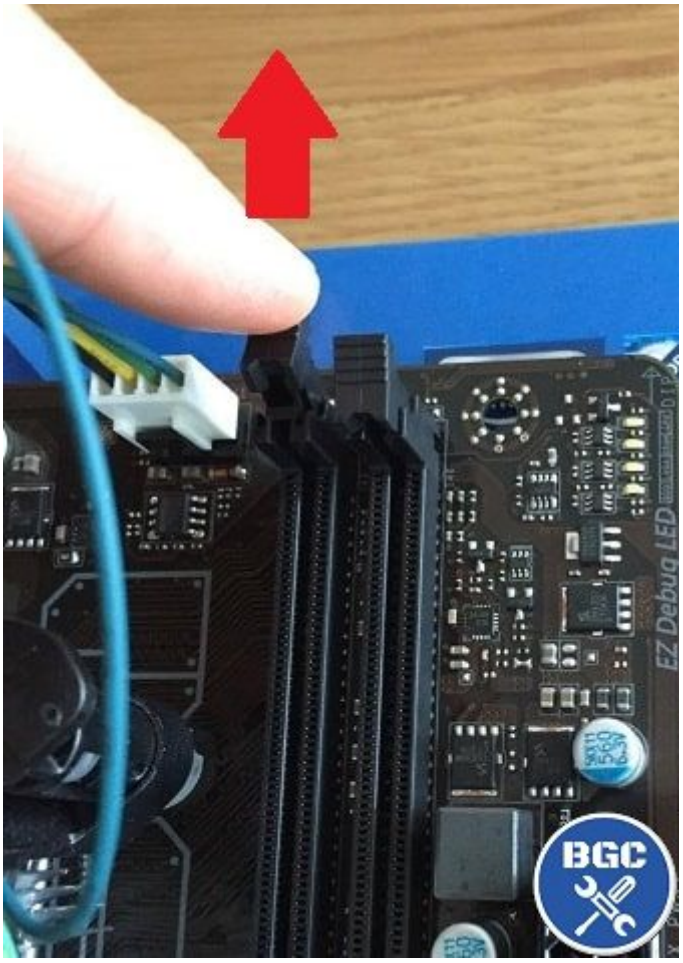


When installing single RAM module, insert it into DIMM slot marked with either “1” or “0”



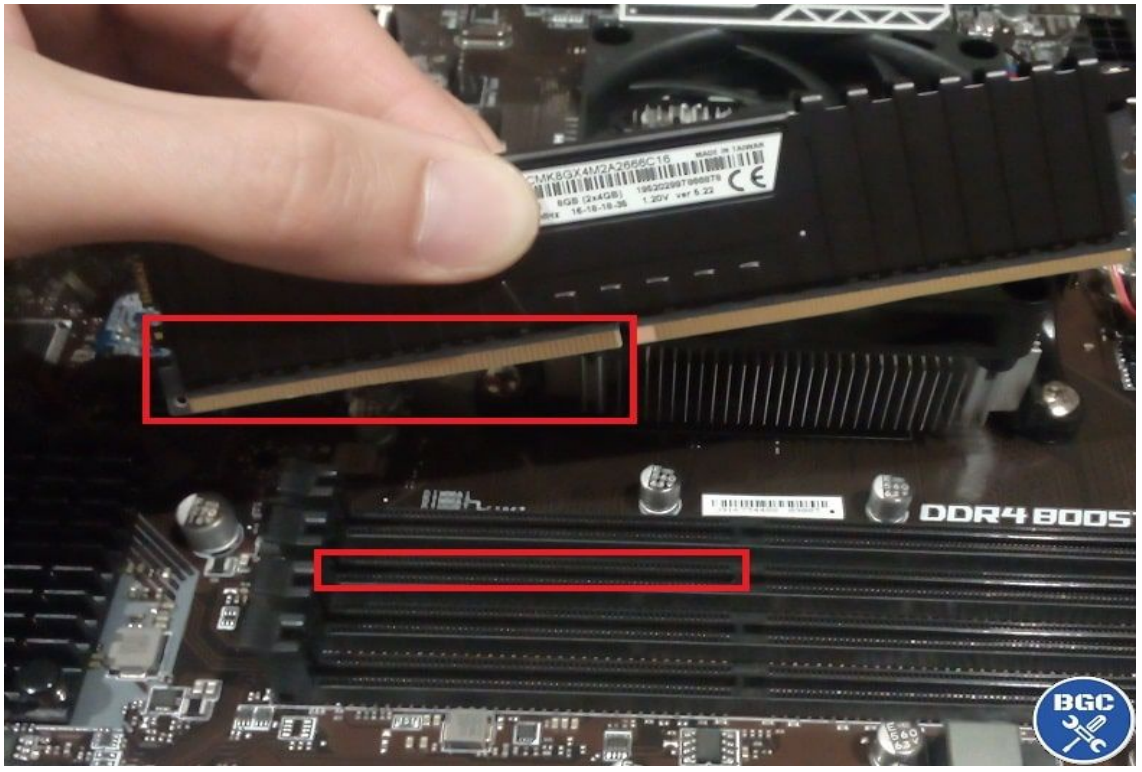
When installing dual-channel RAM refer to the user manual of your motherboard, and also look for these markings. Put your RAM module sticks on slot 1 and 3 or 2 and 4 according to the user manuals.

Now if you have located your DIMM slots and have decided on what combinations of RAM to use, all that's left to it is to insert it!



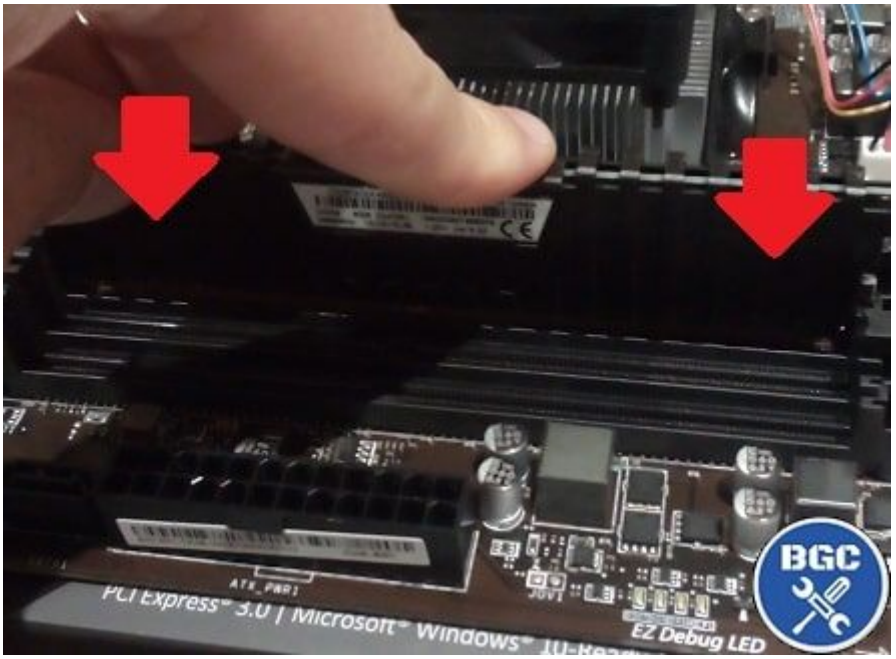
Unlock the safety pin in your DIMM slot by pushing it down

Take out your RAM modules from the box, keep in mind if your RAM has exposed circuitry, hold it by its edges and don't touch the circuit on the sides. If your RAM has a heatsink built into the sides, you will have no problem handling it by the sides.



There’s only one way of installing a RAM module, Align your RAM stick with the socket below, match the cutout of the socket with your RAM stick.

After making sure of the proper orientation, insert your RAM stick into the socket in a slight angle. Lower half of the end first to prevent the RAM stick from getting damaged.



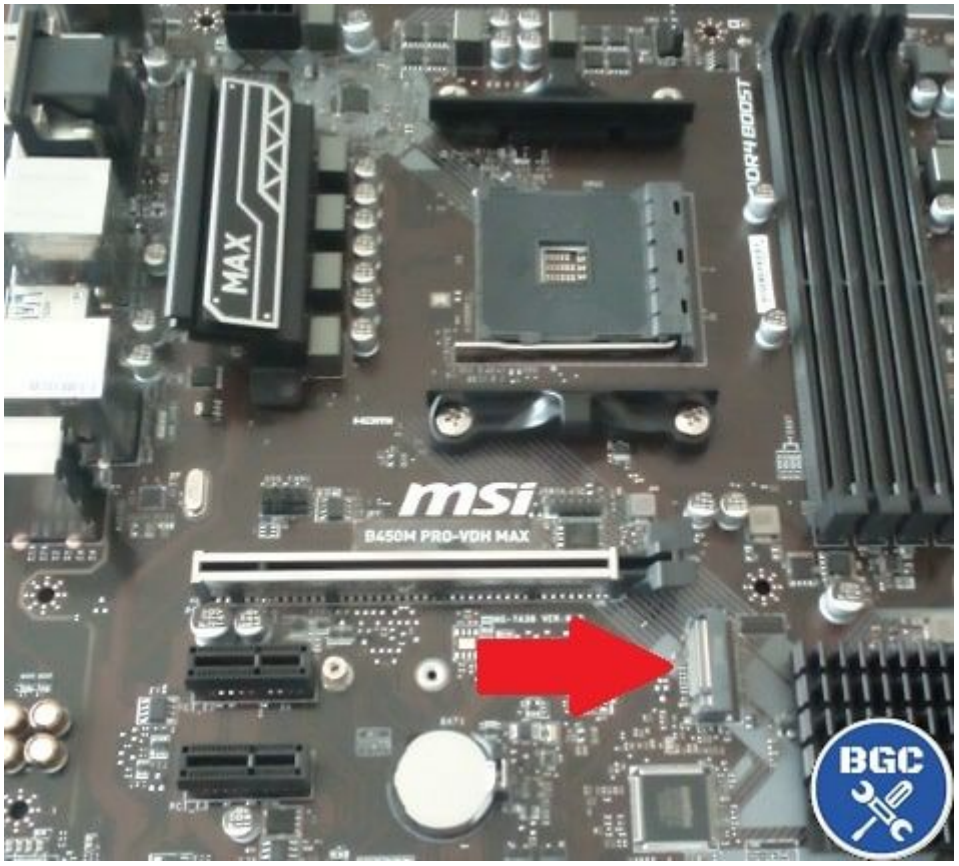
Then put the other half into the slot and push it evenly down. By doing this, you will insert the RAM stick into the socket. The safety pins in the sides might be locked down and make a clicking sound, don't worry as you have done the right thing. Now repeat this process if you have more than one RAM stick.

Step 7 - Installing Hard disk and SSD

Depending on your Hard disk or SSD there might be two different ways of installing it, on this guide we will cover how to install a case mounted Hard disk and an m.2 SSD that connects to your motherboard.

M.2 SSD

M2 SSD is a small form factor SSD that connects directly and stays on your motherboard, in use M2 SSD are precisely the same as usual 2.5-inch case mounted SSD. First of all, locate the M2 socket in your motherboard, some motherboard may not even support this connection option.



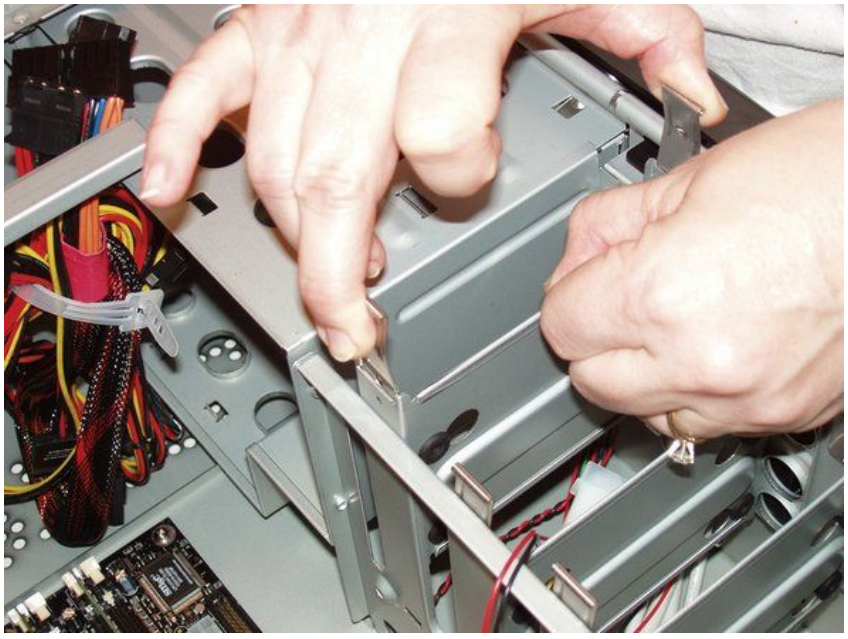
After finding the socket location, prepare your M2 SSD for application.

Take your SSD and put it in the socket by aligning the proper cutout for it. After making sure it is well connected, you will need to screw it down into the motherboard. If you don't screw it down the SSD will hang around mid-air and may break by its own weight.

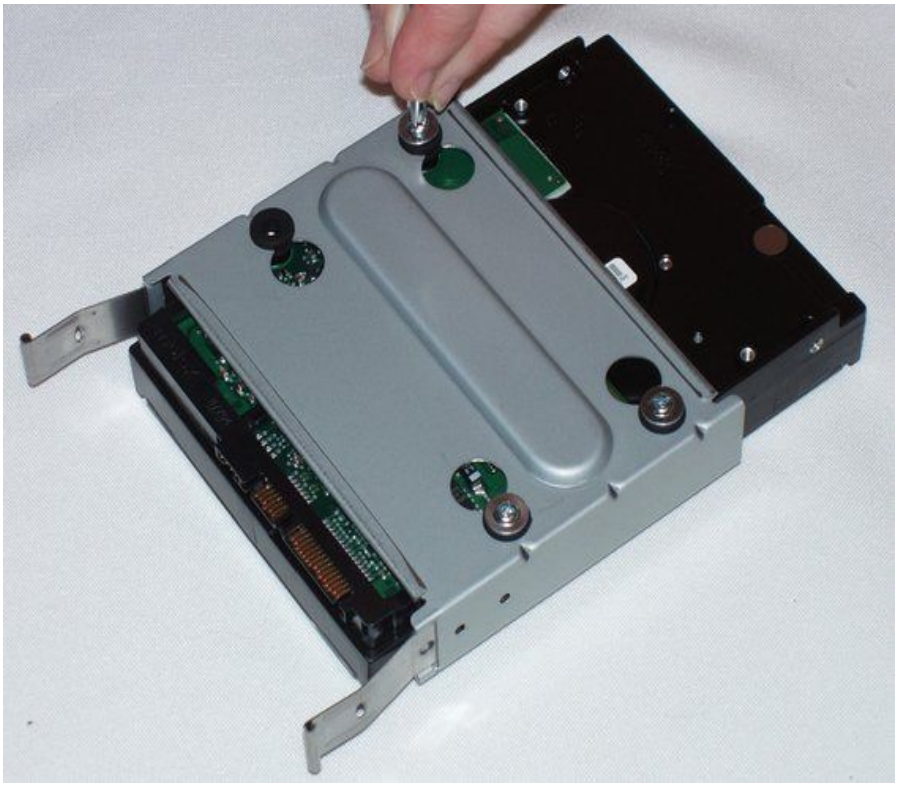
Secure your SSD by screwing it down with the screw provided. The screw will most likely be included with your motherboard. Push down the SSD into the same level as your screw and secure it tightly with the screw.

Case mounted Hard Disk or SSD

A hard disk and SSD that is case mounted will have the same method of application. Most cases usually include a drive tray to insert multiple drives onto it.



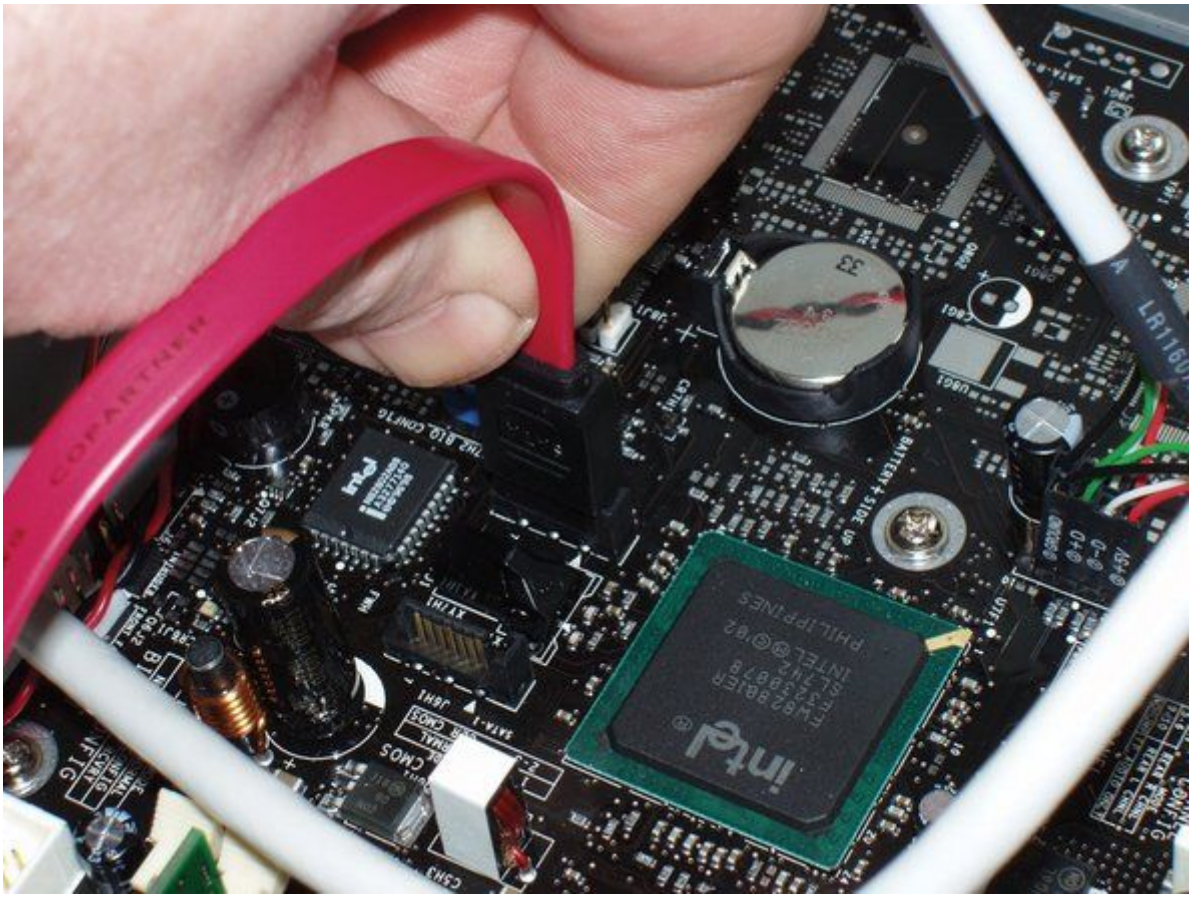
Take out one of the internal hard drive trays by unscrewing it.



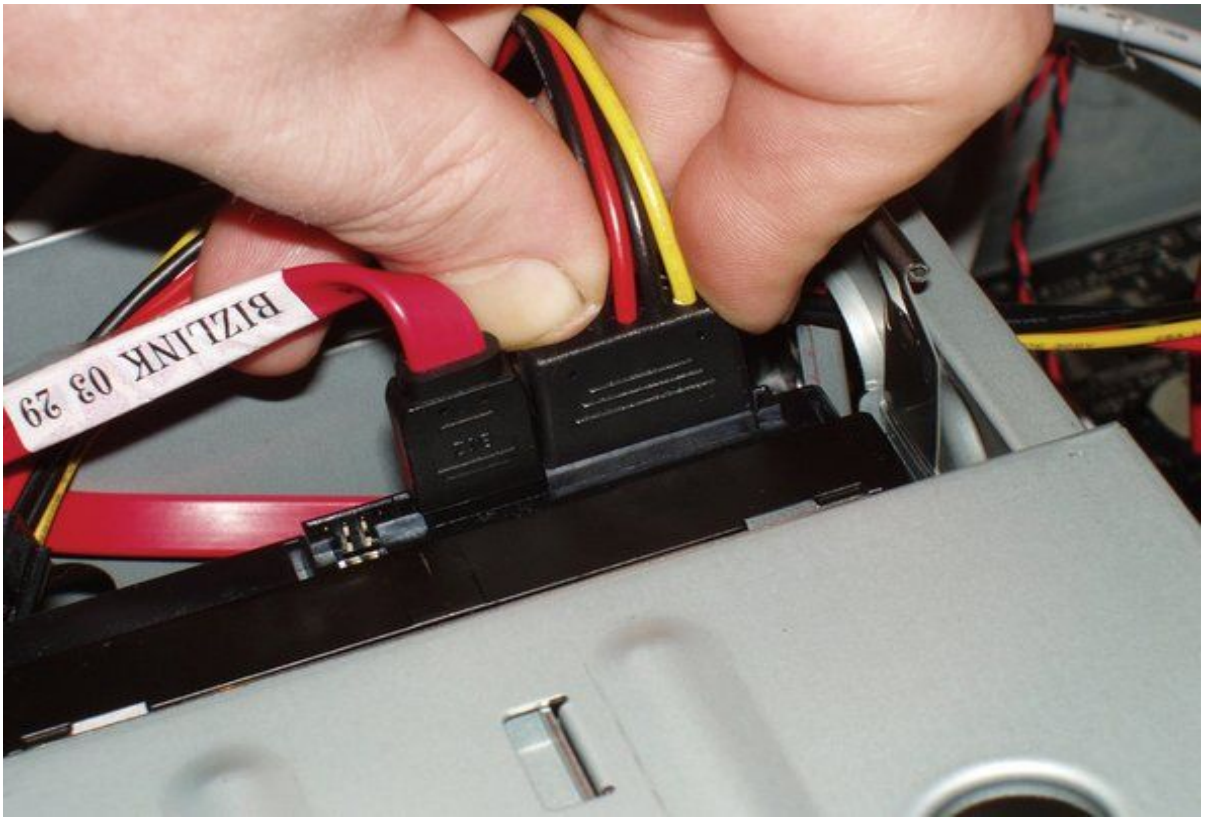
Take your hard drive and screw it down into the tray by adjusting it with the socket provided, you will find the appropriate screws inside your hard drive box. After securely putting your drive into the tray all that's left is to insert it back to the hard drive storage inside your case.

Now on this picture, you will see that the hard drive is back into its former position. Make sure that it is firmly screwed down to prevent damage. For your motherboard to use the hard drive you will need to connect it with a SATA cable

This cable is the way how your motherboard and drive talks together, it usually included when you purchase a new drive. Insert your cable to the drive as instructed in the user manual; you can also refer to the picture.



Now connect the other end of the cable to your motherboard SATA socket, it usually exists in the bottom right part of your board. The part where you connect the SATA cable into your motherboard can be done when you have inserted your board into the case.



Connect the power cable from your power supply into the hard drive, and you are all set!

the power supply cable will look like this. Insert it into the hard drive to provide power.

Step 8 - Mount Motherboard into Case

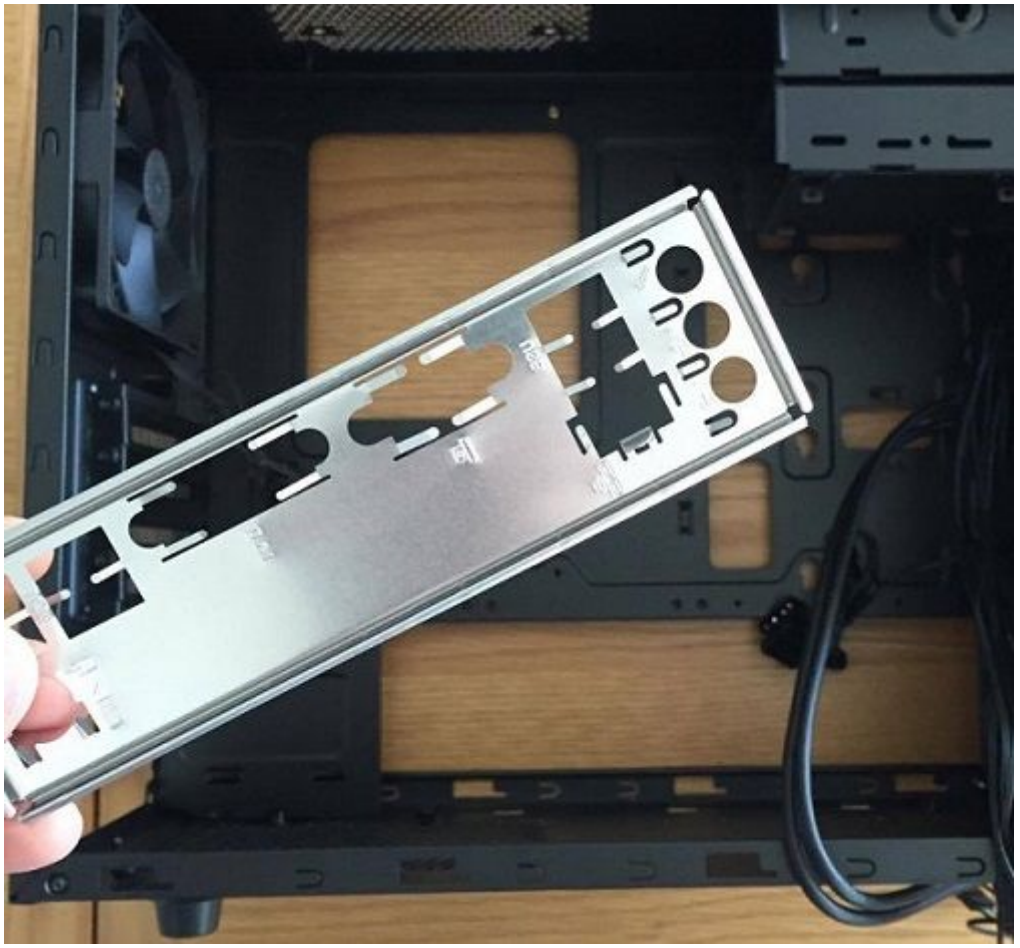
After installing your components, it's time to insert it into the case, follow these steps to insert your motherboard correctly.

1. Install Motherboard IO Shield.

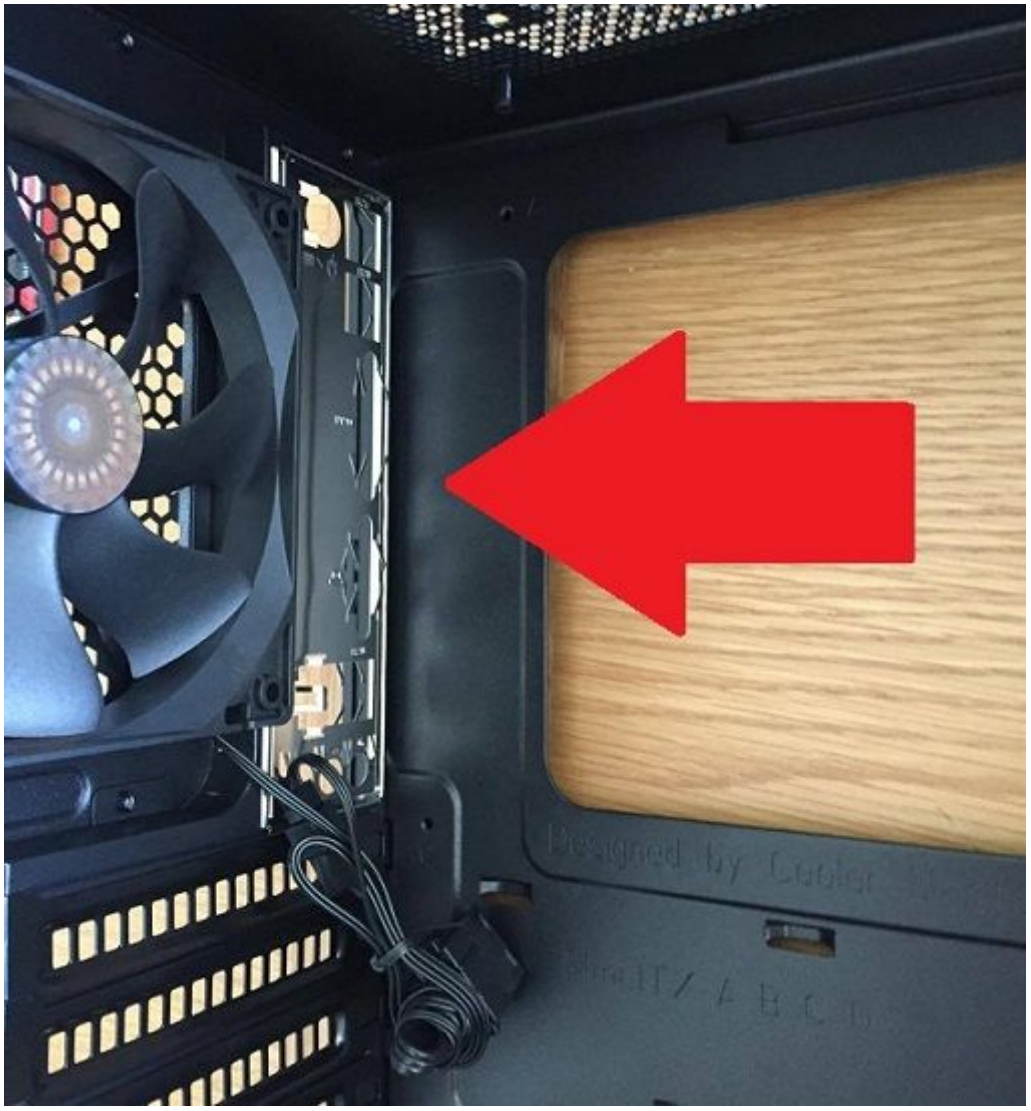
The first step to installing a motherboard into your computer case is to fit the metal backplate, also called the IO Shield (Input Output Shield). This backplate is used to protect the rear of your motherboard, and it has cutouts for the rear connections on your board. Some motherboards, usually higher-end models, already have a backplate/IO shield attached to the motherboard

Higher-end motherboard model may have IO shield Integrated.

If your motherboard has integrated IO shield, you can skip this part. Now for those of you who are not lucky enough to have it built-in, you will need to follow these steps.



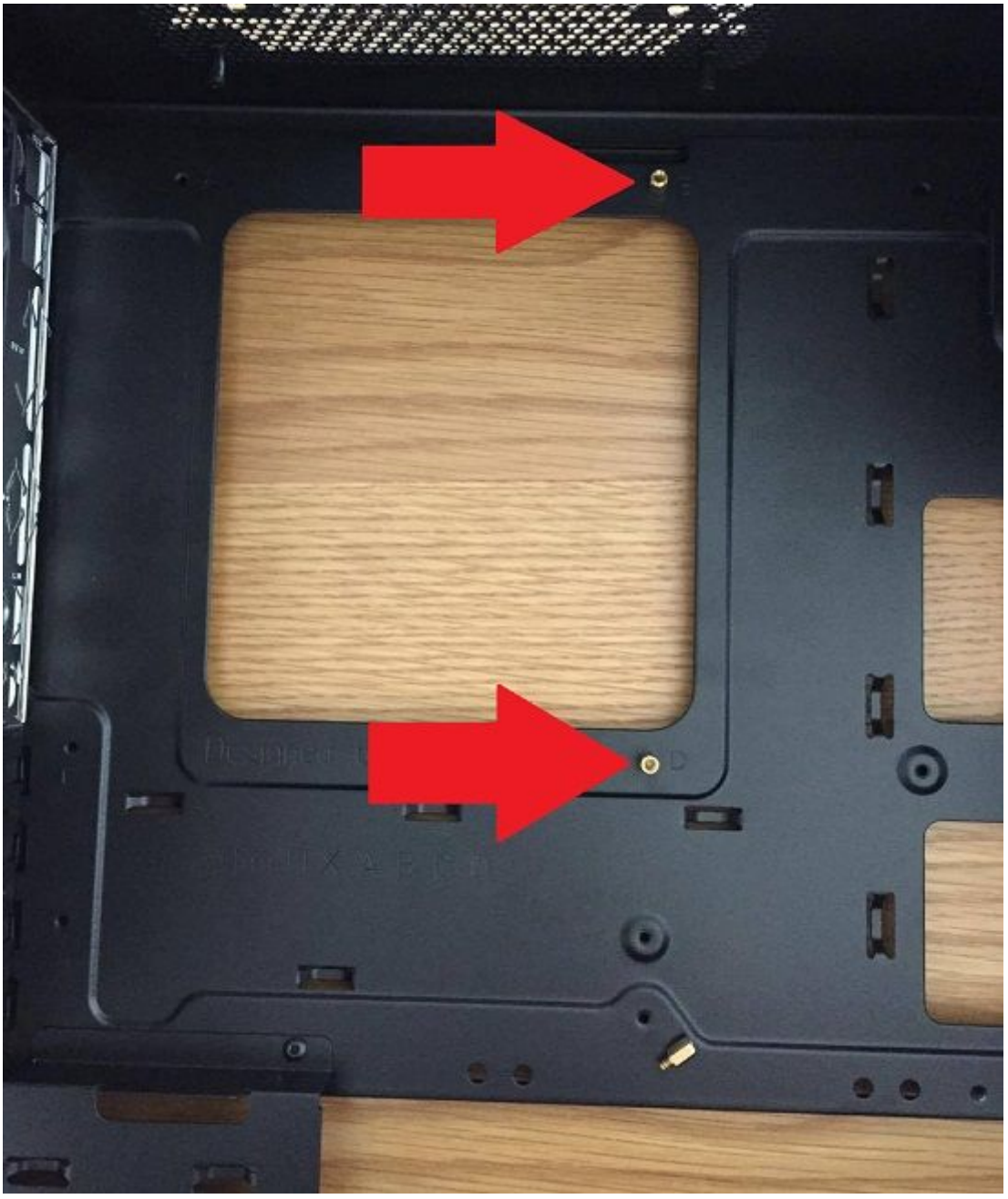
Prepare your IO Shield, it is located in your motherboard box.



Now put it into the backside of your case as shown, you may need to use force to fit it into place so don’t worry about it! Make sure that it is firmly connected to your case. To make sure that your IO shield is well-connected try pushing it a few times from the backside and make sure it doesn’t fell out.

2. Motherboard Stand-Off

No, it’s not a wild west showdown of your motherboards, a standoff or sometimes called a riser is a small screw that connects to your case to provide space between the case and motherboard, it is used to prevent electricity going to your case making damage to the motherboard. You will find these small screws inside your motherboard box.

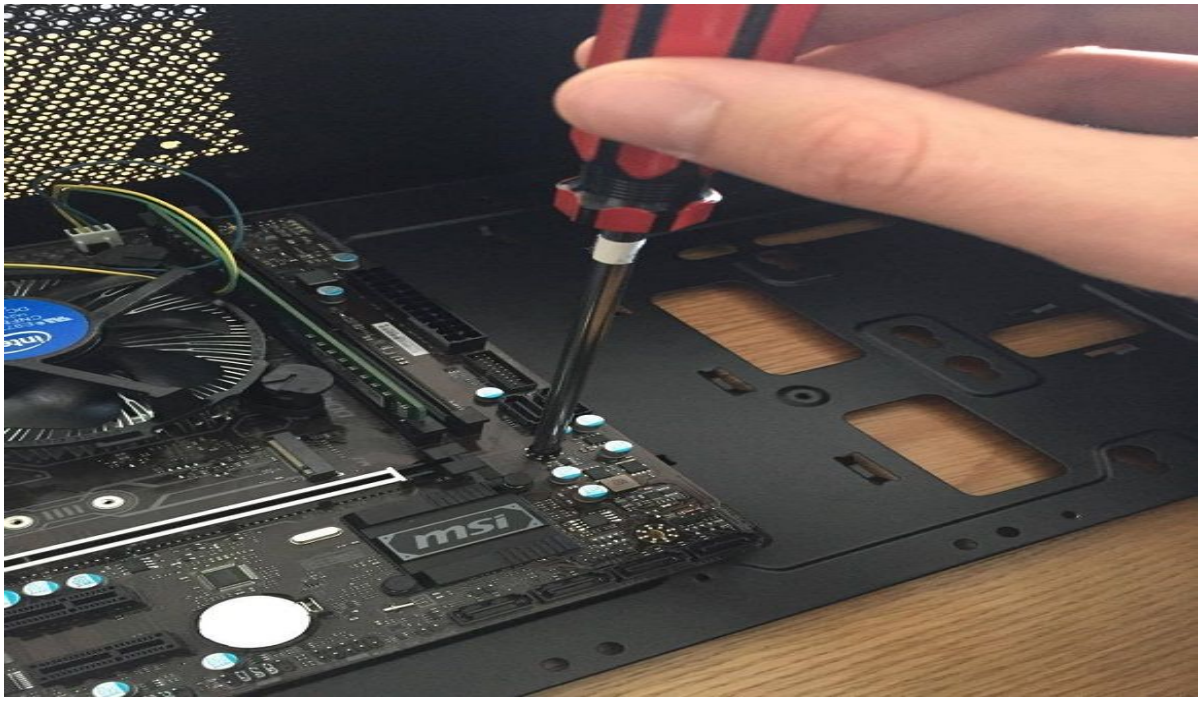


Put your risers into the case by screwing it down, this can usually be done by just using your bare hands. All cases are different so as always, refer to your user manual.

3. Installing Motherboard

Now the most exciting part, after making sure that your case is primed for insertion. You will need to find your motherboard's screw locations.

In this picture, you can see that the motherboard have several spots that the screw will go in and connect it with the case.



Insert your board into the case and make sure that it aligns with all the standoff and the holes in the case. Secure it in with the screws that are provided in your motherboard box. If you have done this, try checking if it is firmly screwed down to your case, wiggle it a bit and if no movement is felt you are good to go! Next step is to connect all the cables into the motherboard.

Step 9 - Connecting Cables to Motherboard

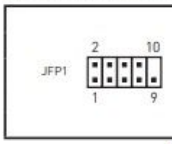
1. Connecting front panel cables

You will need to connect the front panel cables to the motherboard to have access to USB, Headphone Jack, and Power button. Front panel cable usually looks like this. A proper way to do it is to route your cables from the backside of the computer.

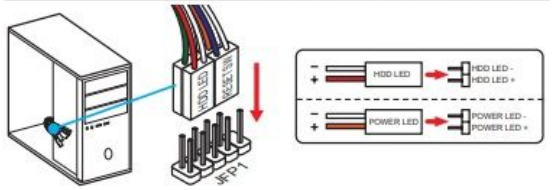
Refer to this table for each connector before connecting it to the motherboard, the front panel cables are usually very delicate and are very easy to screw up.

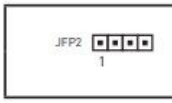
JFP1, JFP2: Front Panel Connectors

These connectors connect to the switches and LEDs on the front panel.



1	HDD LED +	2	Power LED +
3	HDD LED -	4	Power LED -
5	Reset Switch	6	Power Switch
7	Reset Switch	8	Power Switch
9	Reserved	10	No Pin

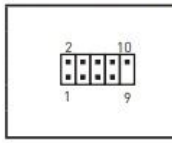




1	Speaker -	2	Buzzer +
3	Buzzer -	4	Speaker +

JUSB1~2: USB 2.0 Connectors

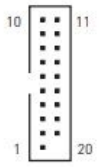
These connectors allow you to connect USB 2.0 ports on the front panel.



1	VCC	2	VCC
3	USB0-	4	USB1-
5	USB0+	6	USB1+
7	Ground	8	Ground
9	No Pin	10	NC

JUSB3: USB 3.1 Gen1 Connector

This connector allows you to connect USB 3.1 Gen1 ports on the front panel.



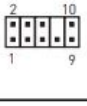
1	Power	11	USB2.0+
2	USB3_RX_DN	12	USB2.0-
3	USB3_RX_DP	13	Ground
4	Ground	14	USB3_TX_C_DP
5	USB3_TX_C_DN	15	USB3_TX_C_DN
6	USB3_TX_C_DP	16	Ground
7	Ground	17	USB3_RX_DP
8	USB2.0-	18	USB3_RX_DN
9	USB2.0+	19	Power
10	NC	20	No Pin

Important

- *Note that the VCC and Ground pins must be connected correctly to avoid possible damage.*
- *In order to recharge your iPad,iPhone and iPod through USB ports, please install MSI® SUPER CHARGER utility.*

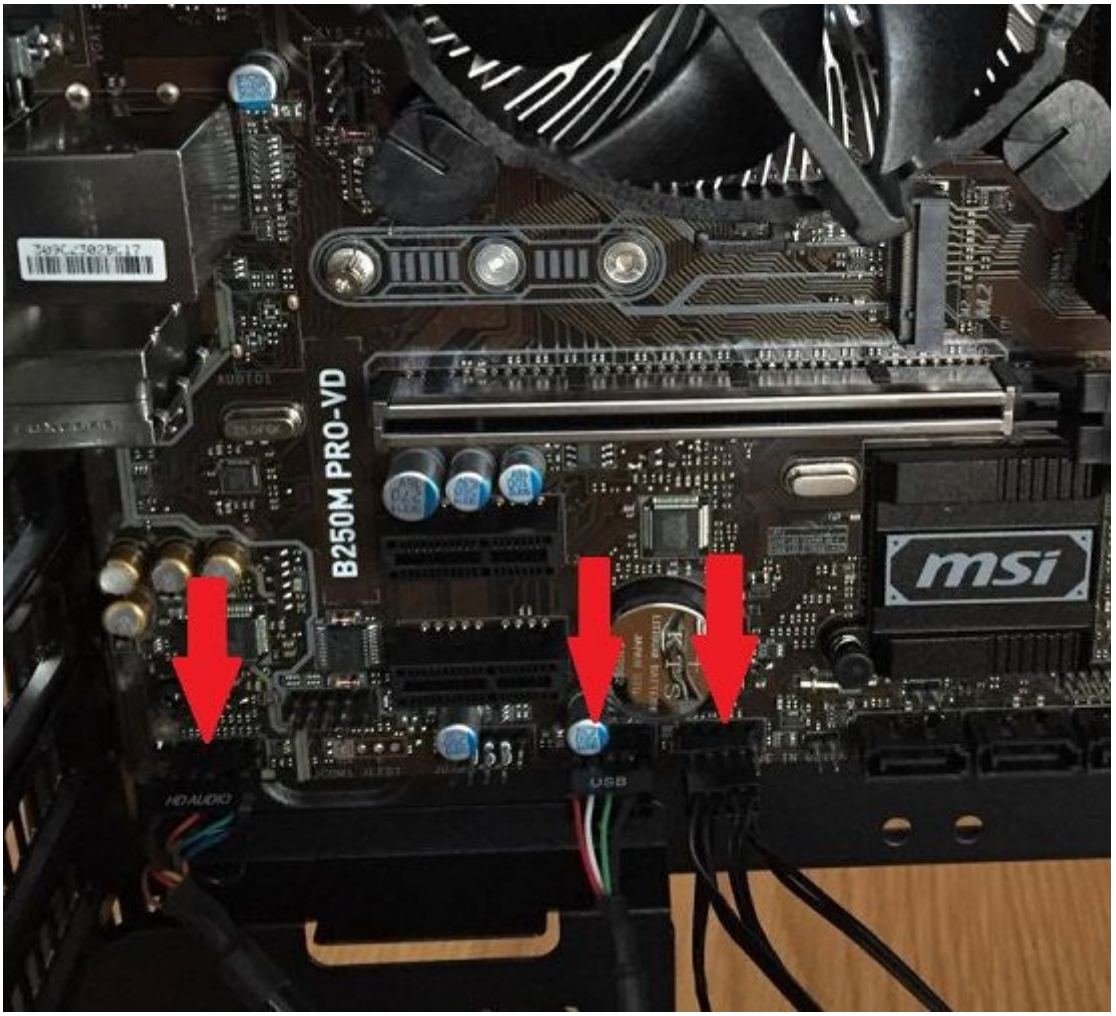
JAUD1: Front Audio Connector

This connector allow you to connect audio jacks on the front panel.



1	MIC L	2	Ground
3	MIC R	4	NC
5	Head Phone R	6	MIC Detection
7	SENSE_SEND	8	No Pin
9	Head Phone L	10	Head Phone Detection

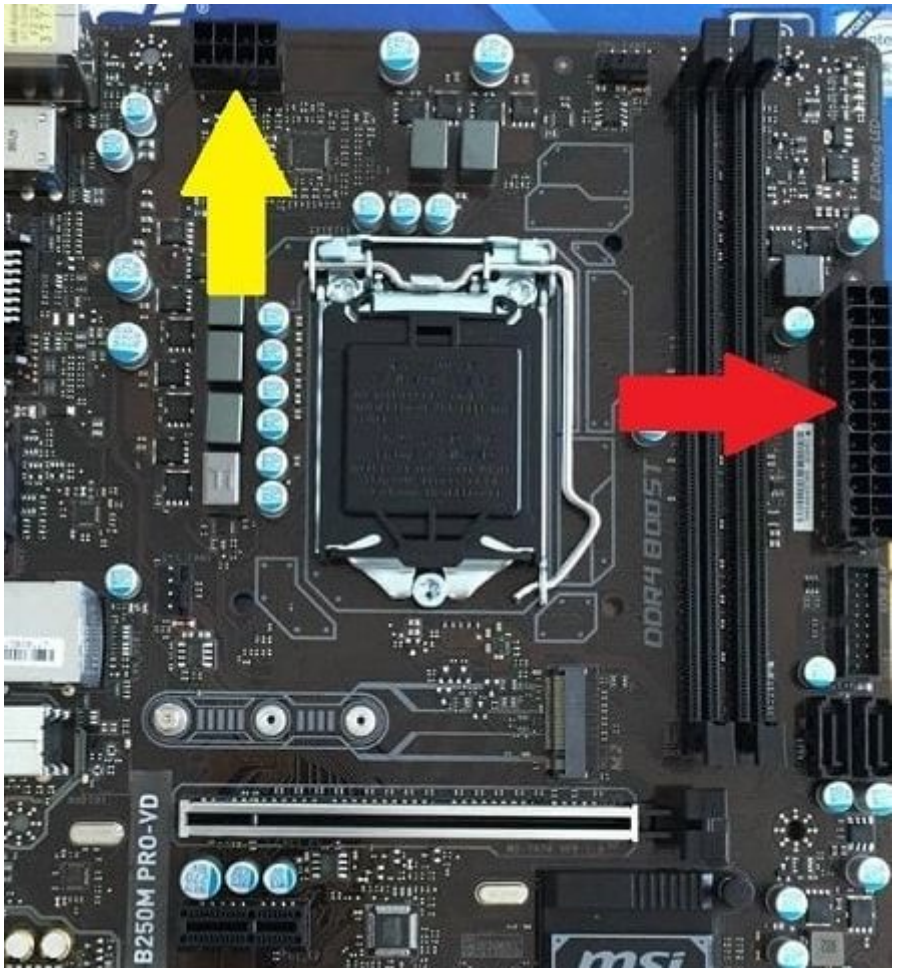
After referring to this chart, all you need to do is to insert the appropriate cables to its socket.



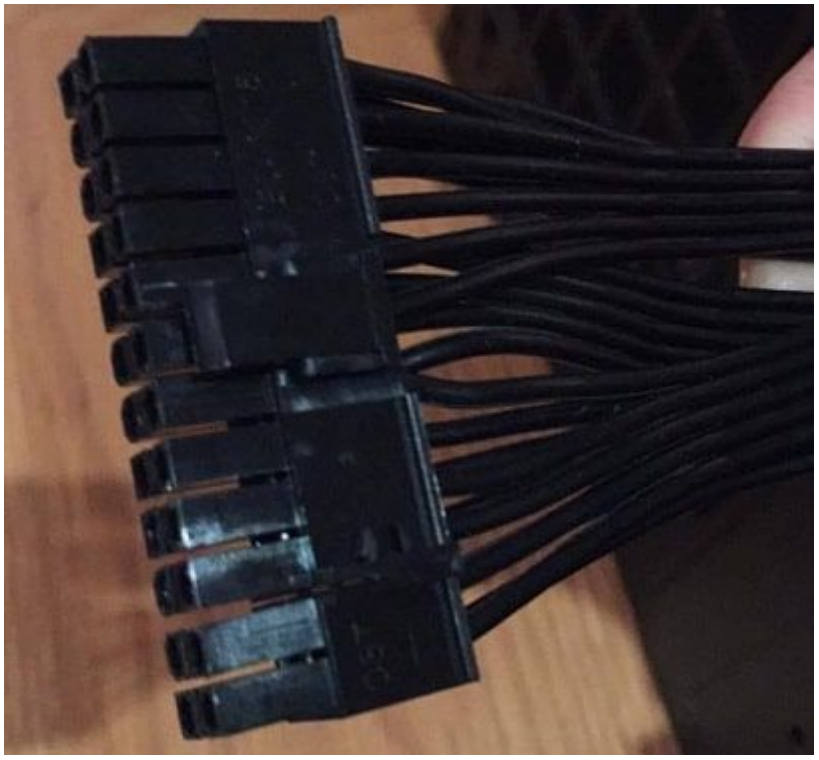
Warning: Be aware of the connections; make sure that it is properly connected to its respecting socket. Failure to do this can damage your board and first boot problems, so do not rush this part of the process.

2. Connecting PSU to the motherboard

It is always good practice to cable manage your PSU and routing it from the backside of the case. You will need to find the 24 pin cable and 8 pin cable. The 24 pin cable is used to power your motherboard and the 8 pin is for your CPU, when buying a PSU you usually left with a lot of extra cables, route all of this into the backside to manage the cable manage.



First of all, you will need to locate your 24 pin cable socket and 8 pin socket, the 24 pins are marked in red, and the 8 pins in yellow. Find these two sockets and you are set. Let's first do our 24 pin cable first.



This is your 24 pin cable, find this and connect it to the motherboard.

This is your 8 pin cable, notice that “CPU” is engraved into the cable. Connect both of the cables into the motherboard, align its cable with the shape of the socket. You will need to

firmly connect both as it can damage your computer if it is connected loosely. This is also the time to connect extra cables like your SATA cables.

For extra cables that are not used in the process, you will need to securely tuck this away on the backside of your computer case, by doing this you will improve airflow inside the computer and provide it with suitable temperatures to work with.

Step 10 - First Boot Up

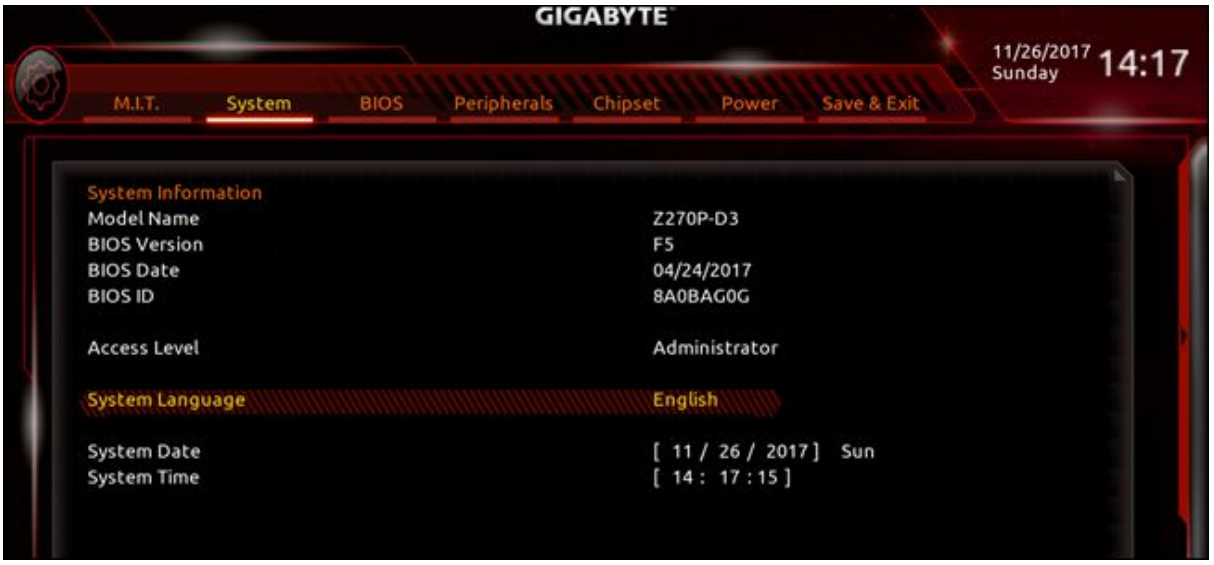
Before booting your PC for the first time, double-check all connections. Make sure that cables are inserted to its proper socket, components to its correct slot and orientation and screws tighten up securely.

For your first boot, you will need to connect peripherals like a monitor, keyboard, mouse, and headphones into your computer.

Also, make sure that your PSU is switched on and connected to the power socket.

You are now all set for your first take off! all that's left is to click that power-on button in front of the case.

If you’ve done everything correctly, you will hear whirls from the computer fan, and a BIOS set up screen in your monitor. To use your computer, you will need to install an operating system and all your component drivers. If your PC fails to boot up you will need to track back your process and find the steps that you did wrong, remember that assembling a PC is a delicate process so don’t rush it!



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all pictures belong to their respective owners

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