Lesson 2: Components of Motherboard, Installation of Motherboard

2.1 Learning Objectives


Objectives

Upon completion of this lesson of the Unit you will be able to:

- Learn about different motherboard types and their features
- Understand major components of a motherboard
- Install or replace motherboard

2.2 Major Components of a Motherboard

By this time, you have understoood the basic types of motherboards and their form factors, let us look at the components found on the motherboard and their locations relative to each other. Many of the following components can be identified on a typical motherboard as shown in Figure 3 .2.

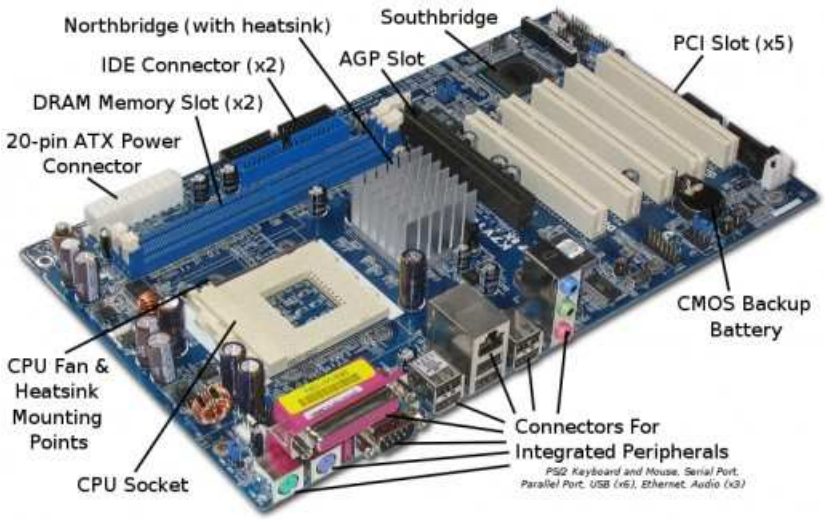

Figure 3 .2: Major Components of a Motherboard

The following section describes each major components.

- **A CPU socket** - this socket houses the actual CPU, directly soldered into it. There are heat sinks and mounting points for fans right next to the CPU socket because of the fact that high speed CPUs generate a lot of heat.

- **A power connector** to distribute power to the CPU and other components.
- **Main memory slots**, typically in the form of DRAM chips.
- The interface between the CPU, the main memory and other components can be created by a chip which is referred to as the **Northbridge** on many types of motherboards. This chip also contains a large heat sink.
- A second chip, which controls the input and output (I/O) functions of a computer, is referred to as the **Southbridge**. It is not connected directly to the CPU. Rather it is connected to the Northbridge and the Northbridge and Southbridge combined are referred to as the *chipset*.
- Slots for one or more hard drives to store files. Integrated Drive Electronics (IDE) and Serial Advanced Technology Attachment (SATA) are the most common types of connections.
- **A Read-only memory (ROM) chip**, which contains the firmware, or startup instructions for the computer system. *This is also called the BIOS.*
- A slot for a video or graphics card. There are a number of different types of slots, including **Accelerated Graphics Port (AGP)** and **Peripheral Component Interconnect Express (PCIe)**.
- Additional slots to connect hardware in the form of **Peripheral Component Interconnect (PCI) slots**.
- Peripherals Connectors. These connectors are the bridge between the outside of your computer and the inside. External peripherals such as keyboard, mouse, monitor, speakers and so on are all connected via these connectors.

2.3 How to install or replace motherboard

Since other components plug into the motherboard, it is very important to understand the methodical steps to install or replace a motherboard which we will learn in this section.

Step 1: Open your computer case.

Remove both side panels for easy access to the motherboard tray. To avoid having to work at weird angles, remove the motherboard tray from the case.

This will allow you to easily install the motherboard. However, keep in mind that not all cases have removable motherboard trays.

- The motherboard tray is typically held in with two screws. Be mindful enough to set these aside so that you dont lose them.
- Installing a motherboard typically means building a new computer. You will need to reinstall your operating system if you are upgrading, and to format any system drives since upgrading to a new motherboard without reinstalling everything on your computer is generally impossible.

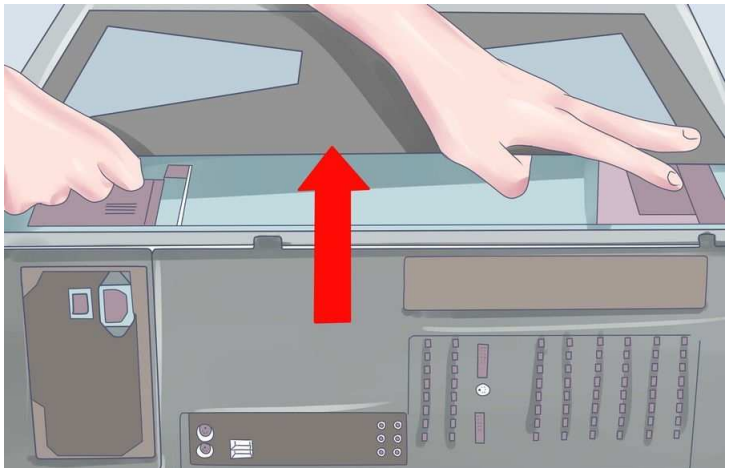

Figure 3 .3: Motherboard Installing Step 1

Step 2: Ground yourself.

Before starting to work on the interior of a computer or handle the motherboard, you should make sure to discharge any electrostatic charge you may have. You can easily do that by simply touching a water tap.

In order to prevent any electrostatic damage, wear an antistatic wrist strap while working on the computer.

Step 3: Replace the I/O panel shield.

I/O panel shield is located at the rear of the case, where the connectors for the motherboard extend out for your monitor, USB devices, and other peripherals. In most cases, you will find a default panel shield installed, which will need to be removed and replaced with the panel that came with your motherboard.

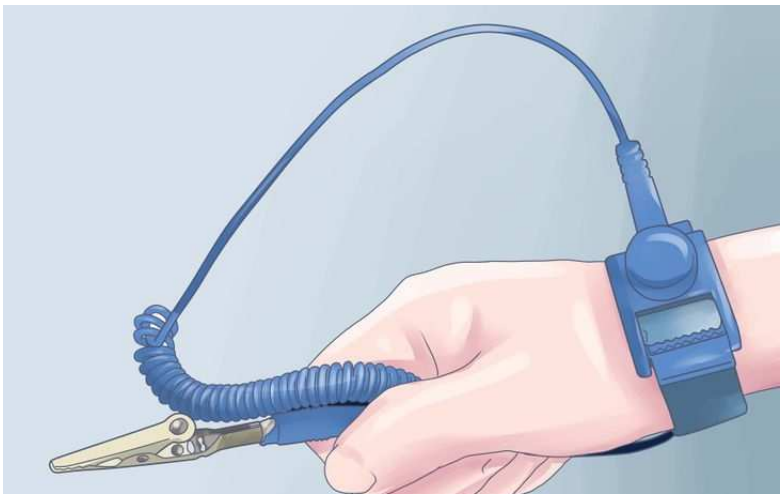

Figure 3 .4: Motherboard Installing Step 2

- Apply pressure to all four corners of the panel and it should snap into place which secures it into the case.
- Installing the panel in the correct direction is very important and you should be mindful of it. To make sure the panel is in the correct direction, compare it to the actual layout of the connectors on the motherboard.

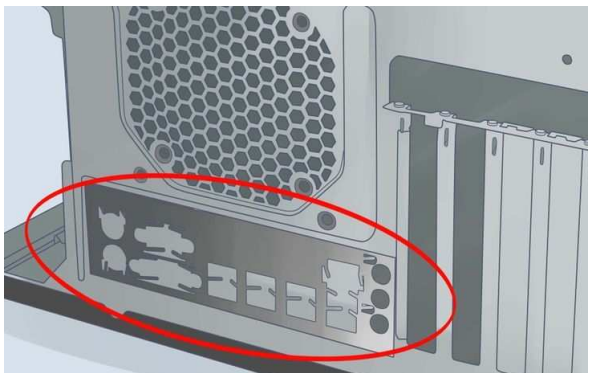

Figure 3 .5: Motherboard Installing Step 3

Step 4: Install the standoffs.

It has 3 sequential steps as follows:

a) **Find the standoffs.** The motherboard should be kept above the case which is done using standoffs and this prevents the motherboard from shorting out and helps cooling. In some cases will find standoffs, while

others may not have them. Nevertheless, your motherboard should come with its own standoffs which can be used.

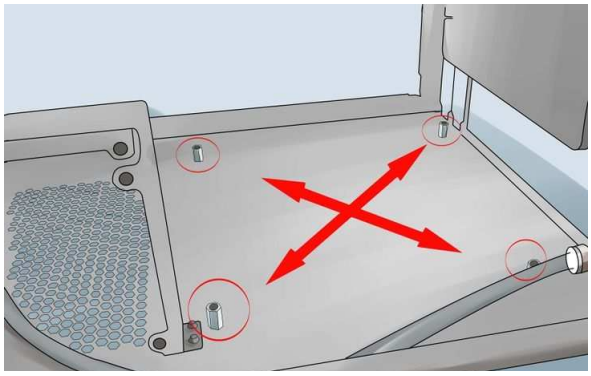

Figure 3 .6: Motherboard Installing Step 4.a

b) **Install the standoffs.** Match the holes on the motherboard with the available standoff locations on the motherboard tray. However, every case and motherboard tray is different with different hole configurations. Line up the motherboard to find a perfect location from which you can use standoffs to secure it. Your motherboard should have a standoff installed on every hole possible.

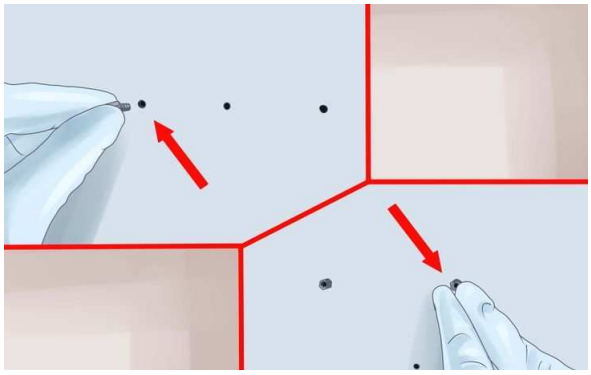

Figure 3 .7: Motherboard Installing Step 4.b

Notes

- *Most standoffs screw into their holes while some are pushed in like pegs.*
- *Be advised that not all of the available holes will be attached with every motherboard. Thus, Connect as many standoffs as possible, and leave the idea of using any extra standoffs. A standoff should be installed on a motherboard only with a corresponding hole.*

c) **Place your motherboard on the standoffs.** As we mentioned, you should check whether the holes and the standoffs are all line up. Should your motherboard tray does not come out of the case, gently force the motherboard against the I/O panel on the back of the case and check if it fits. Start securing the motherboard with screws.

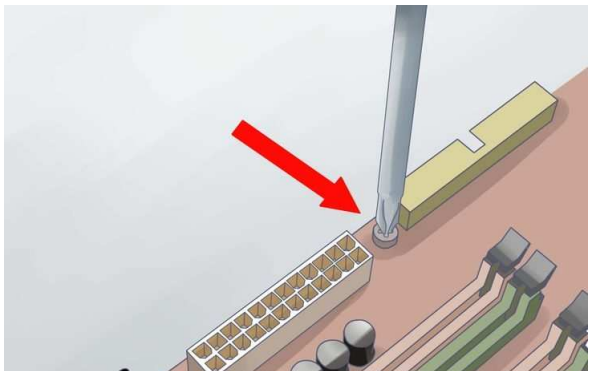

Figure 3 .8: Motherboard Installing Step 4.c

Notes

- *Do not over tighten the screws. Make sure it is firm but not too tight. Using an electric screwdriver will only harm your motherboard.*
- *Holes without metal on them requires cardboard washers between the screw and the motherboard. In fact, try to avoid using non-metallic holes at all.*

Step 5: Install your components

Before reinserting the motherboard tray with the newly-fastened motherboard into the case, make sure to install the following: your CPU, CPU cooler, and RAM. If you do this now, it will be much easier for you to reach everything. If your motherboard is not on a removable tray, install your components after wiring.

Step 6: Connect the power supply.

After securing your motherboard, you can start connecting your components to it. The recommended order to connect the components is that you connect the power supply first, as the plugs will be difficult to reach later. Make sure that both the 20/24-pin connector is attached as well as the 4/8-pin 12V connector.

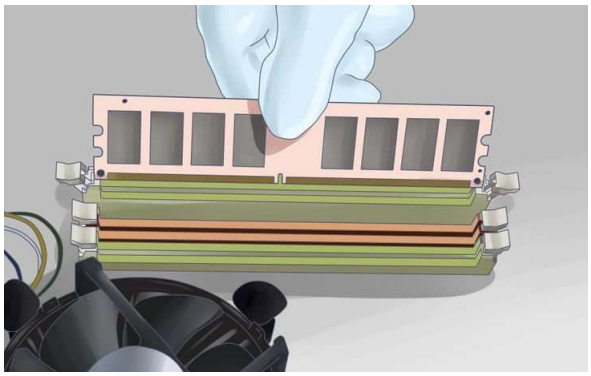

Figure 3 .9: Motherboard Installing Step 5

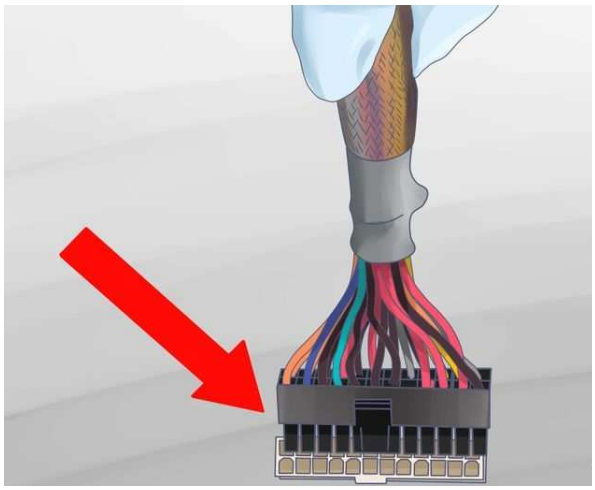

Figure 3 .10: Motherboard Installing Step 6

Caution!

Refer to your power supplys documentation if you are unsure which cables to use.

Step 7: Connect your front panel.

You will need to connect the front panel switches and indicators in order to turn on your computer with the front power button or see when the hard drive is being accessed. Locate the following wires and connect them to the appropriate pins on the motherboard:

- Power switch
- Reset switch
- Power LED
- Hard drive (HDD) LED

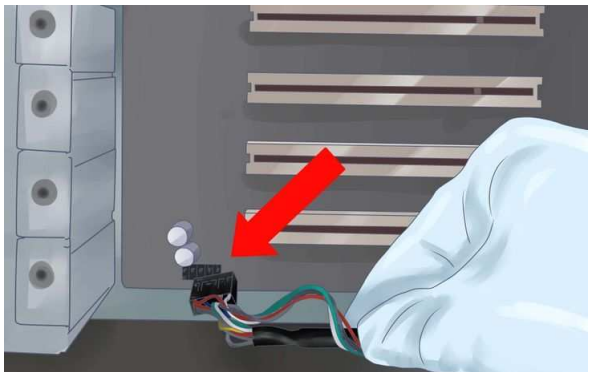

Figure 3 .11: Motherboard Installing Step 7

- Speaker

Step 8: Connect the front USB ports.

Make sure to connect any front USB ports to the appropriate connectors on the motherboard. This is easy since these are typically labeled and also make sure that the correct plugs are placed on the correct pins.

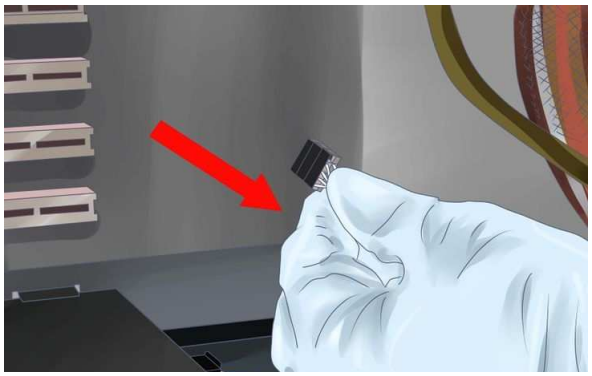

Figure 3 .12: Motherboard Installing Step 8

Step 9: Connect the fans.

Any case and CPU fans should be connected to the appropriate pins on the motherboard. There are typically several places to plug in chassis fans, as well as a two-pin connector near the CPU for the CPU fan.

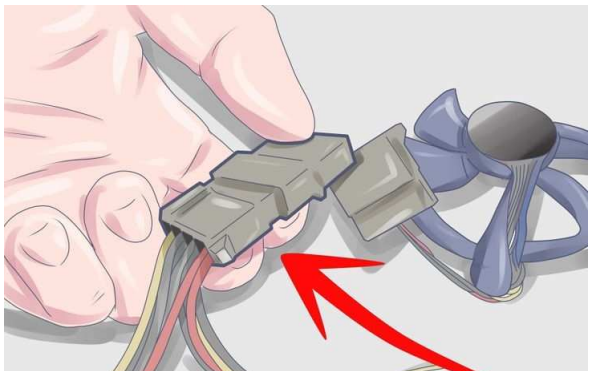

Figure 3 .13: Motherboard Installing Step 9

Step 10: Install your drives.

After making sure that the motherboard is secure and connected, you can start attaching your drives to it. Make sure that you distinguish betwen your SATA and optical drives while attaching them to the correct SATA ports on your motherboard.

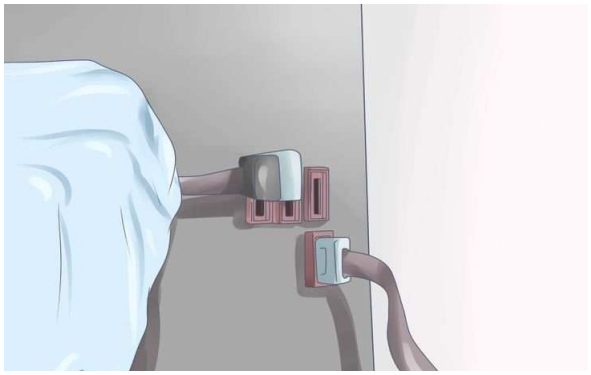

Figure 3 .14: Motherboard Installing Step 10

Step 11: Install a video card.

One of the last components you should install is the video card. The card will take up the most space, and will make reaching other areas difficult. Installing a video card may be optional, depending on your system and needs.

Step 12: Adjust your wiring.

Now that everything is connected to your motherboard, you should carefully move the wiring around and make sure that heat does not get trapped or wires

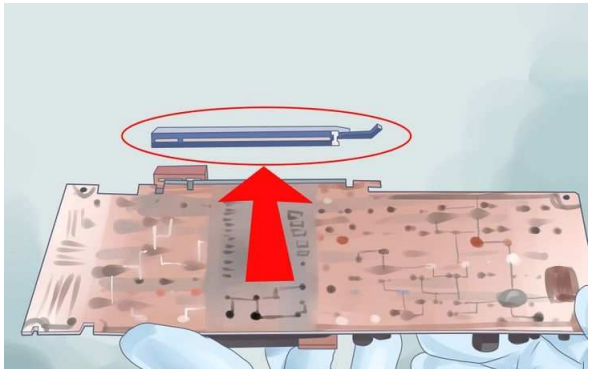

Figure 3 .15: Motherboard Installing Step 11

do not get stuck in fans. Tuck excess cable into spare drive bays and use zip ties to bundle cables together. Be generous to leave enough space for each of your components to breathe.

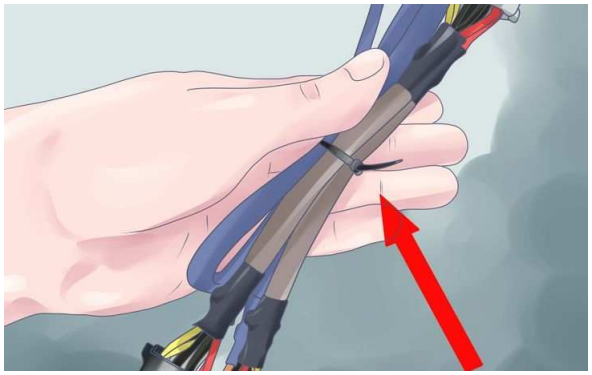

Figure 3 .16: Motherboard Installing Step 12

Close up the computer.

As the final step, return the side panels of the case to their original positions and fix them with screws. Plug your computer and components in and turn your computer on. Now that you have installed all your components as prescribed, prepare for operating system installation. Follow the guides below for specific instructions for your operating system:

- Linux
- Windows

2.4 Exercise

2.4.1 Multiple Choice Question

1. Which one of the following is not a major component of a Motherboard?

    a) CPU Socket
    b) Power Connector
    c) Chipset
    d) SATA Hard Disk

2. Which chip inside a motherboard is used to work as an interface between the CPU and memory?

    a) Northbridge
    b) Southbridge
    c) ROM chip
    d) None of the above

3. Why do we use StandOffs for?

    a) To connect CPU with I/O Devices
    b) To keep motherboard from short circuiting
    c) To keep the CPU cool
    d) All of above

4. Which of the following is part of Chipset?

    a) SATA port
    b) North Bridge
    c) Optical Drive
    d) CPU slot

5. Where is BIOS stored?

    a) ROM Chip
    b) North Bridge
    c) Chipset
    d) Hard Disk

2.4.2 Analytical Question

1. Discuss different components of a motherboard.