



# How To Build A Computer

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## Introduction:

In the early 80's when personal computers ( PCs ) just started becoming popular to the general public, most people were terrified of the thought of even turning one on.

Now more than ever before people are accessing their email, surfing the internet, shopping online and even making new friends using social media without even a second thought about doing any of these things.

But even though many people have become comfortable with operating their computers, there are still a large number of people that would never even attempt to put a computer together because they feel they lack the knowledge to accomplish it successfully.

**I feel they can do it** and save themselves some money in the process, so that is why I created this ebook. People should not have to settle for what a computer manufacturer has to offer them as I feel they can get better for less and this ebook is intended to help them, the everyday people just like **you and me** do just that, and to educate them in...["How To Build A Computer"](#).

Building a computer has become a favorite pastime of mine and the way technology is booming it doesn't look like I'm going to get bored anytime soon. So jump in and walk with me as we learn how to build a computer and what computer building is all about.

### My Revelation:

"My first computer was a Northgate 386/20 , I bought it back in the early to mid 80's. Within about a year it was barely worth a tenth of what I paid for it. That was the first, last and only pre-built computer I ever bought, After I learned how to build a computer myself, there was no going back...

After learning how to build a computer and seeing just how easy it is, you will probably never buy another pre-built system either.



# What Is Needed To Build A Computer?

**Here is a list of hardware and tools that is needed to build a computer.**

Hardware is the individual components that will make up your computer system. To build a complete computer system the following components are required.

**Note:** Some newer motherboards will have integrated video, audio and network cards already built in and these hardware components may or may not be required depending on the motherboard selected.

1. [Computer Case](#)
2. [Power Supply](#) - (if not included with case)
3. [Motherboard](#)
4. [Processor](#)
5. [Memory](#)
6. [Hard Drive](#)
7. [CD/DVD Drive](#)
8. [Video Card / Graphics Card](#) - (if not integrated in motherboard)
9. [Monitor](#)
10. [Keyboard](#)
11. [Mouse](#)
12. [Processor Fan, Heat Sink](#) and [Thermal Paste](#) - (if not included with Processor)
13. [Case Fans](#) - (if not included with case)
14. [Operating System](#)
15. A Phillips Head Screwdriver (non-magnetic)
16. Pair Of Wire Pliers

With the above listed items you will be able to build a complete computer system from the ground up.

# Why Building Your Own Computer Is Better Than Buying A Pre-Built System

Pre-built computer systems , what is not on the outside of the box.

## Pros and Cons of a Pre-Built Computer :

### Pros -

1. Most pre-built computer systems come with warranties and technical support.
2. Pre-built computers setup faster (just unpack and plug and play).
3. A lot of pre-built systems are cheaper upfront than building your own computer

### Cons -

1. A lot of pre-built systems are harder to upgrade and some are not upgradeable.
2. Some pre-built computer systems come with installed software that you may not want or need.
3. Most pre-built computer systems never have the most important thing about it listed on the outside of the box... Keep reading to find out what it is.

## Pros and Cons of Building a Computer :

### Pros -

1. Ability to custom build to suite the users needs (most all components come with individual warranties).
2. Easier to upgrade ( will not get outdated as fast ).
3. The learning experience and educational aspect of it (technical support may not be needed as often).

### Cons -

1. Setup time takes a little longer than with a pre-built computer system.
2. ?

As you can see Pre-Built computer systems and building your own computer both have pros and cons, but in my opinion building a computer is a lot better than buying a pre-built one and here is one reason why:

The most important part of a computer and what really defines what you are able to do with it in the future all depends on one thing... **The Motherboard.**

The motherboard determines what and how much (if anything) you can upgrade. It dictates the type of memory and how much you can install, it decides the type and maximum speed of the processor and how many cores it can have, it even chooses the interface of the video card and how many are allowed to be included.

## What is not on the outside of the box ? :

Don't just take my word for this, look for yourself, the next time you are in a big department store (no names mentioned) that sells pre-built computers, look on the box at what makes up the computer, it will usually tell you about the processor, memory and even video, but in most cases the motherboard is never mentioned... There is a reason for this but it will not be explained now as this ebook is only about how to assemble a computer and not to badger the pre-built computer manufacturers. If you would like to know what I think, then read this article about [" What Computer Manufacturers Do Not Want You to Know About Their Computers - Until-You-Buy-One "](#).

## Precautions and Warnings

### **Sharp Edges:**

Whenever working in or on your computer case be careful of any sharp edges, some cases are made with edges rounded or smoothed, but some may still have a sharp edge every now and then.

### **Electrical Shock:**

Never work on your computer without unplugging the power cord from the power supply first, some of the components in your computer have electricity running through them even when the computer is not turned on. Changing out hardware with the power plugged in could cause you to be shocked or it could also damage the hardware.

### **Static Electricity:**

Static electricity can ruin certain computer hardware, always discharge any static electricity in your body by touching the frame of your computer with both hands before reaching in the case or handling any of your hardware components.

Wearing an anti-static wrist band can help too, just put the Velcro wrist band on your wrist and fasten the attached clip to the frame of your computer case.

### **Excessive Force:**

When inserting any type of pci, pci express, agp cards or memory modules or any other cards into slots on the motherboard, double check to make sure that the alignment is correct and do not use any more force to seat the card than what is needed. If pressing the card in is making the motherboard bow downward very much at all, you are taking a chance of cracking the motherboard and possibly ruining it.

If memory modules are giving too much resistance to get them to snap in, make sure the offset middle slot is in the correct position, press one end down till the tab almost snaps into place, then press the other end all the way down until it does snap into place, then press on both ends at the same time to ensure the module is fully seated.

# Computer Assembly - Work Area And Case Prepping

## Starting off on the right foot.

Your work area should have adequate lighting and consist of a good sized hard surface such as a dinning room table, work bench or even the floor, a place where you will not be disturbed or in anyone's way for a couple of hours .

Placing a thick towel under your computer case will keep the case from scratching your table, bench or floor and it will make it easier to spin and turn the case around when needed.

Some cases have one access panel that can be removed by either taking out 2 to 4 screws on the back edge of the computer and sliding the panel backwards toward the rear of the case, this unhooks the latches that are located on the inside of the front, top and bottom of the panel.

Some cases have only a thumb screw on the back edge that can be loosened with your thumb and forefinger and the panel is pulled backward and removed in the same manner as above and some newer cases have a handle latch that you only pull the handle back and it opens like a door, but the panel comes all the way off to give access to the inside.

Whichever type of case you have, you will need to remove the access panel and prepare to indulge yourself in all the glory of building your own computer.

Now you will want to prepare your case by removing any knock-outs where any expansion slots will be used in the back of the case and where any extra drive(s) such as a DVD player will be in the front of the case.

You can do this by using a pair of pliers to rotate the knock-outs end-over-end a few times until they break off (making sure you only remove the ones that you need to remove).

The next thing you will want to do is look at where your motherboard's mounting holes are to determine where to attach the standoffs to the mounting plate in the case. One way to find this out is to lay the motherboard in the case and align it correctly to where it will be mounted, then take a fine point sharpie marker and at each hole on the motherboard where a mount should be, stick the fine point marker through the hole to mark the hole underneath. Once you remove the motherboard, screw a standoff at each hole with a sharpie mark in it. Snug the standoffs up when screwing them in, but do not over tighten them.

The standoffs should be included with the motherboard accessories and they look like a long brass, hex shaped nut that is male on one end and female on the other (it screws into something and something else screw into it).

A full sized ATX motherboard will require 8 to 12 standoffs and every place your motherboard requires one, you should have a standoff screwed into the mounting plate.

This not only secures your motherboard into your case properly, but also helps give more support to the motherboard, which is needed when inserting memory modules and cards.

The I/O (input/output) shield is a small rectangle shield that fills in all the little gaps around the inputs and outputs of the motherboard such as the video, audio outputs, mouse and keyboard inputs etc.

Different motherboards I/O configurations are different so most motherboards come with their own shield which is easily pressed into the back of the case from the inside pressing out (just make sure you have it aligned in the correct position for your motherboard).

If there is a shield already in the case, you may need to remove it by carefully pressing it in from the outside of the case as this shield may not be configured for your motherboard.

If your case does not have the fans included and installed (most do), then it will be easiest to install them now before going any further.

Basic fan configurations is 1-80mm intake fan in the front (usually bottom) part of the case and 2-120mm exhaust fans mounted in the rear.

But all of this is dependant on your case configuration.

Mounting is achieved with four screws which should be included with your fans.

There, your done, the case is prepped and your ready to start assembling your computer.

It may seem like you haven't got much done yet, but at this point, the assembly is a lot farther along than you might think.

# Installation Begins - Motherboard And Power Supply

The motherboard is the biggest piece of hardware you will have to install and everything else you install will connect to it.

## The Motherboard:

Most motherboards have the processor heat sink and fan mounting bracket (a large rectangle shaped plastic bracket with 3 or 4 tabs hanging off of two of the edges) already installed on the motherboard around the processor socket. If yours does not, you will have to install it. The flat part will mount on the underside of the motherboard, while the taller piece will mount to it from the top side of the motherboard using two screws that should be included.

When installing the motherboard it is best to lay it on the standoffs and look at the back of the computer to verify that the I/O shield is aligned properly before screwing the motherboard to the standoffs. If it is not remove the motherboard and re-align the shield.

If the shield and motherboard are aligned correctly, begin mounting the motherboard by placing screws (snug only, do not over tighten as you may crack the motherboard) everywhere that you have a standoff for it. **Note:** (the I/O shield has small tabs that press against the motherboard and you may need to hold the motherboard toward the back of the case to get the holes to line up properly).

Once you are done installing all the screws for the motherboard... That's it, the motherboard is mounted.

## The Power Supply:

Some cases have the power supply included and already installed, if your case does, then you can skip this step.

The power supply is mounted usually near the top and back of the case and sometimes has it's own little cubby hole. Most only mount with 3 screws from the outside of the case and all you have to do is just make sure the power supply is not upside down ( actually I don't think you can mount one upside down), anyway once the 3 screws are in... the power supply is mounted.

# First Things First - Well, Most Of The Time

Sometimes there are exceptions.

The order in which you mount the rest of the components is optional, because with the many different configurations of cases and physical size of components, this could play a big part in who goes in first and who goes in last, but in my computer building this was the order best suited for my system build.

## The Processor - Heat Sink - Fan

Don't forget the thermal paste - arctic silver 5 rules.

### **The Processor:**

The processor is very fragile "Handle With Care". If you've taken a look at the processor by now (and I'm sure you have), you will see about a billion little gold pins sticking out of one side of it like a bed of nails. They bend very easy...do not drop it like I did or else you will be like I was, trying to straighten the pins out with a steak knife for about an hour.

On the motherboard, around the center of it, you will see your processor socket, usually a white or light colored square with a billion holes in it and a small silver lever next to it.

The lever is a locking lever if you unhook it and rotate it up all the way, you may notice the top portion of the socket shift to one side, that means it's open.



### **Important Note:**

You never should have to press the processor into the holes, it should always fall all the way down flat by gravity alone.

Normally on an AMD processor one corner of the socket will have an arrow and one corner of the processor will have an arrow, line these up by placing the processor pin side down on the open socket, if the processor falls all the way down through the holes you've done good, just lock the lever back down and you're done.

If the processor will not fall all the way down by itself "do not force it", instead double check that the lever is fully up and re-check alignment by comparing corners of the pins to corners of the holes. If it still does not fall all the way down by itself check all your documentation on the processor and the motherboard and verify that they are compatible.

### **Thermal Paste:**

With the processor seated all the way into the socket and the lever locked, it's time to get sticky. Even with a great heat sink and a great fan, processors get hot, thermal paste is the magic ingredient that helps keep your processor cool.

Apply a small amount of thermal paste on the top of the processor and spread it with one finger across the entire surface of the processor, if you need to add more then do it, but just make sure there is a medium thickness coat across the entire top of the processor.

Do the same with the bottom of the heat sink, where it will be touching the processor.

### **The Heat Sink:**

The heat sink will usually have a bracket with a lever mounted on it, when setting it on the processor make sure the bracket's holes are lined up with the tabs hanging off of the plastic heat sink mount that is attached to the motherboard.

Make sure the lever on the heat sink bracket is in the unlock position and then hook the tabs on the side away from the lever, next hook the tabs on the same side as the lever, (depending on the mounting bracket, sometimes you may have to apply a little downward pressure to get them to hook, being careful not to apply too much pressure) once tabs on both sides are hooked by the holes in the bracket, flip the lever(this may be a little tight) to lock the heat sink on.

### **The Fan:**

Usually the fan is attached to the heat sink, if it is not then look at the documentation that came with the heat sink and fan for mounting instructions to the heat sink. Believe it or not the rest is a lot easier...You've already tackled all of the hardest parts.

## Memory - Hard Drives - Optical Drives

**Remember when hard drives were optical drives?**

### **Memory:**

**Note:** check the documentation that came with the motherboard about which slots to use if you are using which types of memory. This can make a big difference in the performance of your computer. It can go from not working to working ok to working great, just by having the right type of memory in the right slots.



Installing memory modules is usually easy, just make sure the notches on the bottom (next to the gold connectors) are lined up correctly with the slot breaks in the slots on the motherboard. Pressing both ends of the module down until the tab locks on both ends snap into place, holding the module there secure.

### **Hard Drive:**

Installing a hard drive is easy too.

Most all hard drives now a days are 3-1/2" and get mounted in a 3-1/2" bay.

Looking in the front of your case(usually in the front), you should see 2 or more bays that the hard drive will just slide into from the rear. Slide the hard drive into one of them with the connecting ports pointing to the back of the computer case. Using 4 screws, mount the hard drive using 2 screws on each side ( you will need to stand the case up and remove the other side panel of the case to access that side).

### **Optical Drives (DVD/CD):**

The same procedure for these drives except you will be mounting them in the 5-1/4 bays and you will want to make sure it is where you previously removed a knock out so that you will have access to it outside of the case.

# Building A Computer - Making The Connection

## Getting wired , one byte at a time.

Now this is the fun part, getting everything connected and keeping our sanity at the same time.

Let's start by connecting the front panel connections first.

The wires and connectors coming from the front panel should consist of :

The power switch

The reset switch

The hard drive led

The internal speaker

and possibly any external usb, temperature gauges, fan speed control, audio or video inputs.

Note: You may need the diagram of your motherboard for this one.

Most motherboards front panel wiring connections are located somewhere on the bottom front corner of the board and are labeled with abbreviations for what connections they are (but they are hard to see, you may need a flashlight and a magnifying glass).

Most case front panel connectors are labeled with abbreviations of what that connector is for, as in SPKR is speaker and PWR is the power button.

Using your diagram, flashlight and magnifying glass, connect each of the front panel connectors to it's corresponding motherboard connectors until they are all connected.

I chose to keep the abbreviated letters facing up on the wires, but this is not always the case, as you may have to turn one over if something is not working and you know you have it on the right connector.

After all this is done... let's move on.

The good news: The front panel connectors are the only ones that can easily be turned over and connected the wrong way (why? I don't know).

I know you have a wad of spaghetti hanging in your case from the power supply, but let's connect some of the small important internal connections first.

You should have a 3 or 4 wire connection coming from the processor fan, look on the motherboard for a CPU1 connector and plug that up there.

You may have a wire that is included with your DVD/CD drive and you need to connect it from the back of the drive to a connector on the motherboard labeled Audio-1.

Next if you have any external USB ports, there should be some wires to connect them, just look on the motherboard for USB1,USB2 and so on.

The type of hard drive and optical drive you have will determine the wire you use to connect it to the motherboard.

If you have a sata drive the wire will be smaller and connect to a sata connection on the motherboard.

If your drive is an ide then the wire will be a lot wider also known as a ribbon and it will connect to the ide connector on the motherboard.

Note: Sata drives are newer and faster and the ide drives are slowly but surely getting obsolete or at least out dated.

Sata and Ide connections can only be connected one way, sata connectors have an "L" shape on one end and Ide connectors have a slot in the middle of them to keep them from being connected upside down.

Let's move on to the power supply.

Depending on your power supply, you may have a different number of connection types and what you use will be determined by the devices you've installed.

On your motherboard you have a great big connection that has either 20 or 24 pins, your power supply will have either a 24 pin connector or a 20 pin connector with a square 4 pin connector that may or may not clip on to the side of it, or you may only have a 20 pin connector without a square 4 pin connector.

If your motherboard has a 24 pin connector and the power supply don't then your power supply will not work.

If your motherboard has a 20 pin connector and your power supply has a solid 24 pin connector, then your power supply will not work.

But hopefully you've done your homework before ordering your hardware and all is well.

## 12.

Make your 20 or 24 pin connection to the motherboard, you may have to press down kind of hard to get it to latch, but be gentle.

You should also have a 12v square 4 wire connector and a 12v connector for it on the motherboard ( this square 4 wire connector will not work with the 20 pin connector to make the 24 pin connection).

Now all that is left is connecting the drives and case fans using the rectangle 4 pin Molex connectors, some fans have an in and out so you can daisy chain connecting them. I saved the video cards for last as a lot of newer cards have not only grown in speed and muscle, but also in size.

If you don't have onboard or integrated video then install your video card now by inserting it into the appropriate slot Pcie into a Pcie slot, Agp into and Agp slot.

You should have a knock out removed for whichever slot the card is installed in and all you need to make sure of is that the card is seated all the way into the slot and install 1 screw into the card frame and into the case frame to help hold it in. ( you may have to plug in a power connection, depending on the card).

Now for safety sake double check all connections, put all access panels back on, connect the monitor, keyboard and mouse to the back of the computer after everything is done, double check that the voltage shown on the back of the power supply is set correctly, and switch is turned, plug the power cord up to the power supply and smell for smoke...

If all is clear, turn the monitor on and push the power button on the front of the computer.

If you do not get a series of beeps and it looks like it's powering up ( it will stop because the hard drive is not formatted and there is no operating system) quickly open the dvd and insert the operating system disc and close it then press the reset button.

If any of the front panel buttons or lights do not work right then you may have to open it back up and flip the connectors over, but remember to power it down, unplug the power cord and discharge the static electricity by touching on the frame first.

As for what to do when the Operating System CD starts installing .... That will come into play on my next ebook...

# Resources To Help You If You Need It

## List Of Useful Links

[Computer help is only a click away!](#)

[Build A Gaming PC For Under \\$1000.00](#)

[Having Problems Updating Your Drivers?](#)

[Learn How To Fix Your Computer Yourself](#)

[Repairing A Laptop Is Easier Than You Think](#)

[Ready To Own Multiple Websites And Make Money?](#)

[Fix The 3 Rings Of Death On Your Xbox 360](#)

[Find The Best Brand Of PC Hardware](#)

[Learn About Computer Hardware Drivers](#)

[How To Assemble A Computer](#)

# A Note From The Author

**' Nothing great was ever achieved without enthusiasm '**

- Ralph Waldo Emerson

I would like to thank you for taking the time to download and read this ebook and  
I hope you find some useful information here.

I feel confident in that  
after reading this ebook you will have decided what I am already sure of -  
**That you can build your own computer !**

**If you have any questions about this ebook or are having trouble building your own  
computer after reading this ebook please send me an email at :  
sendittohutch@gmail.com**