

Build Your Own Computer



<http://www.build-your-own-computer.net>

Table of Contents

Introduction	4
How To Build A Computer	5
Initial Decisions.....	7
What are you planning to do with your computer?.....	7
What is the budget for your new computer?	8
Buying Your Computer Components	9
High End Build	9
Mid Level Build	9
Home Office / Small Business Build.....	10
The Challenge Build.....	10
Computer Tools	11
Required tools.....	11
Optional Tools:.....	11
Computer Case Preparation	13
Getting To Know Your Computer's Motherboard.....	19
Install A CPU.....	22
Install the Heat Sink	27
Installing Computer Memory.....	33
Installing A Motherboard	37
Installing A Power Supply	42
Computer Wiring.....	46
Install Case Fan.....	49
Installing A Hard Drive.....	54
DVD Drive.....	60
Install Floppy Drive.....	64
Installing A Graphics Card	65
Installing The Graphics Card.....	66
Final Preparations Before Booting the Computer	69
The completed computer... ..	69
BIOS Settings	70
Standard CMOS Features Screen.....	71

Installing an Operating System	72
Install Drivers	74
Windows Update	74
Install Motherboard Drivers.....	75
Install Graphics Card Drivers.....	75
Sound Card Drivers	76
Appendix A – Installing Windows XP	78
Appendix B – Installing Windows Vista.....	90
Appendix C – Troubleshooting.....	97
Troubleshooting Computer Problems	97
Duh Issues.....	98
Listen to the Beeps	99
Award BIOS.....	99
AMI BIOS.....	100
Phoenix BIOS	101
Common Computer Problems.....	103
Cabling Issues	103
Power Supply Issues	105
CPU And Motherboard Issues	106
Step by Step Troubleshooting.....	108
Appendix D – Motherboard Diagram.....	110

Introduction

Hello and welcome to my Build Your Own Computer Guide. My goal throughout this guide is to help you build your own computer. I take a step by step approach with pictures to help you out along the way.

I have put links throughout this document that will take you to various places on my website that will give you more detailed information on the various computer components.

Of note is the section on purchasing the computer components. I did not include buying information in this guide, as it changes so frequently. If you want the latest price ranges for the components, go to my [online buying guide](#), and you can get the most up to date links and product information there.

Finally, if you run into issues or need a hand, or just some advice, please feel free to contact me either through my [contact page](#) [online](#) or you can simply [email me](#). I will do my best to get back to you in a timely manner.

Above all, have fun building your computer. It should not be a stressful experience, it should be fun. So if you run into a problem, don't stress on it, check the troubleshooting section, or drop me a line and we'll get it taken care of.

And of course, feel free to send me any [feedback](#) you have on this eBook, good or bad.

Dave

How To Build A Computer

Our goal here is to learn *how to build a computer*. To get started, we'll first ensure that you have all the needed computer parts, and tools. We'll start the adventure with some initial decisions that will need to be made. Next, you'll purchase the components that you will need, and gather your tools together. Finally, we'll build a computer. Here is a list of the required computer parts that will be needed to build your own computer. We'll go into detail on these shortly.



- *Computer Case*
- *Power Supply*
- *Motherboard*
- *CPU*
- *Memory*
- *Hard Drive*
- *Monitor*
- *Keyboard*
- *Mouse*

Here are the topics that I will cover:

- Step 1 - [Initial Decisions](#)
- Step 2 - [Purchase Your Computer Components](#)
- Step 3 - [Gather Your Tools](#)
- Step 4 - [Computer Case Preparation](#)
- Step 5 - [Getting To Know Computer Motherboards](#)
- Step 6 - [Installing The CPU](#)
- Step 7 - [System Memory](#)
- Step 8 - [Motherboard Installation](#)
- Step 9 - [Power Supply Installation](#)
- Step 10 - [Computer Wiring](#)

- Step 11 - [Hard Drive Installation](#)
- Step 12 - [DVD Drive Installation](#)
- Step 13 - [Graphics And Peripheral Cards](#)
- Step 14 - [Initial Boot](#)
 - [Windows XP](#)
 - [Windows Vista](#)
- Step 15 - [Finalize Install](#)
- [Troubleshooting](#)

That should about do it. Let's look at the initial decisions and build a computer...

Initial Decisions

Before purchasing anything for your new computer, you'll need to make some initial decisions. These will determine the components you may need, and how much you will have to spend to get your desired results.



What are you planning to do with your computer?

Are you a gamer? Small business owner? Do you do a lot of video editing? These are just a few of the uses for your new computer. What you plan to do with your computer will in large part determine how much you will need to spend on it. Gaming computers are going to be the most expensive. If you want to play today's games at the highest resolutions with smooth game play, you will need a machine that can handle high end graphics, and has the processing power to keep up.

Do you do a lot of video editing? This type of machine can go either way. If you are a professional video editor, or have a side business, you will most likely want a better machine than if you simply do it at home for your personal use. The decision is yours.

Are you simply looking for a machine to do some basic word processing, maybe some home finances on, read your email and surf the web? Then we can get a pretty inexpensive computer.

What is the budget for your new computer?

Another initial decision is how much money you want to spend. Do you only want to spend \$300? Is the sky the limit? The amount of money that you want to budget for the computer will in part determine what you can do with the computer. If you want to play the latest games, \$300 just won't do that. If you only want to do some home finances, and web surfing, there really is no need to spend \$3,000 on your computer.

Where are you planning to get the components? Where you get your components will have an effect on the cost of your computer. There will be a big price difference between going to your local Best Buy, and buying online from a site like Newegg. Buying online will save you a lot of money, but you have to plan ahead a bit. The best way to save money online is to plan out all the parts you are going to need, and then get them all at once. This will save you a ton on shipping costs, and a lot of times, if you place an order over a certain dollar amount, shipping will even be free.

Once you have made these initial decisions, move on to the next step.

Buying Your Computer Components

You've decided on the type of computer you want, now pick out your computer components. I have outlined below 4 of the most common types of computers. These are by no means set in stone. You can mix and match parts from the different builds. I have also included comments on different modifications to each build. These will allow you to decrease the cost of a build, or increase say the processors speed or memory amount.

Each build will have links to places you can buy the components. Again, these are not set in stone either. I search the web to find the lowest prices I can on the different components, but I may miss a good deal here or there. If you find a good deal on the web, [let me know](#) and I'll get it added in.

Note that none of these builds includes an operating system. If you do not already have one, these are the cheapest prices I could find:

- [Windows XP 32 bit](#) - \$60.00
- [Windows Vista Home Basic Upgrade](#) - \$79.95
- [Windows Vista Home Premium Upgrade](#) - \$85.99

Note that these links go out to the website. Prices change so often, that to keep them up to date in here would take a lot of work. The links will take you to the most up to date prices I have.

High End Build

Want to run Crysis full bore? Need every ounce of speed for WoW or BF2142? This build is designed for people who are into a lot of computer gaming. This will also work for someone who does heavy video rendering and editing or computer animation. This build is not for the timid.

[High End Gaming Computer Build](#)

Mid Level Build

If you do some gaming, and still want nice graphics, but don't need the cutting edge, this build is for you. This build will also work for video and image editing.

[Mid Level Gaming Build](#)

[Home Office / Small Business Build](#)

If you have a small business or home office, with the need to run multiple office application for financial use, word processing, or editing graphics for your business, this build is for you.

[Office Computer Build](#)

[The Challenge Build](#)

I have had quite a few people ask me for the cheapest build I can do, while still using quality computer components. This is that build. I have tried to keep the price as low as possible. This build is great for word processing, email, and web surfing. It would also work well for your child's first computer.

[Cheap Computer Build](#)

Have your parts ordered and on-hand? Then let's continue on to Step Three - Computer Tools

Computer Tools



There are two lists here, required and optional. As you can see, not much is required to build your own computer. However, I do find that things will go easier if you have other tools handy.

Required tools:

- Phillips head screwdriver

Optional Tools:

- Anti-Static wrist band – Some of the computer parts you will be working with are sensitive to static electricity. Static discharges can mess up the delicate electronics in some of the components. If you don't have a wrist band, you need to make sure you discharge yourself before handling the parts. You can do this simply by touching the metal frame of the computer case.
- Tweezers – easier to grab a small screw if you drop one in the case

- Bowl for holding screws
- Hex Socket Screwdriver – Some of the screws you will use will have a hex head. This type of screwdriver makes things easier sometimes. If you don't have one, don't worry, you can still use a regular one
- "Claw" Grabber – another tool for grabbing screws from tight places
- Needle nose pliers
- Flashlight or a bright adjustable lamp that you can have over your work area
- I like to have a box handy to hold all the manuals and extra parts from all the components
- Cup of coffee or other favorite drink
- Small towels – just in case you bump your coffee cup or other favorite drink

Have your tools gathered? Let's move on to

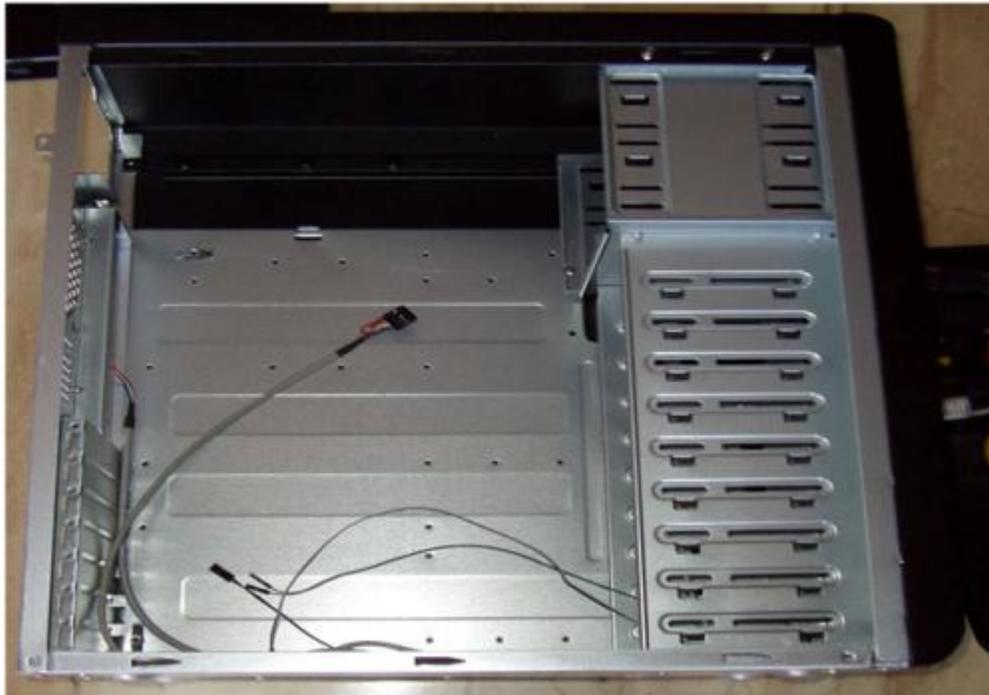
Step Four - Prepare The Computer Case.

Computer Case Preparation

I always like to have a clean table to work on my computer case, with enough room to lay the case out, and still have room to work with the motherboard on the side. But if you don't have a table that big, you can work on the floor as well. Just be careful with smaller parts that you don't lose them.

A word of caution when working directly on a carpeted floor, be careful with static electricity. ***Always make sure you ground yourself by touching the case frame before handling the components.*** If you have an anti-static bracelet, then you don't need to worry about grounding yourself.

Our first step is to get to know the computer case. Familiarize yourself with the layout of the case and where everything is going to be installed. A lot of cases use a similar layout, so once you know one, you are good to go on about 80% of them. If you decided on a custom case, the layout of your case will be a little different, but you will still recognize what is what. Take a few moments now to look over your case and recognize where everything is. Here is the basic case layout:



The large space in the middle is where the motherboard will go. On the right are the hard drive cages, and above them, the cage for the CD/DVD Drives. Top left is where our power supply will go, and the wires are what will connect our front panel LED's to the motherboard.

Here we have the rear looking view from inside the case. From the top will be:

- Power Supply
- Case Fan (round opening on left)
- Motherboard Back Panel (rectangular opening on right)
- Peripheral and Graphic Cards in the slots on the bottom. They currently do not have the brackets removed.



This is the front of the case, viewed from inside. You can see the wiring harness that will connect to the motherboard for our front panel indicator lights. You can also see in the front the hard drive bays and a place for a case fan, should you choose to install one there.



Here we have the back of the case from the outside. You can see from the top...

- Power Supply - The fan opening is on the right, the power cord connection and the power switch on the left.
- Motherboard Back Panel - This where your connections will be for keyboard, mouse etc...
- Case Fan - To the right of the panel opening is the opening for a case fan.
- PCI Slots - On the bottom left are what will be the openings for the PCI slots.



This is the front of the computer case. You can see...

- Power Button
- Reset Switch
- Hard Drive Activity Light - Labeled as H.D.D.
- Front Panel Connections - This particular case has 2 USB ports, and jacks for headphones and a microphone.



Now that you know where everything is, let's look at the connections within the case. You will see a group of wires that are connected to the front panel of your computer case. These wires will hook up the following...

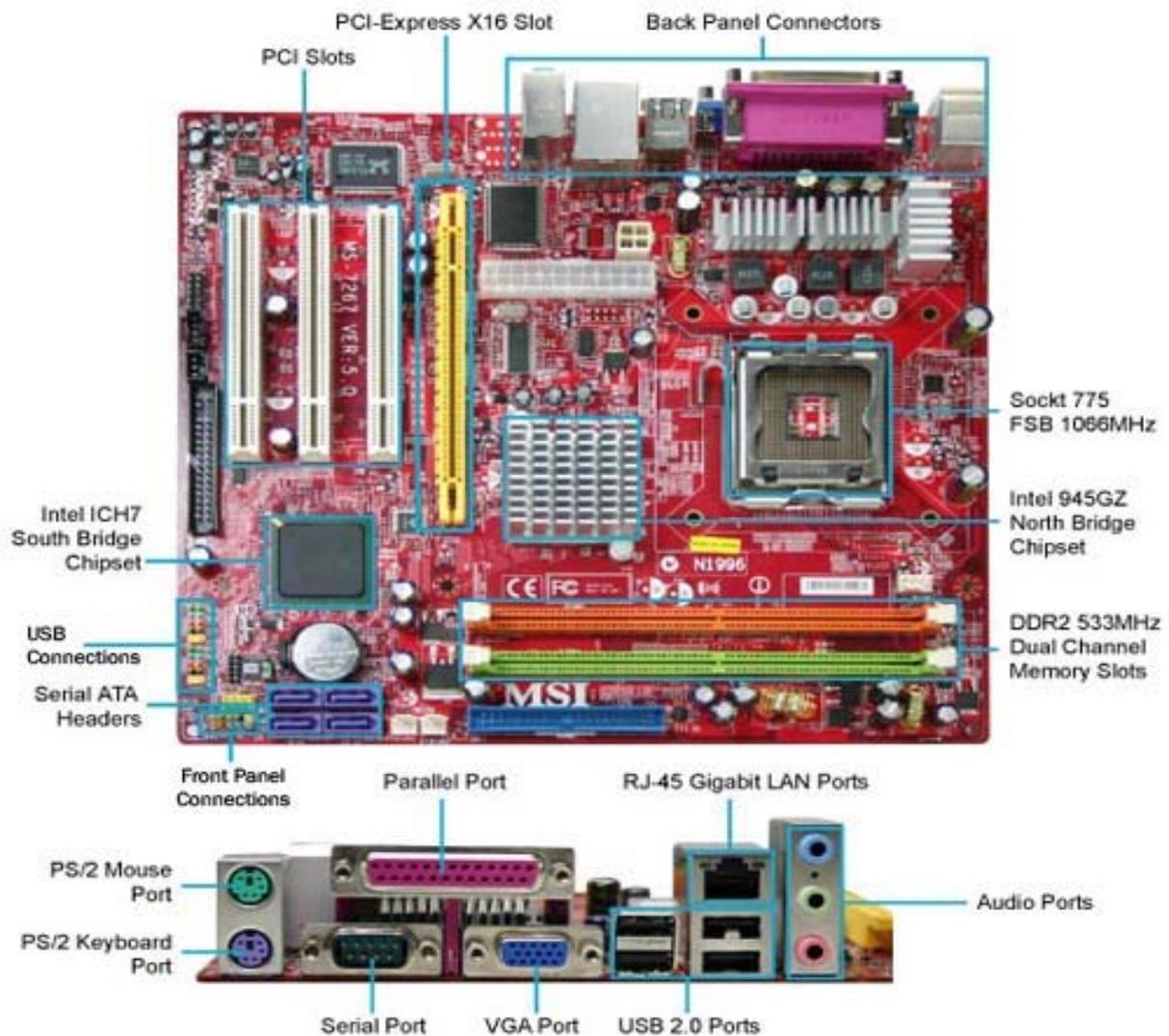
- LED lights on the front panel for the Hard Drive and System Power
- Case Speaker - only used for beeps from boot up and errors
- Reset Switch
- Power Switch
- USB Port
- Audio Port

So you are now familiar with your case layout, you know what will be going where, and you have all the parts ready. Let's move on to the motherboard...

Step Five - Getting To Know Your Motherboard

Getting To Know Your Computer's Motherboard

For the computer motherboard's preparation, I have an MSI 945GZM6, with the Intel 775 chipset. Here is the board we'll be using...



You should take an inventory of what came with your motherboard to ensure that you have everything you will need.

Even though most motherboards are laid out in similar fashion, some may have connections that others don't. Know which connections you will be using. Take a moment and study the layout of your motherboard. Once you know what you are looking at, you will recognize it on any board. You can also refer to your motherboard manual as it will contain a lot of detailed information and motherboard specs.



Next, let's take a look at what was all included with your computer's motherboard. At a minimum, you should have gotten the following...

- The Motherboard
- Motherboard User Manual
- Some will have a quick installation guide.
- Motherboard Drivers CD
- Back Panel Plate
- IDE (Integrated Drive Electronics) Cable – these are usually flat gray cables, however, you may get a colored round one.
- Most still come with a Floppy Drive Cable – this is also usually a flat gray cable, slightly wider than the IDE cable.
- SATA (Serial Advanced Technology Attachment) Cables – These will usually be smaller flat cables, about ½ an inch wide – you should get 1-4 of them.
- SATA Brackets – you may or may not get these – these are connections for external hard drives.

- USB (Universal Serial Bus) Bracket – you may or may not get these – these will be for additional USB connections.

There may be other miscellaneous cables included, but the ones listed above are the main cables we'll be using.

Here's where we stand.

- The case is all laid out and ready to go.
- You've taken inventory of the parts that were included with your motherboard.
- You are familiar with the layout of your motherboard.

Let's continue with installing the CPU...

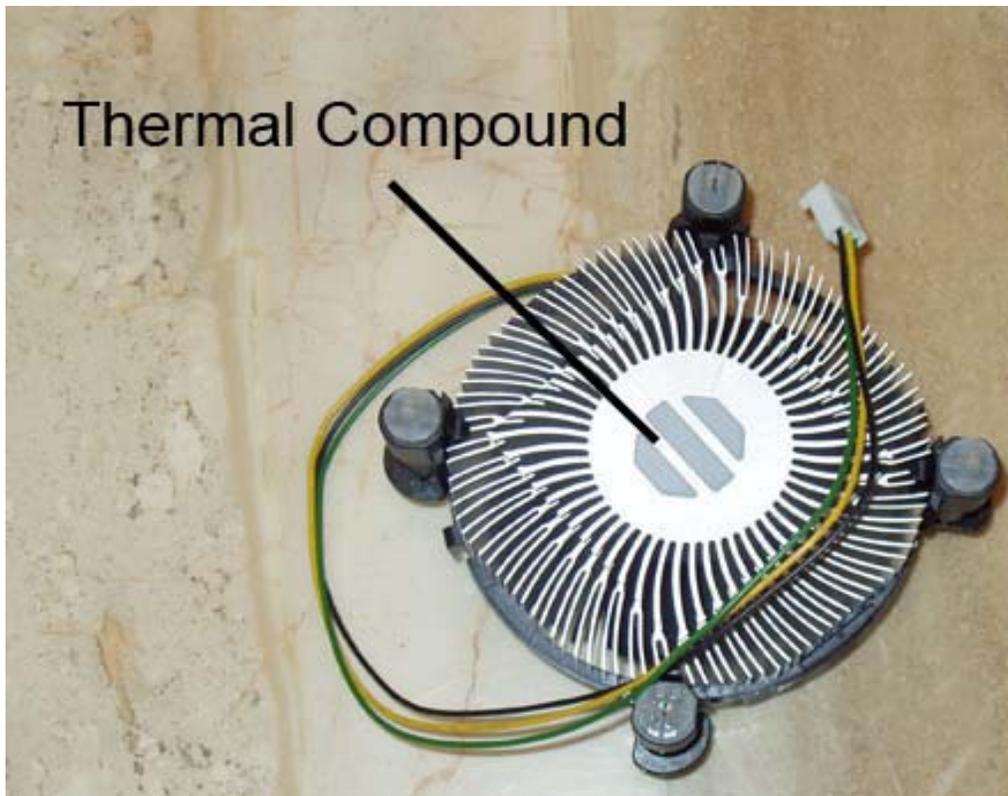
Install A CPU

Ok, we are ready to install a CPU. First off, remember to ground yourself before handling the CPU.

Your computer CPU should have come with 3 main things.

1. CPU
2. Heatsink
3. Small Tube of Thermal Paste (Optional)

Note: If you did not get a tube of thermal paste with your CPU or motherboard, check the bottom of the heat sink. Some heat sinks come with the paste already applied. If your heat sink has the thermal compound already applied, then you don't need to worry about getting any. If there is no paste present, I would recommend running to your nearest computer store and grabbing a tube. It is pretty cheap, around \$5.00, and you really should have some between the heat sink and CPU to maintain a good connection between the two and to keep your CPU temperature down.

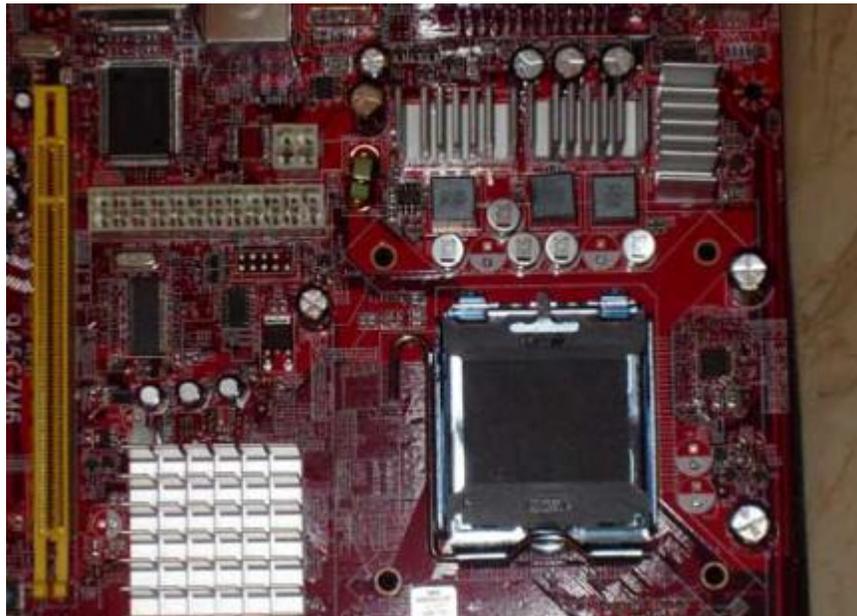


The steps to install a CPU couldn't be easier. You just need to take it *nice and slow*, and be gentle with the processor.

When I install a CPU, I like to take the motherboard and lay it on the foam that it was packed with, on the table. This gives me some room to work on the motherboard, and keeps a soft cushion below it.



1. First, lift the lever on the socket. It tucks underneath a small catch, so push down and gently pull out to release it. There may be a protective socket cover. If so, remove this.



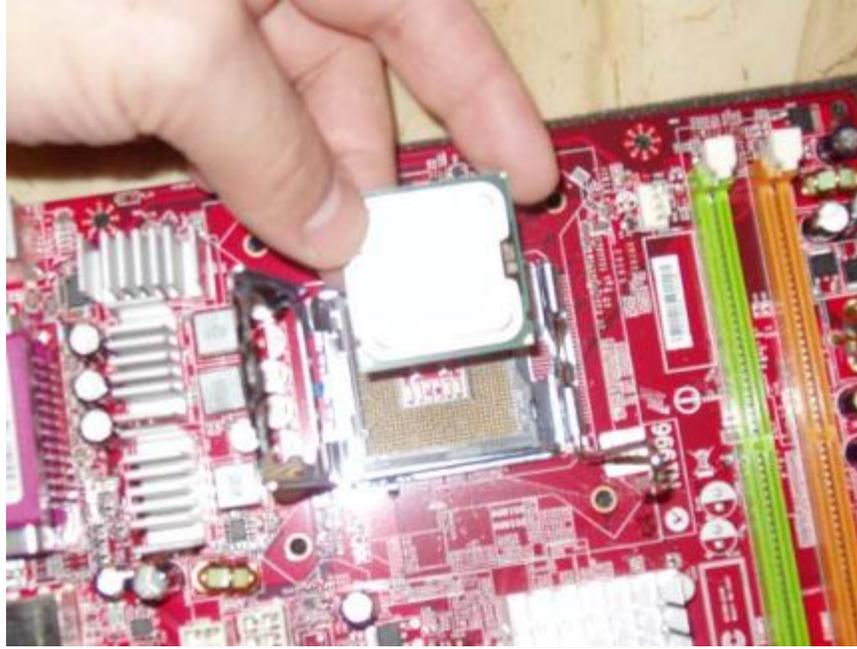
2. Lift the metal plate that is over the socket



3. Next – Find the Alignment Keys on the socket, notches on the side of the CPU, and the Pin 1 Marking – it will be a triangle.



4. Line up the alignment keys on the socket with the notches on the side of the CPU. If they are lined up correctly, the Pin 1 marking on the CPU will line up with the marking on the socket as well.



5. The CPU should simply sit on top of the socket. ***You do not have to apply any pressure to install a CPU.***



6. Once it is seated in place, close the metal plate. This should sit nicely over the top of the processor.



7. Lower the lever and lock it in place. For this step you will apply a small amount of pressure to the lever to lock it down.



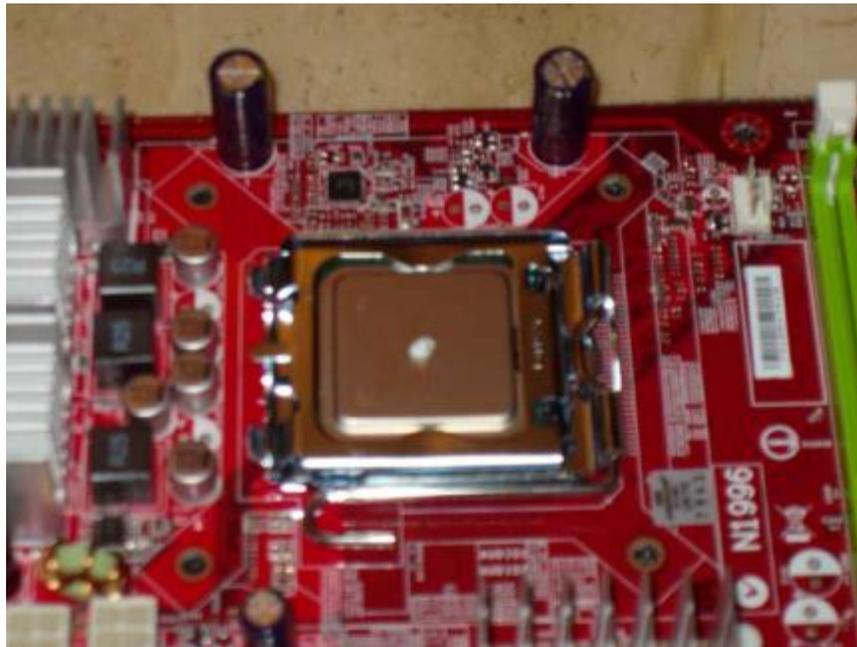
Ok, you have completed the steps to install a CPU - not too difficult. Next, we are going to install the heat sink. This is what keeps the CPU temperature down.

Note: If you bought an after-market heat sink, the instructions below will be similar. The vast majority of Heat Sinks will install the same as we are about to do. However, read over the instructions that came with the heat sink and note major differences. If there are a lot of variations compared to what I outline below, follow the instructions that came with your heat sink.

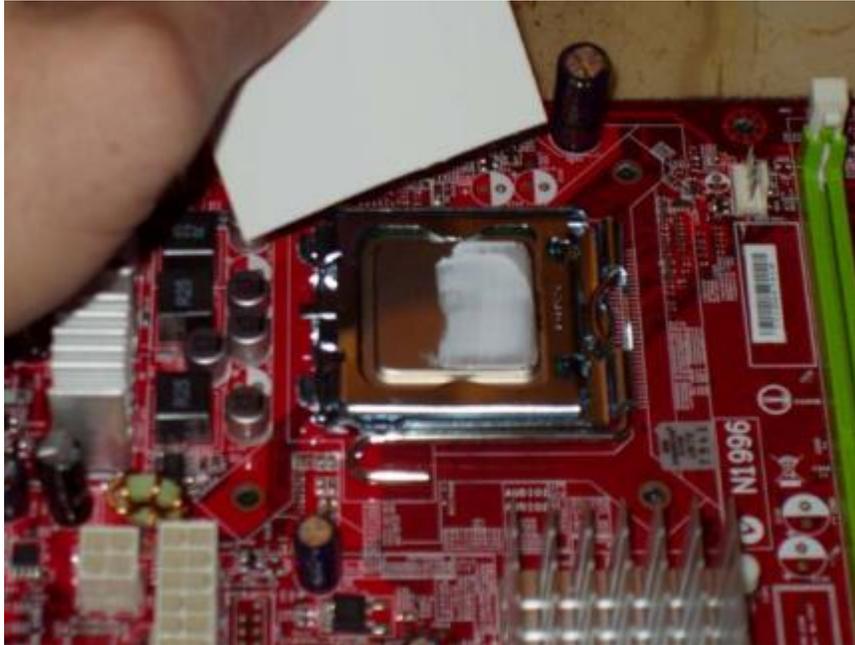
If your heat sink came with the thermal compound pre-applied, then you can skip to step 11 and install the heat sink directly. The thermal compound will activate automatically from the heat when you first use the CPU.

Install the Heat Sink

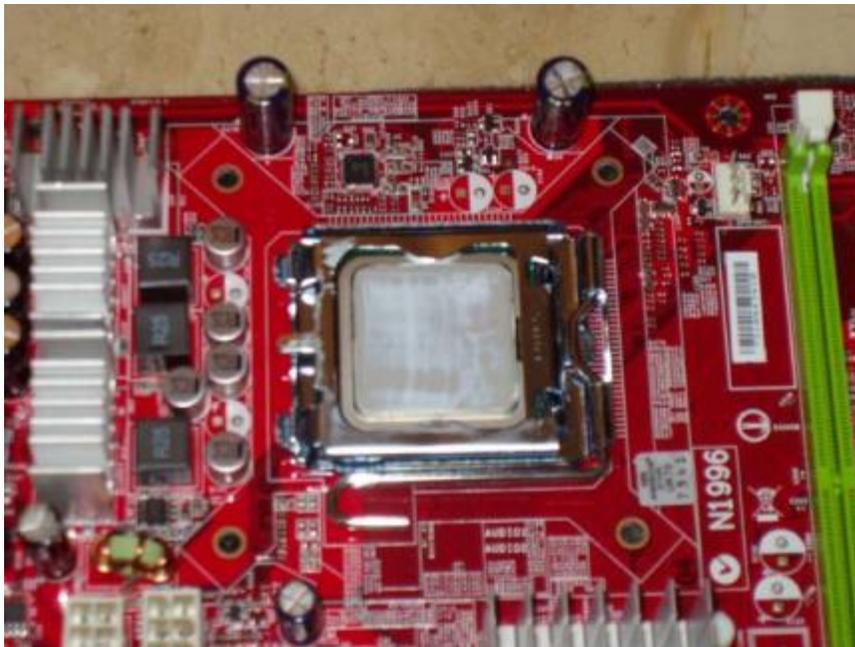
1. Get the Thermal Paste that came with your processor and apply a small drop of it on the CPU.



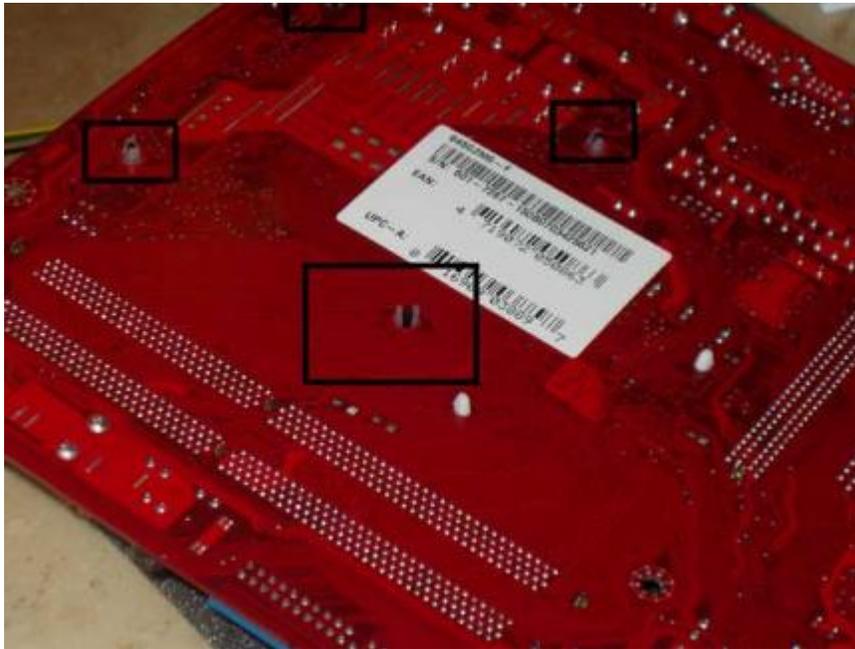
2. I use a business card for this next step, but anything with a straight edge will work, such as a credit card or razor. I am using a stiff piece of paper here. What needs to be done is to spread the thermal paste all over the CPU. Your goal is to apply a thin even layer over the area inside the metal plate. You don't need any on the plate itself, just on the CPU, but getting some on the plate won't hurt anything. This is going to help maintain a connection between the heat sink and the CPU for better heat transfer.



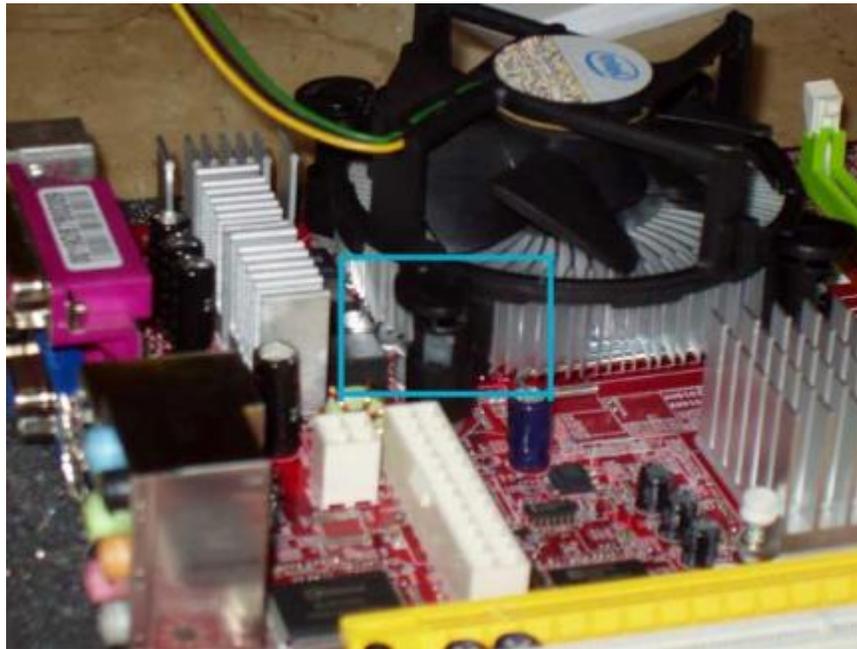
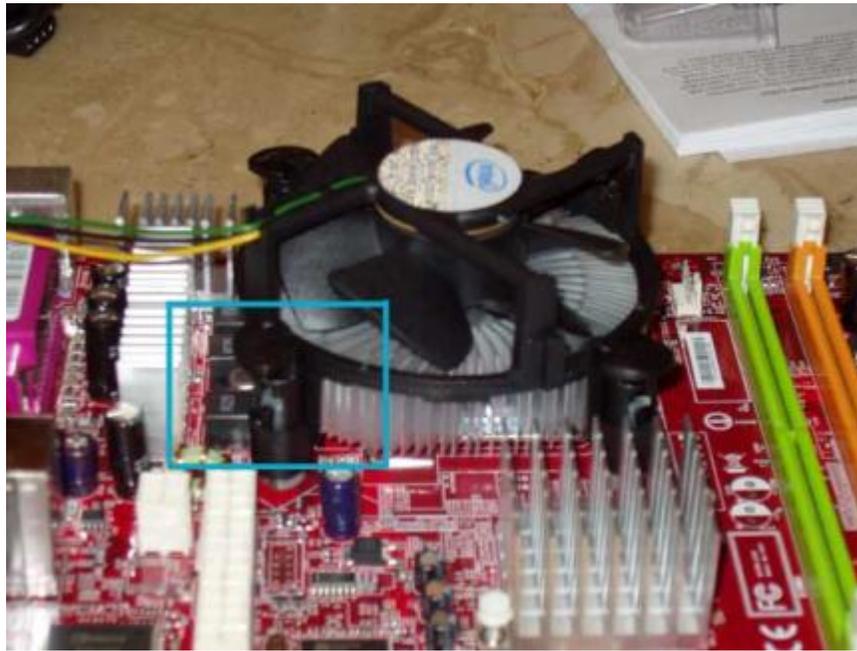
3. Once you have a nice thin layer of thermal paste on the CPU, get your heat sink. You will see 4 pins on the corners of the heat sink. These will align with four holes on the motherboard that surround the socket.



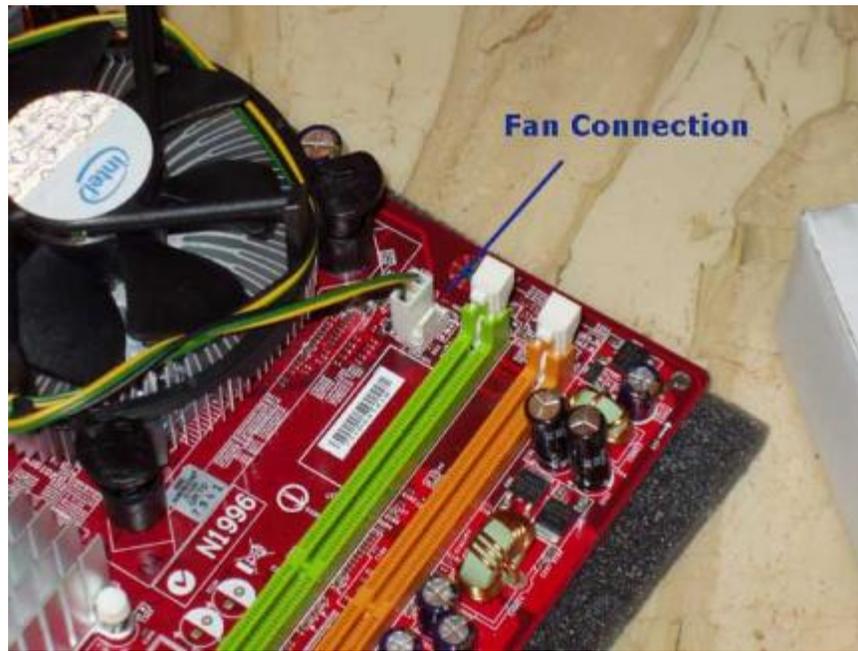
4. Line up the four holes – the orientation of the heat sink does not matter. Select 2 of the pins that are diagonal to each other, and press down on them. Press until you hear a click. I find that pressing the pins, and bracing the back of the motherboard helps with this. You will need to apply some pressure on top of the pins to get them to click into place. Note that sometimes these pins can be tough to get in place. The heat sink will lock down very tightly over the CPU. If you need to, pick up the motherboard and brace the back as you lock a pin down. Do the same for the other 2 pins. When you have all four pins locked down, turn the motherboard over and verify that the pins are all in place. They will look like this.



5. In these 2 pictures, you can see the pins, first in the unlocked position, and then in the locked position.



6. Finally, attach the power connector from the fan on the heat sink to the connection on the motherboard. Look for the label "CPU Fan" on the board.





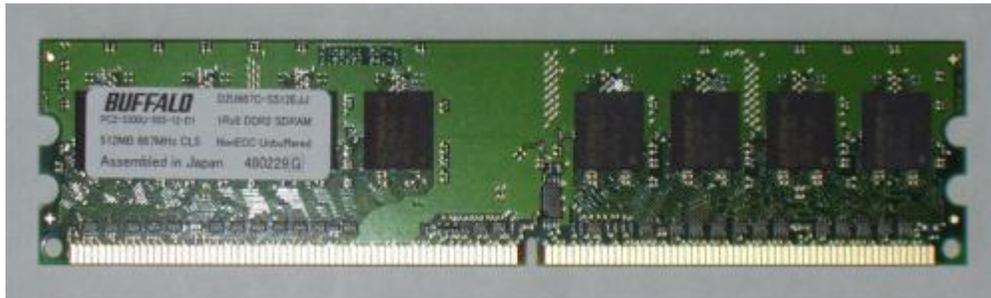
That's it! That's all it takes to install a CPU. With your CPU and heat sink good to go, let's move on to the system memory.

Step Seven - Installing Computer Memory

Installing Computer Memory

Installing computer memory is pretty simple. PC Memory comes in what are called memory sticks. There are no other parts that you will get, as you will not need any screws, or cables for the installation.

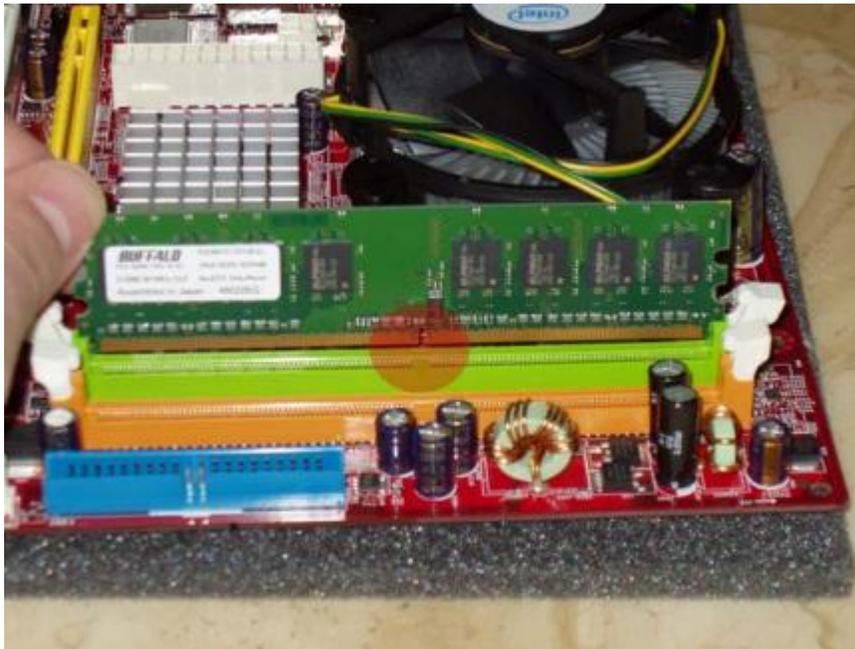
These same steps can be applied to a computer *memory upgrade* as well.



Keep in mind when installing your desktop computer memory is that it has a foolproof design. There is only one way that the memory module will fit into the memory slot. So, to install the memory modules...

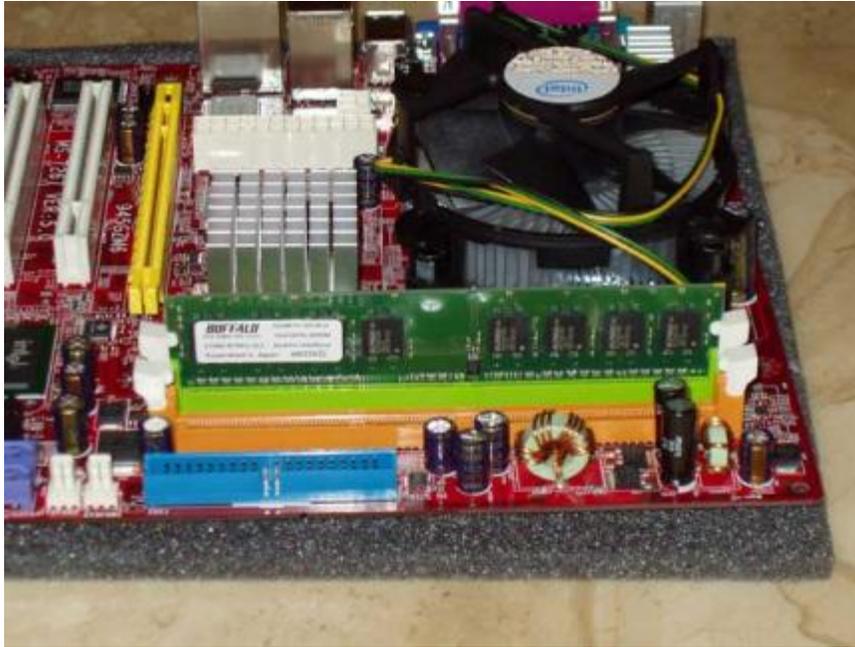


1. Determine where to insert the memory. Memory slots are usually color coded. When you have 2 memory sticks, you will want to install both modules in the same color slots. If you do not have color coded slots, then look in your motherboard manual for the 2 slots that go together.
2. Spread the retaining clips on each side of the memory slot. The clips will move out until they hit their stops. You will not hear any clicks, they just will not move out any further.
3. Insert the module into the slot, ensuring that the memory is oriented correctly. In this picture, look for the red dot in the middle, it shows the notch on the memory stick lined up with the plastic divider in the memory slot. This is how you can tell your memory is lined up correctly.



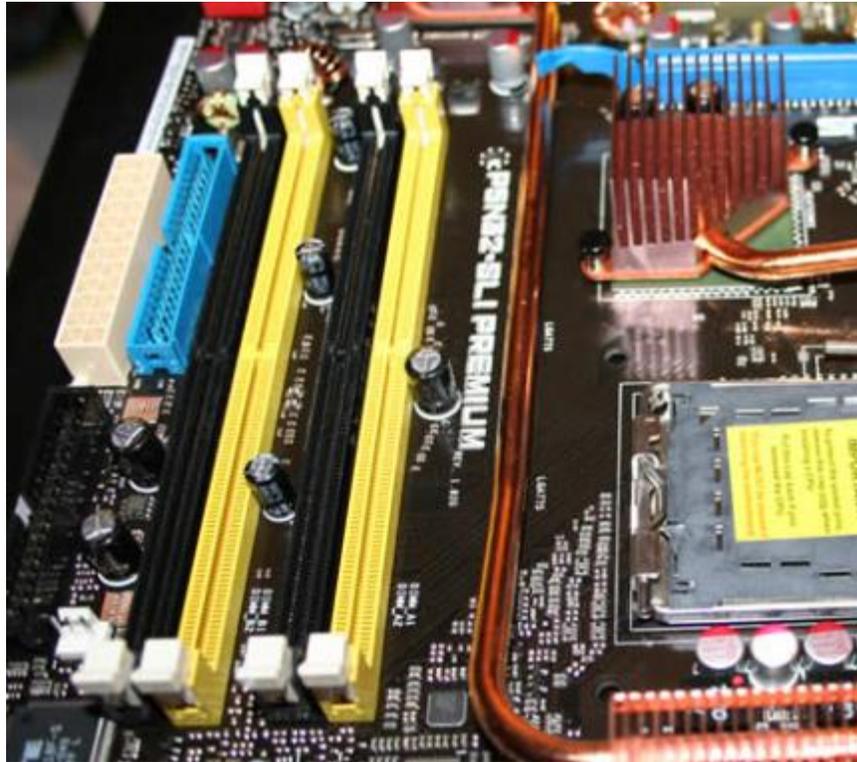
4. Press down evenly on the top of the memory module until you see the retaining clips snap into place. You may need a moderate amount of pressure to seat the memory module into place. You can apply a bit more pressure on one side of the module, then the other to help slide it into place.

5. If you have a second memory stick, remember to install it in the same color slot as the first stick. If you only have two slots, then go ahead and install the second memory stick. Repeat this process for any additional memory you have.



Keep in mind that depending on the board you select, the slots may not be right next to each other, but will still be color coded, as this example shows.

Note that this picture is from a different motherboard. I am using this to illustrate the different types of slots that you may encounter. The motherboard that we are using in this demonstration has only 2 slots. In my case, I will simply use the slots that are available. Installing computer memory this way will enable Dual Channel mode for the memory, which will speed it up. If your motherboard is not color coded, refer to your motherboard manual for the slots that go together.

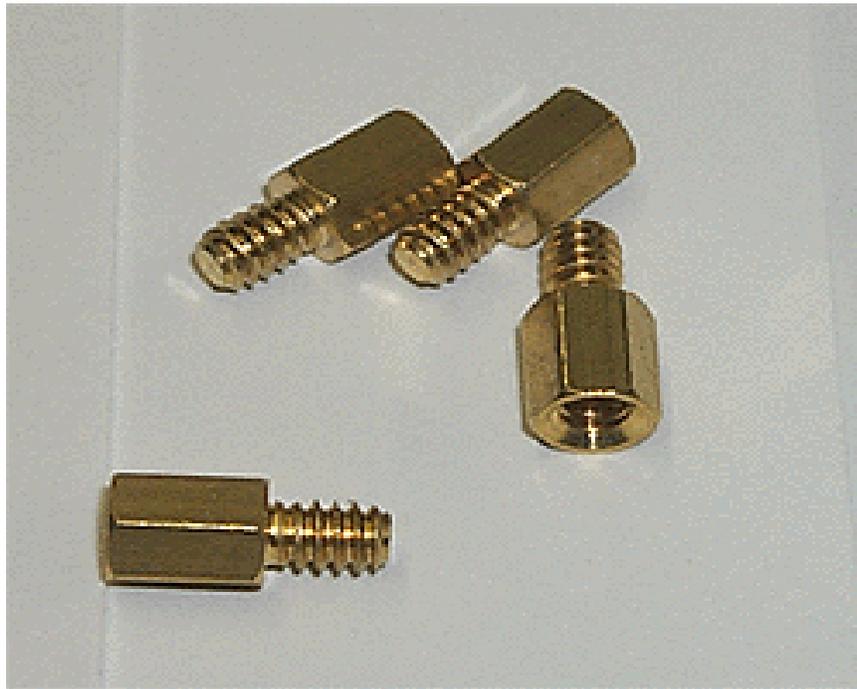


That's it, the memory is installed! Up next is the motherboard...

Installing A Motherboard

Our next step is installing a motherboard. We will need the hex screws that came with your motherboard for this step.

1. First, find the hex screws, also called spacers, they will look like this. You should have around 10 spacers.



2. Most cases will have multiple mounting holes for different types of motherboards. We need to find out which set you will be using. So first off, place the motherboard in the case, and **line up the back panel** of the motherboard with the rectangular space on the back of the case.



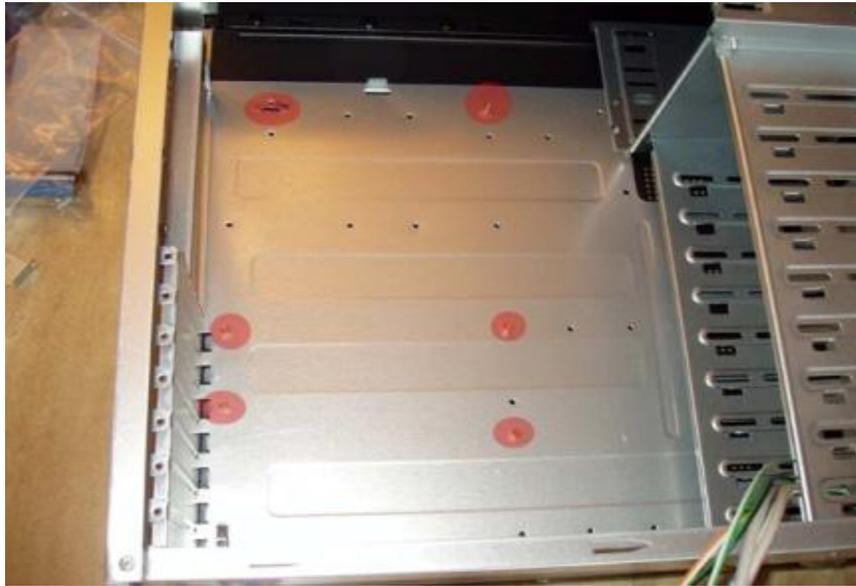
3. Next, identify which holes on the motherboard line up with the holes in the case.

4. The next step is to screw in 4 of the hex screws in the case, where the 4 corner holes of the motherboard line up.



5. Once those are in place, remove the motherboard, set it on the foam cushion again, and insert a hex screw for each hole in the motherboard. When finished, it will look similar to this.

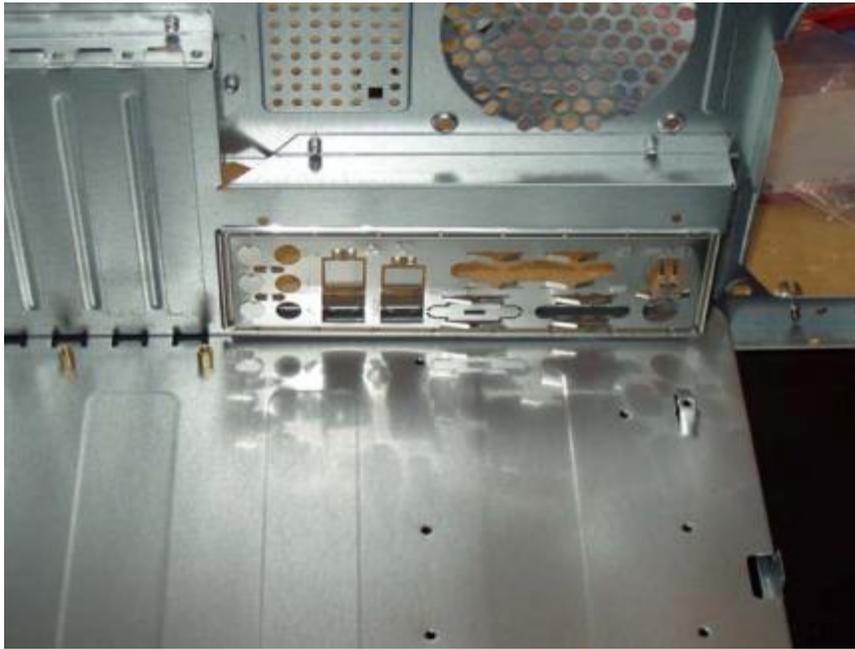
Note: All the holes on the motherboard may not be used. You may have 1 or 2 in the middle that do not line up with any hole on the case. This is fine, and nothing to worry about.



6. Next, find the motherboard's back panel plate. This will fit into the rectangular case opening on the back, from the inside of the case. This should snap into place and be nice and tight.



7. The back panel is in place.



8. With the spacers in place, find your motherboard screws and place the motherboard back in the case, lining up the holes with the spacers you just put in, and lining up the back panel connections on the plate. Note that you may need to remove some of the metal pieces from the back plate if one is blocking a needed opening.



IMPORTANT: Some motherboards are a real tight fit against the back panel plate, and in order to get the screw holes lined up, you may need to brace the motherboard tightly against the back plate. This is not abnormal, just use gentle even pressure against the back plate, line up a hole and put a screw in. Do the same for a second hole and the motherboard will stay in place.

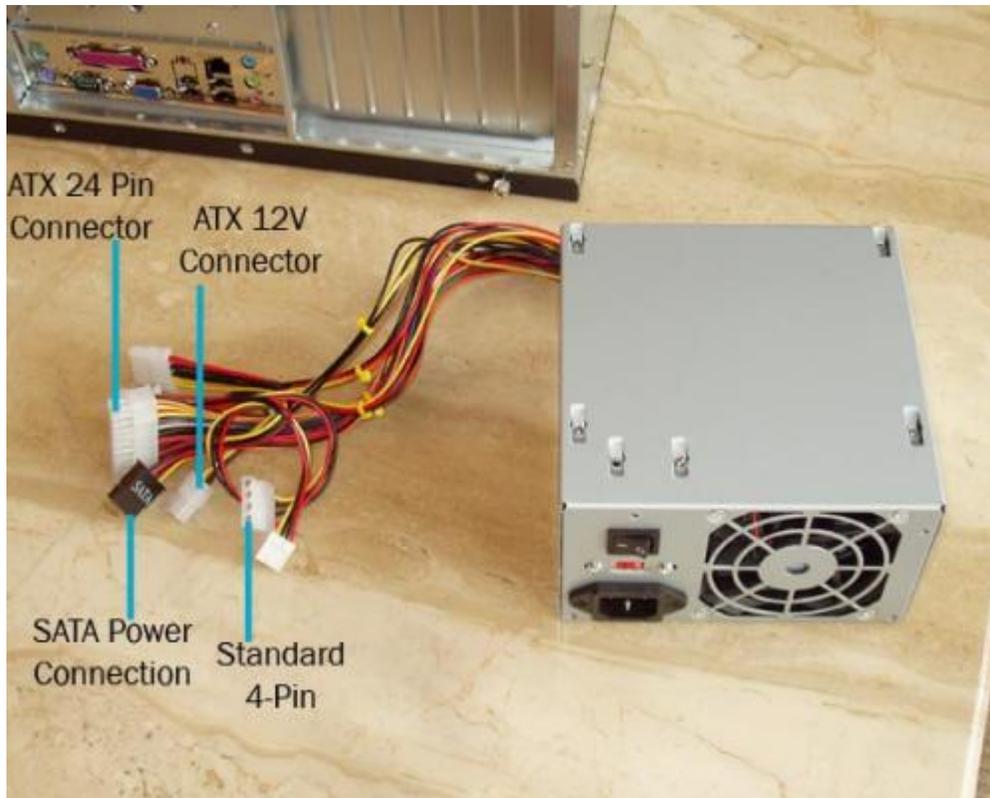
With the motherboard in place, find the rounded top cross-tip screws, and screw them through the motherboard's holes into each of the hex screws you inserted earlier. **Be careful** not to let the screwdriver slip out and scratch the motherboard

Get the screws in place and tighten them down. Don't over tighten the screws. Just get them snug in place.



Congratulations, you just installed a motherboard! On to the power supply and power connections...

Installing A Power Supply



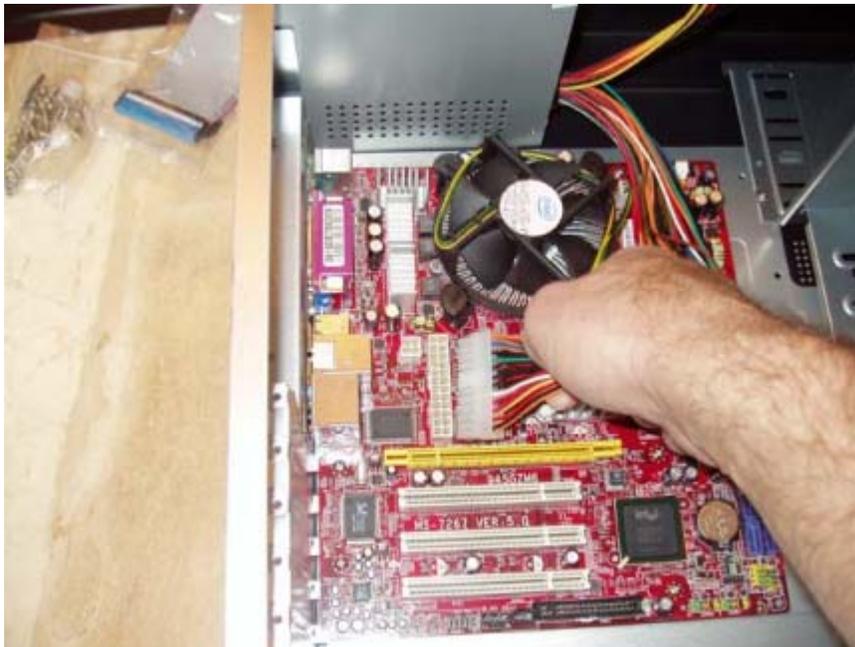
The next step is installing a power supply and hooking up power to the motherboard. Included with your computer power supply should be at least 4 screws, sometimes more. These are what will hold the power supply in place. If it didn't come with screws, borrow a few from the bag of screws that came with the motherboard.

Note: You will always end up with extra screws. I put them in a small bag and store them with the rest of the component materials in a small box.

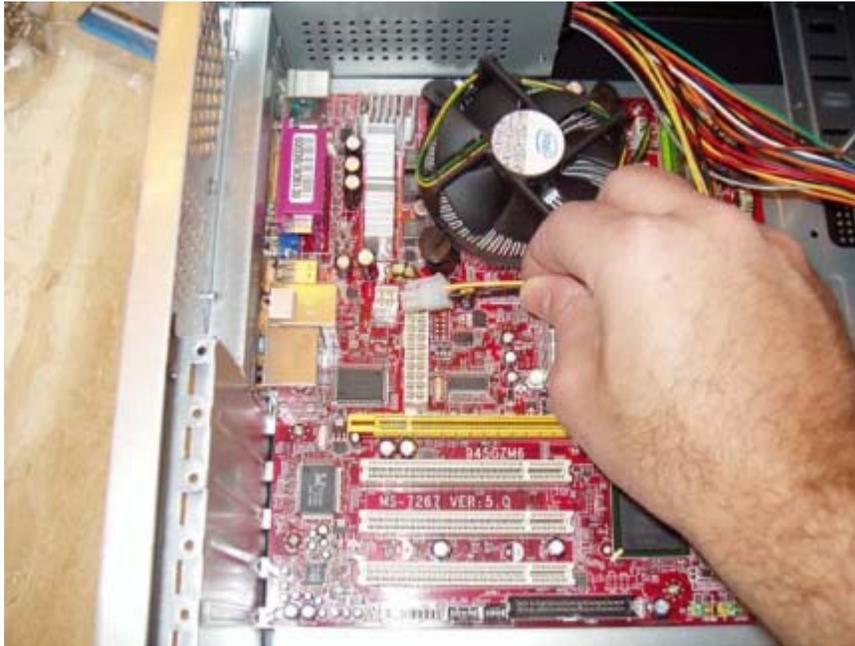
1. Slide the computer power supply into the case, and **secure it** with the four screws. These go in from the outside of the computer, on the back.



2. Next, find the main ATX power cable. Connect this into the ATX power supply connection on the motherboard.



3. Next, connect the 4 Pin power cable to the motherboard.



(Optional) If your computer power supply and motherboard came with a 2X ATX power connection, you should connect that now as well. You will most likely have one of these if your CPU is an Intel Extreme Edition CPU. These are higher end CPU's, so most setups will not use this. See label "E" on the [motherboard diagram](#) for the location of this connection

This is a good time to verify your pc power supply setting. Depending on which country you live in, verify that the voltage setting on the back of the power supply is set correctly. There may or may not be a small switch. If you do not have one, then you do not need to worry about the setting. Most European countries use 230, here in the U.S. we use 115. It should already be set correctly, but it's always good to verify.

You'll probably notice that you have a lot of cables still coming from the power supply. Don't worry, those will get used shortly for your system fans, hard drives, dvd drives, etc. Speaking of wires, I should discuss some wiring basics.

Some power supplies come with quite a few wires, and sometimes you will only use half of them when installing a power supply. We don't want these hanging all over inside the case. They can get caught in your case fans, block airflow, and just plain don't look good. Once we have everything wired up, the best bet is to take all the extra wiring and bundle it up as tightly and neatly as you can. You can then attach it near the power supply at the top or bottom of your case.

I use plastic zip strips for my wiring. When we start running more and more wires into the main area of the motherboard, feel free to get creative on running and securing the wires. The neater you can keep your case, the easier it will be to work with and keep clean in the future. As we go through the rest of the setup, keep an eye on the pictures and how I wire my case. I'm not claiming to be a pro at it, but I do try to keep it neat.

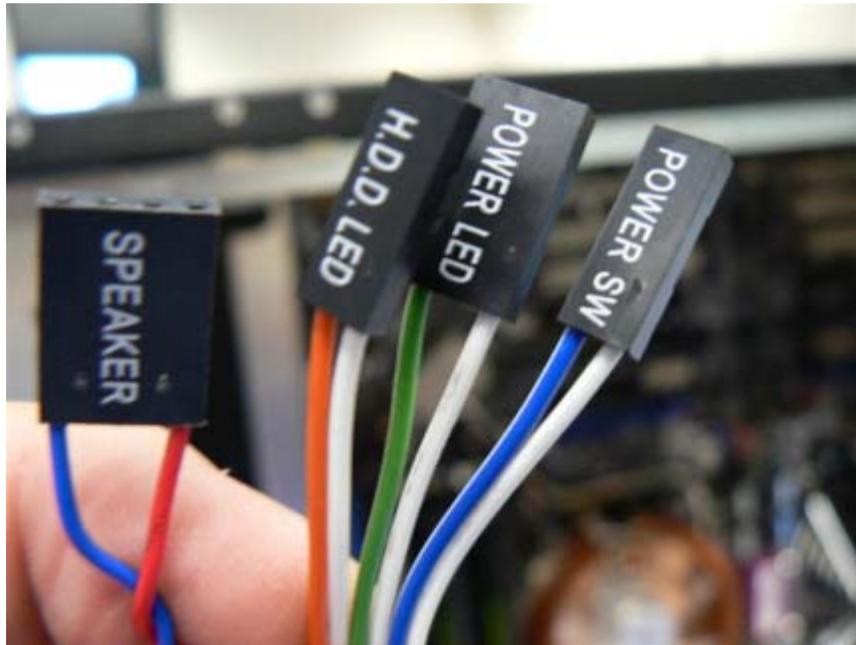


Ok, that's it for installing a power supply. Next up is computer wiring...

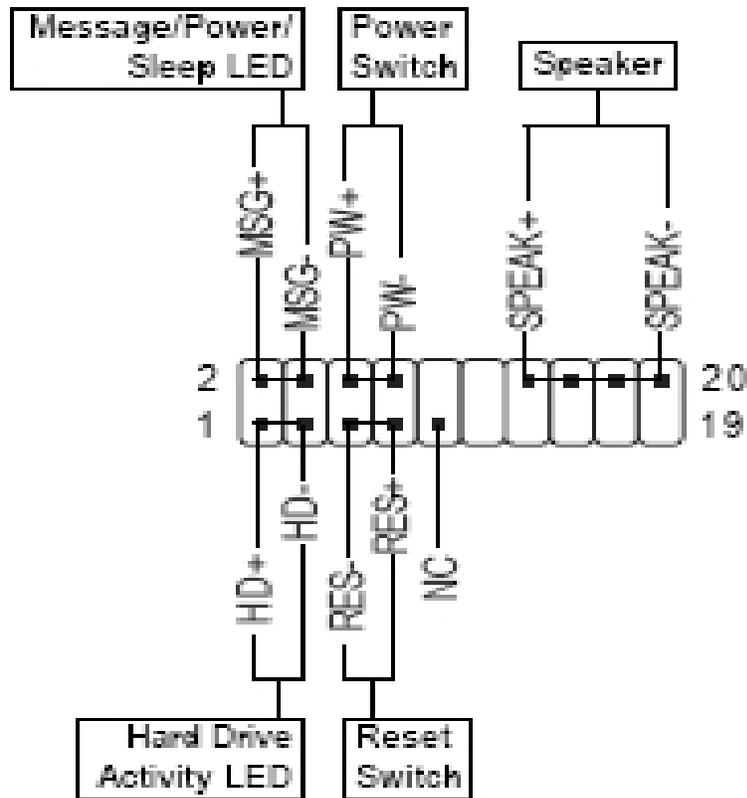
Computer Wiring

Computer wiring includes the wires that you see connected to the front of your case, system fans, and misc. motherboard connections. Let's start with the case wires.

First, identify the different cables that are attached to your case. These are usually bundled together near the bottom, and the connectors on the end of the wires are labeled. You will see things like HDD, Power, PWR, etc. Look on your motherboard for the front panel connection area. See label "M" on the [motherboard diagram](#).

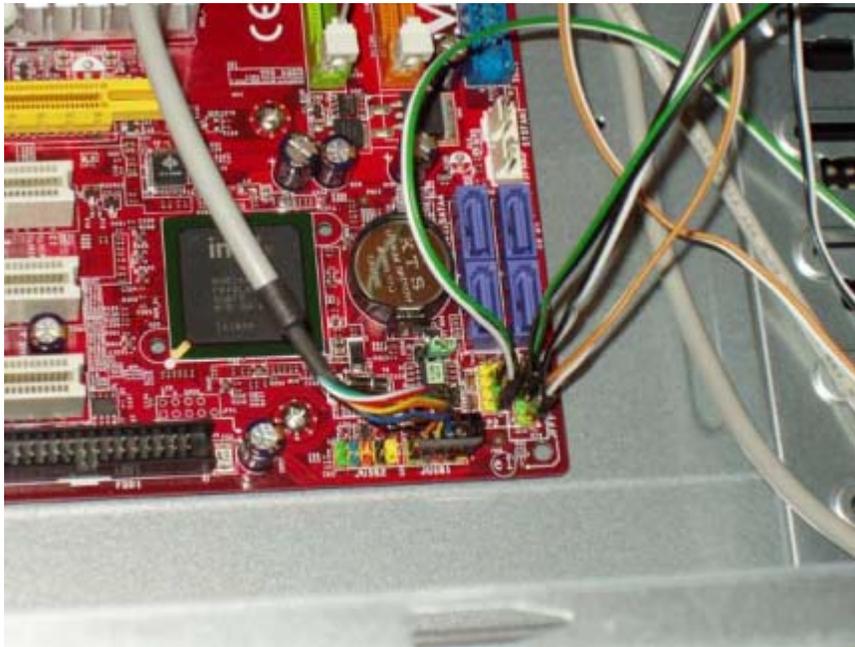


Your motherboard manual will have a page that shows a *detailed diagram* of what goes where.



Here are the connections we need to plug in:

- **Power** (also called Message) – This is the connection for the power LED on the front panel – this will be green when your computer is on.
- **PW** (this is the power switch on the case) – This is the connection for the actual power button on the front of your case.
- **SPEAK** (this is the speaker on the case) – This is the connection for the speaker on the inside of the case.
- **HD** – This is the connection for the hard drive activity light. This will be lit when your hard drive is running.
- **RESET** – This is the connection for the reset button on the front of your case.



Take note of the connection to the left of the all the computer wiring connections. This is the USB connection from the computer case. This is where you will plug in any external USB ports, like the ones on the front of your computer case, or a USB bracket, as shown further down.

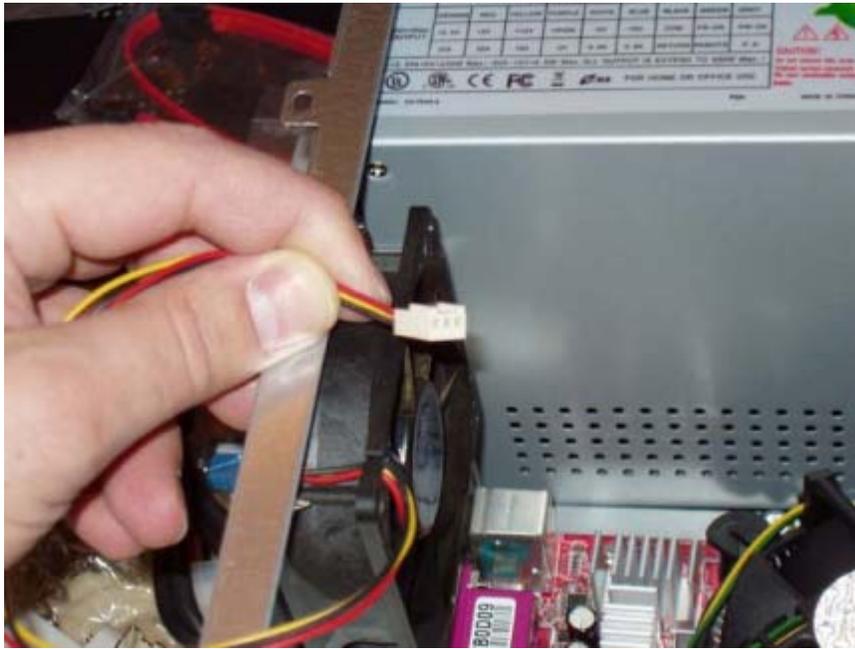
All you need to do here is match up each wire with its pin assignments.

I sometimes run into trouble doing the computer wiring, as my fingers have difficulty working with the small connections (as you will see below). A tweezers and flashlight come in handy for here.

Note: You may not use all of the pin connections on the motherboard. This is normal, and not something you should worry about. Case connections differ by manufacturer.

Install Case Fan

Let's get the case fans connected here as well. Depending on the case you bought, you can have anywhere from 1 to 4 or more fans in your case. The larger fans that are connected to the case itself will have a small 3 or 4 pin power connection.



Some cases will have brackets already installed and you simply need to snap the case fans in place. Otherwise, you can use screws that look like this to connect the fan to the case. These screws are inserted from the outside of the case, on the back.



These can be connected directly to the motherboard. Find the label that says "sys_fan" and plug it in there. Some fans will come with a 4 pin connector that you will connect directly to the power supply. Then, if you have 2 fans on the back of your case, you can string them together to the same power supply connection, like you would do with Christmas lights. Whenever your computer is on, the fans will be on as well. This also helps to keep the computer wiring neat.



You may have smaller fans in your system. Some computer memory setups come with fans that fit over the top of the memory sticks. If you have one of these, look for a connection on the motherboard that reads something to the effect of "sys_fan" or "sys_fan2". These will be small 4 pin connections that you can plug the smaller fans into.

Using this connection instead of going directly to the power supply will allow your system to control the fan speed dependent on temperature. This will also allow you to control fan speeds once your computer is up and running.

If you have fans on your northbridge or southbridge, you will see computer wiring connections coming from these fans. These will connect into the motherboard directly as well. These are 3 pin connections usually, and will be designed to only fit in a specific plug. These plugs will be very near to the north and south bridges.

These are the most common connections for the case and motherboard. You may have other connections such as chassis intrusion, a trusted platform module, or extra COM and LPT cards that you will need to connect to the motherboard. Please see your motherboard manual for these additional connections.

Finally, if your motherboard included an external SATA connection bracket or an external USB bracket, let's hook that in now. Your motherboard may have come with one or the other, or you may have both.



1. First, connect the bracket to the case. I usually put this on the bottom PCI slot to keep it out of the way. You will need to remove one of the metal brackets over the PCI slots on the case.

If you have a SATA bracket:

2. Connect the I cable from the bracket to an available power connection from the power supply

If you have a USB Bracket:

3. Connect the USB cable coming from the bracket to the USB port on your motherboard. This will usually be close to the front panel connections that we did earlier. Most motherboards will come with 2 separate USB connections in case you are connecting multiple USB ports. You can use either one for this connection.



Ok, so far so good? Everything connected so far, computer wiring kept nice and neat? Next up is drive installation...

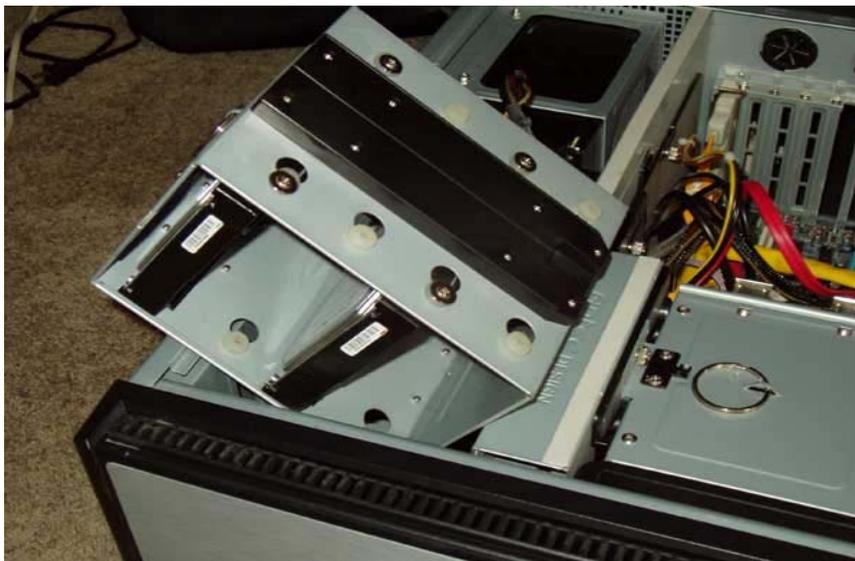
Installing A Hard Drive

Next up is installing a hard drive. This will include hard drives, CD drives, and DVD drives. You have 2 options for connections. Almost all new drives now come with SATA connections, however, you may still find some with IDE connections.



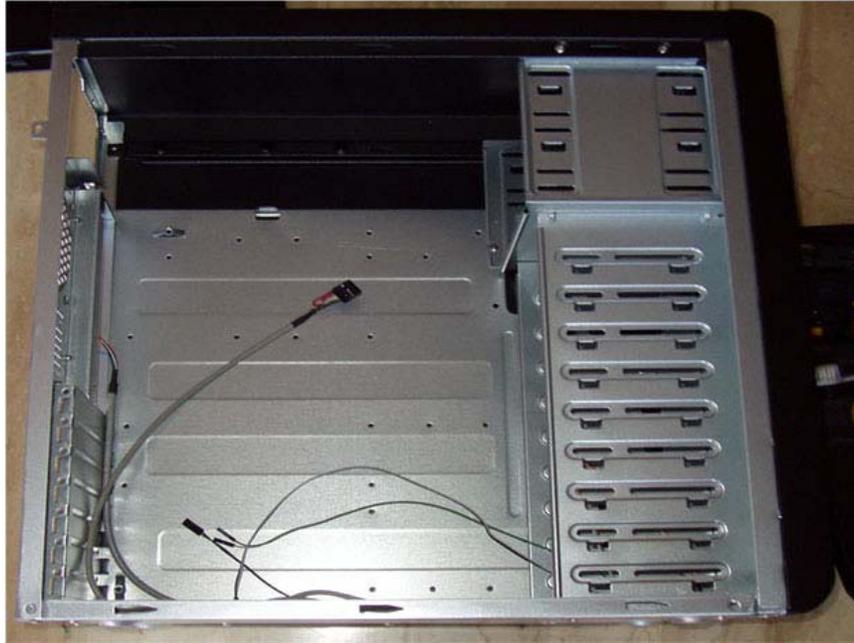
With your motherboard you should have received an IDE cable, and at least 2 SATA cables. You should also have received a bunch of rails. These may also be located on the bottom of your case. Some cases have a holder there for them.

If you have a removable drive cage remove the drive cage from the computer case.



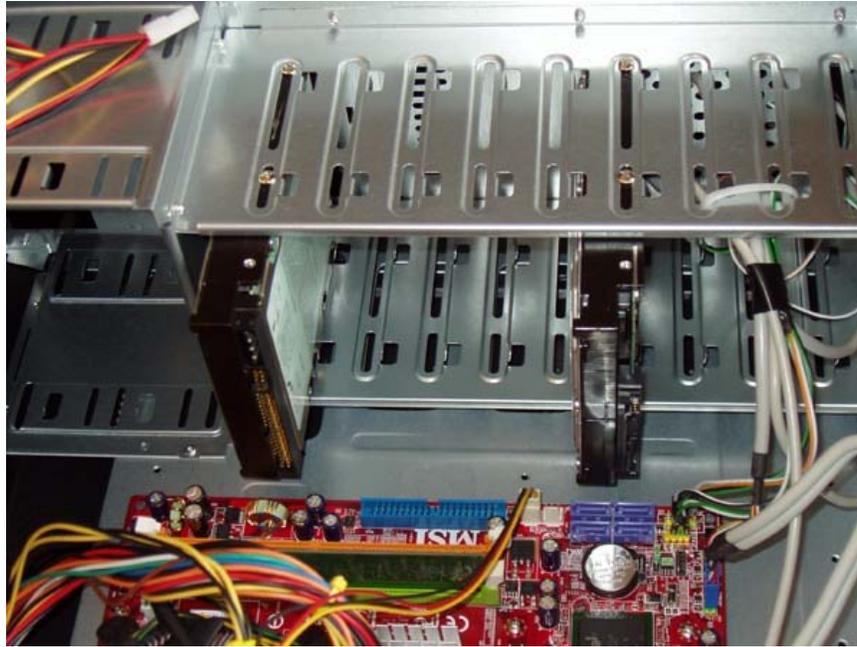
Next, mount the drive in the drive cage. Depending on the type of case you bought, you will either have to use some screws to hold the drive in place, it will just snap into place in an existing bracket within the drive cage, or rarely you may need to mount rails on it.

As you can see, this case does not have a removable drive cage, it is built in. So I simply installed the drives into the case. When installing a hard drive, I like to keep some space between drives for better air flow and cooling.

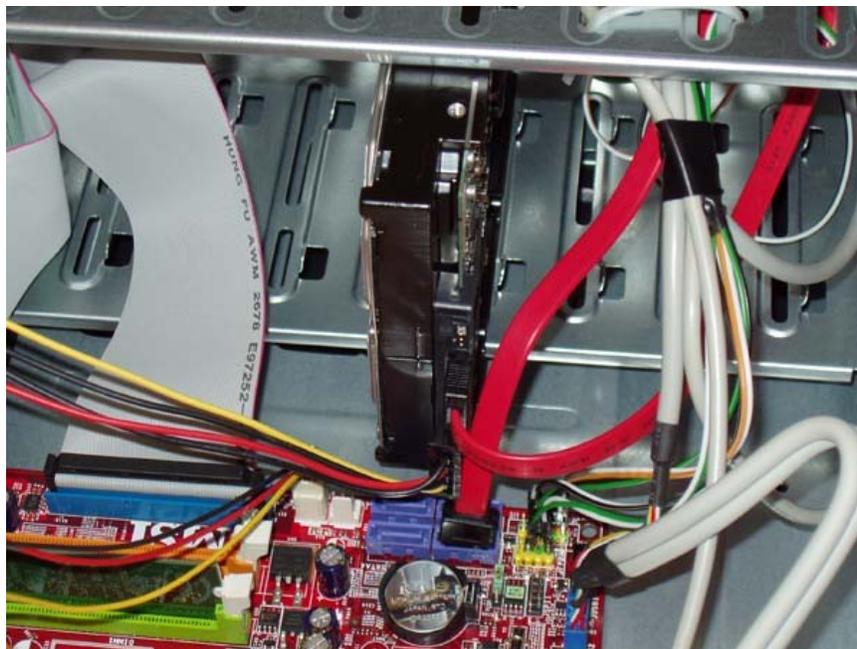


Do this for each computer hard drive you are installing.

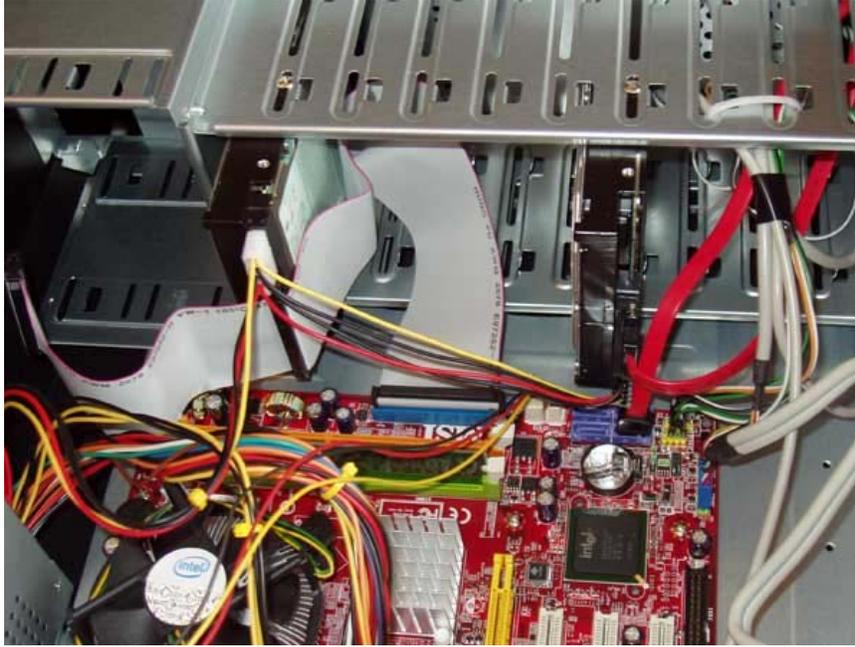
Once all drives are in place, re-install the drive cage, if you used one, into the case.



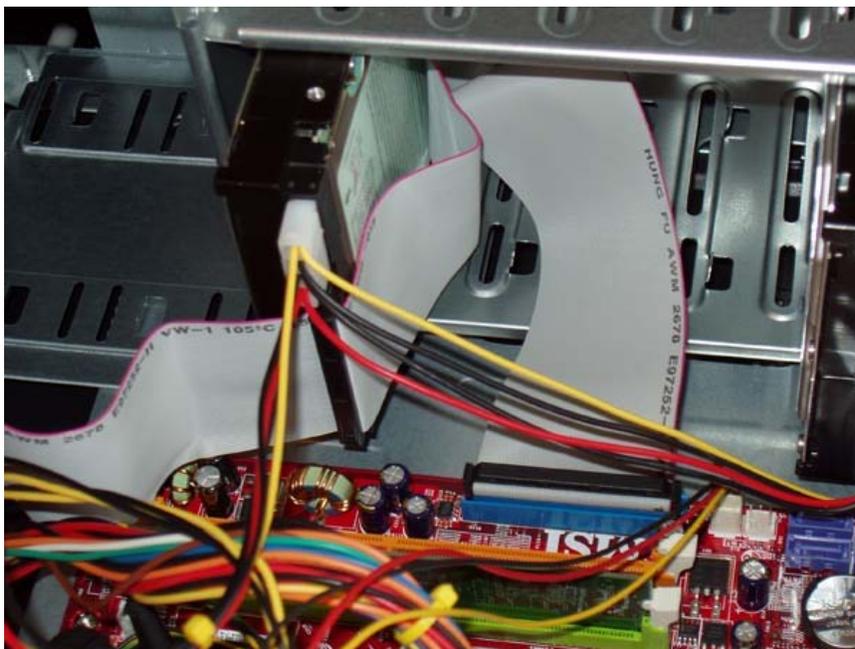
Regardless of the type of drive you have, you will need a power connection for each drive. These will come from the power supply, use the standard 4 pin connection. Make sure to keep your wiring neat, and run a cable to each hard drive. If your power supply came with cable extensions, you can use these and string 2 drives together on the same power cable.



If you have SATA drives, the next step of installing a hard drive is to connect each drive to a SATA connection on the motherboard, label "L" on the [motherboard diagram](#).



If you have an IDE drive, connect the drive to the IDE connection on the motherboard. Label "J" on the [motherboard diagram](#).



If you are using an IDE drive, when installing a hard drive, there are a couple more steps you will need to do.

1 - Set the jumper on the computer hard drive. If you are using a single IDE hard drive, this jumper should be in the Master position.



2 - IDE cables have room for 2 drives on them. These can both be hard drives, or mix of a hard drive and DVD drive. If you have 2 drives to put on this cable, you will need to set one to be the Master and one to be the Slave. Set the hard drive that will hold your Operating System as the master drive, and the other to be the slave.



That's it for installing a hard drive. We're moving right along here, and are nearly complete with the assembly. Next up are the DVD and floppy drives...

DVD Drive

Next step is to install your DVD drive. This is installed similar to installing a hard drive.

Depending on your case, you may or may not need to connect rails to your drive. Some cases may have pre-installed rails you can just snap into. Go ahead and install the rails, 2 per drive if needed. In the case of our example here, the DVD drive is installed the same as a hard drive, attached directly to the non-removable cage.



Again, depending on the case, you may need to remove one of the slot covers on the front of the case. Most cases will need this done. You may either have a metal one that you can twist out, or a plastic one that you can just pop out.



Or you may have both kinds, as is usually the case.



4.

Slide the drive into the case from the front. You will hear the rails click when it is in position. It should be lined up with the front of the case.



Attach a power connection to the drive, directly from the power supply.

Then it is simply a matter of attaching either an IDE cable, or a SATA cable to the drive, and the other end to the motherboard. If you are using an IDE drive, see the above note on IDE connections.



Install Floppy Drive

Finally, if you have a floppy disk drive to install:

1. There is only one location on modern cases to install your floppy drive. You will see on the front of the case a smaller panel that you can remove, usually below the DVD slots. This is where the floppy drive will be installed. Slide the drive in the slot and secure it inside, usually with a few screws. Make sure the front is lined up nicely with the front of the case.
2. Connect a power cable to the drive, directly from the power supply.
3. Connect the FDD cable to the drive, and to the FDD connection on your motherboard. See label "J" on the [motherboard diagram](#). You will notice that the FDD connection is wider than the IDE connection.



That's it for installing the DVD and floppy drives. Next up are graphics and sound cards...

Installing A Graphics Card

Our next step is installing a graphics card. Actually, we'll cover all peripheral cards here, with the most common being...

- Graphics Card(s)
- Sound Card
- Ethernet Card
- Wireless Ethernet Card



There are other types of cards you may use, and the installation for them will be very similar to installing a graphics card. It may be that you do not have any peripheral cards if you got onboard video with your motherboard. If that is the case, you can just skim over this section, and keep it in mind if you should later buy a graphics or sound card.

Note: PCI-E slots come in sizes that include: x1, x2, x4, x8, and x16. These all refer to the communication speed of the slot. There are 2 types of cards to cover here, graphics, and all others.

Motherboards now come with PCI-E slots. See Labels "A, B, and C" on the [motherboard diagram](#). "A" is a PCI slot. These are still in use today, but in the future will be made obsolete. They are being replaced by "C", the PCI-E x1 slot (as well as x2, x4 etc.). These allow faster communications with the motherboard. Finally, slot "B" is the PCI-E x16 slot that will be used for your graphics card.

You may have noticed that the motherboard in the above link has 2 of the x16 slots. This is used for SLI (Scalable Link Interface). This allows you to install 2 graphics cards to really crank up your graphics power. Usually only gamers will go with this type of setup, as it can get quite expensive. The board we are using for this demonstration only has a single PCI-E slot.

Installing The Graphics Card

Carefully line the card up with the PCI-E x16 slot. The back bracket of the card should line up with one or two of the slots on the back of the case. You will need to pop out the slot protectors that it lines up with, or you may have one that is held in place with a screw. Either way, remove the protector and set it aside.

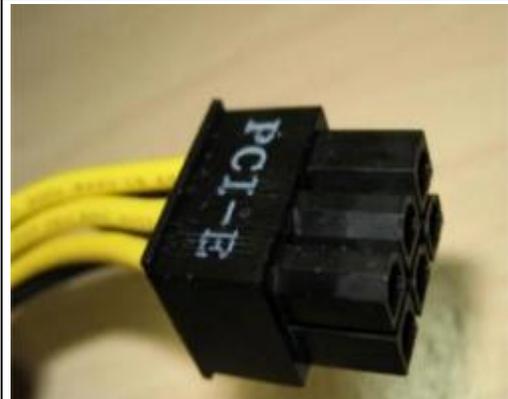
Next, line the card up again, and carefully press the card down into the slot. You want to be sure to use even pressure along the length of the card. When the card is in place, secure it to the back of the case with a small screw.



Depending on the card you bought, you will either have 1 or 2 power connectors. The basic cards will have either no power connection, or a 4 pin connection. Some higher end cards are starting to come with 2 connectors. They will have a 6 and 8 pin connection.



Other cards will have a single 6 pin connection.



6-pin PCIe power connector

The power supply that you researched to buy with this card should have the correct connector. Some will include an adapter that connects 2 of the 4 pin connections into a single 6 pin connection. Regardless of the type of connection, run a wire from the power supply and hook it into the card.

Please refer to your graphics card manual for more detailed information on your connections.

Note: Do not share power cables that your graphics card uses with anything else. Unlike your computers' fans, graphics cards take a lot of power, and don't like sharing with others.



That's it for installing a graphics card. Other cards you may have will be installed the same way. Simply identify which type of slot you need, PCI, x1, x4, x8 and drop the card in. Some cards, such as Ethernet cards and some sound cards, do not require any power connections. Others will; if so, run another power cable from the power supply. Check the manual that came with your peripheral card for the correct installation procedures.

Moving on, the next step is the initial boot up...

Final Preparations Before Booting the Computer

The completed computer...



The last thing we need to do before trying a computer boot is to hook up the peripherals. Plug in your keyboard, mouse, and monitor. Refer to the [back panel diagram](#) if you need to for the correct connections. And don't forget to plug in the power cable to the back of the power supply. Once you have everything in place...

Note: When you first boot up your computer, you will either see the motherboard manufacturer's logo screen, or you will see the POST results screen. When you see either of these, press the "Delete" key on your keyboard. If the Delete key does not work, look for something onscreen to the effect of "F2 = Setup". This is the key that will get you into the computer BIOS screens.

Flip the switch on the back of your power supply, and push the power button on the front of your case and we are off and running!

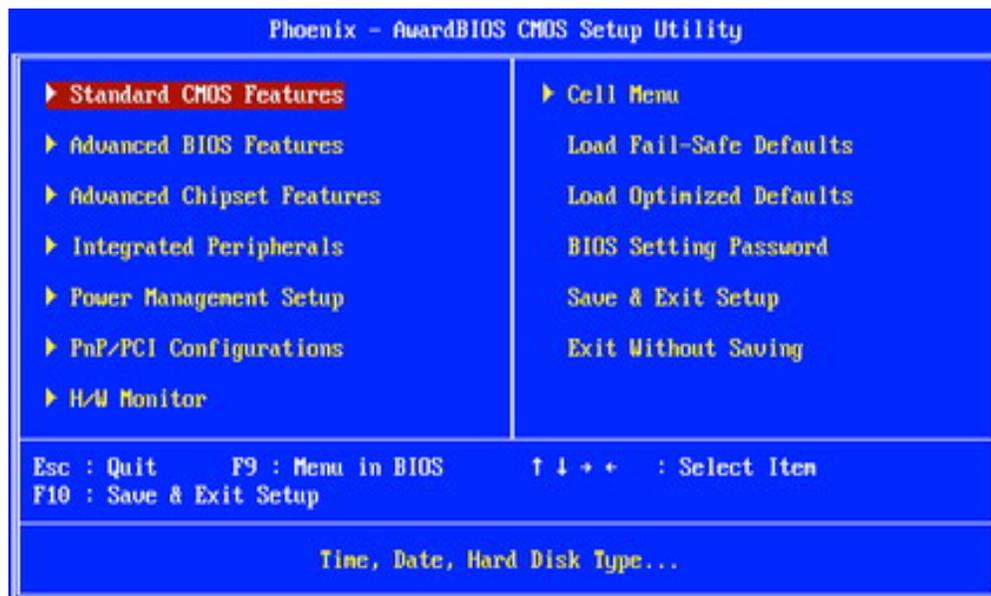
Don't forget to press the "Delete" key during the boot process to get into the BIOS...

Now - if your computer will not boot. *Don't panic*. We can take care of that. If you run into this, take a browse over to the [troubleshooting guide](#) and we'll figure out what's wrong. Again - don't panic, even after 12 years, I still have a computer that will not boot every now and then.

Ok, your computer booted up, you hit your delete key, and we are looking at the BIOS setup screen. Let's adjust some of the BIOS settings and set a few things up.

BIOS Settings

Once in your BIOS, you should see a screen similar to the following:



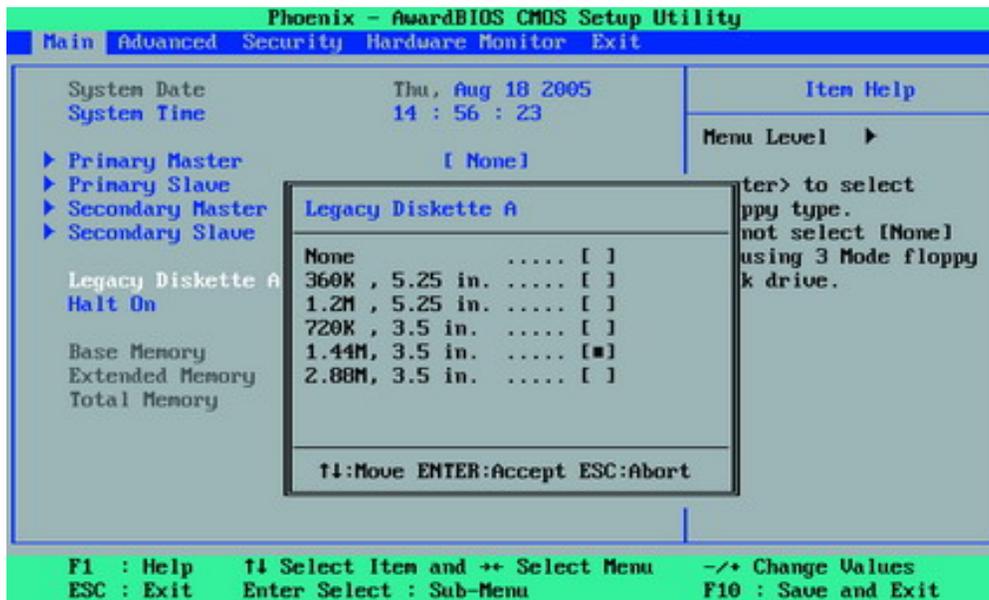
Within the computer BIOS screens you will use the arrow keys on your keyboard to navigate around. The + and - (plus and minus) keys are used to adjust the settings, the enter key will confirm and save your settings and the ESC key will cancel your change, and take you back one screen.

Keep in mind that computer BIOS screens will differ from motherboard to motherboard, but the basic functionality that we will cover here will be pretty much the same. At any time during the process, you can refer to your motherboard manual. Most companies will include instructions for the different setup screens.

Standard CMOS Features Screen

The Standard CMOS Features BIOS Screen is where you can configure the following...

- Time and Date Settings
- Floppy and Hard Drives
- Keyboard Settings
- Monitor Settings



The main setting here to be concerned with is the hard drive. The keyboard and monitor are basically just there for legacy systems, as you either have one, or you don't. The Time and Date settings can be adjusted here, as well as within your Operating System. The Hard Drives however need to be setup here in order for the BIOS to find and access them. Most modern motherboards will allow you to auto detect your hard drive. Simply highlight the IDE or SATA Primary drive and hit the Enter Key. You should see an option to auto detect your drive.



The other thing we'll need to do in the BIOS is to set the boot order. To set the boot order of your computer, first go to Advanced BIOS Features from the main computer BIOS screen, then arrow down to Boot Sequence, and hit Enter. This will bring up a screen that will show you choices you can setup. On some BIOS Screens, you will see the options listed out, as in this picture. Simply select what you want for the First, Second, and Third Boot Device. Most motherboards will come preset with Floppy as the first choice. If you do not have a floppy drive, I would recommend changing this to DVD Drive until you have your operating system installed, after that, you can set it to your primary hard drive.. You can also substitute USB Drive in that slot if you boot from External Drives or Flash Drives.

To setup the rest of your BIOS settings now, [click here](#), otherwise, you can return later to do this.

Installing an Operating System

Once you are ready, open your DVD drive and put in your Operating System DVD - most likely one of the Windows flavors, XP or Vista. When you have this in place, arrow to "Save and Exit" on your BIOS, say yes to the prompt, and your computer will reboot.

This time, let it boot all the way through by itself, and it will find the DVD in the drive and begin the OS installation process.

Depending on which Operating System you purchased, your setup screens will look a bit different. However, the procedure for each is fairly similar.

Keep in mind that these installations can take anywhere from 30 minutes to 2 hours or more. Normally, they take around 1 hour.

- [Windows Vista Install](#)
- [Windows XP Install](#)

We are almost there – Next up is Finalizing Your Setup...

Install Drivers

It's time to finalize your setup and install drivers. At this point you should have Windows installed and running on your computer. You should also have your computer case all closed up and arranged where you want it. The last thing we need to do is to install drivers. This will require the DVD's or CD's that came with your computer components. An Internet connection will be required for the Windows updates.

These steps are not in a specific order, just the order I like to do things in.

Windows Update

The first thing I like to update is Windows itself. Now, depending on the version that you installed, this can be a lengthy or a short process. For Vista installs, this can take some time. The install time for Service Pack 1 can take up to an hour. If you installed Windows XP without any service packs, this can also take over an hour. Also note, you may need to reboot after the update, or during. There are 2 ways to do this. First, you can go directly to the Windows update page that is located here: [Windows Update](#). Note that to use Windows update, you will need to use Internet Explorer.

The other method is to go through Windows itself.

1. Click the Start Button
2. Select Help and Support
3. Under the Heading "Pick A Task" - select "Keep your computer up-to-date with Windows Update"
4. You will be taken to Microsoft's Update page

Install Motherboard Drivers

Install Motherboard drivers. You will use the DVD or CD that came with your motherboard to do this. Insert the DVD into the drive, and it should automatically start up. The screen that you will see will differ based on your motherboard, but you should see an options that says something to the effect of "Install Drivers". This is what we want to do here. Go through the install wizard, and you will probably need to reboot after it is complete. Here are some popular motherboard manufacturers and their support pages.



[Asus](#)



[Gigabyte](#)

EVGA

[EVGA](#)



[MSI](#)

Install Graphics Card Drivers

Install Graphics Card drivers. If you installed a graphics card, you will need to update to the latest drivers. You most likely got a DVD with your graphics card, however I would recommend going online and getting the latest drivers, as they change frequently. You will either need ATI, or Nvidia, depending on which card you bought. Their English support pages are here:



[Nvidia Support](#)



[ATI Support](#)

Sound Card Drivers

You will need to select the driver based on your operating system, and the card that you installed.

Install Sound Card drivers. Again, use the DVD that came with your sound card to install the drivers. Here is a list of some of the most common manufacturers and their driver pages...



[Creative
SoundBlaster](#)



[Turtle Beach](#)

M-AUDIO

[M-Audio](#)



[Asus](#)

Those are the main components that you will need drivers for. At this point, your drivers are updated, and that's about the end of the guide. ***Congratulations on building your own computer.***

I have always enjoyed building computers, and helping others learn. I would welcome any feedback on this guide or my website. Feel free to also send me stories that you may have about your experience building a computer or pictures of your new build.

What follows in the Appendix are instructions for installing Windows XP, and Vista, as well as a troubleshooting guide. If you are experiencing problems with your computer build, and cannot get them resolved through the troubleshooting guide, feel free to contact me. Send me an email at support-guide@build-your-own-computer.net and I will try to get back to you as soon as I can.

Thank you for taking the time to read my guide and visit my website. Check back often for new content, and make sure you sign up for my newsletter, it'll help you keep on top of the latest computer hardware.

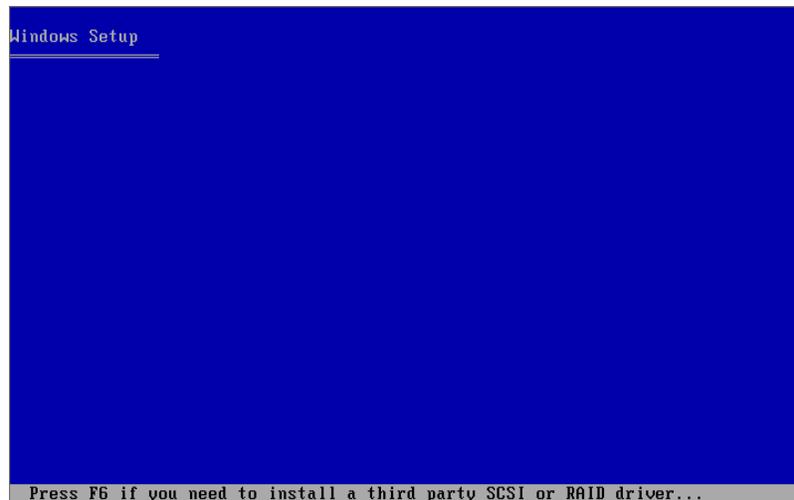
Appendix A – Installing Windows XP

This page describes the process to install Windows XP as a clean install after building a new computer. Below is a step by step set of instructions on how to install Windows XP. If you happen to be upgrading from an earlier version of Windows, these instructions can be used - there are just a few extra steps involved. So let's get it rolling...

1. You have your Windows XP install CD or DVD in the drive, and have booted your computer. This is the first screen you will see.



2. After the Windows setup begins, you will see this screen. If you have a RAID setup, or SCSI drives, press F6 here to set those up. Otherwise, wait for the install Windows XP process to proceed to the next screen...



3. Ok, here is the start of the installation process. This screen offers you a few options. The one we want is to press Enter. The Recovery Console is if you already have Windows XP installed, and need to do a repair or recovery. F3 will cancel the install and exit setup. Press your Enter key and we'll continue on...

```
Windows XP Home Edition Setup

Welcome to Setup.
This portion of the Setup program prepares Microsoft(R)
Windows(R) XP to run on your computer.

• To set up Windows XP now, press ENTER.
• To repair a Windows XP installation using
  Recovery Console, press R.
• To quit Setup without installing Windows XP, press F3.

ENTER=Continue R=Repair F3=Quit
```

4. Ah, the Windows EULA - End User License Agreement. This is the Windows XP License agreement that you must agree to, or you won't be able to install Windows XP. Press F8 to agree to the license.

```
Windows XP Licensing Agreement

Microsoft Windows XP Home Edition
END-USER LICENSE AGREEMENT

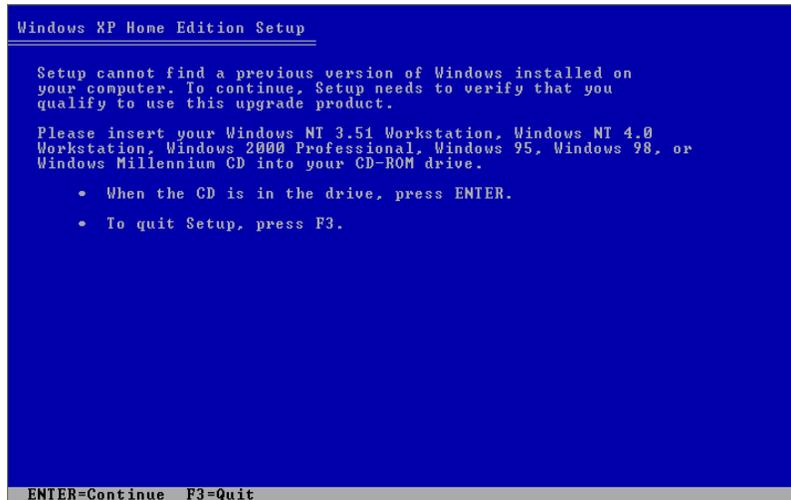
IMPORTANT-READ CAREFULLY: This End-User
License Agreement ("EULA") is a legal agreement between you
(either an individual or a single entity) and Microsoft
Corporation for the Microsoft software product identified above,
which includes computer software and may include associated
media, printed materials, "online" or electronic documentation,
and Internet-based services ("Product"). An amendment or
addendum to this EULA may accompany the Product. YOU AGREE TO BE
BOUND BY THE TERMS OF THIS EULA BY
INSTALLING, COPYING, OR OTHERWISE USING THE
PRODUCT. IF YOU DO NOT AGREE, DO NOT INSTALL
OR USE THE PRODUCT; YOU MAY RETURN IT TO YOUR
PLACE OF PURCHASE FOR A FULL REFUND.

1. GRANT OF LICENSE. Microsoft grants you the following rights
provided that you comply with all terms and conditions of
this EULA:

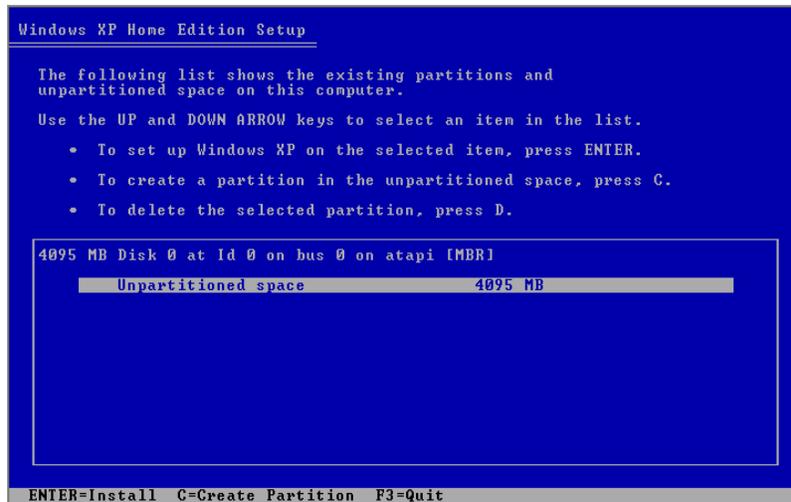
* Installation and use. You may install, use, access,
display and run one copy of the Product on a single
computer, such as a workstation, terminal or other device
("Workstation Computer"). [a]ll The Product may not
be used by more than one (1) processor at any one time

F8=I agree ESC=I do not agree PAGE DOWN=Next Page
```

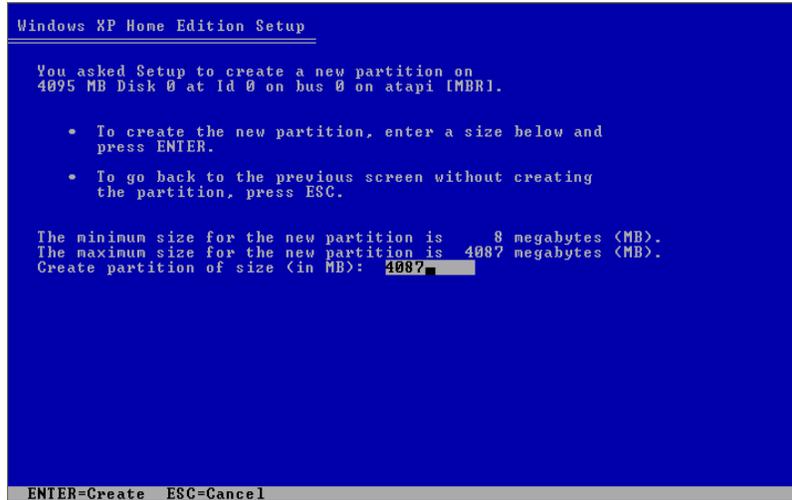
5. You should only run into this screen if you are doing an upgrade, or if you are installing Windows XP from an upgrade CD. In order to proceed, you need to insert your earlier Windows version CD then press Enter.



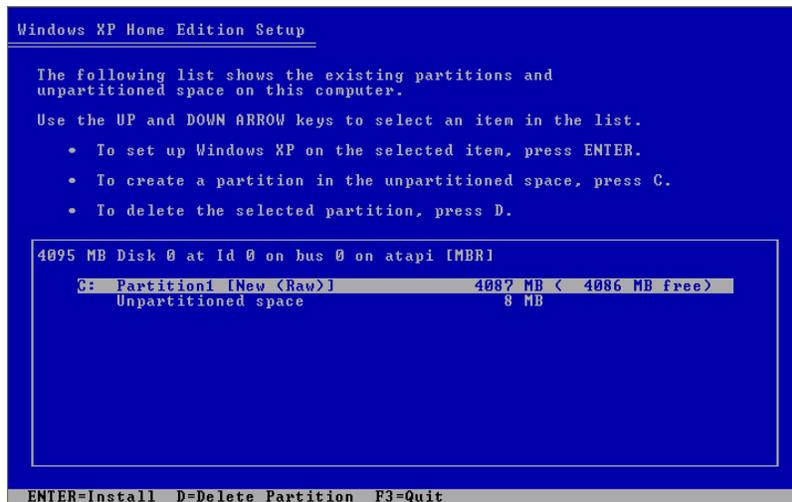
6. Ok, this screen allows you to choose where you are going to install Windows. If you are doing this on a new unpartitioned hard drive, you will see this screen. This is going to format your hard drive, and set it up for installation. If you have multiple hard drives, or multiple partitions on your current hard drive, you may see multiple choices here. For a clean Windows install, we want to select the C drive here.



7. Once you start the partition creation process, you will be asked for the size of the partition. This will show you the minimum and maximum sizes for the partition. Personally, I would take the maximum size and let Windows do its thing.



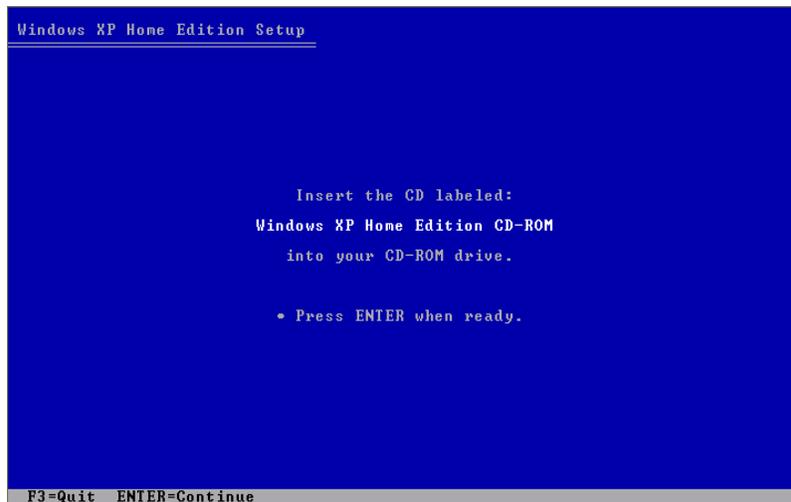
8. Once the partition is created, you will be returned back to this screen. If there is still unallocated space on the drive, you can choose to create another partition. You can also change the partition that was just created. Once you have the partition(s) created, highlight the one you want to install Windows XP on and hit Enter.



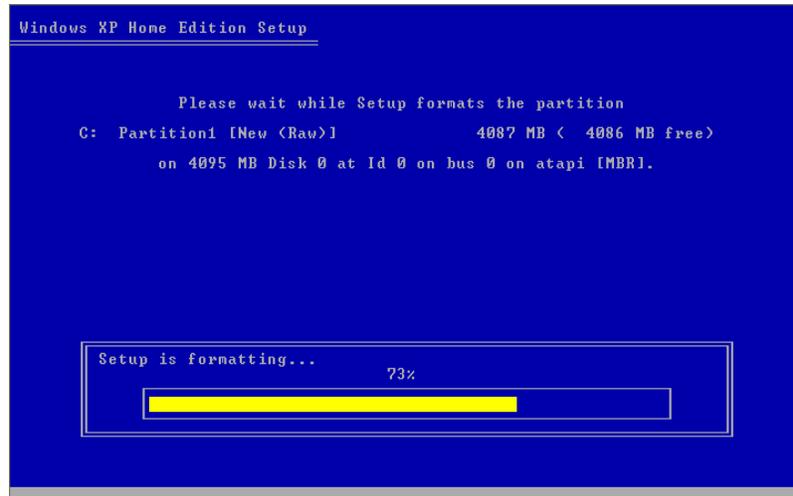
9. The next step is to select the file system to use for your newly created partition. I highly recommend using NTFS, but if you have a reason to go with FAT32, then do so. Offhand, I can't think of a reason but you never know. Highlight your choice and press Enter to move on.



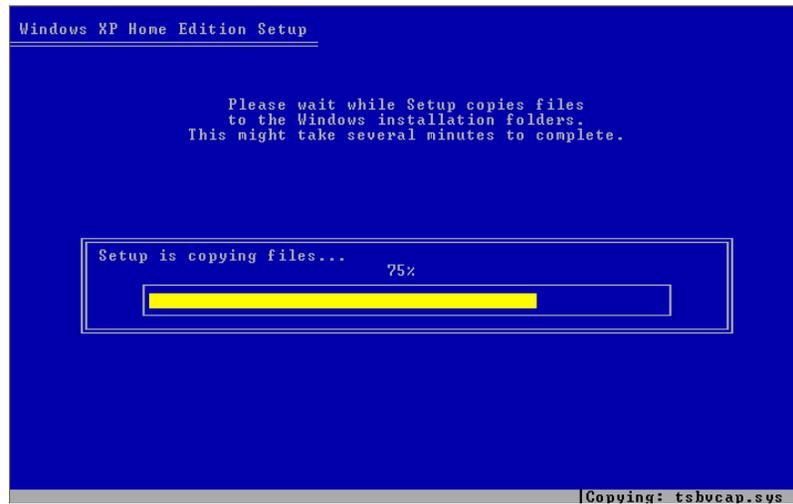
10. A few steps back you might have been asked to insert a previous version of Windows CD. If you did this step, this screen is telling you to re-insert the Windows XP CD. Do so, and press Enter.



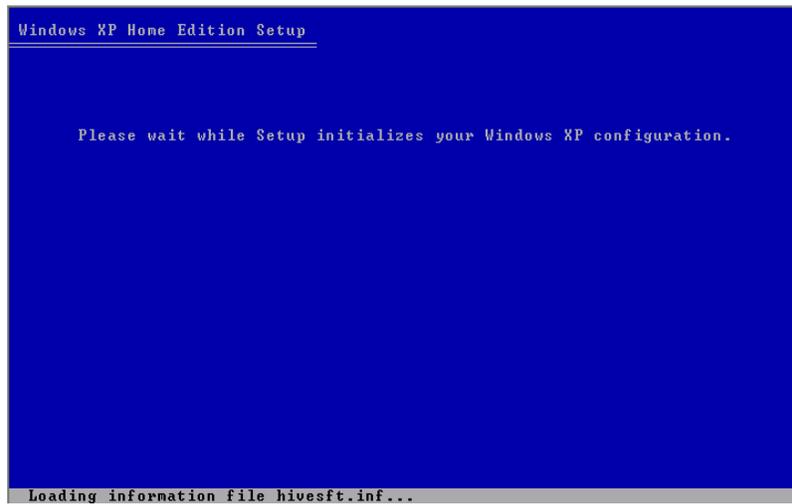
11. Time to create the partition. This can take some time depending on the size of your hard drive. I would suggest grabbing a snack, take a bathroom break, play with the dog - anything other than watching this.



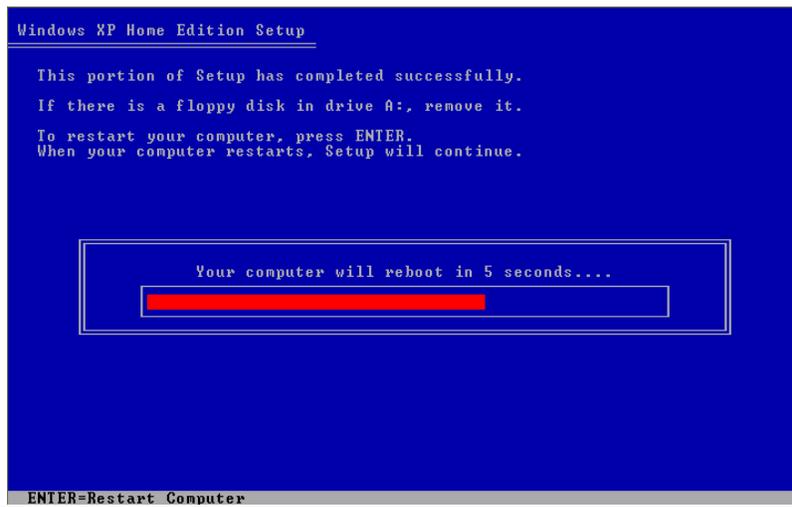
12. You thought the last screen was boring? Get the dog again - more of the same. The hard drive has been formatted, now the install is unpacking and copying the files needed for the install process. Perhaps a short nap?



13. Ok, we're finally getting somewhere. This is a short screen - just getting things ready for the install. Hasn't it already been doing just that?



14. The red bar is the countdown until the computer restarts. If you are up from your nap, hit Enter to end the red bar, otherwise you can watch it as it slowly fills the box until reboot.



15. Alright, coming back online for the rest of the install. You will actually get to do a few things in the upcoming screens...



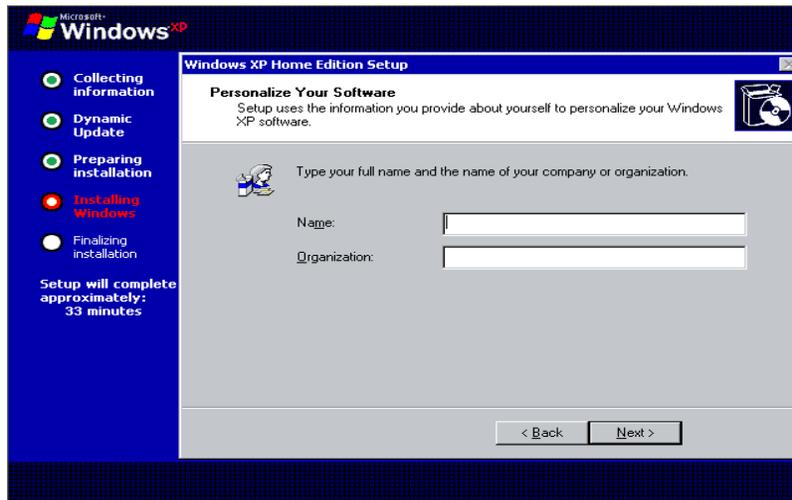
16. There's your countdown timer. Don't put too much stock in it, Microsoft is known for their poor timekeeping. Anyway, give this screen a few moments to get the system ready to install Windows XP.



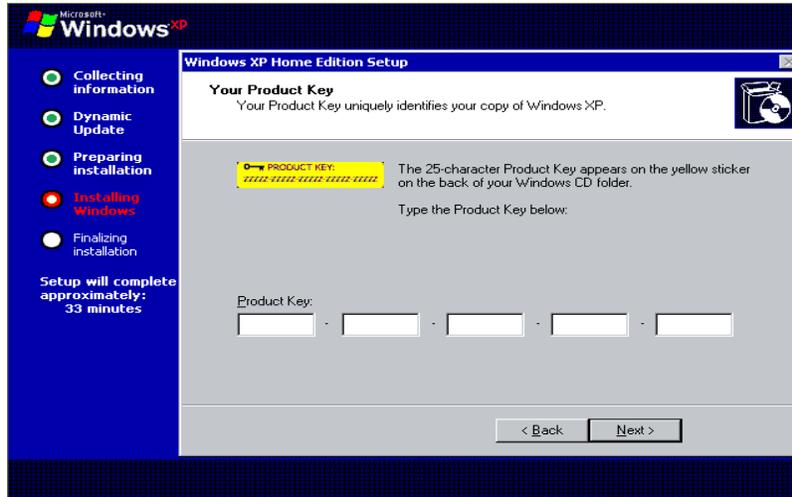
17. Here is something for you to do! This is the Regional and Language Options screen. You will most likely use the defaults if you are going for the English flavor.



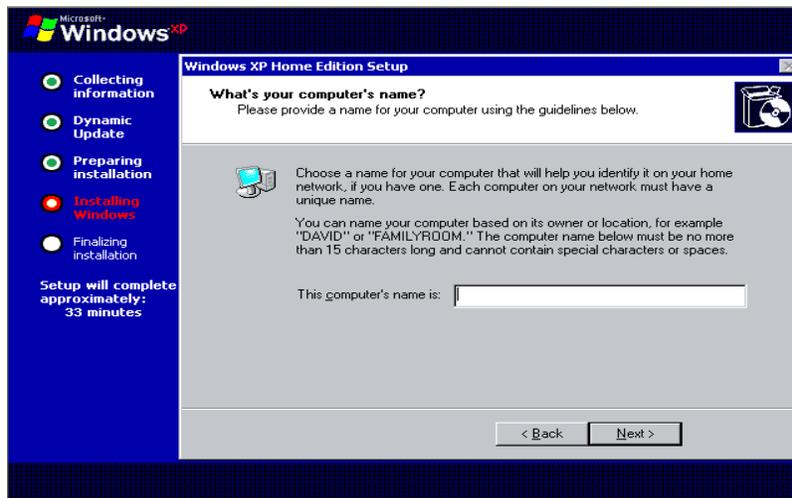
18. This is the Personalize Your Software screen. You can put whatever you want in the text boxes there. For example, you could call yourself Fred Flintstone, and put your company in as Slate Rock and Gravel. I normally just use my first name, and skip the company.



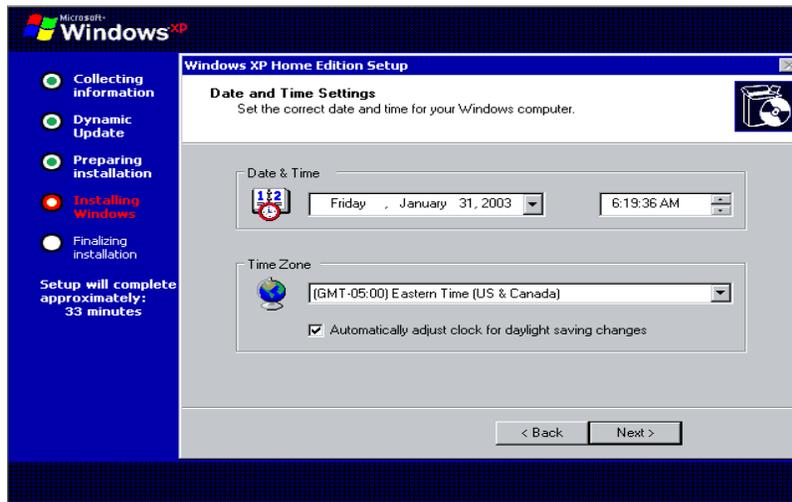
19. This is the license key page. You will find your license key on the back of the CD case, on a certificate that came with the CD, on the CD wrapper, etc. Once you have it, enter it in the boxes provided. If you don't have your license key, you are not going to be able to install Windows XP.



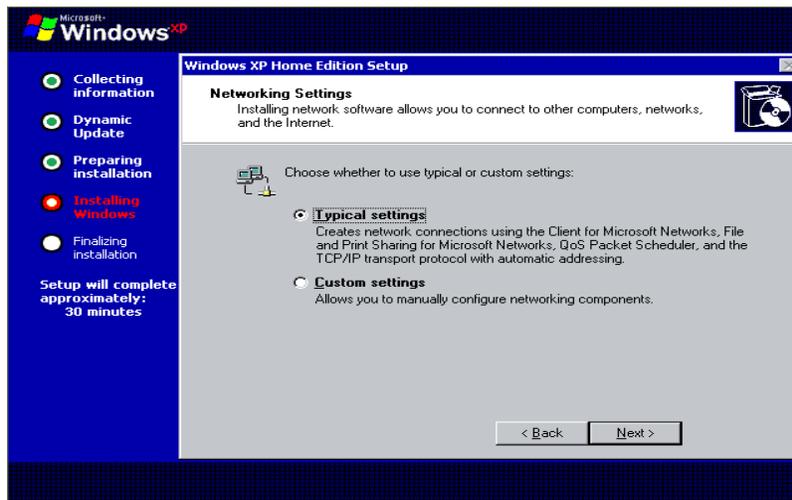
20. Your Computer's Name - again here, you can call your computer whatever you want - Barney if you prefer. Windows may suggest one here, but you can put anything in.



21. Date And Time Settings - Set these to the current date and time, along with your time zone. Almost done...



22. Network Settings Screen - I'd highly recommend just selecting the Typical Settings on this screen. Unless you are a network guru, the Typical Settings will work for you.



23. That's it - that's all the setup screens you have to deal with. This is the final one. This will run for awhile, and once it completes, your computer will restart again and boot directly into Windows.



Note: After this last restart, if you have the DVD drive set as the first drive in the boot order, you should remove the Windows CD when it reboots so that it continues directly into Windows.

That's It, you have just installed Windows XP!

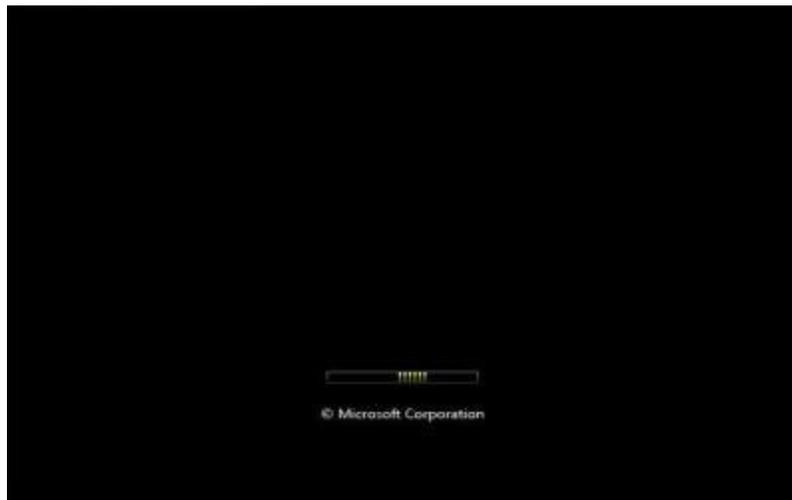
Appendix B – Installing Windows Vista

Here are the step by step instructions to install Windows Vista. It's a pretty straight forward install that will take you anywhere from 30 minutes to 3 hours. I have only had one install take longer than an hour, so you should have this done in under an hour. So drop the Vista DVD in the drive, and boot up your PC.

Note: This guide assumes a clean install. If you are doing an upgrade from an earlier version of Windows, then you will want to start the upgrade process while your computer is already booted into your older Windows version. Simply insert the Windows Vista DVD into the drive. If you have autoplay turned on, your computer will bring up the starting point for the upgrade. If not, you may need to browse in Windows Explorer to your DVD drive and start the setup manually.

Ok, let's get started...

1. This is the boot up screen that you will see when you start to install Windows Vista. Not much to do here except wait for the next screen to appear.



2. Ok, we have arrived at the starting point. Select the language you want to use, your Time and Currency format, and the Keyboard or input method. Once complete, click Next.



3. On this screen you have the options to Install Now, or do a Repair on a previous install. You can also click the "What to know before installing Windows" option. We are doing an install, so click the Install Now option.



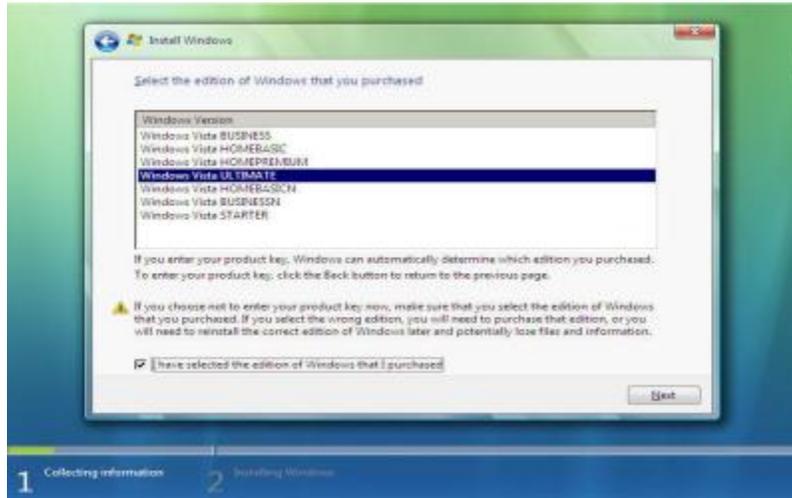
4. Yep, it's the good ol' Microsoft License Key page. This is a bit different than XP's license entry page. You technically do not need to enter a license key at this point. Personally, I would just enter the key, and leave the "Automatically activate Windows when I'm online" checkbox checked. This will cause Windows to activate itself once you install Windows Vista and are online. Keep in mind that if you do not choose to activate your copy, you will receive no support from Microsoft - this includes product updates. So, enter your key, and click Next.



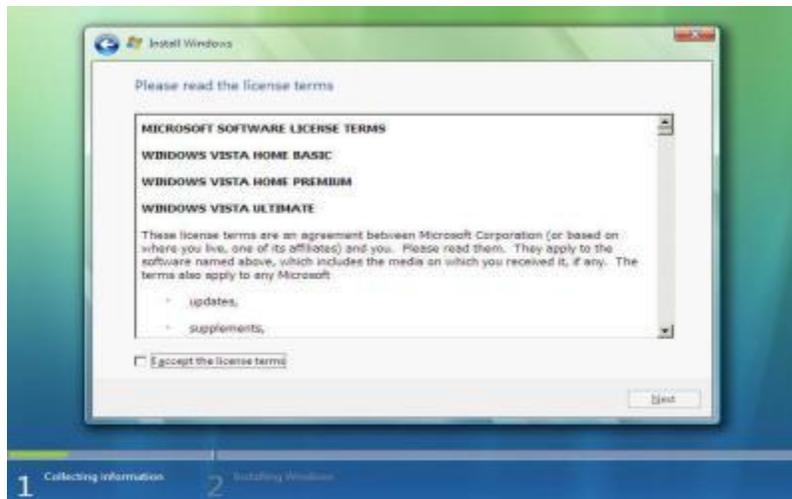
5. If you chose not to enter your license key in the previous step, this window will pop up to verify that you do not want to enter your key. If you select Yes, you will be back on the license key screen. If you click No, you will continue on to the next screen.



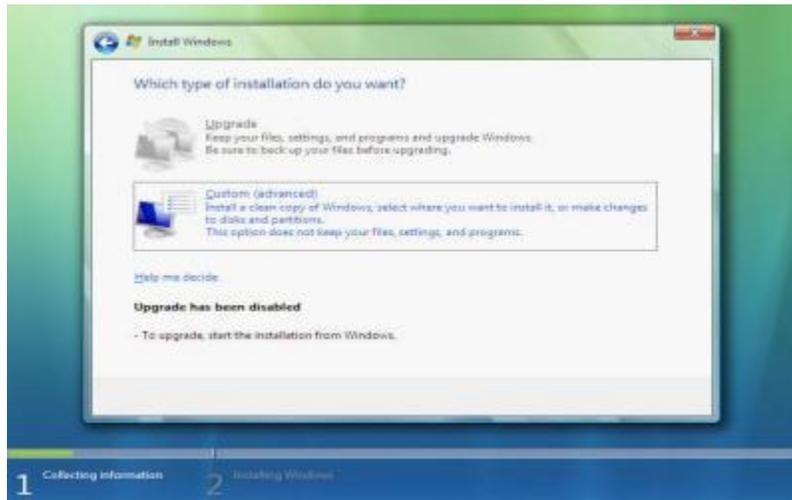
6. If you did not enter the license key in the previous steps, you will see this screen next. This will ask you to enter the copy of Windows Vista that you are installing. Note that you need to select the correct version here. If you do not, it warns that you may need to purchase the version you select, or re-install a different version. Once you have your version selected, check the checkbox at the bottom, and click Next.



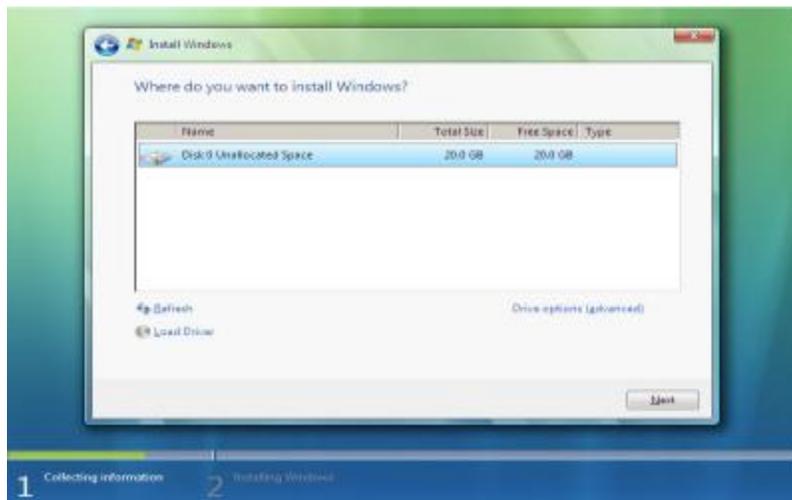
7. Next screen is the Windows License Agreement page. Simply check the checkbox that says "I accept the license terms" and click next. This license agreement is required to install Windows Vista. If you choose not to accept the license terms, click on that shiny red "X" in the upper right of the window, as that is the only other way out. (Vista will not install if you do not accept this license agreement.)



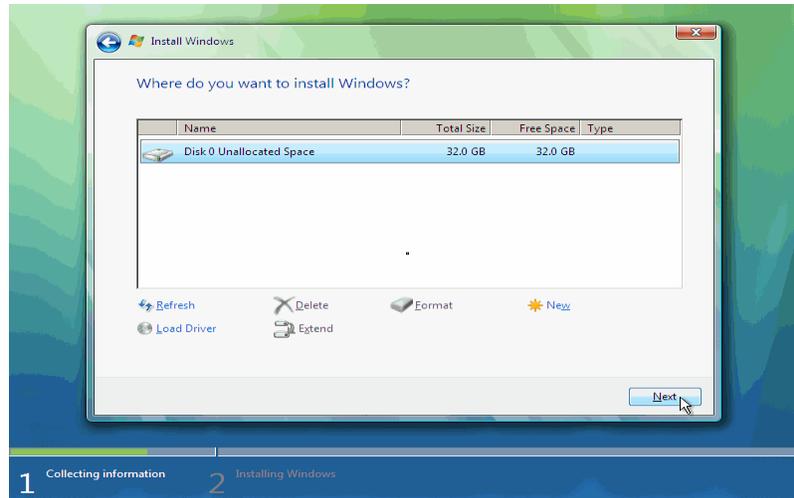
8. This next screen give you 2 options. You can either Upgrade or do a Custom install. If you are doing a new install from a full version DVD (not the upgrade version) of Windows, then the Upgrade option will be disabled. You will want the Custom option here. Since we are doing a clean install, we don't need to worry about the install wiping the hard drive, as it is already clean. If you happen to be doing an upgrade, then you want to select the upgrade option.



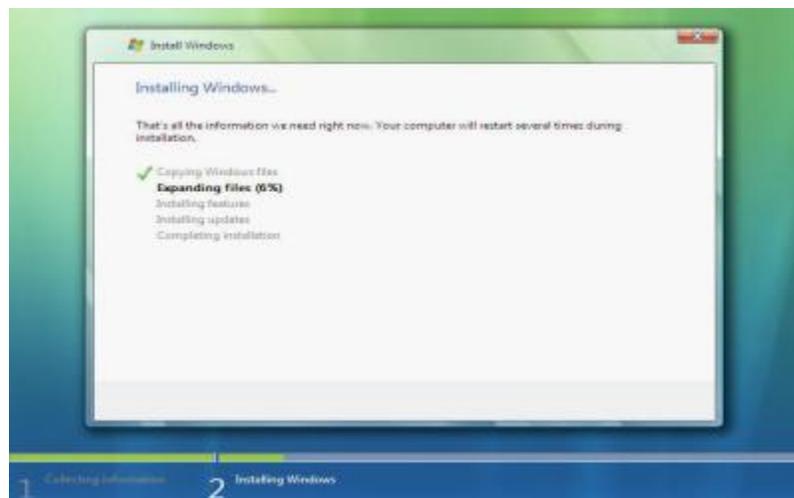
9. This next screen allows you to select where you are going to install Windows Vista. If you only have a single hard drive, that is what you will see here. If you are planning to use the entire drive for the install, then simply click Next. If not, then click the Drive Options link.



9a. If you selected the Drive Options link, you will get a screen that allows you to modify the partitions on your hard drive. You can split your hard drive into 2 partitions if you so choose.



10. Now that the setup program has all the information it needs to run the setup, you can sit back and relax. Or go for a walk, play with the dog, get a snack etc... This portion will take anywhere from 25 minutes to a couple hours. Normally however, this will only take 40-45 minutes.



Note: Your computer will reboot a few times during the install. After the last reboot, you will have a few final screens where you will enter your computer name, your name etc... Once you are past these...

That's it! Windows Vista is now installed and ready to go. After the last reboot, you will be taken into Vista, and can remove your DVD. Store your DVD and the license key in a safe place.

Appendix C – Troubleshooting

Computer troubleshooting is not something that most of us want to do. However, every now and then your computer just doesn't work the way it should. Troubleshooting computer problems can be time consuming, but hopefully the error you are running into can be found here.

Diagnosing computer problems is something I have been doing for awhile now. I have compiled a list of common computer problems below.



Troubleshooting Computer Problems

If you have just finished building your own computer, and are having problems booting up, this section is for you.

- [Duh Issues](#) - issues that just make you say duh! Check these out first, as they are all easy computer fixes, and sometimes they will take care of everything.
- [Listen to the Beeps](#) - when you first turn your computer on, listen for the length and number of beeps.
- [Hardware Issues](#) - maybe your graphics card isn't seated properly, or your memory modules are incompatible...
- [Step By Step](#) - If none of the above have worked, we'll use the process of elimination here to find out what is causing the problem.

Duh Issues

Troubleshooting computer problems is, unfortunately, something we all end up trying at one time or another. This page covers the duh! mistakes that we all make. I have been building computers for over 12 years now, and I still do some of these things.

If you press the power button on the front of your computer, and nothing happens, these are some common computer problems.

- **Power Cable** - Is the power cable plugged in to the power supply on the back of the computer, and is it plugged from there into an outlet? If not, plug it in and give it a try.
- **Power Switch** - On the back of your computer, connected to the power supply is a power switch. Ensure that this is in the on position. If it is not, switch it over and try to turn on your computer again.
- **Disc Still in Drive** - On older systems, if you leave the disc in the drive, you may see a message on-screen that says something like "Non-System Disk" or "Disk Error", remove the disk from the drive and try rebooting.
- **Surge Protector** - Ensure that your surge protector or power strip is plugged in. If it is, ensure that it is getting power. Take a lamp and plug it in to verify that power is flowing through the strip.
- **Monitor** - If you hear the computer booting, fans spinning, hard drive spinning, but don't see anything on-screen, check the monitor. Verify that it is plugged into an outlet, and that it is plugged into the back of the computer.

Did this fix your issue? I hope so, but if not, we'll continue on.

Listen to the Beeps

When diagnosing computer problems, listening to the beeps can help you find issues. If you ever noticed, when you first start your computer, you will hear a beep. If you hear only one beep, then this section is not for you. A single beep means all is well. However, if you hear more than one beep, continue on and find out what they mean.

You will hear these beeps after the POST event (Power On Self Test). These will play on the computer's internal speaker.

There are three types of BIOS's covered here: AMI, Award, and Phoenix. You can tell your BIOS type on the POST screen. Along the top of the screen, it will tell you the type of BIOS you have.

Award BIOS

The Award BIOS uses beeps of different lengths. It uses short and long beeps. When diagnosing computer problems, listen to the length of the beep. The short beep is less than a second in duration, while a long beep is around 2 seconds.

- **2 Short Beeps** - This indicates a CMOS setting error. Look through your BIOS settings to ensure everything is set correctly. If you cannot find anything wrong, reset the BIOS to factory defaults. There should be an option for this on the main BIOS page. If this doesn't fix the issue, refer to your motherboard manual on resetting the BIOS using the jumper settings.
- **1 Long, 1 Short** - This indicates a Motherboard or Memory error. Ensure that all the motherboard connections are down tight, and that your memory modules are locked into the slots. If you have 2 RAM modules, you can try removing one and re-booting, then the other. Sometimes one stick of RAM will be bad, and this can pinpoint that. When diagnosing computer problems like this one, use the process of elimination on the memory modules to pinpoint which is faulty.
- **1 Long, 2 Short** - This indicates a Monitor or Graphics Card error. Ensure that your graphics card is seated tight in the slot, and that it has the proper power connections.
- **1 Long, 3 Short** - This indicates a keyboard error. - Ensure that your keyboard is hooked up correctly. If you are using a PS/2 connection, make sure your keyboard and mouse are in the correct PS/2 connections.
- **1 Long, 9 Short** - This indicates a BIOS ROM error. This usually points to a corrupted BIOS image. What you will need to do is to flash your BIOS. You can do this either on a floppy disk, or on a USB flash drive. [This site](#) will give you step by step instructions to flash your BIOS.

- **Continuous Long** - This indicates that the Graphics Card is not inserted properly. Check to ensure that your Graphics card is in the correct slot, and that it is fully inserted. Also verify that it has the correct power connections.
 - **Continuous Short** - This indicates a Power Error. Usually this points to the motherboard or CPU not receiving enough power. Verify that your power supply is working correctly and that it is putting out enough power. You can find more information on this [here](#)
 - **Continuous High Pitched Beeps** - You may get this while your computer is running - if so, it normally points to a CPU fan failure. Take the cover off your computer while it is running and verify that the CPU fan is operating correctly.
-

AMI BIOS

The AMI BIOS uses a single length beep. When diagnosing computer problems, simply count the number of beeps.

- **1, 2, or 3 Beeps** - This usually indicate bad memory. If you have 2 memory sticks, try removing one, then the other to try and isolate the issue. When diagnosing computer problems like this one, use the process of elimination on the memory modules to pinpoint which is faulty.
- **4 Beeps** - This indicates a motherboard problem. Verify all the connections on the motherboard are in place. Do a visual inspection of the motherboard for broken chips, cracks, or other physical damage.
- **5 Beeps** - This indicates a Processor error. Remove the heat sink and ensure that the CPU is seated correctly in the socket. Ensure that the CPU is in the socket in the correct orientation.
- **6 Beeps** - This can indicate a bad CPU or Motherboard. Refer to 4 and 5 beeps above.
- **7 Beeps** - This can indicate a bad CPU. Refer to 5 beeps above.
- **8 Beeps** - This usually indicates a video error. Ensure that your graphics card is inserted in the slot correctly, and is all the way in. Make sure that you have the correct power connections for your graphics card.
- **9 Beeps** - This indicates a BIOS ROM error. This usually points to a corrupted BIOS image. What you will need to do is to flash your BIOS. You can do this either on a floppy disk, or on a USB flash drive. [This site](#) will give you step by step instructions to flash your BIOS.
- **10 Beeps** - This can indicate a CMOS error. Refer to 4 beeps above. If you don't see anything wrong on the motherboard, verify your BIOS settings. You can also try resetting your BIOS to factory defaults, either by selecting the reset option in the BIOS

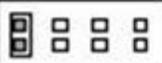
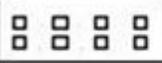
setup, or by removing the battery and setting the jumper to reset. If you choose this, please refer to your motherboard manual for more information on resetting the BIOS.

- **11 Beeps** - This can point to a bad CPU or Motherboard. Refer to 4 and 5 beeps above.

Phoenix BIOS

The Phoenix BIOS uses sets of 3 beep combinations. When diagnosing computer problems, look in the list below for your beep combination. An example would be 1-2-2. This would be BEEP pause BEEP BEEP pause BEEP BEEP.

- **1-1-2, 4-4-3, 4-2-4** - These combinations can point to Motherboard or CPU failure. Verify all the connections on the motherboard are in place. Do a visual inspection of the motherboard for broken chips, cracks, or other physical damage. This could also indicate a Processor error. Remove the heat sink and ensure that the CPU is seated correctly in the socket. Ensure that the CPU is in the socket in the correct orientation.
- **1-1-3, 1-2-1, 1-2-2, 1-2-3, 1-4-3, 1-4-4, 3-1-1, 3-1-2, 3-1-3, 3-1-4, 3-2-2, 3-2-4, 4-2-1, 4-2-2, 4-2-3, 4-3-3, 4-3-4, 4-4-1, 4-4-2** - All these combinations point to problems on the Motherboard. Ensure that all connections on the motherboard are correct. Also, if you are using IDE hard drives, ensure that the jumper settings are correct. Here is a small example of jumper settings on a hard drive or DVD drive.

	Master or single drive
	Drive is slave
	Master with non ATA-compatible slave
	Cable select
	Limit drive capacity to 32 Gbytes

- **1-1-4** - This indicates a BIOS ROM error. This usually points to a corrupted BIOS image. What you will need to do is to flash your BIOS. You can do this either on a floppy disk, or on a USB flash drive. [This site](#) will give you step by step instructions to flash your BIOS.
- **3-3-1** - This can indicate a bad CMOS Battery. These batteries are pretty cheap, so grab one and replace your current battery. It is located on the motherboard, refer to this [motherboard diagram](#) at label "P"

- **3-3-2** - This can indicate a bad CMOS setting. Look through your BIOS settings to ensure everything is set correctly. If you cannot find anything wrong, reset the BIOS to factory defaults. There should be an option for this on the main BIOS page. If this doesn't fix the issue, refer to your motherboard manual on resetting the BIOS using the jumper settings.
- **3-3-4, 3-4-1** - This can indicate Graphics Card problems. Ensure that your graphics card is seated all the way into the slot. Also make sure that the card has the proper power connections. Refer to your graphics card manual for more information on power connections.
- **9-2-1** - This one is rare. It points to a Graphics Card incompatibility. Verify that the graphics card you are using is compatible with your motherboard.
- **All Other Combinations** - The rest of the combinations point to Memory issues. If you have 2 memory sticks, try removing one, then the other to try and isolate which stick is bad. Use the process of elimination on the memory modules to pinpoint which is faulty.

I hope that diagnosing computer problems has fixed your issue. If it did not, head back to the Troubleshooting page and we'll keep trying. Keep in mind that diagnosing computer problems is mostly a process of elimination. You eventually get down to the core of the problem

Common Computer Problems

These are common computer problems that you may run into if you have just finished building your own computer. You can also find some of these issues caused by...

- Accidentally kicking your computer
- Dropping your computer
- Knocking your computer over

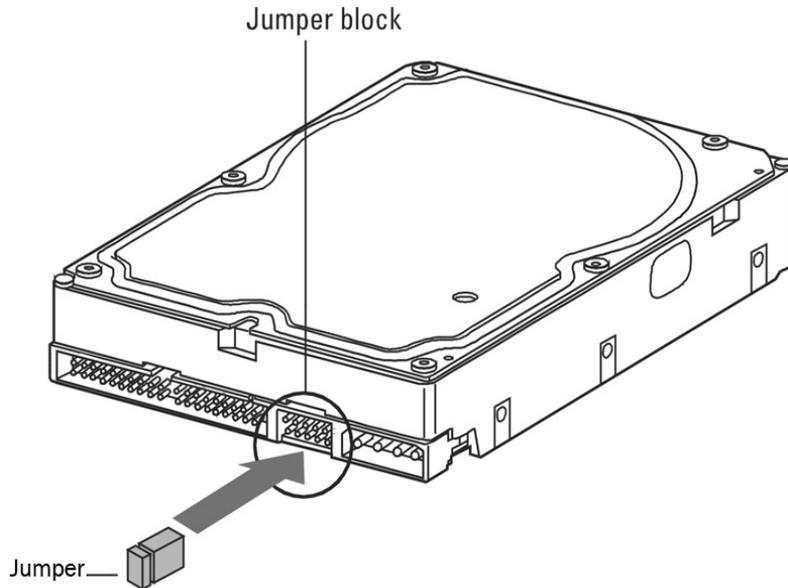
First, have you checked the [duh! page for very common computer problems?](#) If so, continue on. These checks will require that you have your computer turned off and the cover taken off. Make sure your computer is unplugged from the wall.

- Cabling Issues
- Power Supply Issues
- CPU And Memory Issues

Cabling Issues

The most common computer problems after completing your build, are problems with cables.

- **2x2 or 2x4 Power Connector** - Talk about common computer problems - forgetting to plug this cable in is a major one. This is the square or rectangular cable that comes from your power supply and plugs into your motherboard near the CPU. This is not the main ATX power cable. Look on the [motherboard diagram](#) at label "E". This is where your cable will plug in. You will either have a 2x2 with 4 holes, or 2x4 with 8 holes. Ensure that this is plugged in correctly. Refer to your motherboard manual for more detailed information on this connection.
- **IDE Cables** - First off, check the cables from your hard drive to the IDE connection on the motherboard. Ensure it is a tight. Also ensure that you have a power cable hooked to your drive. If you have all of that, you will need to ensure that they are setup correctly. Check your hard drive manual, or look online at the manufacturer's website for the correct jumper settings for your drive. You can also find them on the top of the hard drive a lot of the time. See the picture below for the location of the settings. There are two situations:

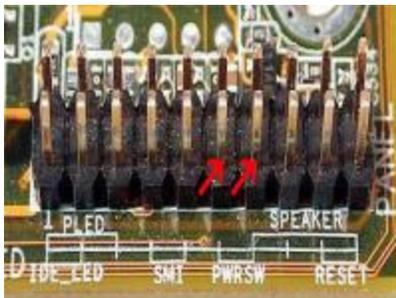


	Master or single drive
	Drive is slave
	Master with non ATA-compatible slave
	Cable select
	Limit drive capacity to 32 Gbytes

1. **Single Drive** - Ensure that the jumper on the back of the hard drive is set to "Master".
2. **Dual Drives** - If you are using dual drives, either 2 hard drives, or a hard drive and DVD drive, ensure that they are set correctly. The hard drive that has your Operating System installed on it should be set to "Master". The second drive needs to be set to "Slave".

Note: You will often find a chart like the one above on the top of your hard drive, or in the hard drive manual.

- **SATA Cables** - If you are using SATA drives, you only need to ensure that the SATA cables are connected correctly to your motherboard, and that you have power cables running from the power supply to the hard drive. See label "L" on the [motherboard diagram](#) for what the SATA connectors look like.



- **Chassis Cables** - Double check that the wires running from the front of your case to the motherboard are connected correctly. Especially the Power Switch wire. This one is a very common computer problem. If this is not connected correctly, you will not be able to switch on the computer. You will need to refer to your motherboard

manual and look for the Front Panel settings. They will differ from motherboard to motherboard, but will be similar to the above picture.

Power Supply Issues

There are a few things that can go wrong with your power supply. We covered the easiest already - make sure it's plugged in. So we are going a bit more in depth here.

- First verify that the power supply is working. Is the fan spinning up when you turn on the computer? Is your voltage set correctly on the back of the power supply - if you are in the United States, ensure you have it set to 115. These are all common computer problems that are easily fixed.
- Next, check each power cable that is coming from the power supply and ensure that it has a tight connection. Check the hard drives, DVD drives, motherboard, and graphics card connections. Check all the case fans and ensure that the power connections are tight. Finally, check the cables that are not connected to anything and ensure they are bundled up and not shorting out on anything.
- If you are familiar with a voltmeter, you can use one to verify that the power coming from the power supply is good, especially the +5 volt rails. If you find some that are bad, you should replace your power supply.
- Can the power supply you have handle enough power for the system? With today's power hungry components, especially graphics cards, you need to ensure that you have a power supply that can power all your peripherals. Many common computer problems stem from having a power supply that cannot put out enough power for the system. Signs that your power supply may not be up to the job...
 - System fails to power on
 - Spontaneous rebooting during regular operation
 - Fans and hard drive do not spin up
 - Electric shocks are felt when you touch the computer case
 - If a static discharge causes reboots, or system failures

- - If you think your power supply is not putting out enough power, check out the [eXtreme Power Supply Calculator](#) to calculate what you should have for your system.
 - Power Supply is overheating and shutting down - Ensure that your power supply fan is running at all times and that nothing is blocking the air intake or output.
-

CPU And Motherboard Issues

Computer startup problems can be caused by the following issues with the CPU...

- Ensure that the processor you installed is compatible with the motherboard. This is a slim chance, as you usually wont be able to install incompatible CPU's and Motherboards. However, it has happened in the past, so its something to look at. Find your motherboard ID and manufacturer, and hit their website and look up your board. All manufacturer's will have a list of compatible CPU's. Ensure that yours is on this list.
- If the processor overheats it will cause the system to shut down. Ensure that your heat sink fan is running. Check the power wires from the fan to the motherboard. Sometimes the fan can be controlled by BIOS settings - if it is not running, that is one thing you will want to check. If none of that works, replace the fan - they are cheap.
- Do you have the correct memory installed? - Incompatible RAM can cause the system to not boot. Again, find your motherboard manufacturer, and the type of RAM you have. You can usually find this information on a sticker on the RAM modules, as shown below...



- Is your computer memory in the correct slots? Some motherboards will require that the RAM be in specific slots, or at least use the first slot. Refer to your motherboard manual for more information on installing the RAM in your system.
- Is the RAM seated firmly in the slot? Make sure that the memory modules are all the way in the slot. The brackets on the ends of the slots will snap into place when the module is inserted correctly. Make sure they are all in tight.

These are some common computer problems that are for the most part easily fixed. Did this fix your issue? Do you have your computer back up and running? If not, head back to the [Troubleshooting page](#) and we'll keep trying.

Step by Step Troubleshooting

We are going to take a step by step walk-through to figure out your computer start up problems. This will be a process of elimination. It may require a few reboots. One trick to remember here - if you need to reboot the computer while it is starting up, hold the power button in for 4 seconds and your computer will shut down.

At any time through this process, if you complete a step that fixes your computer start up problems, you'll continue on by putting components back on one by one. For example, add one DVD drive back into the system, and try re-booting. If it works, add your Sound Card back in and try re-booting again. Eventually, you will find either the component or motherboard connection that is causing problems.

Let's get started...

1. The first thing we want to do is to remove all peripherals from the system. This includes Graphics Cards, Sound Cards, Ethernet Cards, and any other type that are plugged into the PCI slots. Disconnect the keyboard, mouse, any DVD drives, and hard drives that do not contain the Operating System. Leave the drive with the Operating System attached. At the same time, disconnect all power connections, including the 12V and ATX power connections on the motherboard. This will leave us with the motherboard, the installed CPU, installed memory, and a single hard drive connected to the board.
2. Check the motherboard for short-circuit problems. Are you seeing any sparks if you touch metal to the case or motherboard? If so, try to isolate the short circuit.
3. Check the CPU cooler. Ensure that it is attached to the CPU securely, and that the power connector is securely attached to the motherboard.
4. Check that the memory is installed properly in the memory slot. The clips on each end of the slot should be snapped in place, and the memory should be seated all the way down in the slot.
5. Next, insert the graphics card. Connect the main ATX power cable to the motherboard, the 12V cable to the motherboard, and power to the graphics card. Plug in your monitor. Start the computer.

If your computer boots up at this point, press and hold the power button for 4 seconds. This will shut it back down. Reconnect your keyboard and mouse and reboot the computer. When able, press Delete to enter the BIOS. Select the option that reads "Load Optimized Defaults" or "Load Fail-Safe Defaults", then select "Save And Exit" to save the settings and exit the BIOS setup. This will cause your computer to reboot. From here, begin trying to add different components back in until you isolate the problem.

Did this fix your computer start up problems? If not, continue on...

1. Reconnect the keyboard and mouse.

2. If you have multiple memory sticks, remove them all except for one. With one in the top slot, try re-booting. If you are able to boot up at this point, you have a bad memory module. Try adding another stick until you cannot boot. You can also try using the other 2 memory slots if your motherboard has 4. The problem could be with a memory slot on the motherboard as well and should be verified before replacing the memory.
3. When you turn on the computer, does the CPU fan run? If it does not, this can point to problems with the power supply or the motherboard socket.
4. Do you have display on your monitor? If not, this can point to problems with the graphics card, the PCI slot, or the monitor. If you have another graphics card, or your motherboard has on-board video, you can try a different hook up for your monitor.

Did this fix your computer start up problems? If not, continue on...

1. Does the hard drive run when you turn on the computer? If not, try a different cable from the hard drive to the motherboard, either IDE or SATA. Try a different power cable from the power supply to the drive. If none of this works, you may have a bad hard drive on your hands.

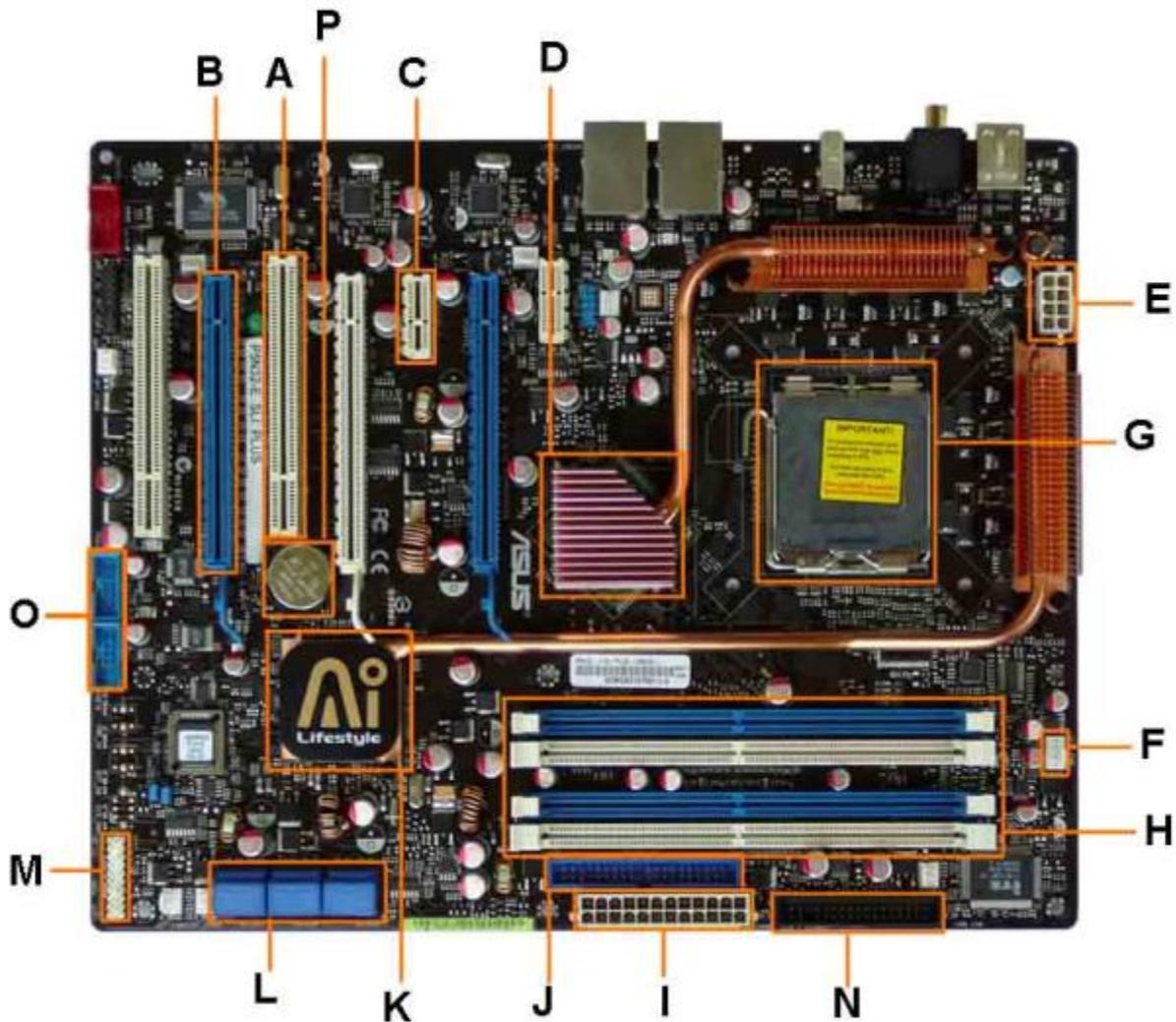
Did this fix your computer start up problems? If so, continue troubleshooting, adding components back into the system one by one until you find the one that is faulty.

If you have been through the entire troubleshooting guide up to this point and still cannot get your computer to boot, don't despair. You can [Contact Me](#) page to send me questions. If you are having problems, send me as many details as you can.

- Make and model of components
- Detail the problem. Please give me more than "It won't boot".
- Tell me if your computer is getting power (do the fans start up?), or if you hit the switch and nothing happens.
- Do you get a number of beeps from your computers speaker when you try to boot?
- Does your computer start booting just fine, then crash out when Windows starts loading?

The more detail you can give me about your computer start up problems, the quicker and easier it will be for me to help you out.

Appendix D – Motherboard Diagram



This is the Asus P5N32-E SLI Motherboard. This Motherboard diagram is typical of today's boards. All boards will be slightly different as far as which components they have, and the locations may differ, but they are pretty close. Once you know what you are looking at, you can recognize it on any board.

- A. **PCI Slot** - This board has 2 PCI slots. These can be used for components such as Ethernet cards, sound cards, and modems.
- B. **PCI-E 16x Slot** - There are 2 of them on this motherboard diagram, both are blue. These are used for your Graphics Card. With two of them onboard, you can run 2 graphics cards in SLI. You would only need this if you are a gamer, or working with high end video / graphics editing. These are the 16x speed versions, which are currently the fastest.

- C. **PCI-E 1x Slot** - There are 3 of these smaller PCI-E slots, and they are the slower 1x speed. These can be used for expansion cards such as Sound Cards, or Ethernet Cards.
- D. **Northbridge** - This is the Northbridge for this motherboard. This allows communication between the CPU and the System Memory and PCI-E slots.
- E. **ATX 12V 2X and 4 Pin Power Connection** Power Connection - This is one of two power connections that supply power to the motherboard. This connection will come from your Power Supply.
- F. **CPU-Fan** Connection - This is where your CPU fan will connect. Using this connection over one from your power supply will allow the motherboard to control the speed of your fan, based on the CPU temperature.
- G. **Socket** - This is where your CPU will plug in. The orange bracket that is surrounding it is used for high end heat sinks. It helps to support the weight of the heat sink.
- H. **Memory Slots** - These are the slots for your RAM. Most boards will have 4 slots, but some will only have 2. The color coding you see on the motherboard diagram is used to match up RAM for Dual-Channel. Using them this way will give your memory a speed boost.
- I. **ATX Power Connector** - This is the second of two power connections. This is the main power connection for the motherboard, and comes from the Power Supply.
- J. **FDD Connection** - The FDD is the Floppy Disk controller. If you have a floppy disk drive in your computer, this is where you will hook it up.
- K. **Southbridge** - This is the controller for components such as the PCI slots, onboard audio, and USB connections.
- L. **SATA Connections** - These are 4 of the 6 SATA connections on the motherboard. These will be used for hard drive, and CD / DVD drives.
- M. **Front Panel Connections** - this is where you will hook in the connections from your case. These are mostly the different lights on your case, such as power on, hard drive activity etc.
- N. **IDE Connection** - The IDE (Integrated Drive Electronics) is the connection for your hard drive or CD / DVD drive. Most drives today come with SATA connections, so you may not use this.
- O. **External USB Connections** - This is where you will plug in external USB connections for your case, and if you have an included USB bracket.
- P. **CMOS battery** - This is the motherboards battery. This is used to allow the CMOS to keep its settings.